state of california
business & transportation agency
department of transportation
division of structures

Caltrans

NOTE: PROGRAM USES
E_s = 28,000,000 PSI

FRAME SYSTEM

Final Report

June 1975

Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration
CA-DOT-DS-4151-1-75-2

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16. Abstract

This report presents the results of a four-year project to provide bridge designers with a unified structural analysis tool for plane rectangular frames made up of prismatic and/or non-prismatic members. The program developed will calculate and report section, member and frame properties, fixed end moments, distributed moment and shear ordinates, and deflections for each member. Sidesway can be considered in single story frames. The program accepts prestressed cable information and produces cable path ordinates, cable path eccentricities, force coefficients, moment coefficients, shortening fixed end moments, prestress force, concrete strength, prestress moments and stresses, combined moments and stresses, and prestress deflections. Moment and shear plots may be obtained as optional output. Provision for describing railroad loadings or special overload truck loadings for live load analysis is also available with this program. A separate program provides input data retention and editing capabilities for this system.

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Charles Call
Natalie Carlson
Larry Cole
David deRosier
David Littlefield
Patrick McCabe
G. Leslie Miller

The efforts of all contributors are greatly appreciated.

The contents of this report reflect the views of the author who is responsible for the facts and the accuracy of the information presented herein. The contents do not necessarily reflect the official views or policies of the State of California or the Federal Highway Administration. This report does not constitute a standard, specification or regulation.

INTRODUCTION

This project was prompted by a recognition of the opportunities for work improvement in the Division of Structures by means of electronic data processing (EDP). Electronic computer-based problem solving services are an important tool in the bridge design function. These services were developed individually over a period of years, each with characteristics appropriate to the known needs and then available processing facilities. Frame System was conceived as an integrated system that could tie together the frame analysis problems into a single system. This approach would eliminate the need to transfer data between the various services. With the implementation of Frame System, it became apparent that additional features added to the basic system could reduce processing costs, improve turnaround, analyze prestressed frames and provide easier to use input/output features. These modifications to the initial system were thought to be a cost effective solution to plane frame analysis capabilities in view of today's performance requirements and the current state-of-the-art in computer hardware and software.

THE PROJECT

6.1 Organization

The project was organized as a closed system with specific processing goals to be achieved. Work was divided into subtasks and designated as features to be added to the mainline frame analysis system. The features were named:

- Prestressed Frame Analysis
- Input data Retention
- Input/output features
- Railroad Loading
- Live Load Deflections

The original approach for project completion was a single person operation with each feature completed in a sequential fashion. Subsequent personnel turnover problems prompted a new approach to project development. The final approach adopted used multiple analyst/programmers to work on individual features of the program under the direction of a project leader. This approach has provided some benefits to ongoing maintenance efforts but has caused difficulties when integration of features were accomplished. Multiple programmer/analyst provide various points of view to the development process and prevent one person from dominating the final product. Maintenance of the program is expected to be less difficult because less time will be needed to understand system operation.

Progress on this project was reported quarterly to the Federal Highway Administration. Funding was originally estimated at $90,000 and later increased to a total of $135,000. Cost overruns were attributed to three major factors. The factors were identified as:

- Inflation of salaries
- Personnel turnover
- Computer System Changes

Processing equipment available to the project evolved from IBM S/360-65 at the outset, to an S/370-168 at termination. A Calcomp drum plotter and 3270 cathode ray tube remote terminals were available for systems development work.

6.2 Performance

Project performance required a mixture of engineering analysis and EDP technology. Interaction between the eventual users of the system and project developers created a constantly changing environment for the project. The primary steps to achieve the goals of the system were:

- Problem definition
- Evaluation of Alternatives
- Translation to flow charts
- Coding
- Testing
- Documentation
- Implementation

The project performance was adversely affected by turnover of personnel. The original author of the system and his chief assistant programmer left for greener pastures during the first third of the project. Subsequent replacement personnel were trained engineers but required a period of additional training prior to becoming significant contributors to the project. As a result of the turnover problem, a multiple programmer/analyst approach to program development was attempted. Spin off from this technique has been to increase the interaction between members of the development team and to yield an improved product. Improved maintenance capabilities is expected to be a benefit in this approach because checks and balances occur before the program code becomes complex or locked in. Negative factors that distract from program development by this method are perceived to be the following:

- Coordination difficult
- Unproductive discussion time
- Coding errors from two or more sources difficult to diagnose
- Communication difficult

It is felt, overall, that for a large system development project the concept of a programming team approach will yield a good final product.

6.3 Implementation

The original Frame System program was in routine production status at the beginning of this project. Each feature of the project was programmed and tested by the programmer/ analyst prior to a trial implementation period. The trial period involved the selection of EDP oriented bridge designers to be initial users of the feature to be implemented. Checking of the newly created feature was accomplished in a quasi-production environment so that the systems operation could be monitored in its final configuration. Parallel operation of the existing program allowed comparisons of output values and system performance. User participation in system implementation was instrumental in removing many unforeseen program bugs that were not uncovered in the program testing period. Implementation in the production environment followed the user test period with a simultaneous removal of the previous program modules. Modules removed from the production libraries were not destroyed for approximately three months in order to provide backup protection. Implementation of new features ultimately results in a reevaluation of the product itself. For this system new improvements have been suggested by developments in bridge design, bridge maintenance, and computer software and hardware capabilities.

6.4 Benefits

Frame System benefits the bridge design function in several ways. First the lengthy, repetitive type calculations for a bridge structure are reduced to an easier description of the physical constraints of the design problem. Analysis of the loads and load combinations are automatically generated with the resulting output usable in the next step of the design procedure. Second, the previous time constraint for analysis of bridge designs is improved. The resulting additional time in the design process allows the exploration of many structural alternatives as opposed to the previous method of selecting one design and completing it within the time constraint. Aesthetics of bridge structures are also improved due to the ease of analysis of structures with varying shapes. Previous hand analysis techniques were designed to be used with bridges whose superstructure and substructure members were of constant dimensions throughout the length of the member. The addition of nonprismatic members added significantly to the rigors of manual analysis calculations with a resultant lack of commitment by designers to a complex design for the benefit of aesthetics. The computer program provides an alternative to manual analysis that encourages the considerations of aesthetics.

In addition to the benefits derived from providing a service for design, the system was modified to incorporate cost savings in computer processing. The existing system operated in what is known as a "batch environment." This technique consisted of a cycle of input forms, keypunching, machine processing and printed output. The usual outcome of one cycle of operation was an error in input data. The error condition was then identified, corrected and resubmitted for machine processing. A substantial amount of the reprocessing costs involved the rekeypunching of data that had no errors with the resultant increased probability of new errors developing in previously correct data. Analysis of operation costs also indicated that a substantial amount of the cost of operations was due to keypunch charges. The system solution to this problem consisted of two ideas. The primary system objective was to reduce the keypunch effort for problem data that was correct. The secondary objective was to reduce the time from input submission to receipt of printed output.

To achieve the first objective a preprocessing program was designed to store data in computer readable form regardless of the correctness of the data. Subsequent processing determined if the data could be processed and provided the necessary information for correction if errors were encountered. The second submittal of data was then processed on an exception basis in that only the data in error was repunched. The resultant benefit was a drastic reduction in keypunch costs.

Time delay in processing was also attributable to system float time that occurred during the processing cycle. An attempt to shorten the path was inserted into the system to provide a parallel processing path. The additional path removed the need for keypunching by placing the engineer in direct contact with the computer via a computer terminal with a video display. Correction data, if the volume was small, was keyed directly to computer storage and resubmission initiated from the terminal.

DESCRIPTION OF PROGRAM

7.1 Nature of Program

Frame System was designed to provide orthogonal plane frame analysis capability for prismatic or nonprismatic bridge frames with or without intermediate hinges. The main purpose of the system is to provide a low cost frame analysis program for a majority of the bridges designed in California. The program uses the method of integration to produce member properties and fixed end moments. Distributed end moments are produced using the Hardy-Cross method of moment distribution. This analysis method has proven to be sufficient for a majority of the framed structures designed in California. This method of analysis as implemented in Frame System has limitations with respect to the following factors:

- Curvature
- Torsion
- Axial deformations
- Shear deformations
- Skew
- Transverse distribution
- Partial fixity of supports
- Sloping members

Structural frames with the above constraints will require other analysis techniques. Programs such as "The Structural Design Language," known by the acronym STRUDL, developed at the M.I.T. Civil Engineering Systems Laboratory, may be used when the bridge designer has determined that the limitations of Frame System have been exceeded.

To provide a low cost alternative to the large multipurpose programs such as STRUDL required features to both minimize processing costs and features to minimize user costs. Program optimization was accomplished using the H level IBM FORTRAN IV compiler for efficient core usage and loop structure in machine language. Processing costs were reduced with respect to resubmittals by providing a data update facility within the system. Resubmittal costs are reduced because the volume of keyed data is significantly reduced using the update capability. Only those records with changes need be keyed for subsequent submittals of Frame System. Keying of input data records was determined to be the major source of generated costs from computer operations in our environment.

Minimization of costs from the user point of view involves ease of input submittal and interpretation of results. Input submittal is performed with preprinted input forms with descriptive column headings to guide the users input preparation. Where input values are repetitive or standard shapes are involved, provision is made to either recall previously coded input data or use standard shapes stored in the program. Variations of the standard member shapes can be accomplished by adding or subtracting parts at a cross section. For live loading input effort is limited to a description of the number of lanes of the standard AASHTO truck to be applied to the structure.

Output results are arranged in a logical order. The philosophy adopted for frame system was an automatic print of the input values followed by the results calculated by the program. Program output formats were designed to fit into the subsequent design steps. For example a summary sheet provides moments and axial load results for the controlling conditions in column design.

7.2 Coordinate System and Sign Convention

The coordinate system used by Frame System is two dimensional with the X and Y axis arranged in the usual order encountered in structural engineering (see Fig. 1).

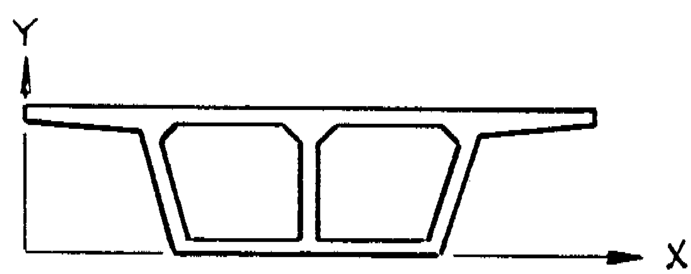


Fig. 1

The axis of bending for the cross section is considered to be located at the center of gravity of the section and parallel to the X axis. For a vertical member, the axis system is rotated ninety degrees so that the X and Y axis are parallel to the cross section plane of the column (see Fig. 2).

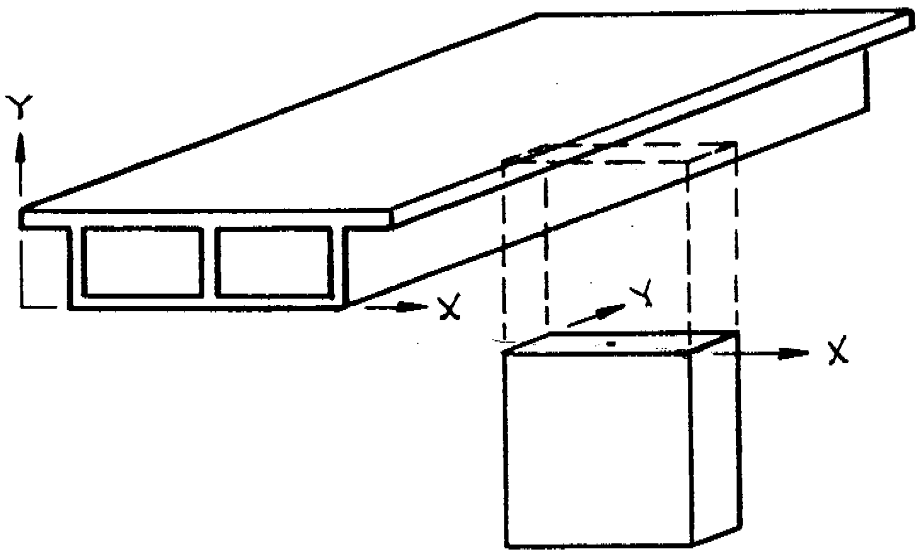


Fig. 2

The sign convention for Frame System is beam convention. For example, a positive moment reported on output for a horizontal member indicates the member has positive curvature at that point. Text books often mention that positive curvature is the shape a horizontal member would assume to hold water (see Fig. 3).

i.e.

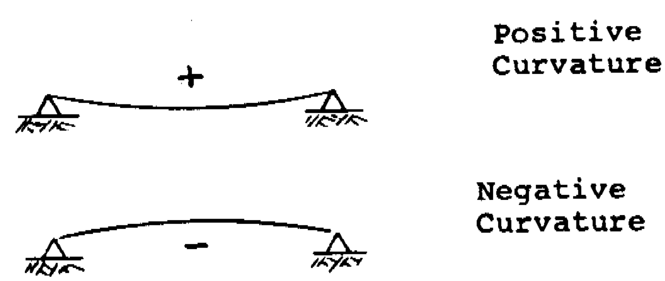


Fig. 3

For vertical members a positive moment would indicate the member is bending with positive curvature viewed with the bottom as the left end of the member (see Fig. 4).

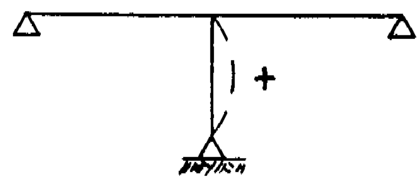


Fig. 4

Deflections and rotations are measured from the unloaded position of the frame. Clockwise rotations are positive and downward deflections are positive. For vertical members a positive deflection indicates the member has deflected to the right.

7.3 Analysis Assumptions

The Hardy-Cross analysis technique considers the frame members to be linearly elastic. Analysis of bending and shear by the method implies knowledge from three sources. First and foremost are the laws of Statics. Second are the facts of geometry which relate how the structure is connected. Third, the properties of materials is involved in the problem with Hooke's law assumed and moduli of elasticity of the component parts of a structure known. The final moments are obtained by successive numerical approximations. The method in general involves the calculation of moments at the ends of all beams in a frame under certain artificial conditions of restraint, then a redistribution of unbalanced moments by arithmetical proportion when the artificial restraints are removed. For Frame System the balancing procedure is performed five times for structures with distribution factors on all members within the range $.1 \leq x \leq .9$. For all other distribution factors not within the above limitations, ten cycles of moment distribution are performed. For frames that require sidesway correction a one inch horizontal deflection is introduced and the resulting moments distributed throughout the frame. If a loading condition is specified to be sideswayed, the base shear equations are solved to obtain the required amount of sidesway moments needed to adjust the distributed moments.

The method of moment distribution has been considered the major method of moment and shear calculation in California bridge design for many years with adequate results obtained from this method. Methods to account for the affects of axial deformation and shear deformation have existed for many years. It is felt by this author that frame system should be modified to utilize these additional analysis techniques to optionally consider the additional deformations that physically occur in a bridge structure.

8. Summary

The project to modify Frame System has produced a computer program that provides for the analysis of a significant portion of the bridges designed for the California Department of Transportation. The features implemented have reduced significantly the computational load for the bridge designer. The prestress, and update features of the project have contributed to the design effort and will most likely provide for more economical bridge designs. The Railroad Loading feature of the project was implemented as Live Load Generator option to the program. This feature was thought to be a solution for railroad multi-axle loadings. Upon reflection of the capability as implemented, it has been found that the system is inadequate for AREA loadings and partially adequate for loadings such as BART trains. The major use has been in the area of special overload permit vehicle analysis. When the Department becomes involved in mass transit design work or extensive railroad bridge design it will become necessary to rework this area of the program. The Live Load deflection feature was determined not necessary at the present time. As a result the live load deflection may be obtained from the existing program by simulating the critical Live Load situation with a loading trial.

APPENDIX A

FRAME SYSTEM UPDATE
(BDEØ38)

PROGRAM DOCUMENTATION

CONTENTS

FRAME SYSTEM UPDATE

The purpose of the Frame System Update program is to provide a means of storing Frame System input data in a readily accessible file for periods of 30 days or more. The user may then add, modify, or delete information from the stored file and rerun his problem. He may also skip certain load trials for a run, and then, on a subsequent run, select them again.

All of the above features are made available via line number, a special code on the input forms, and the BRIDGE JOB CONTROL FORM.

CREATING A NEW FILE

New files may be created only by using the BRIDGE JOB CONTROL FORM (FORM H BD D 147) and a full set of Frame System input date for a problem. If no cover sheet is used the problem will be processed under normal Frame System batch processing with no file stored.

The following is an example of the BRIDGE JOB CONTROL FORM that must be used to store a data file for Frame System Update

BRIDGE JOB CONTROL BDEJCL

PROGRAM NAME	PRIORITY	SOURCE DIST	SOURCE UNIT	CHARGE DIST	CHARGE UNIT	EXPEND AUTH	SPECIAL DESIGNATION (USE WHEN APPLICABLE)	IDENT DIST	IDENT GROUP	IDENT BATCH	PROB	FILE STATUS	FILE ADDRESS	RETPD	PARM	CORE REGION	TIME	COMMENTS (NAME)	S C NO
																			7275

USER INSTRUCTIONS

THIS FORM MUST BE USED FOR THE FOLLOWING BRIDGE DEPARTMENT COMPUTER APPLICATIONS.

FRAME SYSTEM UPDATE
BRIDGE DECK GEOMETRICS
ICES BRIDGE STRUDL
ICES BRIDGE COGO
ICES BRIDGE LIST
TIME SHEET SUMMARY
MAN HOUR SUMMARY

EXAMPLES OF EACH OF THE ABOVE APPLICATIONS ARE AVAILABLE ON SEPARATE SHEETS.

KEY PUNCH INSTRUCTIONS

USE BLUE CARD PUNCH AS SHOWN (RIGHT CC) USE PRINTER PUNCH.
PUNCH DATA CARDS AND PLACE BEHIND BLUE CARD.

PROCESSING INSTRUCTIONS

JOB NAME **BDEJCL** PLACE BLUE CARD AND DATA BEHIND 'JCL' CARDS.
MANY DECKS, BLUE CARD & DATA, MAY BE SUBMITTED TOGETHER.

INPUT **CARDS**
OUTPUT **PRINTER** (SYSOUT = D)

ALPHABETIC BATCH IDENTIFICATION

A	0-4	K	50-54
B	5-9	L	55-59
C	10-14	N	60-64
D	15-19	O	65-69
E	20-24	P	70-74
F	25-29	Q	75-79
G	30-34	R	80-84
H	35-39	S	85-89
I	40-44	T	90-94
J	45-49	U	95-99

BRIDGE CLERK

RETURN INPUT CARDS AND OUTPUT TO SUBMITTER ________ EXT ______ DATE ________

DH OS D147 (Rev. 10-73)

The BRIDGE JOB CONTROL FORM must be filled out in the following manner for Frame System Update. Under program name, write FRAM. Start the word in Column 1. Under priority, place a number from ØØ to Ø7 or 11. For applications where overnight turnaround is acceptable use a priority ØØ.

Fill in appropriate cost information under source, charge, expenditure authorization and special designation, if applicable. Fill in District, Group, Batch and Problem Number. The parameters 'RETPD','CORE', and 'TIME', are not used in this application and can be ignored and left blank.

'FILE STATUS' refers to the condition of the file. If it is a new file write the word 'NEW' in the space provided. If the file already exists and some manipulation of the data is to take place write the world 'OLD' under file status. If the file is to be deleted write the word 'DEL' under file status. No additional forms are required to delete a file. If the file is of no further use, please delete the file as space in the storage facilities is limited.

The file address is a six digit name composed of alpha and numeric characters. The file name must be left adjusted and must not contain any blanks. Each job must have a unique name so it would be to the users advantage to use your 'DIST-GROUP-BATCH-PROBLEM NO' identification (i.e., 14T1Ø1).

The 'PARM' parameter must be either 1, 2 or left blank. Instructions for the different parm parameters are given in the table below.

PARM PARAMETER ON JOB CONTROL FORM

LIST/RUN CODE	FILE STATUS	UPDATE DATA ATTACHED	NO UPDATE DATA
Blank	New	File will be created and run	
	Old	File will be updated and run	Old File will be run
1	New	File will be created	
	Old	File will be updated, and listed	Old File will be listed
2	New	File will be created and run	
	Old	File will be updated listed and run	Old fill will be listed and run

The following is an example of a completed BRIDGE JOB CONTROL FORM for storing a file for Frame System.

BRIDGE JOB CONTROL BDEJCL

PROGRAM NAME	PRIORITY	SOURCE DIST	SOURCE UNIT	CHARGE DIST	CHARGE UNIT	EXPEND AUTH	SPECIAL DESIGNATION (USE WHEN APPLICABLE)	IDENT DIST	IDENT GROUP	IDENT BATCH	PROB	FILE STATUS	FILE ADDRESS	RETPD	PARM	CORE REGION	TIME	COMMENTS (NAME)	S C NO
FRPM	00	14	053	14	033	910002		1H	T	10	01	OLD	1HT166					MC CABE	7275

USER INSTRUCTIONS

THIS FORM MUST BE USED FOR THE FOLLOWING BRIDGE DEPARTMENT COMPUTER APPLICATIONS.

- FRAME SYSTEM UPDATE
- BRIDGE DECK GEOMETRICS
- ICES BRIDGE STRUDL
- ICES BRIDGE COGO
- ICES BRIDGE LIST
- TIME SHEET SUMMARY
- MAN HOUR SUMMARY

EXAMPLES OF EACH OF THE ABOVE APPLICATIONS ARE AVAILABLE ON SEPARATE SHEETS.

ALPHABETIC BATCH IDENTIFICATION

A	0-4	K	50-54
B	5-9	L	55-59
C	10-14	N	60-64
D	15-19	O	65-69
E	20-24	P	70-74
F	25-29	Q	75-79
G	30-34	R	80-84
H	35-39	S	85-89
I	40-44	T	90-94
J	45-49	U	95-99

KEY PUNCH INSTRUCTIONS

USE BLUE CARD PUNCH AS SHOWN (RIGHT CC) USE PRINTER PUNCH.
PUNCH DATA CARDS AND PLACE BEHIND BLUE CARD.

PROCESSING INSTRUCTIONS

JOB NAME **BDEJCL** PLACE BLUE CARD AND DATA BEHIND 'JCL' CARDS.
MANY DECKS, BLUE CARD & DATA, MAY BE SUBMITTED TOGETHER.

INPUT: **CARDS**
OUTPUT: **PRINTER** (SYSOUT = D)

BRIDGE CLERK

RETURN INPUT CARDS AND OUTPUT TO SUBMITTER ____________ EXT. ________ DATE __________

DH OS D147 (Rev. 10-73)

Each problem submitted must be a separate and distinct problem. Do not submit multiple problems with one BRIDGE JOB CONTROL FORM. Each job must have one BRIDGE JOB CONTROL FORM followed by the Frame System Forms. If you wish to store two problems you must submit each problem separately with its own BRIDGE JOB CONTROL FORM and file address. The next version of the program will allow for multiple problems in a single file. This new version will be released about February 1, 1[illegible]

UPDATE

All existing input sheets for Frame System have t[illegible] columns added to the left of the data section[illegible] the CODE column and LINE No. column.

Update	
CODE	Line No.

Both of these columns should be left blank when creating a new file, but are used when updating an old file.

LINE NO.

When creating a new file (FILE STATUS is NEW), the line numbers are automatically assigned by the program and are printed on the Frame System Update output.

When updating an existing file (FILE STATUS is OLD) the Line No. of the new or modified record must always be included. If the Line No. of the new record is not found in the file it will be inserted in the file. If the Line No. exists in the file the program will replace the entire old line of data with the new line.

CODE

This column can either be left blank or filled with a code letter of D, R, or S.

If the Code is left blank, the line of data will be inserted in the file, or replace the existing line of data in the file.

If D is used, the Line No. given will be searched for in the existing file and, if found, will be deleted from the file. If not found, an error message will be output to the user.

If S is used, the Line No. given will be skipped by the program on all future runs.

To reuse the skipped record, place an R in the Code column and provide the Line No. of the record. It will then be used in all future runs of the file.

Each time a new record is read or acted on by Frame System Update it will print a message of the action taken on that record. Either it was modified, added, or deleted from the data set. Also it will tell if the record will be skipped or returned to the job stream of the Frame System Program.

The List program will give a formatted list of all the records stored in the data set. It will also list if a record was to be skipped or returned to the job stream on the current run of 'Frame System'.

A number of examples follow that will illustrate the various features of the program.

1) Insert or modify Line No. 0025.

Update: CODE	Update: Line No.	Member No.	End Joint No. Lt.	End Joint No. Rt.	End Condition lt.	End Condition rt.	Direction	Length ft.
	25	2	2	3			H	750

The entire line will be replaced so all data must be entered.

2) Delete record 0040.

Update: CODE	Update: Line No.	Member No.	End Joint No. Lt.	End Joint No. Rt.	End Condition lt.	End Condition rt.	Direction	Length ft.
D	40							

3) Skip record 0050

Update: CODE	Update: Line No.	Member No.	End Joint No. Lt.	End Joint No. Rt.	End Condition lt.	End Condition rt.	Direction	Length ft.
S	50							

4) Return record 0060 to problem job stream.

Update CODE	Update Line No.	Member No.	End Joint No. Lt.	End Joint No. Rt.	End Condition lt.	End Condition rt.	Direction	Length ft.
R	6∅							

The following is an example of input and output for Frame System Update.

Figures 1 and 2 are the input forms that created the file. Figure 3 is the output from the program showing line numbers and formats.

BRIDGE JOB CONTROL BDEJCL

PROGRAM NAME	PRIORITY	SOURCE DIST	SOURCE UNIT	CHARGE DIST	CHARGE UNIT	EXPEND AUTH	SPECIAL DESIGNATION (USE WHEN APPLICABLE)	IDENT DIST	IDENT GROUP	IDENT BATCH	PROB	FILE STATUS	FILE ADDRESS	RETPD	PARM	CORE REGION	TIME	COMMENTS (NAME)	S C NO
FRAM	00	14	033	14	033	910002		14	T	1001		OLD	14FL64					McCABE	7275

USER INSTRUCTIONS
THIS FORM MUST BE USED FOR THE FOLLOWING BRIDGE DEPARTMENT COMPUTER APPLICATIONS.

- FRAME SYSTEM UPDATE
- BRIDGE DECK GEOMETRICS
- ICES BRIDGE STRUDL
- ICES BRIDGE COGO
- ICES BRIDGE LIST
- TIME SHEET SUMMARY
- MAN HOUR SUMMARY

EXAMPLES OF EACH OF THE ABOVE APPLICATIONS ARE AVAILABLE ON SEPARATE SHEETS

KEY PUNCH INSTRUCTIONS
USE BLUE CARD PUNCH AS SHOWN (RIGHT CC) USE PRINTER PUNCH
PUNCH DATA CARDS AND PLACE BEHIND BLUE CARD.

PROCESSING INSTRUCTIONS

JOB NAME **BDEJCL** PLACE BLUE CARD AND DATA BEHIND 'JCL' CARDS.
MANY DECKS, BLUE CARD & DATA, MAY BE SUBMITTED TOGETHER.

INPUT **CARDS**
OUTPUT **PRINTER** (SYSOUT = D)

BRIDGE CLERK
RETURN INPUT CARDS AND OUTPUT TO SUBMITTER *P. McCabe* EXT *6519* DATE *10-1-73*

ALPHABETIC BATCH IDENTIFICATION

A	0-4	K	50-54
B	5-9	L	55-59
C	10-14	N	60-64
D	15-19	O	65-69
E	20-24	P	70-74
F	25-29	Q	75-79
G	30-34	R	80-84
H	35-39	S	85-89
I	40-44	T	90-94
J	45-49	U	95-99

DH OS D147 (Rev. 10-73)

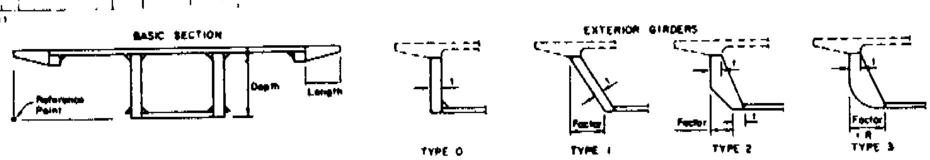
Figure 1

FRAME SYSTEM
Superstructure Sections BDE0AA

Page *1* of *1*
Name *McCABE*
Phone *5-6519*

IDENT (DIST GROUP BATCH PROB): *14T 1001*
SOURCE / CHARGE / EXPENDITURE AUTHORIZATION: *14033 14033 910002*

LINE NO	MEMBER NO	CROSS SECTION LOCATION (FT)	REF PT COORD X (FT)	Y (FT)	SS DATA WIDTH ED-ED (FT)	DEPTH (FT)	SLAB DATA TOP THICK (IN)	BOTTOM THICK (IN)	INT GIRDERS / EXTERIOR GIRDERS / OVERHANGS	STORE
	1	00.	00	00	340	325	725	700	312112150112150307113 0711	
	1	200.	↓	↓	370	↓			↓	
	1	500.			450					01
	2	00D1								
	2	500.	00	00	450	350	750	725	412112150112150307113 0711	
	2	1000.	↓	↓	500				↓	



Form H-80 D112 (REV 6/73)

Figure 2

IDENT 14T 1001   FRAME SYSTEM UPDATE   OCT. 01, 1973   PAGE 1

SUPERSTRUCTURE SECTIONS

LINE NO.	MEM NO	X-SEC LOCAT	RE	REF. PT. COORD. X	Y	S.S. DATA WIDTH	DEPTH	SLAB DATA TOP	BOT	INT. GRDRS NO	WB	EXTERIOR GIRDERS LEFT T	WB	FACT	RIGHT T	WB	FACT	OVERHANGS LEFT LEN	EX	IN	RIGHT LEN	EX	IN	ST
ADDED																								
0010	1	0.0		0.0	0.0	34.0	3.25	7.25	7.00	3	12	1	12	1.50	1	12	1.50	3.6	7	11	3.0	7	11	
ADDED																								
0020	1	20.0		0.0	0.0	37.0	3.25	7.25	7.00	3	12	1	12	1.50	1	12	1.50	3.0	7	11	3.0	7	11	
ADDED																								
0030	1	50.0		0.0	0.0	45.0	3.25	7.25	7.00	3	12	1	12	1.50	1	12	1.50	3.0	7	11	3.0	7	11	01
ADDED																								
0040	2	0.0	01	0.0	0.0	0.0	0.0	0.0	0.0	0	0		0	0.0		0	0.0	0.0	0	0	0.0	0	0	
ADDED																								
0050	2	50.0		0.0	0.0	45.0	3.50	7.50	7.25	4	12	1	12	1.50	1	12	1.50	3.0	7	11	3.0	7	11	
ADDED																								
0060	2	100.0		0.0	0.0	50.0	3.50	7.50	7.25	4	12	1	12	1.50	1	12	1.50	3.0	7	11	3.0	7	11	

THE NEW FILE WITH IDENTIFICATION ROA.FRAM.BD14T166   WILL EXPIRE ON

WEDNESDAY   OCTOBER 31, 1973

BATCH CHARGE UNITS=   7   APPROXIMATE MACHINE TIME 4.20 SECS   APPROXIMATE MACHINE CHARGE $ 0.84

Figure 3

Figure 4 is the input form showing the corrections that are to be made to the file.

Figure 5 is the output showing the changes that were made to the file.

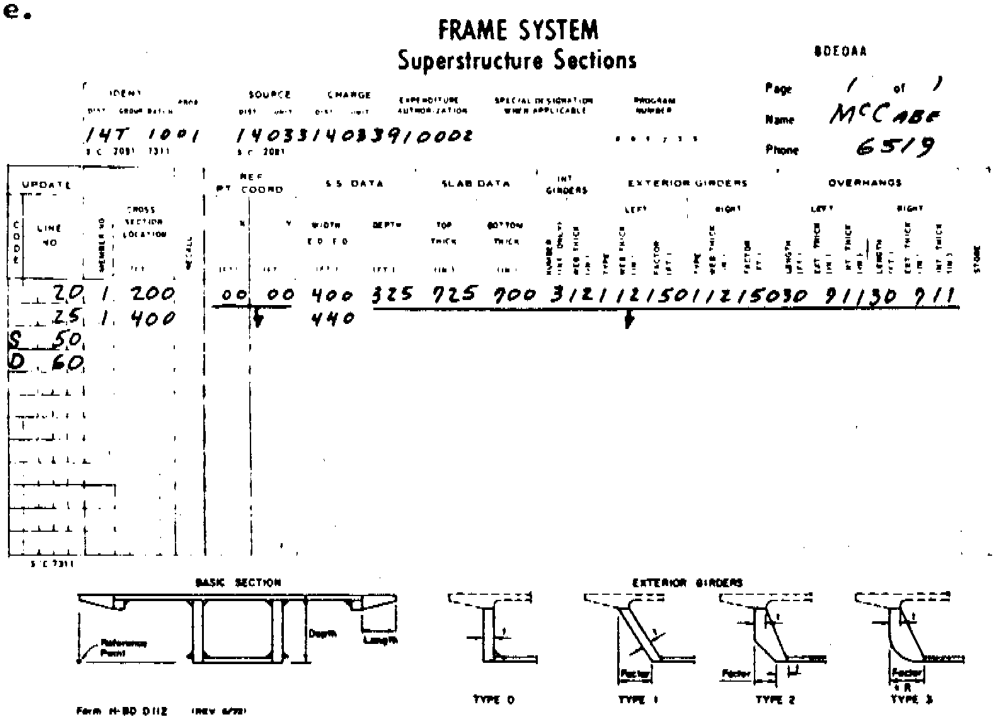


Figure 4

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SUPERSTRUCTURE SECTIONS

LINE NO.	MEM NO	X-SEC LOCAT	RF	REF. PT. COORD. X	Y	S.S. DATA WIDTH	DEPTH	SLAB DATA TOP	BOT	INT. GRDRS NO	WB	EXTERIOR GIRDERS LEFT T	WB	FACT	RIGHT T	WB	FACT	OVERHANGS LEFT LEN	EX	IN	RIGHT LEN	EX	IN	ST
MODIFIED																								
0020	1	20.0		0.0	0.0	40.0	3.25	7.25	7.00	3	12	1	12	1.50	1	12	1.50	3.0	7	11	3.0	7	11	
ADDED																								
0025	1	40.0		0.0	0.0	44.0	3.25	7.25	7.00	3	12	1	12	1.50	1	12	1.50	3.0	7	11	3.0	7	11	
SKIPPED																								
0050	2	50.0		0.0	0.0	45.0	3.50	7.50	7.25	4	12	1	12	1.50	1	12	1.50	3.0	7	11	3.0	7	11	
DELETED																								
0060	2	100.0		0.0	0.0	50.0	3.50	7.50	7.25	4	12	1	12	1.50	1	12	1.50	3.0	7	11	3.0	7	11	

Figure 5

Figures 6 and 7 are formatted lists of all the records in the file after updating.

```
IDENT  14T 10 01          FRAME SYSTEM LIST              OCTOBER   02, 1973            PAGE    1

SUPERSTRUCTURE SECTION PROPERTIES

C LINE MEM   LOC  RECALL       X      Y      SUPERS TRUCTURE     SLAB THICKNESS   INT. GIRDER      STORE
O                                              WIDTH    DEPTH       TOP  BOTTOM     NO.  WEB
   10  1    0.0              0.0    0.0       34.0     3.25       7.25    7.00      3    12.            0

                      LT. EXT. GIRDER     RT EXT. GIRDER     LT. OVERHANG        RT. OVERHANG
                      TYPE  WEB  FACTOR   TYPE  WEB  FACTOR  LENGTH  EXT.  INT.  LENGTH  EXT.  INT.
                       1    12.    1.50    1    12.   1.50    3.0     7.   11.    3.0     7.   11.

C LINE MEM   LOC  RECALL       X      Y      SUPERS TRUCTURE     SLAB THICKNESS   INT. GIRDER      STORE
O                                              WIDTH    DEPTH       TOP  BOTTOM     NO.  WEB
   20  1   20.0              0.0    0.0       40.0     3.25       7.25    7.00      3    12.            0

                      LT. EXT. GIRDER     RT EXT. GIRDER     LT. OVERHANG        RT. OVERHANG
                      TYPE  WEB  FACTOR   TYPE  WEB  FACTOR  LENGTH  EXT.  INT.  LENGTH  EXT.  INT.
                       1    12.    1.50    1    12.   1.50    3.0     7.   11.    3.0     7.   11.

C LINE MEM   LOC  RECALL       X      Y      SUPERS TRUCTURE     SLAB THICKNESS   INT. GIRDER      STORE
O                                              WIDTH    DEPTH       TOP  BOTTOM     NO.  WEB
   25  1   40.0              0.0    0.0       44.0     3.25       7.25    7.00      3    12.            0

                      LT. EXT. GIRDER     RT EXT. GIRDER     LT. OVERHANG        RT. OVERHANG
                      TYPE  WEB  FACTOR   TYPE  WEB  FACTOR  LENGTH  EXT.  INT.  LENGTH  EXT.  INT.
                       1    12.    1.50    1    12.   1.50    3.0     7.   11.    3.0     7.   11.

C LINE MEM   LOC  RECALL       X      Y      SUPERS TRUCTURE     SLAB THICKNESS   INT. GIRDER      STORE
O                                              WIDTH    DEPTH       TOP  BOTTOM     NO.  WEB
   30  1   50.0              0.0    0.0       45.0     3.25       7.25    7.00      3    12.            1

                      LT. EXT. GIRDER     RT EXT. GIRDER     LT. OVERHANG        RT. OVERHANG
                      TYPE  WEB  FACTOR   TYPE  WEB  FACTOR  LENGTH  EXT.  INT.  LENGTH  EXT.  INT.
                       1    12.    1.50    1    12.   1.50    3.0     7.   11.    3.0     7.   11.
```

Figure 6

```
IDENT  14T 10 01          FRAME SYSTEM LIST              OCTOBER   02, 1973            PAGE    2

SUPERSTRUCTURE SECTION PROPERTIES

C LINE MEM   LOC  RECALL       X      Y      SUPERS TRUCTURE     SLAB THICKNESS   INT. GIRDER      STORE
O                                              WIDTH    DEPTH       TOP  BOTTOM     NO.  WEB
   40  2    0.0   01         0.0    0.0        0.0     0.0        0.0     0.0       0    0.             0

                      LT. EXT. GIRDER     RT EXT. GIRDER     LT. OVERHANG        RT. OVERHANG
                      TYPE  WEB  FACTOR   TYPE  WEB  FACTOR  LENGTH  EXT.  INT.  LENGTH  EXT.  INT.
                       0    0.     0.0     0    0.    0.0     0.0     0.    0.    0.0     0.    0.

C LINE MEM   LOC  RECALL       X      Y      SUPERS TRUCTURE     SLAB THICKNESS   INT. GIRDER      STORE
O                                              WIDTH    DEPTH       TOP  BOTTOM     NO.  WEB
S  50  2   50.0              0.0    0.0       45.0     3.50       7.50    7.25      4    12.            0

                      LT. EXT. GIRDER     RT EXT. GIRDER     LT. OVERHANG        RT. OVERHANG
                      TYPE  WEB  FACTOR   TYPE  WEB  FACTOR  LENGTH  EXT.  INT.  LENGTH  EXT.  INT.
                       1    12.    1.50    1    12.   1.50    3.0     7.   11.    3.0     7.   11.

                COST DISTRIBUTION
SOURCE  CHARGE  EXP. AUTHOR.  SPECIAL DESIGNATION
14033   14033    910002
```

Figure 7

SYSTEM DOCUMENTATION

A complete package of system documentation may be obtained for the Frame System Update program by sending a request and a 9-track magnetic tape to:

California Department of Transportation
Division of Structures
Bridge Computer Services
Box 1499
Sacramento, California 95807

APPENDIX B

FRAME SYSTEM
(BDEØ35)

PROGRAM DOCUMENTATION

VERSION 6.1 MOD Ø

CONTENTS

DEPARTMENT OF TRANSPORTATION
OFFICE OF STRUCTURES
COMPUTER SERVICE

FRAME SYSTEM

INSTRUCTIONS FOR USERS

This service is a general plane frame analysis and design program with a large degree of flexibility and several specialized input features. The following list is a summary of some of the program's capabilities:

1. The frame members may be prismatic or non-prismatic.
2. Intermediate member hinges and cantilevers are accommodated.
3. Sidesway may be included.
4. Members must be orthogonal - girders are horizontal and columns are vertical.
5. Reduction of the negative moment due to support width may be obtained.
6. Moment and Shear diagrams can be produced in plotted form.
7. Loads may be given as applied forces or as fixed-end-moments.
8. Live Loads for a standard HS truck or any 3-axle load will be automatically generated.
9. Influence lines may be generated, and plots produced.
10. Live Loads for a 13-axle truck may be automatically generated.
11. Bent live loading may be generated. (Future release)
12. The frame can be designed or analyzed for prestress from a given cable path.

Since this program is for plane frames only, the user must be aware of the limitations of the analysis method. Factors such as curvature, torsion, axial and shear deformations, skew, transverse distribution, and partial fixity are not considered in the program. Considerable judgement is required in deciding if a structure such as a skewed, curved box girder bridge with intermediate diaphragms should be analyzed as a plane frame. For this type of structure, programs such as STRUDL, CELL, CURVBRG, MUPDI or FINPLA may be better.

DATA PREPARATION

Data may be given directly from input forms, or via an existing input file. To create or modify a file for a frame system problem see the user instructions titled "Frame System Update."

The following input forms may be used to define a problem:

FRAME DESCRIPTION describes the frame. By itself, this data would produce a dead load analysis.

SUPERSTRUCTURE SECTIONS describes cross-section geometry. By itself this form will produce section properties. This data is normally used to supplement the frame description data. The section described by this form may be modified by submitting Section Properties by Parts with the same member no. and cross-section location.

SECTION PROPERTIES BY PARTS describes a section of a prismatic member or multiple sections of a non-prismatic member. By itself this form will produce section properties. This data is normally used to supplement the frame description data or the superstructures sections data.

LOAD DATA describes the loading conditions applied to the frame. It can only be used as a supplement to the frame description.

SUPERSTRUCTURE LIVE LOAD describes the live load condition to be applied to the frame. A multiple of the standard HS20-16 truck or a user designed 3-axle truck may be specified as the live load.

LIVE LOAD GENERATOR describes the multi-axle live load to be applied to the frame. Variations of the axle load and spacing may be obtained, or the program will default to a standard P-13 truck.

PRESTRESSED DATA describes the prestressing cable paths to be incorporated in the frame to resist the input loads.

COMMON INPUT

IDENT and accounting data are standard. See General Instructions 1-1. Problem may be any number, but it must be the same number for all data pertaining to the problem.

IDENT.				SOURCE		CHARGE		EXPENDITURE AUTHORIZATION	SPECIAL DESIGNATION WHEN APPLICABLE
DIST.	GR.	BATCH	PROB.	DIST	UNIT	DIST	UNIT		

s/c 2091, 7310 s/c 2091

UPDATE CODE AND LIVE NO. are input required by the "Frame System Update" program. This information is not needed by the Frame System program.

FRAME DESCRIPTION

Member No. must start with 1 and increase consecutively. Horizontal members must be numbered first. Up to 50 members may be analyzed for dead load. If the live load input form is used only 25 horizontal members are allowed. If prestress data is used only 15 horizontal members are allowed.

Update		Member No.	End Joint No.		End Condition		Direction	Length	Min. I	Hinge Location or Support Width	E
CODE	Line No.		Lt.	Rt.	lt.	rt.		ft.	ft^4	ft	ksi

Dead Load		Member Properties				Recall		D.L.	
Uniform	Unit Wt.	-K- Stiffness Factor		-C- Carry Over Factor		Member	Reverse	Deflections	Sidesway
k/ft.	pcf	Lt.	Rt.	Lt.	Rt.		R	D	S

END JOINT NUMBERS define the structural topology or connectivity. Each member is connected to two of the joints in the structure. For vertical members, the left end is assumed to be the bottom and the right end is assumed to be the top. Joints must be numbered consecutively starting with 1. Up to nine members may meet at one joint except if Live Load data or Prestressed Data are included. Then only three members may meet at one joint.

END CONDITIONS describe the degree of freedom of the member at the joint.

C = Cantilevered (unsupported)

P = Pinned (Moment is released. Horizontal and vertical forces are continuous.)

R = Roller (Moment and Horizontal force is released.)

Please note that vertical forces, including uplift, can be transmitted thru both a pin and a roller. A roller at the end of a vertical member causes the member to act as a cantilever. (See Sidesway Restrictions). If no entry is made, the end condition is assumed to be fixed.

DIRECTION is assumed to be vertical unless a "G" or "H" is entered to indicate a girder or horizontal member.

LENGTH is the span length of the member from centerline of support to centerline of support.

MIN. I is the minimum moment of inertia. If the moment of inertia is entered here, then certain output features are not provided. If this entry is left blank, the required section properties must be provided by the "Superstructure Section" or "Section Properties by Parts" input forms.

HINGE LOCATIONS OR SUPPORT WIDTH define the hinge location or support width, depending on the entry in the "Direction" field. If a "G" or "H" is entered for direction, then a hinge location is defined, otherwise, a support width is defined. Hinge location is given as the distance in feet from the left support to the hinge centerline. The support is usually the bent cap width in feet or the column width in feet. This information is needed to obtain the moment reduction.

E, the modulus of elasticity, may be input or the user may accept the built-in defaults. Once an entry is made, E remains constant for all subsequent members until another entry is made. If no value is given, E defaults to two values. An E of 750 KSI is used for stiffness, deflections, and prestress elastic shortening calculations. An E of 3000 KSI is used for sidesway calculations.

DEAD LOAD can be applied to the input frame by two methods.

UNIFORM describes a uniform load in kips/foot.

UNIT WT. describes the weight of the material to be used in calculating dead load. To use unit weight, the member must be described with Section Properties input. If no unit weight is given a value of zero is used. A separate value is required for each member described. Both a uniform load and a unit weight may be applied simultaneously. Dead loads applied to vertical members are assumed to act parallel to the longitudinal axis of the member. Supplemental loads may be added to the dead load analysis by giving "Load Data" with the trial no. 00. Supplemental loads such as barrier railings, sidewalks, and wearing surfaces may be applied as "Added Dead Load" by submitting "Load Data" input with the trial no. 01.

STIFFNESS AND CARRY OVER factors have to be given only when the member is non-prismatic and has not been defined by section properties input data. The factors may be given adjusted for pinned end conditions, if desired. The drawback of giving stiffness and carry over factors is that fixed end moments must be given for any loads applied to these members. Also, deflections cannot be calculated for these members.

MEMBER RECALL is available for members which have identical properties. These properties include Length, I, end condition, area, unit weight, and dead load. The only data required for the repetitive member is the member number, the end joint numbers, and the member number from which the data is to be obtained. If the member is to be flipped end for end enter "R" in the REVERSE column. Any other data given for the repetitive member, including section properties, is ignored. Data may not be recalled from a member which was generated by member recall.

DEFLECTIONS at the quarter points of all members will automatically be calculated for Dead Load (trial no. 00). If they are desired at some evenly spaced points other than the quarter points, enter the number of equal spaces under DEFLECTIONS. The entry needs to be made only once and may be made in the data for any member. Repeating the same entry in the data for several members is harmless, but two or more different entries will result in the last entry being used for all members. In addition to the above, deflections will always be calculated at hinges and at the quarter points of the longer portion of a hinged member.

If correction for SIDESWAY is desired in the Dead Load analysis (trial no. 00), enter 'S' on the Frame Description input. The entry needs to be made only once and may be made in the data for any member. If correction for SIDESWAY is desired for any other trial, the entry must be made on Load Data input for that trial. This entry needs to be made only once per trial and may be made in the data for any line of the trial.

SIDESWAY DIAGNOSTICS, if any, are reported following the Fixed End Moments of the trial in which SIDESWAY was first requested.

If Sidesway Diagnostics are not present, the result of swaying the frame one inch to the right is reported in the form of Vertical member shears and end moments. If the structure contains hinges, these results are obtained by deflecting each frame separately. (The whole structure is not deflected simultaneously.)

Page headings will indicate whether sidesway was considered. If Sidesway Diagnostics are present, the heading will indicate that diagnostics are present and sidesway was not considered in analysis.

Sidesway Assumptions:

1. Hinges transfer vertical, but not horizontal forces.

2. Rollers resist vertical forces.

Sidesway Restrictions:

1. The structure must be a single story, plane, rectangular frame.

2. Ends of intermediate horizontal members may not be a roller or cantilever.

3. An end horizontal member which has a roller or cantilever, must be the only member at that joint.

4. Vertical members cannot be cantilevered.

5. Rollers are permitted at the right (top) end of vertical members, but not at the left (bottom) end.

SUPERSTRUCTURE SECTIONS

Normally this input option is used to supplement the frame description data, producing section and member properties. It may also be used as a stand alone submittal, producing just section properties. In either case, the section described may be modified by inputing section properties by parts data with the same member no. and cross section location.

UPDATE					REF. PT. COORD.		S.S. DATA		SLAB DATA	
CODE	LINE NO.	MEMBER NO.	CROSS SECTION LOCATION (FT)	RECALL	X (FT)	Y (FT)	WIDTH E.D.-E.D. (FT.)	DEPTH (FT.)	TOP THICK. (IN.)	BOTTOM THICK. (IN.)

The MEMBER NO. and CROSS SECTION LOCATION identify and locate the section from the left end of the member. Both must be repeated on each line used to describe the section.

Generally, the MEMBER NO. will correspond to that of a Frame Description member. The exception is that if the member number is zero (and an arbitrary Location given), section properties alone are calculated, which allows building sections initially, storing the results, and recalling them when building members.

If the member is prismatic, only one section need be described. Its CROSS SECTION LOCATION may be zero if the member length is defined in the Frame Description. Otherwise, the location of this section must define the member length.

When describing a non-prismatic member, the resulting I diagram is one which varies as a straight line between the sections given. Therefore, the number of sections needed to describe the member depends on how the moment of inertia varies. The CROSS SECTION LOCATION of the first section would be zero. The last section location would equal the member length used in calculating the stiffness and carryover factors. A maximum of 50 sections per member is allowed.

For both prismatic and non-prismatic members, if the member length given in the frame description does not agree with the length defined by the last cross section location, the difference is resolved as follows. The length defined by the last cross section location is used to calculate member properties. The length given by the frame description is used to calculate fixed-end-moments.

The section properties that have been calculated for a given member no. and cross section location may be saved for future use. This is done by entering a number from 1 to 99 under STORE. Only one entry under STORE is needed for each cross section location even when using both the superstructure sections form and the section properties by parts form.

RECALL data for use in subsequent sections by entering the number which was assigned to store the data. Section properties are calculated in order of member no. and cross section location. Recall is only available on a stored value from a member no. and cross section location whose section properties have already been calculated. More than one recall may be made per section. The recalled data may be modified by adding or subtracting parts, provided that the X-Y coordinate system is on the same reference datum for both sections. The SIGN field cannot be applied to the data recalled. Sections may be recalled within and between problems, but not between batches.

WIDTH and DEPTH of the superstructure must be given. The width is measured from edge of deck to edge of deck and the depth is measured from top of deck to bottom of soffit. The depth must also be measured from the reference point.

TOP and BOTTOM SLAB THICKNESS must be given, except for T-beam sections, in which case the bottom slab is omitted.

INT. GIRDERS		EXTERIOR GIRDERS						OVERHANGS						
		LEFT			RIGHT			LEFT			RIGHT			
NUMBER (INT. ONLY)	WEB THICK. (IN.)	TYPE	WEB THICK. (IN.)	FACTOR (FT.)	TYPE	WEB THICK. (IN.)	FACTOR (FT.)	LENGTH (FT.)	EXT. THICK. (IN.)	INT. THICK. (IN.)	LENGTH (FT.)	EXT. THICK. (IN.)	INT. THICK. (IN.)	STORE

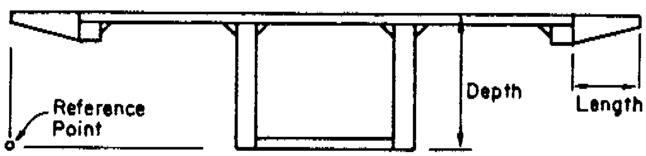
INT. GIRDERS NUMBER and WEB THICKNESS is optional input. Omit both entries if the section consists of exterior girders only.

EXTERIOR GIRDERS TYPE is shown on a sketch on the input form. The exterior girder may be omitted by entering it as a Type 9. Type 0 is assumed if no type is given.

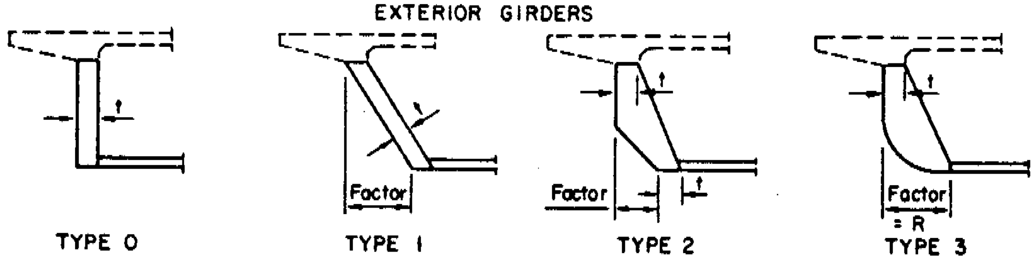
WEB THICKNESS is measured perpendicular to the girder face and is assumed to be equal to the interior girder thickness if omitted. The exterior girder FACTOR must be given for types 1, 2 and 3 to the nearest .01 foot.

Standard 4" fillets are assumed as shown.

BASIC SECTION

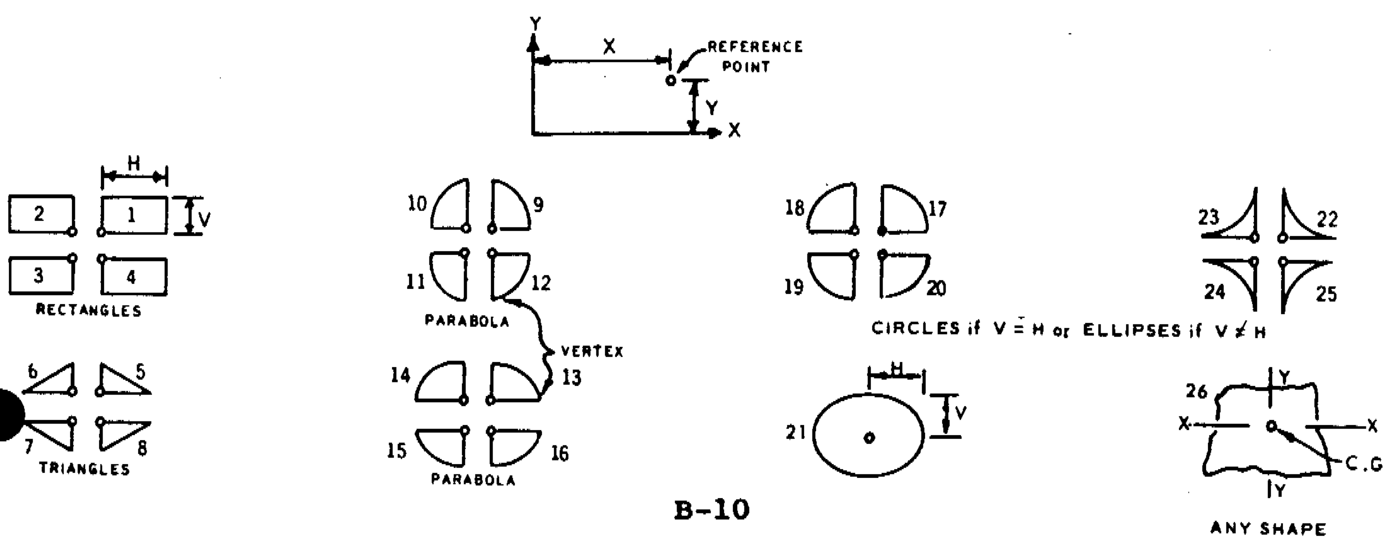


EXTERIOR GIRDERS



TYPE 9 MEANS NO EXTERIOR GIRDER

PART CODES



SECTION PROPERTIES BY PARTS

Normally, this input option is used to supplement the frame description data, and/or the superstructure sections data, to produce section and member properties. It may also be used as a stand alone submittal, producing just section properties.

MEMBER NO., CROSS SECTION LOCATION, STORE and RECALL are described in the SUPERSTRUCTURE SECTIONS part of these instructions.

Sections are built by adding or subtracting the parts shown. PART CODE identifies the shape of the figure being defined. If no part code is given, but ANY SHAPE data is input, the part code is assumed to be 26. Part code 27 is used to give a depth to the cross section. The depth is used to calculate stresses.

Part Dimensions		Ref. Pt. Coord.		Any Shape			
Vertical V or Depth D ft.	Horizontal H ft.	X ft.	Y ft.	Area $ft.^2$	Ixx $ft.^4$	Iyy $ft.^4$	Store

SIGN is used to subtract a given part from a gross section or to build a section with negative properties.

VERTICAL and HORIZONTAL dimensions are required input if part codes 1 thru 25 are used. Area, Ixx and Iyy are not used for these part types. Part Code 26 may be used to define any shape with known properties. Area, Ixx, Iyy, and the reference points X and Y should be given.

The moment of inertia about the Y-Y axis is not used in the analysis of the frame, therefore, it is not necessary to give x or Iyy for any part. Note that omitting this data will produce false answers for Iyy.

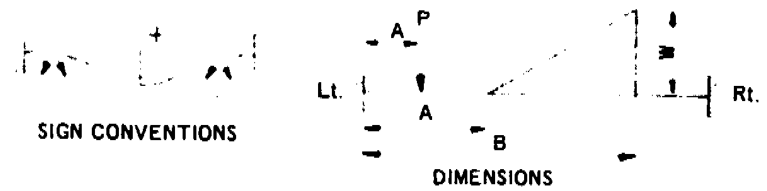
LOAD DATA

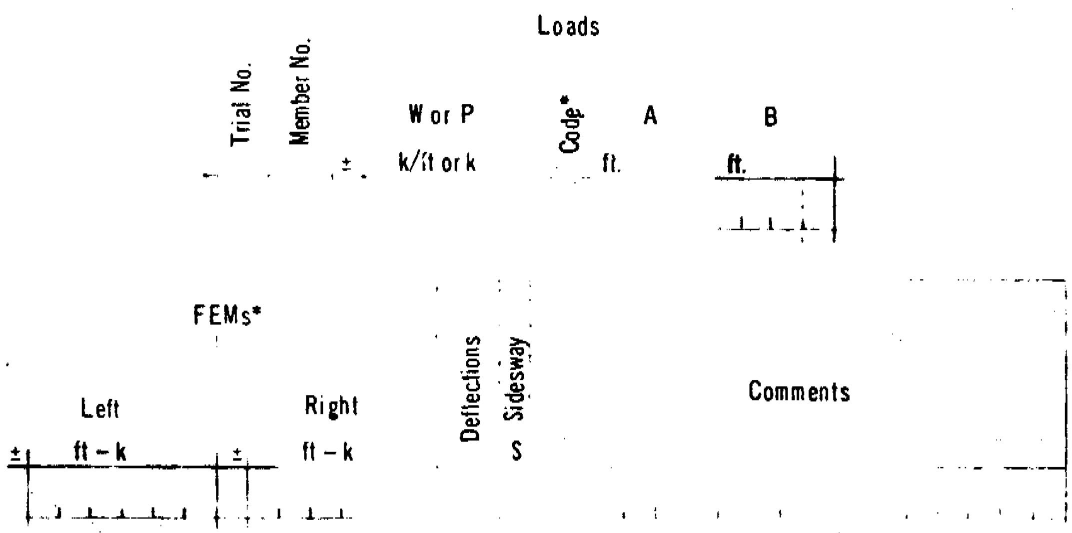
TRIAL NO represent different loading conditions submitted for a single problem. Trial no. 00 is taken to be dead load which supplements the dead load given inthe frame description. Bent Caps and diaphragms would be examples of trial no. 00 loads. Trial no. 1 is assumed to be added dead loads, i.e., barrier railing, wearing surface, signs. Added dead load is any loading which is placed on a frame in its final condition. This condition usually has an effect only on prestressed frames.

MEMBER NO. refer to the member to which the load is applied. Any or all members may be loaded in a given trial.

* CODE

L = Max. W on left
R = Max. W on right
U = Uniform Load
P = Point Load





If the dimensions "A" and "B" happen to be greater than the member length, the member length is used and a warning message is printed.

Enter an 'S' in the sidesway column to obtain sideswayed results for all loads of a given trial. Only one entry per trial is required.

Up to 17 characters of COMMENTS may be made per line on which other data (trial no., etc.) are given. If a single comment covers more than one line, the comment lines may not print in order.

SUPERSTRUCTURE LIVE LOAD

This feature uses two types of input data, MEMBER DATA and LIVE LOAD DATA. Combinations of both or either by itself may be used to produce horizontal member moment and shear envelopes, and the maximum vertical member moments and reactions due to a HS20-44 AASHTO or a multi-axle live loading as well as alternative, standard construction, and sidewalk live loadings. Upon request, influence line ordinates will also be produced.

Plotted results may be obtained for the dead load and live load moment and shear diagrams and for the influence line diagram. All plots must start with the first member in the frame and will continue to the last member.

INFLUENCE LINES, both ordinates and plots, may be obtained by entering a check mark (✓) in the proper box on the input form. Member No. 1 and Number of Live Load Lanes must also be given.

Separate plots will be produced for each horizontal member. Each plot frame will contain the influence lines for the .2L, .4L, .5L, .6L, .8L and 1.0L positions along a particular member. Each influence line is delineated by a separate line code shown on the plot.

MOMENT and SHEAR plotted results may be obtained by entering a code shown in the table below. To obtain dead load plots only enter Member No. 1 and the plot code, but leave the Number of Live Loads blank. To obtain plots with live loads, the Number of Live Load Lanes as well as Member No. 1 and the plot code must be input.

RESISTING MOMENT OF UNIT STEEL values may be given and will cause tick marks to appear on the moment diagrams.

Entry Code	Program Response
Blank or Ø	No plot
1	Plot Moment & Shear Diagram for DL+LL and DL.
2	Plot Moment diagram for DL+LL and DL.
3	Plot Shear diagram for DL+LL and DL.
4	Plot Moment & Shear diagram for DL only.
5	Plot Moment diagram for DL only.
6	Plot shear diagram for DL only.
7	Plot Moment & Shear diagram for LL only.
8	Plot Moment diagram for LL only.
9	Plot Shear diagram for LL only.

The minimum input data required to produce results due to a HS20-44 AASHTO or multi-axle live loading is the NUMBER of LIVE LOAD LANES applied to the horizontal members of the frame. Although this data may be given as MEMBER and/or LIVE LOAD DATA, it will normally be given as MEMBER DATA. Reduction in the number of substructure lanes due to improbable coincident maximum loading is not performed by this feature, but the reduced data may be given by the user.

Unless otherwise specified, AASHTO IMPACT FACTORS will be included in the calculations and therefore, should not be included in the NUMBER of LIVE LOAD LANES.

Superstructure Live Load input data must be accompanied by Frame Description input data. Superstructure Sections, Section Properties by Parts, and the Load Data input options may also be used, producing results as described in earlier instructions.

When the Superstructure Live Load feature is used, the frame is subject to the following limitations:

1. The structure must be a rectangular single story plane frame.

2. Horizontal members must be numbered consecutively starting with 01, up to a maximum of 25.

3. Cantilevered members are not allowed.

MEMBER DATA

Member No.	Number of Live Load Lanes				Plot Data				COMMENTS
	Superstructure		Substructure		Resisting Moment of Unit Steel		Moment & Shear	Influence Lines P-13	
	Lt. End	Rt. End	Lt.	Rt.	Positive	Negative		✓	

When using this input option, enter the horizontal MEMBER No. to which the line of data corresponds.

The NUMBER of LIVE LOAD LANES is classified by results that pertain to the SUPERSTRUCTURE and SUBSTRUCTURE. They may be varied linearly from the LT. END to the RT. END of the member. When given as MEMBER DATA, the NUMBER OF LIVE LOAD LANES must be given for the LT. END of SUPERSTRUCTURE MEMBER NO. 01. SUBSTRUCTURE MEMBER 01 defaults to 1.0 L. L. Lane when left blank. In both cases, when an entry is made, it is assumed to be constant for both ends of all subsequent members until another entry is made. When the value for the LT. END of a member is not given, it is assumed to equal that of the RT. END of the previous member. The value at the RT. END of a member, when not given, is assumed to equal that of the LT. END of the next member if it is given. Otherwise, the value at the RT. END is assumed to equal that of the LT. END of the same member.

A check mark under P-13 will cause the program to generate live loads as follows for one live load lane.

Each axle of a P-5 truck is placed at each 10th point of each span. Axles are arranged for the truck moving in both directions.

One heavy axle of the P-Series truck is added and the above procedure repeated. This process continues until the P-13 truck is checked.

LIVE LOAD DATA

L. L. No.	Truck – (1 Lane)					Lane – (1 Lane)			No Impact	Number of Live Load Lanes
	P_1 Kips	D_1 Ft.	P_2 Kips	D_2 Ft.	P_3 Kips	Uniform Kips/ft.	Moment Rider Kips	Shear Rider Kips	√	
1										
2										
3										

This input option need be used only when the LIVE LOAD DATA consists of something other than the standard HS20-44 AASHTO live loading plus impact, provided that the NUMBER of LIVE LOAD LANES is given as MEMBER DATA.

If the TRUCK and LANE data for L. L. No. 1 is not given, HS20-44 AASHTO loading (without alternative) is assumed. If either or both is given for L. L. No. 1, it replaces the HS20-44 loading. Alternative loading if required, should be entered as described below.

TRUCK and/or LANE data entries for L. L. No.'s 2 or 3 produce separate results in addition to L. L. No. 1.

The TRUCK load for one lane may consist of one, two or three axles. It is defined by entering the axle loads P_1, P_2, and P_3 (0.1 kips) and their spacing D_1 and D_2 (0.1 ft).

The LANE load for one lane may consist of a UNIFORM load (kips/ft) and/or MOMENT RIDER (0.1 kips) and/or SHEAR RIDER (0.1 kips).

Enter a check mark (✓) when NO IMPACT is desired for the particular L. L. NO.

When the NUMBER of LIVE LOAD LANES is given as LIVE LOAD DATA, it overrides that given as MEMBER DATA. It is constant for all horizontal members and used both for SUPERSTRUCTURE and SUBSTRUCTURE results.

Up to 22 characters of COMMENTS may be made per L. L. No. on which other data is given. When no data is entered for L. L. NO. 1, the comment defaults to 'HS20-44 AASHTO LOADING WITHOUT ALTERNATIVE.'

LIVE LOAD GENERATOR

The live load generator input form is similar to the superstructure Live Load Form. Entries on this form will allow AREA railroad or special live load description. Entries in the "Member Data" portion of the form describes the number of lanes that will be loaded with the special truck described on the "Live Load Data" portion of the form.

MEMBER DATA

Update		Member No.	Number of Live Load Lanes					Plot Date				
			Superstructure		Substructure			Resisting Moment of Unit Steel				
CODE	Line No.		Lt. End	Rt. End	Lt.	Rt.		Positive	Negative	Moment & Shear	Scale	Influence lines

LIVE LOAD DATA

Update			Multi Axle Live Loading							
			P_N	D_1	P_{N+1}	D_2	P_{N+2}	D_3	P_{N+3}	D_4
CODE	Line No.	L L No.	Kips	Ft.	Kips	Ft.	Kips	Ft.	Kips	Ft.
		4								
		4								

					OVER LOAD					
P_{N+4}	D_5	P_{N+5}	D_6	P_{N+6}	Color Code	No of Axles	Cooper Loading	✓ NO IMPACT	COMBINE	CARD CONTROL
Kips	Ft.	Kips	Ft.	Kips						
										1
										2

Live load data is supplied for each axle of the proposed special vehicle. Axle loads in kips and axle spacing in feet may be continued for a maximum of two lines per live load number.

OVERLOAD, COOPER LOADING, and COMBINE are data entry areas reserved for future enhancements.

Impact will be considered unless a check mark (✓) is provided in the "NO IMPACT" field.

LIVE LOAD RESULTS

LIVE LOAD DIAGNOSTICS, if present, will indicate that the live load limitations placed on the frame have been violated or an error was made in the superstructure live load input data.

SUPERSTRUCTURE LIVE LOAD input data is reported as given or assumed.

For each L. L. NO. for which LIVE LOAD DATA was given or assumed, the following results are reported for the tenth points of the horizontal members.

1. NEGATIVE LIVE LOAD MOMENT ENVELOPE AND ASSOCIATED SHEARS. HORIZONTAL MEMBER STRESSES - TOP AND BOTTOM FIBRE.

2. DEAD LOAD PLUS NEGATIVE LIVE LOAD MOMENT ENVELOPE. HORIZONTAL MEMBER STRESSES - TOP AND BOTTOM FIBRE.

3. POSITIVE LIVE LOAD MOMENT ENVELOPE AND ASSOCIATED SHEARS.

4. DEAD LOAD PLUS POSITIVE LIVE LOAD MOMENT ENVELOPE. HORIZONTAL MEMBER STRESSES - TOP AND BOTTOM FIBRE.

5. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS. (POSITIVE, NEGATIVE AND RANGE)

6. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPES. (POSITIVE AND NEGATIVE)

The dead load plus live load envelopes are reported only if the dead load analysis was performed with all horizontal members loaded. The dead load results are obtained from Trial No. 0 of the basic system as described in earlier instructions.

Be careful when using the dead load plus live load shear envelopes. The dead load shears are computed, and only one ordinate is saved at each tenth point. Therefore, when the dead load includes concentrated loads, the abrupt steps are not shown. If the load is exactly at a tenth point, only the most positive value is retained.

LIVE LOAD SUPPORT RESULTS are also reported for each L. L. NO. for which LIVE LOAD DATA was given or assumed. Dead load is not included. Impact is included, unless otherwise specified.

The MAX. POSITIVE AND NEGATIVE (uplift) AXIAL LOAD at each SUPPORT or TOP of VERTICAL MEMBER is reported, as is TOP and BOTTOM vertical member moments created by the same loading.

The MAX POSITIVE and NEGATIVE LONGITUDINAL MOMENT at the TOP of each VERTICAL MEMBER is reported, as is the AXIAL LOAD and BOTTOM vertical member moment created by the same loading.

Beam sign convention is used for all live load results. Units are kips and feet.

INFLUENCE LINE RESULTS

When requested, the following types of INFLUENCE LINES are reported. Ordinates for each are given at the tenth points and at hinges.

The INFLUENCE LINES for GIRDER MOMENT, reported for each tenth point of the horizontal members, are extended two spans on each side of the span with the influence point.

The INFLUENCE LINES for GIRDER SHEAR, reported for the left end of each horizontal member, are extended two spans on each side of the span with the influence point. From this line, the influence line for shear at any point in that member may be constructed.

The INFLUENCE LINES for REACTION at TOP of COLUMN (or support if no clumn is present) are extended two spans on each side of the column.

The INFLUENCE LINES for MOMENT at TOP OF COLUMN are extended two spans on each side of the column.

PRESTRESSED DATA

The prestressed data form is used to describe a prestressed cable path which is to be applied to a previously described frame and its dead load, added dead load and live load. The prestressing may be part length, and/or multiple tendon. Input, as described below, consists of three types of information: 1) orientation, 2) cable path geometry, and 3) specifications.

TRIAL NO. is the number of the input cable path configuration. Different cable path geometry or specifications can be tried in a single submittal by varying the trial number.

FRAME NO. is the number of structural frame. A frame is defined as the area between hinge and/or end supports. For example, an eight span structure with 2 intermediate hinges would have 3 frames.

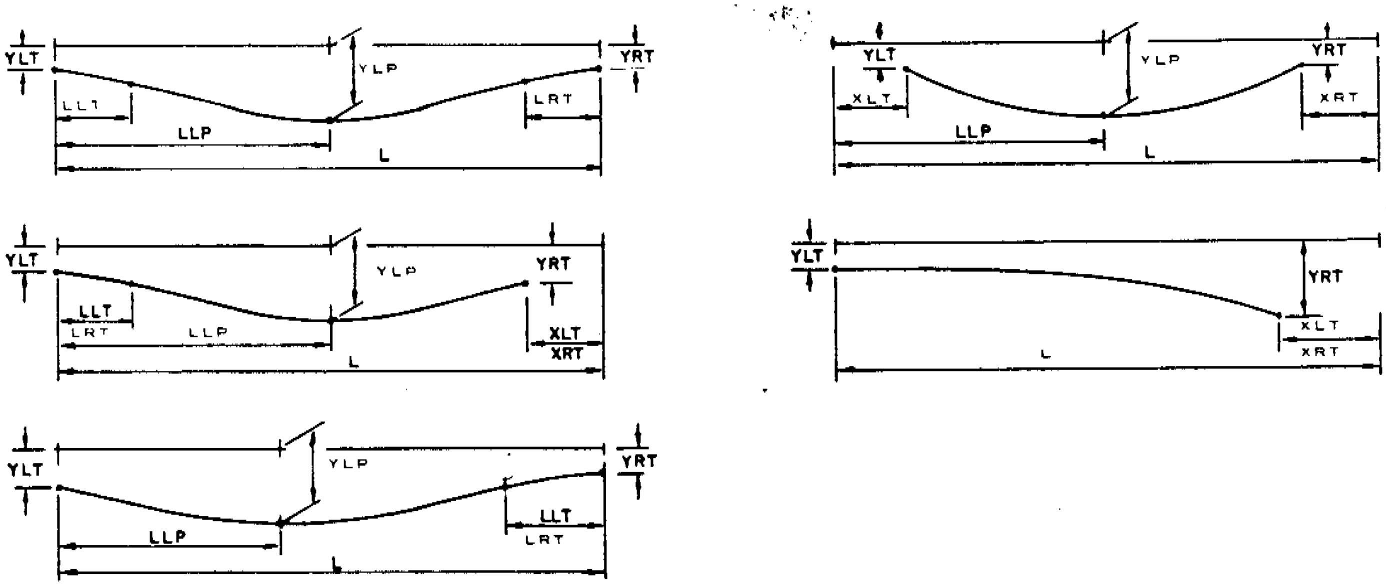
PATH NO. is a number or letter used to identify the various cable paths in a multiple tendon prestressed frame. The effects of the multiple paths in the same trial and frame are all added together. When multiple paths are defined, only one path may have an unknown jacking force.

MEMBER NO. is the member for which prestress information is being input. The member number is the same as is shown on the Frame Description input form. Up to 15 horizontal members can be input if prestressed input is submitted. Member numbers need not begin with 1.

Cable Path

Trial No	Frame No	Path No	Member No	LLT	LLP	LRT	YLT	YLP	YRT	XLT	XRT
				%	%	%	ft	ft	ft	ft	ft

The cable path geometry is described by defining a series of four parabolic sections per span. The end of cable locations must also be given.



LLT, LLP, and LRT are the horizontal locations of the points of inflection of the cable. The abbreviations, LLT; LLP and LRT mean "Length to left point", "Length to low point" and "Length to right point." The values to be input are in percent of span, accurate to the nearest 1%. Note that the illustrated path configurations or the illustrated configurations reversed are the only allowable paths. LLP is always the length from the left end of the span to the low point.

YLT, YLP and YRT are the vertical offsets from the top of the deck to the C.G. of the prestress force as shown on the sketch. The abbreviations YLT, YLP and YRT mean "Offset to left point", "Offset to low point", and "Offset to right point." The values are input to the nearest 0.01 of a foot.

XLT and XRT are the horizontal distances from the end of span to the ends of the cable path. The abbreviations XLT and XRT, mean "distance to left end of cable," and "distance to right end of cable."

U is the friction curvature coefficient. If left blank, the default value of 0.25 will be used. A separate value may be input for each span.

K is the friction wobble coefficient per foot of stressing steel. If left blank, a default value of 0.0002 will be used. A separate value may be input for each span.

fs is the ultimate strength of the prestressing steel in kips per square inch. If left blank, a default value of 270 ksi will be used. Only one value may be input for each path.

Specifications

u	k	fs	% Jack	End	Anchor Set LT	Anchor Set RT	Allow. Tension Spec.	Allow. Tension	P-Jack	f'c	% Shortening	Losses
$X10^{-2}$	$X10^{-4}$	KSI			In	In		%	KIPS	KSI		KSI

%JACK is the maximum allowable temporary jacking stress expressed as a percent of the ultimate strength of the prestressing steel. If left blank, a default value of 75% is used. Only one value may be input for each path. If both end stressing is requested, the same value for % Jack is used at each end.

END is the input to request jacking location. Enter "L" for left end jacking enter "R" for right end jacking, enter "B" for both end jacking. If left blank, a default value of "B" is used. Only one value may be entered for each path.

ANCHOR SET, LT, and RT is the length, in eighths of an inch, of the anchor set. If one end jacking was requested no entry need be made for the anchor set of the non-jacked end. Only one value for anchor set left, and one value for anchor set right may be entered per path. If left blank, a default value of 5/8" is used.

ALLOWABLE TENSION is the given value of the allowable maximum tension stress for which the frame is to be designed. Two methods of input are provided. If a check (✓) is placed in the SPEC input field, the allowable tension will be calculated using the specifications in the Bridge Planning and Design Manual, Volume I. The formula is $6\sqrt{f'c}$.

If an entry is made in the % field, the allowable tension is the entered % times $6\sqrt{f'c}$. Only one choice is allowed and only one entry is allowed per path. If left blank, the program will design for no tension (if possible).

P-JACK is the input prestress force in kips. If a value for P-JACK is input for all paths in a given trial and frame, then the program only analyzes the structure and reports the effects. If multiple path prestressing is described, all values of P-JACK except one must be given. The path with no value will have its prestress force designed by the program based on full DL + added DL + LL + I. Stresses are then checked for both the DL + PS and DL + added DL + PS cases to assure that tension in these cases does not exceed zero. If tension is detected, P-JACK is redesigned to eliminate the tension and a warning message is printed. When this occurs, the full allowable tension value may not appear in the final stresses.

f'c is the required concrete strength. This value is used as the basis for calculating the allowable tension. If left blank, a default value of 3.5 ksi will be used.

% SHORTENING is the percent of theoretical elastic shortening to be included in the prestressing calculations based on the final prestress force coefficients. Only those frames with columns affected by shortening will be considered. If left blank, a default value of 100% is used. To eliminate shortening, enter a zero. To obtain any other even 10% increment enter its multiple of 10%.

Losses (ksi) are the losses due to creep and shrinkage. If left blank, a default value of 32 ksi is used.

RESULTS

The following items are listed as they appear in the output for each problem. Whether a particular item appears, depends on the nature of the problem.

First, the FRAME DESCRIPTION input is reported as given, except for the deflection and sidesway entries, which do not appear.

SECTION PROPERTIES are reported for each section described with the Section Properties by Parts input option. The input is reported as given, followed by the area, centroid location with respect to the X Y coordinate system chosen, and the moments of inertia about the centroidal X-X and Y-Y axes.

When the above sections supplement a frame member, MEMBER PROPERTIES about the X-X axis are reported. They are the length of the member, minimum moment of inertia about the X-X axis, and the relative stiffness (small k) and carry over factors.

The absence on any message under FRAME DIAGNOSTICS, indicates that no errors have been detected in the data which makes up the frame. The presence of an error message terminates processing of the problem. If the first diagnostic states that 'Errors have been found in either the frame description or cross section data', this indicates that error messages have been printed somewhere in the preceding output of the problem. Although processing is terminated, Load Data input is reported as given, along with error messages pertaining to it.

FRAME PROPERTIES is the result of combining the Frame Description with the Member Properties. Carry Over and Distribution Factors are adjusted for pinned end conditions. At this point, all data pertaining to the frame should be reviewed to determine if it is reasonable and describes the frame as intended.

For each trial, the LOADINGS are reported as given. Errors, if any, in Load Data are reported, and result in processing being terminated for the trial.

FIXED END MOMENTS are the total FEM's for a trial and are adjusted for pinned end conditions.

Distributed MOMENTS and SHEARS are reported at the one-tenth points for each member. In each case, the horizontal members are separated from the vertical members. Beam sign convention is used.

COLUMN REACTIONS are calculated on the assumption that the user followed the rule that the left end of the column was the bottom. Any deviation from this rule will yield incorrect reactions.

The TANGENTIAL ROTATIONS at the ends of each member are measured from the unloaded position, with clockwise being positive.

DEFLECTIONS are measured from the unload position. Positive is downward for horizontal members and to the right for vertical members.

The MAX. POSITIVE AND NEGATIVE (uplift) AXIAL LOAD at each SUPPORT or TOP of VERTICAL MEMBER is reported, as is TOP and BOTTOM vertical member moments created by the same loading.

The MAX POSITIVE and NEGATIVE LONGITUDINAL MOMENT at the TOP of each VERTICAL MEMBER is reported, as is the AXIAL LOAD and BOTTOM vertical member moment created by the same loading.

Beam sign convention is used for all live load results. Units are kips and feet.

INFLUENCE LINE RESULTS

When requested, the following types of INFLUENCE LINES are reported. Ordinates for each are given at the tenth points and at hinges.

The INFLUENCE LINES for GIRDER MOMENT, reported for each tenth point of the horizontal members, are extended two spans on each side of the span with the influence point.

The INFLUENCE LINES for GIRDER SHEAR, reported for the left end of each horizontal member, are extended two spans on each side of the span with the influence point. From this line, the influence line for shear at any point in that member may be constructed.

The INFLUENCE LINES for REACTION at TOP of COLUMN (or support if no column is present) are extended two spans on each side of the column.

The INFLUENCE LINES for MOMENT at TOP of COLUMN are extended two spans on each side of the column.

MODIFICATIONS TO EXISTING SYSTEM

Due to popular demand, the following modifications were made to the existing system. Details of the basis system are described in earlier instructions.

On FRAME DESCRIPTION input, if UNIT WT. is given (accidentally) and the section data (area) was not, the unit wt. is not used and a warning message is printed.

When using SECTION PROPERTIES by PARTS input, if the PART CODE is omitted and data given for AREA and I_{xx}, but not for the PART DIMENSIONS V and H, a message is printed stating that part code 26 (any shape) was assumed.

LIVE LOAD RESULTS

LIVE LOAD DIAGNOSTICS, if present, will indicate that the live load limitations placed on the frame have been violated or an error was made in the superstructure live load input data.

SUPERSTRUCTURE LIVE LOAD input data is reported as given or assumed.

For each L. L. NO. for which LIVE LOAD DATA was given or assumed, the following results are reported for the tenth points of the horizontal members.

1. NEGATIVE LIVE LOAD MOMENT ENVELOPE
2. DEAD LOAD PLUS NEGATIVE LIVE LOAD MOMENT ENVELOPE
3. POSITIVE LIVE LOAD MOMENT ENVELOPE
4. DEAD LOAD PLUS POSITIVE LIVE LOAD MOMENT ENVELOPE
5. LIVE LOAD SHEAR ENVELOPES (POSITIVE, NEGATIVE and RANGE)
6. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPES (POSITIVE and NEGATIVE)

The dead load plus live load envelopes are reported only if the dead load analysis was performed with all horizontal members loaded. The dead load results are obtained from Trial No. 0 of the basic system as described in earlier instructions.

Be careful when using the dead load plus live load shear envelopes. The dead load shears are computed, and only one ordinate is saved at each tenth point. Therefore, when the dead load includes concentrated loads, the abrupt steps are not shown. If the load is exactly at a tenth point, only the most positive value is retained.

LIVE LOAD SUPPORT RESULTS are also reported for each L.L. NO. for which LIVE LOAD DATA was given or assumed. Dead load is not included. Impact is included, unless otherwise specified.

If the LOAD DATA dimensions A or B happen to be greater than the member length, the latter is assumed for these dimensions and a message is printed.

The Dead Load analysis (TRIAL NO. 0) will now be performed even if all horizontal members are not loaded. An appropriate message is printed. The analysis performed with this inconsistency will not be added to Live Load results.

MOMENT AND SHEAR PLOTTED RESULTS

Dead load moments and shears are plotted as dashed lines. Live load moments and shears are plotted as solid lines from enveloped data as presented in the printed output. Plots will be annotated to show if the Deal Load is included or excluded from the Live Load envelopes.

INFLUENCE LINE PLOTTED RESULTS

When influence lines are requested the plotted results will produce separate plot frames for each horizontal member. Each plot frame will contain the influence lines for the .2L, .4L, .5L, .6L, .8L, and 1.0L positions along the particular member. Each influence line is delineated by a separate line code shown on the plot.

SAMPLE PROBLEMS

The following sample problems are intended to illustrate the major features of the program Frame System. Problem complexity increases from problem 1 to problem 5 with an expectation that prior problem concepts have been mastered. The following descriptions show which feature the sample problems illustrate:

- Sample problem 1 is an example of the use of the input forms, Frame Description, Section Properties by Parts, and Load Data.

- Sample problem 2 is an example of the use of the Superstructure Section input form and the automatic generation of flaring superstructure member properties.

- Sample problem 3 is an example of the use of the Superstructure Live Load input form. Plotted and printed results for influence lines and HS20-44 Live Load moment and shear envelopes are produced by this problem.

- Sample problem 4 is an example of the use of the Live Load Generator input form. Live Load envelopes are printed for a family of overload trucks consisting of the truck described on the form and successive trucks formed by removal of axles until three axles remain.

- Sample problem 5 is an example of the use of the Prestressed Data input form. Prestress analysis and calculation of jacking force required is provided with the analysis.

SAMPLE PROBLEM 1

PROBLEM

A. General

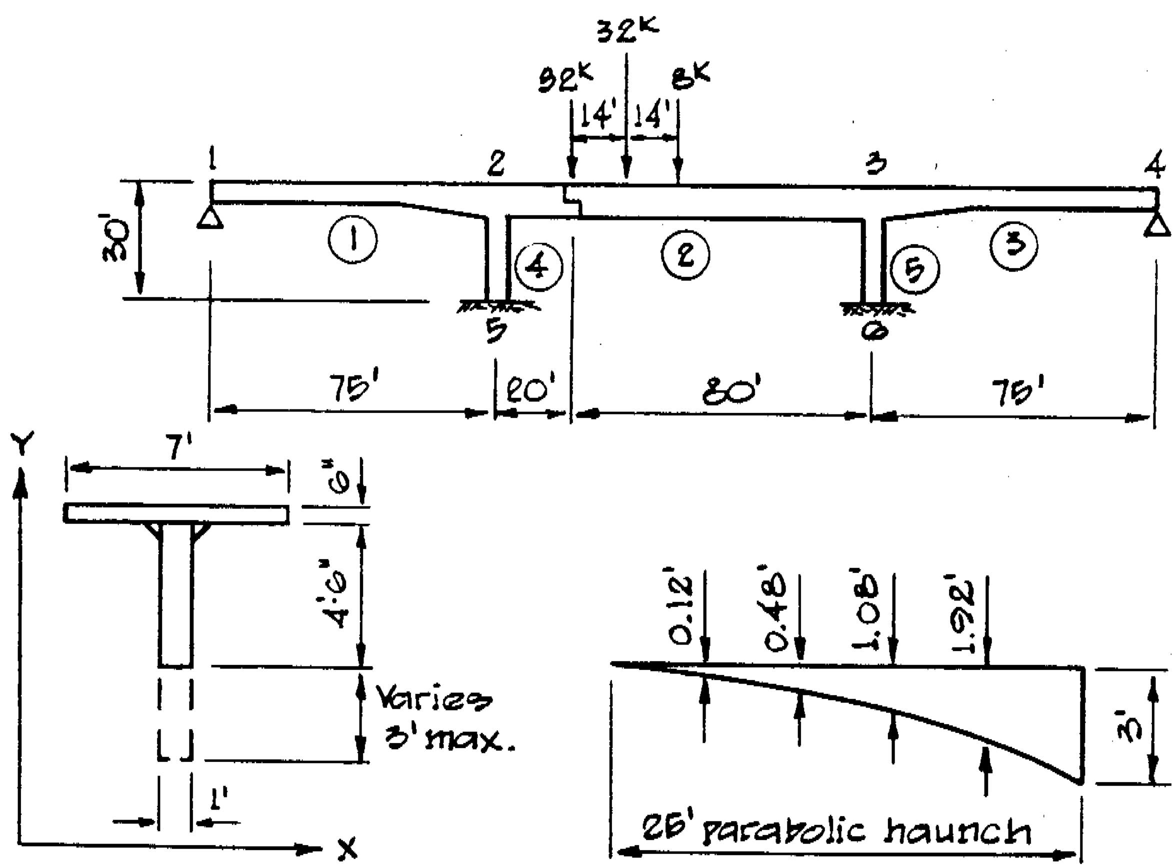
Three-span bridge with one expansion joint. Span properties to computed by program.

B. Loading

Dead load of bent caps and hinge as coded on Load Data form trial 00. Live load as coded on Load Data form trial 01.

C. Section Properties

Columns are prismatic as coded on Frame Description form. Superstructure cross section varies as per Figure 5 and is coded on the Section Properties By Parts form.



Sample Problem I

DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - FRAME DESCRIPTION

DS-D93 (REV. 2/75)

BDEOAA

Page 1 of 3

Name Example #1

Phone 445-6519

IDENT (DIST GR. BATCH PROB.)	SOURCE (DIST UNIT)	CHARGE (DIST UNIT)	EXPENDITURE AUTHORIZATION	SPECIAL DESIGNATION WHEN APPLICABLE	PROGRAM NUMBER
14T 0701	14033	14033	910002		BDE035

S/C 2091, 7310 S/C 2091

Member No.	End Joint No. Lt.	End Joint No. Rt.	End Condition lt.	Direction	Length ft.	Min. I ft⁴	Hinge Location or Support Width ft	Dead Load Uniform k/ft.	Dead Load Unit Wt. pcf	K Stiffness Factor Lt.	K Rt.	C Carry Over Factor Lt.	C Rt.	Recall Member	Reverse R	D.L. Deflections	Sidesway S
1	1	2	P	G	750			180	150								
2	2	3		G	1000		200	180	150								
3	3	4												∅1	R		
4	5	2			300	1000		600									
5	6	3			300	1000		600									

S/C 7310

END CONDITION: C - Cantilever, P - Pin, R - Roller

DIRECTION: G or H - Horizontal

Lt, Rt, Hinge Location, Rt, Lt

DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - LOAD DATA

DS-D95 (REV. 2/75)

BDEOAA

Page 3 of 3

Name Example #1

Phone

IDENT (DIST GR. BATCH PROB.): 14T 0701 S/C 7318

*CODE: L=Max. W on left; R=Max. W on right; U=Uniform Load; P=Point Load

SIGN CONVENTIONS — DIMENSIONS (A, B, Lt, Rt)

Trial No.	Member No.	W or P k/ft or k	Code*	A ft.	B ft	FEMs* Left ft-k	FEMs* Right ft-k	Deflections	Sidesway S	Comments
00	02	25200	P	00						CAP WT
		21000	P	200						HINGE WT
		25200	P	1000						CAP WT
01	02	32000	P	200				1	0	TRUCK LOAD
		32000	P	340						1 LANE
		8000	P	480						NO IMPACT

S/C 7318

*When FEMs are given, they are not calculated for any load on that member.

INPUT

Sample Problem I

DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - SECTION PROPERTIES BY PARTS

DS-D94 (REV 2 75)

BDEOAA

Page 2 of 3

Name *Example #1*

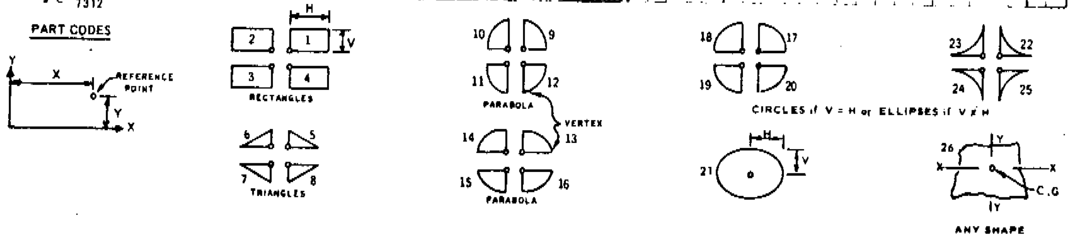
Phone

IDENT. DIST.	GROUP	BATCH	PROB.	SOURCE DIST.	UNIT	CHARGE DIST.	UNIT	EXPENDITURE AUTHORIZATION	SPECIAL DESIGNATION WHEN APPLICABLE	PROGRAM NUMBER
14	T	07	01							B D E 4 3 5

S/C 2091, 7312 S/C 2091

Update CODE	Line No.	Member No.	Cross Section Location ft.	Recall	Sign + or -	Part Code	Part Dimensions Vertical V or Depth D ft.	Horizontal H ft.	Ref. Pt. Coord. X ft.	Y ft.	Any Shape Area ft.²	Ixx ft.⁴	Iyy ft.⁴	Store
		01	00			01	50	700	00	750				
						01	450	100	300	300				
						07	33	33	300	750				
						08	33	33	400	750				01
			500	01										
			600			04	48	100	300	300				
			650				108							
			700				192							
			750				300							
		02	00	02										02

S/C 7312



OUTPUT Sample Problem I

IDENT 141 07 01 FRAME SYSTEM MAY, 01, 1975 PAGE 1

FRAME DESCRIPTION

LINE NO.	MEM NO	JOINT NO. LT	JOINT NO. RT	END COND LT RT	DIR	SPAN	I	SUPPORT OR HINGE	E	DEAD LOAD UNIFORM	DEAD LOAD SFC	K LT	K RT	CARRY OVER FACTORS LT	CARRY OVER FACTORS RT	RECALL MEM
0010	1	1	2	P	6	75.0	0.0	0.0	0.	0.180	150.	0.0	0.0	0.0	0.0	
0020	2	2	3		6	100.0	0.0	20.0	0.	0.180	150.	0.0	0.0	0.0	0.0	
0030	3	3	4			0.0	0.0	0.0	0.	0.0	0.	0.0	0.0	0.0	0.0	01R
0040	4	5	2			30.0	10.00	0.0	0.	0.600	0.	0.0	0.0	0.0	0.0	
0050	5	6	3			30.0	10.00	0.0	0.	0.600	0.	0.0	0.0	0.0	0.0	

OUTPUT DESCRIPTION

Page 1 of Frame System output reports the frame description input data. This page is provided to allow verification of input data as received from the keypunch section. If stiffness factor is given use relative stiffness factor on input sheet (i.e., for fixed prismatic beam use 4).

IDENT 141 07 01 FRAME SYSTEM MAY, 01, 1975 PAGE 2

SECTION PROPERTIES

LINE NO.	MEM	LOC	RECALL	+ - CODE	V	H	X	Y	AREA	IXX	IYY	STORE
0010	1	0.0		1	0.50	7.00	0.0	7.50	0.0	0.0	0.0	
0040	1	0.0		1	4.50	1.00	3.00	3.00	0.0	0.0	0.0	
0030	1	0.0		7	0.33	0.33	3.00	7.50	0.0	0.0	0.0	
0020	1	0.0		8	0.33	0.33	4.00	7.50	0.0	0.0	0.0	01

(INERTIAS OF PARTS: AREA, IXX, IYY)

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y
8.11	3.50	6.36	20.09	14.71

LINE NO.	MEM	LOC	RECALL	+ - CODE	V	H	X	Y	AREA	IXX	IYY	STORE
0050	1	50.0	01	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
		RECALL 1					3.50	6.36	8.11	20.09	14.71	

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y
8.11	3.50	6.36	20.09	14.71

LINE NO.	MEM	LOC	RECALL	+ - CODE	V	H	X	Y	AREA	IXX	IYY	STORE
0060	1	60.0	01	4	0.48	1.00	3.00	3.00	0.0	0.0	0.0	
		RECALL 1					3.50	6.36	8.11	20.09	14.71	

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y
8.59	3.50	6.16	25.97	14.75

Pages 2 through 5 reports **section** properties at user **defined** cross-section locations along the members. The output is arranged in increasing order of member number and increasing order of cross-section location starting from the left end of the member. Each line of input data is printed for verification followed by a calculated value of area, centroid location, and moment of inertia about centroid for the total section.

```
IDENT  141 07 01                    FRAME SYSTEM              MAY, 01, 1975              PAGE    3

SECTION PROPERTIES
LINE                     +                                                INERTIAS OF PARTS
 NO. MEM    LOC  RECALL = CODE     V       H       X       Y      AREA        IXX        IYY   STORE
0070   1    65.0   01     4      1.08    1.00    3.00    3.00     0.0         0.0        0.0
           RECALL  1                             3.50    6.36     8.11       20.09      14.71

           AREA          CENTROID LOCATION          MOMENT OF INERTIA ABOUT CENTROID
                           X        Y                       X-X                Y-Y
           9.19          3.50     5.90                     34.67              14.80

LINE                     +                                                INERTIAS OF PARTS
 NO. MEM    LOC  RECALL = CODE     V       H       X       Y      AREA        IXX        IYY   STORE
0080   1    70.0   01     4      1.92    1.00    3.00    3.00     0.0         0.0        0.0
           RECALL  1                             3.50    6.36     8.11       20.09      14.71

           AREA          CENTROID LOCATION          MOMENT OF INERTIA ABOUT CENTROID
                           X        Y                       X-X                Y-Y
          10.03          3.50     5.53                     49.62              14.87

LINE                     +                                                INERTIAS OF PARTS
 NO. MEM    LOC  RECALL = CODE     V       H       X       Y      AREA        IXX        IYY   STORE
0090   1    75.0   01     4      3.00    1.00    3.00    3.00     0.0         0.0        0.0     02
           RECALL  1                             3.50    6.36     8.11       20.09      14.71

           AREA          CENTROID LOCATION          MOMENT OF INERTIA ABOUT CENTROID
                           X        Y                       X-X                Y-Y
          11.11          3.50     5.05                     74.02              14.96


IDENT  141 07 01                    FRAME SYSTEM              MAY, 01, 1975              PAGE    4

MEMBER  1 PROPERTIES

                  LENGTH          MIN INERTIA          STIFFNESS              CARRY OVER
                                                      LT         RT          LT         RT
                   75.0              20.09           4.307      6.066       0.655      0.471


IDENT  141 07 01                    FRAME SYSTEM              MAY, 01, 1975              PAGE    5

SECTION PROPERTIES
LINE                     +                                                INERTIAS OF PARTS
 NO. MEM    LOC  RECALL = CODE     V       H       X       Y      AREA        IXX        IYY   STORE
0100   2     0.0   02     0      0.0     0.0     0.0     0.0      0.0         0.0        0.0
           RECALL  2                             3.50    5.05    11.11       74.02      14.96

           AREA          CENTROID LOCATION          MOMENT OF INERTIA ABOUT CENTROID
                           X        Y                       X-X                Y-Y
          11.11          3.50     5.05                     74.02              14.96

MEMBER  2 PROPERTIES

               HINGE AT LOCATION  20.0
                  LENGTH          MIN INERTIA          STIFFNESS              CARRY OVER
                                                      LT         RT          LT         RT
                  100.0              74.02           0.231      3.692       4.000      0.250
```

Page 5 reports section properties at the beginning or left hand side of member 2. Following the section properties output is the member properties calculated for member 2. The assumption for calculation of member properties is that the member is prismatic since only one cross-section location was given for the member. Output stiffness and carryover factors assume that the member end conditions **are fixed**-fixed. Member length is obtained from the **Frame Des**cription form.

IDENT 141 07 01 FRAME SYSTEM MAY, 01, 1975 PAGE 6

FRAME DIAGNOSTICS

NO ERRORS FOUND

FRAME PROPERTIES

MEM NO	JT LT	JT RT	END COND LT	END COND RT	DIR	SPAN	I	SUPPORT OR HINGE	E	CARRY OVER FACTORS LT	CARRY OVER FACTORS RT	DISTRIBUTION FACTORS LT	DISTRIBUTION FACTORS RT
1	1	2	P		G	75.0	20.09	0.0	750.	0.655	0.0	0.0	0.428
2	2	3			G	100.0	74.02	20.0	750.	4.000	0.250	0.065	0.527
3	3	4		P	G	75.0	20.09	0.0	750.	0.0	0.655	0.216	0.0
4	5	2				30.0	10.00	0.0	750.	0.500	0.500	0.0	0.507
5	6	3				30.0	10.00	0.0	750.	0.500	0.500	0.0	0.257

Page 6 reports the frame properties as assembled from the Frame Description and Section Properties by Parts forms. The message "no errors found" indicates that the program will attempt to process the loadings specified by the user. If an error message is encountered at this point further load processing is terminated out loading conditions are scanned for Syntax errors.

IDENT 141 07 01 FRAME SYSTEM MAY, 01, 1975 PAGE 7

LOAD DATA TRIAL 0

LINE	MEM	W OR P	LOAD CODE	A	B	FIXED END MOMENTS LEFT	FIXED END MOMENTS RIGHT	DEFLT	COMMENTS
0030	2	25.200	P	0.0	0.0	0.	0.		CAP WT.
0020	2	21.000	P	20.0	0.0	0.	0.		HINGE WT.
0010	2	25.200	P	100.0	0.0	0.	0.		CAP WT.

FIXED END MOMENTS TRIAL 0

MEM NO	FIXED END MOMENTS LT	FIXED END MOMENTS RT	MEM NO	FIXED END MOMENTS LT	FIXED END MOMENTS RT	MEM NO	FIXED END MOMENTS LT	FIXED END MOMENTS RT
1	0.	-1250.	2	-1869.	-1586.	3	-1250.	0.
4	0.	0.	5	0.	0.			

Page 7 reports the input data received from the load data form. Data for each trial is assembled together and the resulting fixed end moments are printed for all loads of the trial. Fixed end moments have been adjusted for pinned or roller end conditions.

OUTPUT   Sample Problem I

IDENT 14T 07 01 FRAME SYSTEM MAY, 01, 1975 PAGE 8

*** SIDESWAY NOT CONSIDERED. ***

HORIZONTAL MEMBER MOMENTS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	202.	325.	369.	336.	223.	32.	-238.	-587.	-1020.	-1544.
2	-1893.	-854.	0.	459.	734.	824.	730.	451.	-13.	-662.	-1495.
3	-1362.	-856.	-441.	-110.	141.	314.	408.	424.	361.	220.	0.

WARNING - MEMBER DEPTHS WERE NOT USED FOR ALL MEMBERS SO STRESSES WERE NOT CALC.

VERTICAL MEMBER MOMENTS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
4	174.	122.	70.	17.	-35.	-87.	-140.	-192.	-244.	-297.	-349.
5	-66.	-46.	-27.	-7.	13.	33.	53.	73.	93.	113.	133.

HORIZONTAL MEMBER SHEARS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	32.1	21.7	11.2	0.7	-9.8	-20.2	-30.7	-41.2	-52.0	-63.6	-76.5
2	138.3	94.6	76.2	36.7	16.2	-0.2	-18.7	-37.1	-55.6	-74.1	-117.7
3	74.1	61.1	49.6	38.8	28.3	17.8	7.3	-3.1	-13.6	-24.1	-34.6

VERTICAL MEMBER SHEARS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
4	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4	-17.4

Pages 8, 9 & 10 provide moments, shears, reactions, rotations and deflections for load trial Ø. Member weight for vertical members is calculated from member length and uniform dead load entered on frame description form. Deflections at quarter points for trial Ø is provided automatically with provision for additional **deflection** output when requested on Frame Description form.

IDENT 14T 07 01 FRAME SYSTEM MAY, 01, 1975 PAGE 9

*** SIDESWAY NOT CONSIDERED. ***

VERTICAL MEMBER SHEARS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
5	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6

VERTICAL MEMBER REACTIONS TRIAL 0

MEM NO	LT REACTION	RT REACTION	MEMBER WEIGHT
4	232.8	214.8	18.0
5	209.6	191.8	18.0

```
IDENT  141 07 01                    FRAME SYSTEM                 MAY, 01, 1975               PAGE  10
TRIAL  0

TANGENTIAL ROTATIONS - RADIANS - CLOCKWISE POSITIVE
   SPAN     LT. END     RT. END     SPAN    LT. END      RT. END      SPAN    LT. END      RT. END

     1     0.002898    0.002422      2     0.002422    -0.000922      3     -0.000922    -0.003580

     4     0.000000    0.002422      5     0.000000    -0.000922

HORIZONTAL MEMBER DEFLECTIONS IN FEET AT 1/ 4 POINTS FROM LEFT END - DOWNWARD POSITIVE

     MEMBER  1    E=  750.      0.0          0.041         0.032        -0.008        0.0

     MEMBER  2    E=  750.      0.0          0.086         0.099         0.055        0.0

              LONG HINGE     LT      1/4     1/2     3/4     RT
                           0.078   0.100   0.088   0.042   0.0

     MEMBER  3    E=  750.      0.0          0.014         0.059         0.059        0.0

VERTICAL MEMBER DEFLECTIONS IN FEET AT 1/ 4 POINTS FROM LEFT END.

     MEMBER  4    E=  750.      0.0         -0.003        -0.009        -0.010        0.0

     MEMBER  5    E=  750.      0.0          0.001         0.003         0.004        0.0
```

```
IDENT  141 07 01                    FRAME SYSTEM                 MAY, 01, 1975               PAGE  11
LOAD DATA  TRIAL  1
                          LOAD                                 FIXED END MOMENTS
   LINE  MEM     W OR P    CODE        A         B          LEFT      RIGHT   DEFLT      COMMENTS
   0060   2      32.000     P        20.0       0.0          0.          0.     10     TRUCK LOAD
   0050   2      32.000     P        34.0       0.0          0.          0.            1 LANE
   0040   2       8.000     P        48.0       0.0          0.          0.            NO IMPACT
FIXED END MOMENTS  TRIAL  1

   MEM     FIXED END MOMENTS          MEM     FIXED END MOMENTS           MEM     FIXED END MOMENTS
   NO       LT          RT            NO       LT          RT             NO       LT           RT

    1       0.          0.             2     -1175.       -369.            3       0.           0.
    4       0.          0.             5        0.          0.
```

Page 11 reports the load data for trial 1. Fixed end moments due to the applied loads are also calculated and printed for the load trial.

Sample Problem 3

DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - LOAD DATA

DS-095 (REV. 2-75)

BDEOAA

Page 3 of 4

Name *Example # 3*

Phone

IDENT: DIST. 14 GR. T BATCH PROB 0703

S.C 7316

* CODE
L = Max. W on left
R = Max. W on right
U = Uniform Load
P = Point Load

SIGN CONVENTIONS

Lt A P A B Rt

DIMENSIONS

Update: CODE	Update: Line No.	Trial No.	Member No.	Loads: W or P (k/ft or k)	Code*	A (ft)	B (ft)	FEMs*: Left (ft-k)	FEMs*: Right (ft-k)	Deflections	Sidesway	Comments
		0	1	14037	P	810						DIAPH
		0	2	14037	P	750						DIAPH
		0	2	2500	P	00						CAP WT.

S/C 7316

*When FEMs are given, they are not calculated for any load on that member

DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - SUPERSTRUCTURE LIVE LOAD

DS-D125 (REV. 2-75)

BDEOAA

IDENT: DIST. 14 GR. T BATCH PROB 0703

S/C 7320, 7321

Page 4 of 4

Name *Example #3*

Phone

MEMBER DATA

Update: CODE	Update: Line No.	Member No.	Superstructure Lanes: Lt. End	Superstructure Lanes: Rt. End	Substructure Lanes: Lt.	Substructure Lanes: Rt.	Resisting Moment of Unit Steel: Positive	Resisting Moment of Unit Steel: Negative	Moment & Shear	Influence Lines	P-13	COMMENTS
		1	2.43		1.0		4500	50 P	1	✓		2 SPAN EXAMPLE W/INFL & PLT

S/C 7320

Frame Description data with the horizontal members numbered consecutively starting with 01 must accompany this data.

Member Data – When the Number of L L Lanes is given, it must be given for the left end of Superstructure Member 01. (Substructure Member 01 defaults to 1.0 when left blank.) Thereafter, it is assumed to be constant until another entry is made.

Live Load Data – For AASHO HS20-44 loading, leave Truck and Lane data blank for L.L No 1. When this data is given, it replaces the HS20-44 loading. An entry for the Number of Live Load Lanes, overrides that given as Member Data. Data entries for L.L. No.'s 2 and 3 produce separate results in addition to L.L. No 1.

Influence Lines – When checked, a plot of the influence lines will be produced along with the printed results.

LIVE LOAD DATA

Update: CODE	Update: Line No.	L L No.	Truck (1 Lane): P_1 (Kips)	D_1 (Ft.)	P_2 (Kips)	D_2 (Ft.)	P_3 (Kips)	Uniform (Kips/ft)	Moment Rider (Kips)	Shear Rider (Kips)	No Impact	Number of Live Load Lanes	COMMENTS
		1											
		2											
		3											

S/C 7321

```
IDENT  14T 07 03                  FRAME SYSTEM                  MAY, 02, 1975                PAGE  1

FRAME DESCRIPTION
          JOINT  END                           SUPPORT                                              CARRY OVER
LINE MEM   NO.   COND                             OR                DEAD LOAD            K            FACTORS     RECALL
 NO.  NO  LT RT  LT RT  DIR   SPAN      I       HINGE      E    UNIFORM SEC       LT      RT        LT     RT     MEM

0010   1   1  2   R       G   162.0    0.0      0.0       0.    0.0   150.     0.0    0.0       0.0    0.0
0020   2   2  3      R    G   150.0    0.0      0.0       0.    0.0   150.     0.0    0.0       0.0    0.0
0030   3   4  2                26.0   84.00     0.0       0.    0.0     0.     0.0    0.0       0.0    0.0


IDENT  14T 07 03                  FRAME SYSTEM                  MAY, 02, 1975                PAGE  2

SECTION PROPERTIES

LINE MEM    LOC  RECALL        X        Y        SUPERSTRUCTURE       SLAB THICKNESS   INT. GIRDER       STORE
                                                  WIDTH   DEPTH        TOP    BOTTOM    NO.  WEB
0010   1     0.0               0.0      0.0        34.0    6.50        6.75    5.75      2   12.              01

                         LT. EXT. GIRDER      RT. EXT. GIRDER      LT. OVERHANG          RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                         0    12.   0.0       0    12.   0.0       3.5    7.    11.     3.5    7.    11.

              AREA           CENTROID LOCATION          MOMENT OF INERTIA ABOUT CENTROID
                                 X         Y                  X-X                Y-Y
              55.54            17.00      3.63              343.63             4967.14


LINE MEM    LOC  RECALL        X        Y        SUPERSTRUCTURE       SLAB THICKNESS   INT. GIRDER       STORE
                                                  WIDTH   DEPTH        TOP    BOTTOM    NO.  WEB
0020   1   140.0   01          0.0      0.0         0.0    0.0         0.0     0.0       0    0.

                         LT. EXT. GIRDER      RT. EXT. GIRDER      LT. OVERHANG          RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                         0     0.   0.0       0     0.   0.0       0.0    0.    0.      0.0    0.    0.
LINE                    +                                                     INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE      V       H        X        Y      AREA        IXX         IYY    STORE
           RECALL  1                                17.00     3.63   55.54      343.63     4987.14

              AREA           CENTROID LOCATION          MOMENT OF INERTIA ABOUT CENTROID
                                 X         Y                  X-X                Y-Y
              55.54            17.00      3.63              343.63             4987.14


IDENT  14T 07 03                  FRAME SYSTEM                  MAY, 02, 1975                PAGE  3

SECTION PROPERTIES

LINE MEM    LOC  RECALL        X        Y        SUPERSTRUCTURE       SLAB THICKNESS   INT. GIRDER       STORE
                                                  WIDTH   DEPTH        TOP    BOTTOM    NO.  WEB
0030   1   162.0               0.0      0.0        34.0    6.50        6.75    8.00      2   12.              02

                         LT. EXT. GIRDER      RT. EXT. GIRDER      LT. OVERHANG          RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                         0    12.   0.0       0    12.   0.0       3.5    7.    11.     3.5    7.    11.

              AREA           CENTROID LOCATION          MOMENT OF INERTIA ABOUT CENTROID
                                 X         Y                  X-X                Y-Y
              59.65            17.00      3.41              381.06             5224.21


MEMBER  1 PROPERTIES

                        LENGTH          MIN INERTIA          STIFFNESS              CARRY OVER
                                                            LT        RT           LT        RT
                        162.0             343.63          4.021     4.098        0.509     0.499
```

OUTPUT   Sample Problem 3

```
IDENT  141 07 03                    FRAME SYSTEM                    MAY. 02, 1975                    PAGE   4

SECTION PROPERTIES

LINE MEM    LOC  RECALL        X        Y         SUPERSTRUCTURE       SLAB THICKNESS   INT. GIRDER       STORE
                                                  WIDTH    DEPTH       TOP     BOTTOM     NO.  WEB
0040   2     0.0   02         0.0      0.0         0.0      0.0        0.0      0.0       0    0.

                    LT. EXT. GIRDER      RT. EXT. GIRDER      LT. OVERHANG          RT. OVERHANG
                    TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                     0     0.    0.0      0     0.    0.0      0.0     0.    0.      0.0     0.    0.
LINE                      +                                            INERTIAS OF PARTS
 NO. MEM    LOC  RECALL = CODE       V        H        X        Y      AREA        IXX        IYY   STORE
          RECALL  2                                  17.00     3.41    59.85      381.06    5224.21

             AREA              CENTROID LOCATION             MOMENT OF INERTIA ABOUT CENTROID
                                  X        Y                       X-X              Y-Y
            59.85               17.00     3.41                    381.06           5224.25


LINE MEM    LOC  RECALL        X        Y         SUPERSTRUCTURE       SLAB THICKNESS   INT. GIRDER       STORE
                                                  WIDTH    DEPTH       TOP     BOTTOM     NO.  WEB
0050   2    22.0   01         0.0      0.0         0.0      0.0        0.0      0.0       0    0.

                    LT. EXT. GIRDER      RT. EXT. GIRDER      LT. OVERHANG          RT. OVERHANG
                    TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                     0     0.    0.0      0     0.    0.0      0.0     0.    0.      0.0     0.    0.
LINE                      +                                            INERTIAS OF PARTS
 NO. MEM    LOC  RECALL = CODE       V        H        X        Y      AREA        IXX        IYY   STORE
          RECALL  1                                  17.00     3.63    55.54      343.63    4987.14

             AREA              CENTROID LOCATION             MOMENT OF INERTIA ABOUT CENTROID
                                  X        Y                       X-X              Y-Y
            55.54               17.00     3.63                    343.63           4987.16



IDENT  141 07 03                    FRAME SYSTEM                    MAY. 02, 1975                    PAGE   5

SECTION PROPERTIES

LINE MEM    LOC  RECALL        X        Y         SUPERSTRUCTURE       SLAB THICKNESS   INT. GIRDER       STORE
                                                  WIDTH    DEPTH       TOP     BOTTOM     NO.  WEB
0060   2   150.0   01         0.0      0.0         0.0      0.0        0.0      0.0       0    0.

                    LT. EXT. GIRDER      RT. EXT. GIRDER      LT. OVERHANG          RT. OVERHANG
                    TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                     0     0.    0.0      0     0.    0.0      0.0     0.    0.      0.0     0.    0.
LINE                      +                                            INERTIAS OF PARTS
 NO. MEM    LOC  RECALL = CODE       V        H        X        Y      AREA        IXX        IYY   STORE
          RECALL  1                                  17.00     3.63    55.54      343.63    4987.14

             AREA              CENTROID LOCATION             MOMENT OF INERTIA ABOUT CENTROID
                                  X        Y                       X-X              Y-Y
            55.54               17.00     3.63                    343.63           4987.16

MEMBER  2 PROPERTIES

                    LENGTH            MIN INERTIA            STIFFNESS               CARRY OVER
                                                           LT          RT           LT         RT
                    150.0               343.63            4.105       4.023        0.499      0.509



IDENT  141 07 03                    FRAME SYSTEM                    MAY. 02, 1975                    PAGE   6

FRAME DIAGNOSTICS

     NO ERRORS FOUND

FRAME PROPERTIES
```

MEM NO	JT LT	JT RT	END COND LT	END COND RT	DIR	SPAN	I	SUPPORT OR HINGE	E	CARRY OVER FACTORS LT	CARRY OVER FACTORS RT	DISTRIBUTION FACTORS LT	DISTRIBUTION FACTORS RT
1	1	2	R		G	162.0	343.63	0.0	750.	0.509	0.0	0.0	0.254
2	2	3		R	G	150.0	343.63	0.0	750.	0.0	0.509	0.275	0.0
3	4	2				28.0	84.00	0.0	750.	0.500	0.500	0.0	0.471

OUTPUT

Sample Problem 2

IDENT 141 07 02 FRAME SYSTEM MAY, 02, 1975 PAGE 27

LL NO. 2. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 1	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	314.6	265.6	218.4	173.8	132.3	94.8	61.9	34.5	12.1	9.0	9.0
MOMENT	0.0	3166.9	5241.7	6255.3	6352.1	5689.6	4456.6	2881.3	1164.2	971.4	1079.5
NEG. V	-34.1	-34.1	-40.0	-72.8	-117.7	-165.5	-210.9	-253.4	-292.1	-326.4	-355.6
MOMENT	0.0	-408.7	2795.6	4264.8	5583.4	6072.7	5583.0	4256.5	2268.5	-172.5	-2624.2
RANGE	348.6	299.6	258.5	246.6	250.1	260.3	272.9	287.7	304.2	335.4	364.6

LL NO. 2. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 2	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	352.3	318.7	278.6	234.3	187.9	141.7	97.6	58.0	25.3	25.3	25.3
MOMENT	-3202.2	5.4	2911.9	5133.4	6424.9	6680.3	5932.0	4351.3	129.2	533.4	937.7
NEG. V	-40.6	-40.6	-40.6	-52.5	-89.8	-132.4	-178.1	-224.7	-270.0	-312.0	-348.3
MOMENT	1627.9	977.6	327.4	4092.1	5723.8	6624.9	6571.1	5477.2	3396.5	521.1	-2818.0
RANGE	393.0	359.3	319.3	286.8	277.7	274.0	275.7	282.7	295.3	337.2	373.6

LL NO. 2. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 3	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	352.6	318.9	278.5	233.8	187.0	140.5	96.6	57.6	26.5	26.5	26.5
MOMENT	-3263.0	380.9	3675.9	6168.0	7574.5	7784.1	6657.0	5024.3	262.1	753.0	1243.8
NEG. V	-25.0	-25.0	-26.7	-59.3	-98.9	-143.2	-189.9	-236.5	-280.9	-320.7	-353.6
MOMENT	1147.2	685.2	2753.6	5117.6	6927.5	7800.8	7523.3	6052.4	3510.8	216.4	-3377.5
RANGE	377.6	343.9	305.2	293.1	288.0	283.7	286.5	294.1	307.5	347.3	380.1

IDENT 141 07 02 FRAME SYSTEM MAY, 02, 1975 PAGE 28

LL NO. 2. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 4	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	357.3	328.8	295.4	257.6	216.3	172.2	125.8	77.9	38.8	35.1	35.1
MOMENT	-2840.6	254.0	3114.2	5455.9	7039.4	7667.2	7181.9	5464.4	3240.0	-491.1	0.0
NEG. V	-6.1	-6.1	-15.7	-39.7	-69.1	-103.4	-141.8	-183.7	-228.3	-275.0	-323.1
MOMENT	859.7	773.7	1761.6	3888.3	5804.1	7237.6	7942.8	7715.4	6392.5	3849.9	0.0
RANGE	363.4	335.0	311.1	297.3	285.4	275.6	267.7	261.6	267.1	310.1	358.2

IDENT 141 07 02 FRAME SYSTEM MAY, 02, 1975 PAGE 29

LL NO. 2. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 1	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	965.1	742.3	521.3	302.8	87.6	-123.8	-351.0	-552.5	-748.5	-925.4	-1099.2
NEG. V	616.5	442.6	262.8	56.2	-162.5	-384.1	-623.9	-840.1	-1052.7	-1260.8	-1463.8

LL NO. 2. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 2	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	1456.9	1193.4	921.6	645.5	367.4	89.3	-207.0	-478.4	-742.9	-974.6	-1206.4
NEG. V	1065.9	834.1	602.3	358.8	89.6	-184.7	-462.7	-761.1	-1038.2	-1311.9	-1560.0

LL NO. 2. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 3	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	1798.8	1374.5	1066.2	753.4	438.7	124.2	-208.2	-515.2	-814.2	-1082.2	-1350.2
NEG. V	1421.2	1030.6	761.0	460.3	152.7	-159.5	-494.7	-809.3	-1121.7	-1429.5	-1730.4

LL NO. 2. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 4	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	1762.2	1522.6	1275.0	1019.9	758.1	490.3	192.6	-85.3	-357.4	-597.3	-836.6
NEG. V	1398.7	1187.7	963.9	722.6	472.6	214.7	-75.1	-346.9	-624.5	-907.4	-1194.8

IDENT 101 07 02 FRAME SYSTEM MAY, 02, 1975 PAGE 30

LL NO. 2. LIVE LOAD SUPPORT RESULTS

		MAX. AXIAL LOAD			MAX. LONGITUDINAL MOMENT		
		AXIAL LOAD	------MOMENT------ TOP	BOT.	AXIAL LOAD	------MOMENT------ TOP	BOT.
SUPPORT JT. 1							
	POSITIVE	314.6	0.	0.	0.0	0.	0.
	NEGATIVE	-34.1	0.	0.	0.0	0.	0.
MEMBER 5							
	POSITIVE	363.6	-455.	227.	290.3	1785.	-893.
	NEGATIVE	-49.6	548.	-274.	289.6	-2076.	1038.
MEMBER 6							
	POSITIVE	379.2	-396.	198.	272.8	1702.	-851.
	NEGATIVE	-31.8	330.	-165.	260.6	-1965.	982.
MEMBER 7							
	POSITIVE	361.3	439.	-219.	277.8	2194.	-1097.
	NEGATIVE	-32.7	-384.	192.	282.6	-1892.	946.
SUPPORT JT. 5							
	POSITIVE	323.1	0.	0.	0.0	0.	0.
	NEGATIVE	-35.1	0.	0.	0.0	0.	0.

THE RATIO OF SUBSTRUCTURE / SUPERSTRUCTURE LOADING IS 1.000

***** BATCH TOTALS 26 FRAME UNITS 12 L.L. UNITS 0 PLOT UNITS 0 PRESTRESS UNITS COST= $ 6.32

SAMPLE PROBLEM 3

PROBLEM

A. General

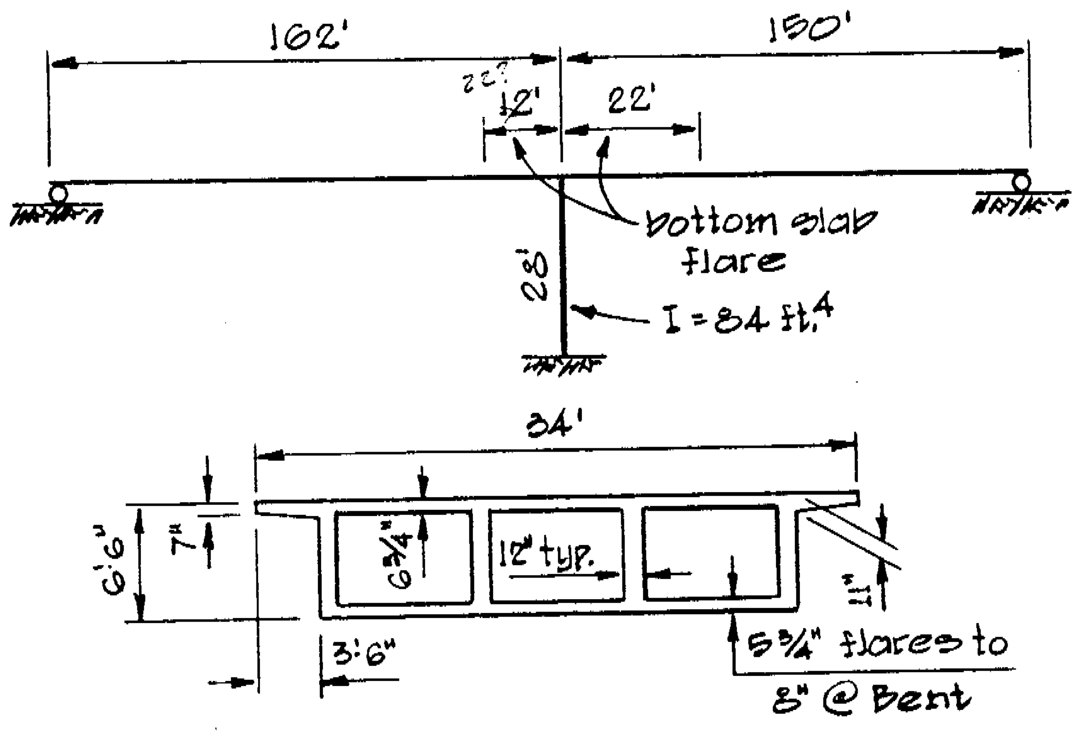
Two-span bridge with no expansion joints. Span properties to be computed by program. Influence lines for moment and shear to be automatically printed and plotted. Moment and shear diagram envelopes to be printed and plotted for AASHTO HS20-44 loading.

B. Section Properties

Column prismatic as coded on Frame Description form. Superstructure cross-section varies with a bottom slab flare near the bent as coded on Superstructure Sections input form. (See fig. 7)

C. Loading

Dead load of diaphragms as coded on Load Data form trial 00. Live load of 2.43 lanes of AASHTO HS20-44 without alternative.



DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - FRAME DESCRIPTION

DS-D93 (REV 2 75)

BDEOAA

Page *1* of *4*

Name *Example #3*

Phone

IDENT. DIST. GR. BATCH PROB.	SOURCE DIST UNIT	CHARGE DIST UNIT	EXPENDITURE AUTHORIZATION	SPECIAL DESIGNATION WHEN APPLICABLE	PROGRAM NUMBER
14T 0703	14033	14033	910002		BDE035
S/C 2091, 7310	S/C 2091				

Update Code	Line No.	Member No.	End Joint No Lt.	End Joint No Rt.	End Condition Lt.	End Condition Rt.	Direction	Length ft.	Min. I ft⁴	Hinge Location or Support Width ft	Dead Load Uniform k/ft.	Unit Wt pcf	-K- Stiffness Factor Lt.	-K- Stiffness Factor Rt.	-C- Carry Over Factor Lt.	-C- Carry Over Factor Rt.	Recall Member	Reverse R	DL Deflections	Sidesway S
		1	1	2		R	H	1620				150								
		2	2	3		R	H	1500				150								
		3	4	2				280	8400											

S. C 7310

END CONDITION
C Cantilever
P - Pin
R = Roller

DIRECTION
G or H = Horizontal

Rt
Lt
Rt.
Hinge Location
Lt.

DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - SUPERSTRUCTURE SECTIONS

DS D112 (REV 4/75)

BDEOAA

Page *2* of *4*

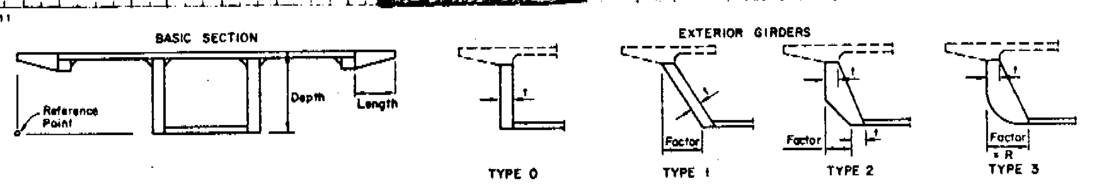
Name *Example #3*

Phone

IDENT DIST GROUP BATCH PROB.	SOURCE DIST UNIT	CHARGE DIST UNIT	EXPENDITURE AUTHORIZATION	SPECIAL DESIGNATION WHEN APPLICABLE	PROGRAM NUMBER
14T 0703					BDE035
S/C 2091, 7311	S/C 2091				

Update Code	Line No.	Member No.	Cross Section Location (FT)	Recall	Ref. Pt. Coord. X (FT)	Ref. Pt. Coord. Y (FT)	S.S. Data Width E.D.-E.D. (FT)	S.S. Data (obscured columns)	Bottom Thick (IN.)	Int Girders (obscured)	Ext. Girders Left Web Thick (IN)	Left Factor (FT)	Right Type	Right Web Thick (IN)	Right Factor (FT)	Overhangs Left Length (FT)	Left Ext Thick (IN)	Left Int Thick (IN)	Right Length (FT)	Right Ext Thick (IN)	Right Int Thick (IN)	Store
		1	00				340	6[illegible]75	575	2[illegible]	12		0	12		35	7	11	35	7	11	01
		1	1400	01																		
		1	1620				340	6[illegible]	[illegible]00	2[illegible]	2012		0	12		35	7	11	35	7	11	02
		2	00	02																		
		2	2200	01																		
		2	1500	01																		

S/C 7311



OUTPUT — Sample Problem I

*** SIDESWAY NOT CONSIDERED, ***

HORIZONTAL MEMBER MOMENTS TRIAL 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-54.	-109.	-163.	-217.	-271.	-326.	-380.	-434.	-488.	-543.
2	-1187.	-593.	0.	273.	355.	292.	166.	39.	-87.	-214.	-340.
3	-156.	-140.	-124.	-109.	-93.	-78.	-62.	-47.	-31.	-16.	0.

WARNING - MEMBER DEPTHS WERE NOT USED FOR ALL MEMBERS SO STRESSES WERE NOT CALC.

VERTICAL MEMBER MOMENTS TRIAL 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
4	322.	225.	129.	32.	-64.	-161.	-258.	-354.	-451.	-548.	-644.
5	-92.	-65.	-37.	-9.	18.	46.	74.	102.	129.	157.	185.

HORIZONTAL MEMBER SHEARS TRIAL 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	-7.2	-7.2	-7.2	-7.2	-7.2	-7.2	-7.2	-7.2	-7.2	-7.2	-7.2
2	59.3	59.3	59.3	27.3	-4.7	-12.7	-12.7	-12.7	-12.7	-12.7	-12.7
3	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1

VERTICAL MEMBER SHEARS TRIAL 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
4	-32.2	-32.2	-32.2	-32.2	-32.2	-32.2	-32.2	-32.2	-32.2	-32.2	-32.2

Pages 12, 13 & 14 provide moments, shears, deflections, rotations and reactions for load trial 1. Deflections and rotations at tenth points along the horizontal members were requested on the Load Data form.

*** SIDESWAY NOT CONSIDERED, ***

VERTICAL MEMBER SHEARS TRIAL 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
5	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2	9.2

VERTICAL MEMBER REACTIONS TRIAL 1

MEM NO	LT REACTION	RT REACTION	MEMBER WEIGHT
4	66.6	66.6	
5	14.7	14.7	

```
IDENT  141 07 01                        FRAME SYSTEM                       MAY. 01, 1975                     PAGE  14

TRIAL  1

TANGENTIAL ROTATIONS - RADIANS - CLOCKWISE POSITIVE
   SPAN     LT. END      RT. END      SPAN     LT. END       RT. END      SPAN     LT. END      RT. END

     1     -0.002930    0.004474       2      0.004474     -0.001263       3     -0.001263     0.000840

     4     -0.000000    0.004474       5      0.000000     -0.001283

HORIZONTAL MEMBER DEFLECTIONS IN FEET AT 1/10 POINTS FROM LEFT END - DOWNWARD POSITIVE

     MEMBER  1     E=  750.      0.0           -0.022         -0.042         -0.060         -0.073         -0.081
                                -0.081         -0.073         -0.057         -0.031          0.0

     MEMBER  2     E=  750.      0.0            0.051          0.109          0.105          0.097          0.084
                                 0.068          0.051          0.032          0.015          0.0

               LONG HINGE      LT       1/4      1/2      3/4     RT
                              0.109    0.097    0.068    0.032   0.0

     MEMBER  3     E=  750.      0.0           -0.009         -0.016         -0.021         -0.023         -0.023
                                -0.021         -0.017         -0.012         -0.006          0.0

VERTICAL MEMBER DEFLECTIONS IN FEET AT 1/10 POINTS FROM LEFT END.

     MEMBER  4     E=  750.      0.0           -0.001         -0.004         -0.008         -0.013         -0.017
                                -0.019         -0.020         -0.017         -0.011          0.0

     MEMBER  5     E=  750.      0.0            0.000          0.001          0.002          0.004          0.005
                                 0.006          0.006          0.005          0.003          0.0

***** BATCH TOTALS      32 FRAME UNITS    0 L.L. UNITS    0 PLOT UNITS    0 PRESTRESS UNITS  COST= $  0.64
```

SAMPLE PROBLEM 2

PROBLEM

A. General

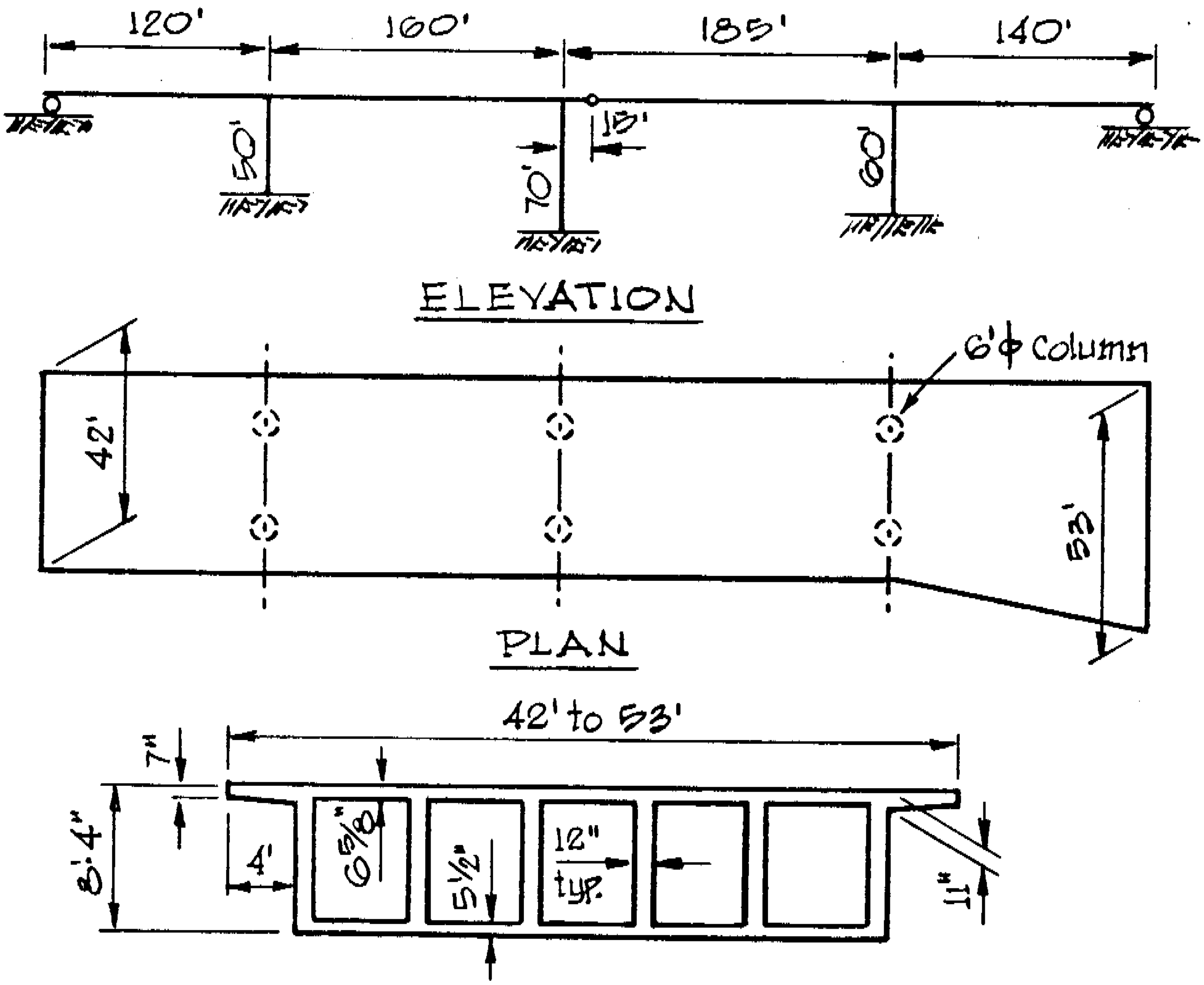
Four-span bridge with one expansion joint. Span properties to be computed by program.

B. Section Properties

Columns prismatic as coded on Frame Description form. Superstructure cross-section varies as per figure 6 and coded on Superstructure Sections input form.

C. Loading

Dead load of diaphragms, AC surfacing, and hinge as coded on Load Data form trial 00. Live loading as coded on Superstructure Live Load form.



Sample Problem 2

DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - FRAME DESCRIPTION

DS-D93 (REV 2 75)

BDEOAA

Page 1 of 4

Name *Example #2*

Phone

IDENT (DIST. GR. BATCH PROB.)	SOURCE (DIST UNIT)	CHARGE (DIST UNIT)	EXPENDITURE AUTHORIZATION	SPECIAL DESIGNATION WHEN APPLICABLE	PROGRAM NUMBER
14T 0702	14033	14033	910002		BDE035

S/C 2081, 7310 — S/C 2091

Code	Line No.	Member No.	End Joint No. Lt.	End Joint No. Rt.	End Condition Lt. Rt.	Direction	Length ft.	Min. I ft⁴	Hinge Location or Support Width ft	Dead Load Uniform k/ft.	Unit Wt. pcf	K Stiffness Factor Lt.	K Stiffness Factor Rt.	C Carry Over Factor Lt.	C Carry Over Factor Rt.	Recall Member	Recall Reverse	D.L. Deflections	Sidesway
		1	1	2	R	G	1200			360	150								S
		2	2	3		G	1600			↓	↓								
		3	3	4		G	1850												
		4	4	5	R	G	1400												
		5	6	2			500	12724											
		6	7	3			700	↓											
		7	8	4			600												

S/C 7310

END CONDITION: C = Cantilever, P = Pin, R = Roller

DIRECTION: G or H = Horizontal

Lt. Rt. Hinge Location

DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - SUPERSTRUCTURE SECTIONS

DS 0112 (REV 4/75)

BDEOAA

Page 2 of 4

Name *Example #2*

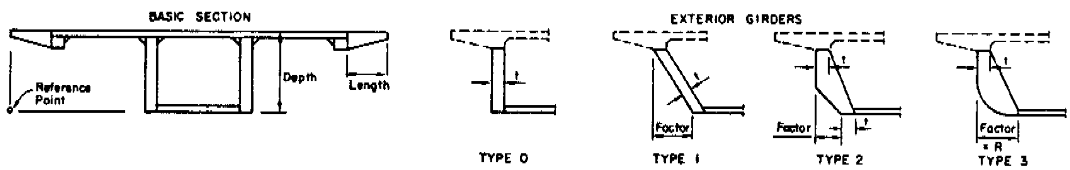
Phone

IDENT (DIST GROUP BATCH PROB.)	SOURCE (DIST. UNIT)	CHARGE (DIST. UNIT)	EXPENDITURE AUTHORIZATION	SPECIAL DESIGNATION WHEN APPLICABLE	PROGRAM NUMBER
14T 0702					BDE035

S/C 2091, 7311 — S/C 2091

Code	Line No	Member No.	Cross Section Location (FT)	Recall	Ref. Pt. Coord X (FT)	Ref. Pt. Coord Y (FT)	S.S Data Width E.D.-E.D. (FT)	S.S Data (other columns)	Int Girders	Ext. Girders Left Web Thick (IN)	Left Factor (FT)	Right Type	Right Web Thick (IN)	Right Factor (FT)	Overhangs Left Length (FT)	Left Ext. Thick (IN)	Left Int. Thick (IN)	Right Length (FT)	Right Ext Thick (IN)	Right Int Thick (IN)	Store
		01					420	8[illegible] [illegible]63 550 [illegible]							40			40			01
		02		01																	
		03		01																	
		04					420	8[illegible]							40			40			
		04	1400				530	8[illegible] [illegible]50 [illegible] [illegible]12							40			40			

S/C 7311



TYPE 9 MEANS NO EXTERIOR GIRDER

INPUT

Sample Problem 2

DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - LOAD DATA

DS 095 (REV 2-75)

BDEOAA

Page 3 of 4

Name *Example #2*

Phone

IDENT: DIST. 14 GR. T BATCH 07 PROB. 02 — S C 7316

* CODE
L - Max. W on left
R = Max. W on right
U = Uniform Load
P = Point Load

SIGN CONVENTIONS — DIMENSIONS (Lt, A, B, Rt)

Update CODE	Line No.	Trial No.	Member No.	W or P k/ft or k	Code*	A ft.	B ft	FEMs* Left ft-k	FEMs* Right ft-k	Deflections	Sidesway	Comments
			0001	20500	P	600						DI AP
			02		P	800						DIAP
			03		P	1000						DIAP
			03	122600	P	0150						HINGE
			04	24600	P	700						DIAP
			01	1400	U							AC SURFACING
			02									
			03									
			04									
			04	0385	R							

S/C 7316

*When FEMs are given, they are not calculated for any load on that member.

DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - SUPERSTRUCTURE LIVE LOAD

DS-D125 (REV 2-75)

BDEOAA

IDENT: DIST. 14 GR. T BATCH 07 PROB. 02 — S/C 7320, 7321

Page 4 of 4

Name *Example #2*

Phone

MEMBER DATA

Update CODE	Line No	Member No.	Superstructure Lt. End	Superstructure Rt. End	Substructure Lt.	Substructure Rt.	Resisting Moment of Unit Steel Positive	Negative	Moment & Steel	Influence Lines	✓ P-13	COMMENTS
		01	3.0		2.7							EMPTY CREEK BRIDGE
		04		3.7 2.6		3.0						

S/C 7320

Frame Description data with the horizontal members numbered consecutively starting with 01 must accompany this data.

Member Data – When the Number of L.L. Lanes is given, it must be given for the left end of Superstructure Member 01. (Substructure Member 01 defaults to 1.0 when left blank.) Thereafter it is assumed to be constant until another entry is made.

Live Load Data – For AASHO HS20-44 loading, leave Truck and Lane data blank for L.L. No. 1. When this data is given, it replaces the HS20-44 loading. An entry for the Number of Live Load Lanes, overrides that given as Member Data. Data entries for L.L. No.'s 2 and 3 produce separate results in addition to L.L. No. 1.

Influence Lines – When checked, a plot of the influence lines will be produced along with the printed results.

LIVE LOAD DATA

Update CODE	Line No.	L.L. No.	Truck P1 Kips	D1 Ft.	P2 Kips	D2 Ft.	P3 Kips	Lane Uniform Kips/ft	Moment Rider Kips	Shear Rider Kips	No Impact	Number of Live Load Lanes	COMMENTS
		1											
		2	7.00	13.0	13.00	28.0	13.00					1.00	CONSTRUCTION LOAD
		3											

S/C 7321

OUTPUT   Sample Problem 2

IDENT 14T 07 02 FRAME SYSTEM MAY. 02, 1975 PAGE 1

FRAME DESCRIPTION

LINE NO.	MEM NO	JOINT NO. LT	JOINT NO. RT	END COND LT	END COND RT	DIR	SPAN	I	SUPPORT OR HINGE	E	DEAD LOAD UNIFORM	DEAD LOAD SEC	K LT	K RT	CARRY OVER FACTORS LT	CARRY OVER FACTORS RT	RECALL MEM
0010	1	1	2	R		G	120.0	0.0	0.0	0.	0.360	150.	0.0	0.0	0.0	0.0	
0020	2	2	3			G	160.0	0.0	0.0	0.	0.360	150.	0.0	0.0	0.0	0.0	
0030	3	3	4			G	185.0	0.0	0.0	0.	0.360	150.	0.0	0.0	0.0	0.0	
0040	4	4	5		R	G	140.0	0.0	0.0	0.	0.360	150.	0.0	0.0	0.0	0.0	
0050	5	6	2				50.0	127.24	0.0	0.	0.0	0.	0.0	0.0	0.0	0.0	
0060	6	7	3				70.0	127.24	0.0	0.	0.0	0.	0.0	0.0	0.0	0.0	
0070	7	8	4				60.0	127.24	0.0	0.	0.0	0.	0.0	0.0	0.0	0.0	

IDENT 14T 07 02 FRAME SYSTEM MAY. 02, 1975 PAGE 2

SECTION PROPERTIES

LINE	MEM	LOC	RECALL	X	Y	SUPERSTRUCTURE WIDTH	SUPERSTRUCTURE DEPTH	SLAB THICKNESS TOP	SLAB THICKNESS BOTTOM	INT. GIRDER NO.	INT. GIRDER WEB	STORE
0010	1	0.0		0.0	0.0	42.0	8.33	6.63	5.50	4	12.	01

LT. EXT. GIRDER TYPE	LT. EXT. GIRDER WEB	LT. EXT. GIRDER FACTOR	RT. EXT. GIRDER TYPE	RT. EXT. GIRDER WEB	RT. EXT. GIRDER FACTOR	LT. OVERHANG LENGTH	LT. OVERHANG EXT.	LT. OVERHANG INT.	RT. OVERHANG LENGTH	RT. OVERHANG EXT.	RT. OVERHANG INT.
0	12.	0.0	0	12.	0.0	4.0	7.	11.	4.0	7.	11.

*** SOME OF THE ABOVE DATA HAS BEEN ASSUMED. ***

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y
84.64	21.00	4.57	801.52	11086.41

MEMBER 1 PROPERTIES

LENGTH	MIN INERTIA	STIFFNESS LT	STIFFNESS RT	CARRY OVER LT	CARRY OVER RT
120.0	801.52	4.000	4.000	0.500	0.500

Page 2 reports the member properties of the first horizontal member. Default values are provided by the program for exterior girders with a type Ø girder 12 inches thick as the assumed data. Left and right deck overhangs are specified as being four feet long with thickness of 7 inches at edge of deck and 11 inches at the edge of the exterior girder. Pages 3 and 4 provide similar data except the properties of the members have been recalled from member 1.

OUTPUT   Sample Problem 2

```
IDENT  141 07 02                    FRAME SYSTEM                    MAY, 02, 1975                  PAGE    3

SECTION PROPERTIES

LINE MEM     LOC   RECALL       X        Y          SUPERSTRUCTURE        SLAB THICKNESS    INT. GIRDER       STORE
                                                    WIDTH   DEPTH         TOP     BOTTOM     NO.  WEB
0020   2      0.0    01        0.0      0.0          0.0     0.0          0.0      0.0        0    0.

                      LT. EXT. GIRDER       RT. EXT. GIRDER       LT. OVERHANG          RT. OVERHANG
                      TYPE  WEB  FACTOR     TYPE  WEB  FACTOR    LENGTH  EXT.  INT.    LENGTH  EXT.  INT.
                       0     0.   0.0        0     0.   0.0       0.0     0.    0.       0.0    0.    0.
LINE                       +                                                INERTIAS OF PARTS
 NO. MEM     LOC  RECALL - CODE       V       H        X         Y       AREA        IXX        IYY     STORE
           RECALL  1                                 21.00      4.57    84.84      801.52   11086.41

            AREA              CENTROID LOCATION              MOMENT OF INERTIA ABOUT CENTROID
                                 X         Y                     X-X             Y-Y
           84.84               21.00      4.57                 801.52          11086.45


MEMBER  2 PROPERTIES

                        LENGTH          MIN INERTIA           STIFFNESS                 CARRY OVER
                                                            LT          RT            LT          RT
                        160.0             801.52           4.000       4.000         0.500       0.500
```

```
IDENT  141 07 02                    FRAME SYSTEM                    MAY, 02, 1975                  PAGE    4

SECTION PROPERTIES

LINE MEM     LOC   RECALL       X        Y          SUPERSTRUCTURE        SLAB THICKNESS    INT. GIRDER       STORE
                                                    WIDTH   DEPTH         TOP     BOTTOM     NO.  WEB
0030   3      0.0    01        0.0      0.0          0.0     0.0          0.0      0.0        0    0.

                      LT. EXT. GIRDER       RT. EXT. GIRDER       LT. OVERHANG          RT. OVERHANG
                      TYPE  WEB  FACTOR     TYPE  WEB  FACTOR    LENGTH  EXT.  INT.    LENGTH  EXT.  INT.
                       0     0.   0.0        0     0.   0.0       0.0     0.    0.       0.0    0.    0.
LINE                       +                                                INERTIAS OF PARTS
 NO. MEM     LOC  RECALL - CODE       V       H        X         Y       AREA        IXX        IYY     STORE
           RECALL  1                                 21.00      4.57    84.84      801.52   11086.41

            AREA              CENTROID LOCATION              MOMENT OF INERTIA ABOUT CENTROID
                                 X         Y                     X-X             Y-Y
           84.84               21.00      4.57                 801.52          11086.45


MEMBER  3 PROPERTIES

                        LENGTH          MIN INERTIA           STIFFNESS                 CARRY OVER
                                                            LT          RT            LT          RT
                        185.0             801.52           4.000       4.000         0.500       0.5
```

```
IDENT  14T 07 02                        FRAME SYSTEM                    MAY, 02, 1975                  PAGE    5

SECTION PROPERTIES

LINE MEM     LOC  RECALL         X         Y          SUPERSTRUCTURE        SLAB THICKNESS   INT. GIRDER       STORE
                                                      WIDTH    DEPTH        TOP     BOTTOM     NO.  WEB
0040    4      0.0              0.0       0.0          42.0    8.35         7.50     6.00       4   12.

                          LT. EXT. GIRDER      RT. EXT. GIRDER       LT. OVERHANG          RT. OVERHANG
                         TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.    LENGTH  EXT.  INT.
                          0    12.   0.0       0    12.   0.0       4.0    7.    11.      4.0    7.    11.
    ***  SOME OF THE ABOVE DATA HAS BEEN ASSUMED. ***

               AREA            CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                                   X          Y                    X-X                 Y-Y
              88.03              21.00      4.59                 841.20             11373.28


LINE MEM     LOC  RECALL         X         Y          SUPERSTRUCTURE        SLAB THICKNESS   INT. GIRDER       STORE
                                                      WIDTH    DEPTH        TOP     BOTTOM     NO.  WEB
0050    4    140.0              0.0       0.0          53.0    8.33         7.50     6.00       4   12.

                          LT. EXT. GIRDER      RT. EXT. GIRDER       LT. OVERHANG          RT. OVERHANG
                         TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.    LENGTH  EXT.  INT.
                          0    12.   0.0       0    12.   0.0       4.0    7.    11.      4.0    7.    11.
    ***  SOME OF THE ABOVE DATA HAS BEEN ASSUMED. ***

               AREA            CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                                   X          Y                    X-X                 Y-Y
             100.41              26.50      4.58                1025.90             21970.50



IDENT  14T 07 02                        FRAME SYSTEM                    MAY, 02, 1975                  PAGE    6

MEMBER  4 PROPERTIES

                         LENGTH          MIN INERTIA          STIFFNESS                 CARRY OVER
                                                             LT          RT            LT         RT
                         140.0             841.20          4.211       4.650         0.525      0.475
```

Pages 5 & 6 reports the member properties of horizontal member 4. At the left end of member 4 the cross section properties are coded for location Ø.Ø. The right end of member 4 is described for location 140.Ø. The program calculates the member properties by assuming a straight line variation of cross section properties from location ØØ to location 140.Ø.

OUTPUT Sample Problem 2

FRAME DIAGNOSTICS

NO ERRORS FOUND

FRAME PROPERTIES

MEM NO	JT LT	JT RT	END COND LT	END COND RT	DIR	SPAN	I	SUPPORT OR HINGE	E	CARRY OVER FACTORS LT	CARRY OVER FACTORS RT	DISTRIBUTION FACTORS LT	DISTRIBUTION FACTORS RT
1	1	2	H		G	120.0	801.52	0.0	750.	0.500	0.0	0.0	0.399
2	2	3			G	160.0	801.52	0.0	750.	0.500	0.500	0.399	0.449
3	3	4			G	165.0	801.52	0.0	750.	0.500	0.500	0.388	0.367
4	4	5		H	G	140.0	841.20	0.0	750.	0.0	0.475	0.424	0.0
5	6	2				50.0	127.24	0.0	750.	0.500	0.500	0.0	0.203
6	7	3				70.0	127.24	0.0	750.	0.500	0.500	0.0	0.163
7	8	4				60.0	127.24	0.0	750.	0.500	0.500	0.0	0.169

LOAD DATA TRIAL 0

LINE	MEM	W OR P	LOAD CODE	A	B	FIXED END MOMENTS LEFT	FIXED END MOMENTS RIGHT	DEFLT	COMMENTS
0020	1	1.400	U	0.0	0.0	0.	0.		AC SURFACING
				ASSUMED DATA	120.0				
0010	1	20.500	P	60.0	0.0	0.	0.		DIAP
0040	2	20.500	P	80.0	0.0	0.	0.		DIAP
0030	2	1.400	U	0.0	0.0	0.	0.		AC SURFACING
				ASSUMED DATA	160.0				
0060	3	20.500	P	100.0	0.0	0.	0.		DIAP
0050	3	1.400	U	0.0	0.0	0.	0.		AC SURFACING
				ASSUMED DATA	165.0				
0070	3	122.600	P	15.0	0.0	0.	0.		HINGE
0100	4	1.400	U	0.0	0.0	0.	0.		AC SURFACING
				ASSUMED DATA	140.0				
0090	4	0.365	H	0.0	0.0	0.	0.		AC SURFACING
				ASSUMED DATA	140.0				
0080	4	24.600	P	70.0	0.0	0.	0.		DIAP

FIXED END MOMENTS TRIAL 0

MEM NO	FIXED END MOMENTS LT	FIXED END MOMENTS RT	MEM NO	FIXED END MOMENTS LT	FIXED END MOMENTS RT	MEM NO	FIXED END MOMENTS LT	FIXED END MOMENTS RT
1	0.	-26535.	2	-31312.	-31312.	3	-43301.	-41959.
4	-38650.	0.	5	0.	0.	6	0.	0.
7	0.	0.						

Page 8 reports the load data input and fixed end moment output for Load Data Trial Ø. This loading is additive to the uniform loads generated by the program from the uniform dead load and the unit weight specified on the Frame Description form.

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SIDESWAY DIAGNOSTICS

NO ERRORS FOUND

RESULTS OF 1 INCH SWAY TO THE RIGHT

VERTICAL MEMBER	SHEAR (KIPS)	MOMENTS (FT-KIPS) LT	RT
5	375.8	-9928.	8863.
6	152.9	-5437.	5265.
7	220.3	-6950.	6267.

BASED ON E = 3000 KSI

Page 9 reports the moments and shears for a one inch movement to the right of the described frame. The output is a result of the entry "S" on the Frame Description form. All succeeding output labeled "Sidesway Included" will include the effects of sidesway in the moments, shears and reactions.

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*** SIDESWAY INCLUDED, ***

HORIZONTAL MEMBER MOMENTS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	6763.	11441.	14032.	14538.	12958.	9046.	3047.	-5037.	-15206.	-27462.
2	-27511.	-11661.	481.	6914.	13639.	14656.	11636.	4909.	-5527.	-19671.	-37524.
3	-39394.	-15548.	1502.	13595.	20729.	22906.	19900.	11763.	-1293.	-19326.	-42316.
4	-40982.	-22787.	-7570.	4626.	13757.	19780.	22305.	21633.	17722.	10525.	0.

HORIZONTAL MEMBER STRESSES TRIAL 0 BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-268.	-453.	-556.	-576.	-513.	-358.	-121.	199.	602.	1087.
2	1089.	462.	-19.	-353.	-540.	-580.	-461.	-194.	219.	779.	1485.
3	1560.	615.	-59.	-538.	-821.	-907.	-788.	-466.	51.	765.	1675.
4	1552.	844.	275.	-164.	-479.	-675.	-746.	-710.	-571.	-333.	0.

HORIZONTAL MEMBER STRESSES TRIAL 0 TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	220.	373.	457.	474.	422.	295.	99.	-164.	-495.	-895.
2	-896.	-360.	16.	290.	444.	478.	379.	160.	-180.	-641.	-1223.
3	-1284.	-507.	49.	443.	675.	746.	646.	384.	-42.	-630.	-1379.
4	-1266.	-689.	-224.	134.	391.	551.	609.	580.	466.	272.	0.

OUTPUT Sample Problem 2

*** SIDESWAY INCLUDED, ***

VERTICAL MEMBER MOMENTS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
5	-186.	-173.	-159.	-145.	-131.	-118.	-104.	-90.	-77.	-63.	-49.
6	828.	558.	288.	18.	-252.	-521.	-791.	-1061.	-1331.	-1601.	-1870.
7	-814.	-599.	-384.	-169.	46.	260.	475.	690.	905.	1120.	1335.

HORIZONTAL MEMBER SHEARS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	650.5	476.7	302.9	129.0	-44.8	-218.6	-412.9	-586.8	-760.6	-934.4	-1108.2
2	1106.5	874.7	643.0	411.2	179.4	-52.3	-304.6	-536.4	-768.1	-999.9	-1231.7
3	1446.2	1055.6	787.6	519.6	251.7	-16.3	-304.8	-572.8	-840.8	-1108.8	-1376.7
4	1404.9	1193.8	979.6	762.2	541.7	318.1	86.7	-163.2	-396.2	-632.4	-871.7

VERTICAL MEMBER SHEARS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
5	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7	2.7
6	-38.5	-38.5	-38.5	-38.5	-38.5	-38.5	-38.5	-38.5	-38.5	-38.5	-38.5
7	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8	35.8

VERTICAL MEMBER REACTIONS TRIAL 0

MEM NO	LT REACTION	RT REACTION	MEMBER WEIGHT
5	2214.8	2214.8	0.0
6	2677.9	2677.9	0.0
7	2781.6	2781.6	0.0

TRIAL 0

TANGENTIAL ROTATIONS - RADIANS - CLOCKWISE POSITIVE

SPAN	LT. END	RT. END	SPAN	LT. END	RT. END	SPAN	LT. END	RT. END
1	0.005917	0.000428	2	0.000428	0.002656	3	0.002656	-0.001137
4	-0.001137	-0.008783	5	0.000000	0.000428	6	0.000000	0.002656
7	0.000000	-0.001137						

HORIZONTAL MEMBER DEFLECTIONS IN FEET AT 1/ 4 POINTS FROM LEFT END - DOWNWARD POSITIVE

MEMBER 1	E= 750.	0.0	0.149	0.175	0.076	0.0
MEMBER 2	E= 750.	0.0	0.153	0.246	0.107	0.0
MEMBER 3	E= 750.	0.0	0.373	0.609	0.345	0.0
MEMBER 4	E= 750.	0.0	0.134	0.306	0.260	0.0

VERTICAL MEMBER DEFLECTIONS IN FEET AT 1/ 4 POINTS FROM LEFT END.

MEMBER 5	E= 750.	0.0	0.001	0.004	0.008	0.013
MEMBER 6	E= 750.	0.0	-0.007	-0.017	-0.015	0.013
MEMBER 7	E= 750.	0.0	0.005	0.015	0.020	0.013

OUTPUT Sample Problem 2

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LIVE LOAD DIAGNOSTICS

NO ERRORS FOUND

SUPERSTRUCTURE LIVE LOAD EMPTY CREEK BRIDGE

LINE NO.	MEM NO.	NUMBER OF LIVE LOAD LANES SUPERSTRUCTURE LT.END	SUPERSTRUCTURE RT.END	SUBSTRUCTURE LT.END	SUBSTRUCTURE RT.END	RESISTING MOMENT OF UNIT STEEL POSITIVE	NEGATIVE	PLOT M & S ENV.	PLOT SCALE	INFLUENCE LINES	P13
0010	1	3.000	3.000	2.7	2.7	0.	0.	0	0	NO	NO
	2	3.000	3.000	2.7	2.7	0.	0.				
	3	3.000	3.000	2.7	2.7	0.	0.				
0020	4	3.000	3.726	2.7	3.0	0.	0.				

LINE NO.	LIVE LOAD NO.	TRUCK P1	D1	P2	D2	P3	LANE UNIFORM	MOM. RIDER	SHEAR RIDER	IMPACT	NO. LL LNS.	LIVE LOAD SIDESWAY	COMMENTS
	1.	8.0	14.0	32.0	14.0	32.0	0.640	18.0	26.0	YES	0.0	NO	HS20-44 AASHO LOADING WITHOUT ALTERNATIVE
0010	2.	70.0	13.0	130.0	28.0	130.0	0.0	0.0	0.0	YES	1.00	NO	CONSTRUCTION LOAD

Page 14 reports the input values for standard AASHTO superstructure live load. The standard HS20-44 truck is generated, for live load number 1 when no data is provided for Live Load data. The number of lanes specified as member data is used as the number of live load lanes if no data is supplied for lanes on the Live Load data input. Live Load Data for LL Number 2 is specified such that the specific axle loading will be moved across the superstructure to generate moment and shear envelopes. Maximum results will need to be compared between Live Load number 1 and 2 to obtain absolute maximums.

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LL NO. 1. NEGATIVE LIVE LOAD MOMENT ENVELOPE AND ASSOCIATED SHEARS

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-330.	-661.	-991.	-1321.	-1652.	-1982.	-2312.	-2717.	-4161.	-6596.
SHEAR	0.0	-27.5	-27.5	-27.5	-27.5	-27.5	-27.5	-27.5	-2.8	-169.5	-232.7
2	-7072.	-3703.	-1767.	-1550.	-1835.	-2119.	-2404.	-2688.	-3124.	-4942.	-6331.
SHEAR	245.4	170.2	6.2	-17.6	-17.6	-17.6	-17.6	-17.6	4.1	-102.7	-250.8
3	-8694.	-4536.	-2263.	-1894.	-1893.	-1891.	-1890.	-1888.	-2350.	-4780.	-9049.
SHEAR	264.7	177.8	4.1	0.1	0.1	0.1	0.1	0.1	-11.5	-185.3	-269.4
4	-6685.	-5356.	-3451.	-3001.	-2572.	-2143.	-1715.	-1286.	-857.	-429.	0.
SHEAR	276.9	118.5	-24.1	30.6	30.6	30.6	30.6	30.6	30.6	30.6	0.0

HORIZONTAL MEMBER STRESSES LL MAX NEG BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	13.	26.	39.	52.	65.	78.	92.	108.	166.	261.
2	280.	147.	70.	61.	73.	84.	95.	106.	124.	196.	330.
3	344.	180.	90.	75.	75.	75.	75.	75.	93.	169.	358.
4	329.	198.	125.	107.	90.	73.	57.	42.	28.	14.	0.

HORIZONTAL MEMBER STRESSES LL MAX NEG TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-11.	-22.	-32.	-43.	-54.	-65.	-75.	-89.	-136.	-215.
2	-230.	-121.	-58.	-51.	-60.	-69.	-78.	-88.	-102.	-161.	-271.
3	-283.	-148.	-74.	-62.	-62.	-62.	-62.	-62.	-77.	-156.	-295.
4	-268.	-162.	-102.	-87.	-73.	-60.	-47.	-34.	-23.	-11.	0.

Pages 15 reports the negative live load moment envelope, associated shears, top member stresses, and bottom member stresses. Associated shears are the shears that are produced at the point in question when the envelope moment was produced. Stresses are calculated assuming that section properties do not have composite materials.

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LL NO. 1. DEAD LOAD PLUS NEGATIVE LIVE LOAD MOMENT ENVELOPE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	6433.	10760.	13042.	13217.	11306.	7060.	735.	-7754.	-19387.	-34056.
2	-34593.	-15364.	-1266.	7364.	11804.	12537.	9233.	2221.	-6651.	-24613.	-45855.
3	-48088.	-20084.	-761.	11700.	18837.	21015.	18010.	9895.	-3643.	-24105.	-51365.
4	-49667.	-28143.	-11022.	1626.	11166.	17637.	20590.	20346.	16865.	10097.	0.

HORIZONTAL MEMBER STRESSES FOR DL+LL MAX NEG BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-255.	-427.	-516.	-523.	-448.	-280.	-29.	307.	768.	1348.
2	1369.	608.	51.	-292.	-467.	-496.	-366.	-88.	342.	974.	1815.
3	1904.	795.	30.	-463.	-746.	-832.	-713.	-392.	144.	954.	2033.
4	1881.	1043.	400.	-58.	-389.	-602.	-689.	-668.	-543.	-319.	0.

HORIZONTAL MEMBER STRESSES FOR DL+LL MAX NEG TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	210.	351.	425.	431.	368.	230.	24.	-253.	-632.	-1110.
2	-1127.	-501.	-42.	240.	385.	408.	301.	72.	-282.	-802.	-1494.
3	-1567.	-654.	-25.	381.	614.	685.	587.	322.	-119.	-785.	-1674.
4	-1534.	-851.	-326.	47.	318.	491.	562.	545.	443.	261.	0.

Pages 16 through 21 have similar output with page headings describing reported values. Shear results report only one value per tenth point so that abrupt changes at the tenth points will not be printed.

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LL NO. 1. POSITIVE LIVE LOAD MOMENT ENVELOPE AND ASSOCIATED SHEARS

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	2413.	4052.	4984.	5341.	5182.	4563.	3498.	2122.	1170.	920.
SHEAR	0.0	161.0	152.0	101.4	74.8	-106.1	-130.8	-153.2	-173.0	-84.4	6.2
2	1393.	1314.	2664.	4191.	5200.	5556.	5328.	4430.	2953.	1467.	1145.
SHEAR	-27.9	63.0	158.2	133.3	106.2	78.2	-105.6	-132.9	-158.2	-82.9	16.8
3	1258.	1505.	3200.	4908.	6252.	6666.	6117.	4829.	3105.	1215.	964.
SHEAR	-18.0	78.4	155.9	130.6	76.8	-34.9	-84.0	-130.4	-160.8	-77.9	16.0
4	666.	1133.	2851.	4657.	6123.	7052.	7291.	6906.	5665.	3421.	0.
SHEAR	-3.7	97.6	171.7	176.5	130.1	105.2	-88.7	-118.2	-173.7	-206.6	0.0

HORIZONTAL MEMBER STRESSES LL MAX POS BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-96.	-160.	-197.	-211.	-205.	-181.	-138.	-84.	-46.	-37.
2	-55.	-52.	-105.	-166.	-206.	-220.	-211.	-175.	-117.	-58.	-45.
3	-50.	-60.	-127.	-194.	-247.	-264.	-242.	-191.	-123.	-48.	-38.
4	-25.	-42.	-103.	-165.	-213.	-241.	-244.	-227.	-182.	-106.	0.

HORIZONTAL MEMBER STRESSES LL MAX POS TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	79.	132.	162.	174.	169.	149.	114.	69.	39.	30.
2	45.	43.	87.	137.	169.	181.	174.	144.	96.	48.	37.
3	41.	49.	104.	160.	204.	217.	199.	157.	101.	40.	31.
4	21.	34.	84.	135.	174.	196.	199.	185.	149.	88.	0.

Sample Problem 2

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LL NO. 1. DEAD LOAD PLUS POSITIVE LIVE LOAD MOMENT ENVELOPE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	9176.	15493.	19017.	19880.	18140.	13608.	6545.	-2914.	-14036.	-26536.
2	-26118.	-10347.	3144.	13105.	18839.	20214.	16965.	9339.	-2573.	-18204.	-36379.
3	-36137.	-14043.	4703.	18502.	26961.	29572.	26017.	16611.	1813.	-18111.	-41353.
4	-40316.	-21654.	-4719.	9283.	19860.	26831.	29596.	28539.	23367.	13946.	0.

HORIZONTAL MEMBER STRESSES FOR DL+LL MAX POS BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-363.	-613.	-753.	-787.	-718.	-539.	-259.	115.	556.	1051.
2	1034.	410.	-124.	-519.	-746.	-800.	-672.	-370.	102.	721.	1440.
3	1510.	556.	-186.	-732.	-1068.	-1171.	-1030.	-658.	-72.	717.	1637.
4	1527.	802.	171.	-330.	-692.	-915.	-990.	-936.	-753.	-441.	0.

HORIZONTAL MEMBER STRESSES FOR DL+LL MAX POS TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	299.	505.	620.	648.	591.	443.	213.	-95.	-457.	-865.
2	-851.	-337.	102.	427.	614.	659.	553.	304.	-84.	-593.	-1185.
3	-1243.	-458.	153.	603.	879.	964.	848.	541.	59.	-590.	-1347.
4	-1246.	-655.	-140.	269.	565.	747.	806.	765.	615.	360.	0.

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LL NO. 1. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 1	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	234.1	201.1	168.8	137.9	108.6	81.5	57.0	35.6	20.0	11.5	8.4
MOMENT	0.0	2413.0	4052.2	4963.0	5212.6	4890.1	4106.0	2993.2	977.2	666.2	1005.6
NEG. V	-30.1	-35.5	-52.8	-73.5	-105.2	-135.5	-163.9	-189.8	-213.0	-242.6	-274.4
MOMENT	1020.7	1191.8	2282.2	4289.8	5005.5	5047.4	4500.7	3472.6	2092.0	-2016.6	-5017.6
RANGE	264.3	236.6	221.6	211.4	213.8	217.0	220.9	225.5	233.0	254.2	282.8

LL NO. 1. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 2	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	292.2	251.5	211.3	173.4	143.2	112.2	81.7	55.0	37.2	24.5	23.3
MOMENT	-5452.8	-1473.9	1404.4	4130.1	5100.8	5402.5	5012.2	2637.0	1740.7	1096.9	2016.8
NEG. V	-37.9	-38.9	-46.1	-62.6	-84.2	-110.8	-141.8	-176.9	-215.1	-255.5	-296.9
MOMENT	2716.4	2221.5	2382.6	3257.1	3979.4	4307.8	4013.7	2898.7	609.9	-2343.3	-6573.6
RANGE	330.1	290.4	257.3	236.0	227.4	222.9	223.6	231.8	252.3	280.0	320.2

LL NO. 1. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 3	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	311.8	265.9	221.0	178.6	139.9	106.8	78.5	52.8	35.0	23.8	22.6
MOMENT	-6895.7	-2041.4	1391.7	3454.3	5685.1	6149.5	5626.9	2326.4	1266.9	1699.9	1973.6
NEG. V	-24.9	-26.1	-37.6	-55.8	-80.2	-110.7	-143.8	-182.8	-225.3	-270.2	-315.9
MOMENT	2316.5	2006.0	3022.6	4313.4	5674.4	6155.2	5746.3	4456.1	1920.5	-1959.7	-7172.9
RANGE	336.6	292.0	258.6	234.4	220.1	219.4	222.3	235.6	260.3	293.9	338.5

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LL NO. 1. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 4	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	314.1	279.8	245.0	210.4	161.1	153.4	122.4	88.4	62.2	41.4	33.3
MOMENT	-6620.4	-2789.1	453.8	2656.0	6086.8	6934.0	7022.0	6192.9	3232.7	1691.8	1206.7
NEG. V	-5.2	-9.5	-20.6	-40.8	-65.4	-94.2	-126.9	-163.0	-202.3	-244.3	-288.6
MOMENT	732.2	1197.0	2306.1	3994.1	5493.4	6594.9	7105.0	6847.4	5664.8	3420.5	0.0
RANGE	319.3	289.3	265.6	251.2	246.5	247.6	249.3	251.4	264.5	285.7	321.9

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LL NO. 1. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 1	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	864.7	677.8	471.7	266.9	63.8	-137.1	-355.9	-551.1	-740.6	-922.9	-1099.9
NEG. V	620.4	441.2	250.1	55.6	-150.0	-354.1	-576.8	-776.6	-973.6	-1177.1	-1362.7

LL NO. 1. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 2	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	1398.7	1126.2	854.3	584.6	322.6	59.8	-222.9	-481.4	-730.9	-975.4	-1208.4
NEG. V	1066.6	835.8	596.9	348.6	95.2	-163.1	-446.4	-713.2	-963.2	-1255.4	-1528.6

LL NO. 1. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 3	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	1757.9	1321.5	1008.6	698.2	391.6	92.5	-226.3	-520.0	-805.8	-1085.0	-1354.1
NEG. V	1421.3	1029.5	750.0	463.8	171.5	-127.0	-448.6	-755.6	-1066.1	-1378.9	-1692.6

LL NO. 1. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 4	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	1719.0	1473.6	1224.6	972.7	722.8	471.5	189.1	-74.8	-334.0	-591.0	-838.4
NEG. V	1399.7	1184.3	959.0	721.5	476.3	223.9	-60.1	-326.2	-598.5	-876.7	-1160.4

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LL NO. 1. LIVE LOAD SUPPORT RESULTS

		MAX. AXIAL LOAD			MAX. LONGITUDINAL MOMENT		
		AXIAL LOAD	------MOMENT------ TOP	BOT.	AXIAL LOAD	------MOMENT------ TOP	BOT.
SUPPORT JT. 1	POSITIVE	210.7	0.	0.	0.0	0.	0.
	NEGATIVE	-27.1	0.	0.	0.0	0.	0.
MEMBER 5	POSITIVE	427.2	-389.	194.	169.3	1420.	-710.
	NEGATIVE	-41.6	460.	-230.	230.0	-1507.	754.
MEMBER 6	POSITIVE	466.3	-290.	145.	195.9	1363.	-682.
	NEGATIVE	-37.9	122.	-61.	237.7	-1646.	823.
MEMBER 7	POSITIVE	477.2	376.	-188.	251.6	1724.	-862.
	NEGATIVE	-25.0	-294.	147.	211.8	-1530.	765.
SUPPORT JT. 5	POSITIVE	233.7	0.	0.	0.0	0.	0.
	NEGATIVE	-29.9	0.	0.	0.0	0.	0.

Page 22 reports the live load support results for live load number 1. Maximum axial loads and moments are produced for maximum axial load and maximum longitudinal moment.

Sample Problem 2

IDENT 14T 07 02 FRAME SYSTEM MAY, 02, 1975 PAGE 23

LL NO. 2. NEGATIVE LIVE LOAD MOMENT ENVELOPE AND ASSOCIATED SHEARS

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-409.	-817.	-1226.	-1635.	-2043.	-2452.	-2861.	-3269.	-3678.	-4890.
SHEAR	0.0	-34.1	-34.1	-34.1	-34.1	-34.1	-34.1	-34.1	-34.1	-34.1	-265.0
2	-6163.	-2700.	-2296.	-1892.	-1488.	-1623.	-2274.	-2924.	-3574.	-4224.	-5367.
SHEAR	255.5	25.3	25.3	25.3	25.3	-40.6	-40.6	-40.6	-40.6	-40.6	-246.2
3	-6839.	-3174.	-2683.	-2192.	-1701.	-1211.	-1625.	-2087.	-2549.	-3014.	-7106.
SHEAR	240.0	26.5	26.5	26.5	26.5	26.5	-25.0	-25.0	-25.0	-189.9	-242.7
4	-5365.	-4420.	-3929.	-3438.	-2947.	-2456.	-1965.	-1473.	-982.	-491.	0.
SHEAR	257.6	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	0.0

HORIZONTAL MEMBER STRESSES LL MAX NEG BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	16.	32.	49.	65.	81.	97.	113.	129.	146.	194.
2	244.	107.	91.	75.	59.	64.	90.	116.	141.	167.	212.
3	271.	126.	106.	87.	67.	48.	64.	83.	101.	119.	281.
4	203.	164.	143.	122.	103.	84.	66.	48.	32.	16.	0.

HORIZONTAL MEMBER STRESSES LL MAX NEG TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-13.	-27.	-40.	-53.	-67.	-80.	-93.	-107.	-120.	-159.
2	-201.	-88.	-75.	-62.	-48.	-53.	-74.	-95.	-116.	-136.	-175.
3	-223.	-103.	-87.	-71.	-55.	-39.	-53.	-68.	-83.	-98.	-232.
4	-166.	-134.	-116.	-100.	-84.	-68.	-54.	-39.	-26.	-13.	0.

Pages 23 through 30 reports the corresponding envelope and maximum values for live load number 2.

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LL NO. 2. DEAD LOAD PLUS NEGATIVE LIVE LOAD MOMENT ENVELOPE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	6355.	10624.	12806.	12903.	10914.	6594.	187.	-8306.	-18864.	-32352.
2	-33674.	-14362.	-1816.	7022.	12151.	13033.	9363.	1985.	-9101.	-23896.	-42891.
3	-46234.	-18722.	-1181.	11403.	19026.	21696.	18276.	9696.	-3841.	-22339.	-49422.
4	-46346.	-27208.	-11499.	1188.	10811.	17324.	20340.	20160.	16740.	10034.	0.

HORIZONTAL MEMBER STRESSES FOR DL+LL MAX NEG BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-252.	-421.	-507.	-511.	-432.	-261.	-7.	329.	748.	1281.
2	1333.	569.	72.	-278.	-481.	-516.	-371.	-79.	360.	946.	1696.
3	1830.	741.	47.	-451.	-753.	-859.	-723.	-384.	152.	884.	1957.
4	1755.	1008.	417.	-42.	-376.	-591.	-680.	-662.	-539.	-317.	0.

HORIZONTAL MEMBER STRESSES FOR DL+LL MAX NEG TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	207.	346.	417.	420.	356.	215.	6.	-271.	-615.	-1054.
2	-1097.	-468.	-59.	229.	396.	425.	305.	65.	-297.	-779.	-1398.
3	-1506.	-610.	-38.	372.	620.	707.	595.	316.	-125.	-728.	-1610.
4	-1432.	-823.	-340.	34.	307.	462.	556.	540.	440.	259.	0.

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LL NO. 2. POSITIVE LIVE LOAD MOMENT ENVELOPE AND ASSOCIATED SHEARS

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	3187.	5242.	6695.	7156.	6916.	6111.	4593.	2562.	971.	1079.
SHEAR	0.0	265.6	218.4	132.1	87.6	-124.7	-167.3	-206.2	-240.7	9.0	9.0
2	1626.	978.	3331.	5602.	7064.	7534.	7244.	5954.	3769.	954.	938.
SHEAR	-40.6	-40.6	225.7	184.2	139.1	92.5	-129.3	-175.3	-218.4	-256.5	25.3
3	1147.	969.	4128.	6678.	8258.	8684.	8198.	6561.	3983.	878.	1244.
SHEAR	-25.0	259.5	223.0	180.7	134.9	-90.8	-137.7	-183.2	-225.1	-210.4	26.5
4	860.	774.	3412.	5806.	7587.	8532.	8770.	8162.	6393.	3650.	0.
SHEAR	-6.1	-6.1	240.0	205.7	167.2	-183.7	-92.7	-136.9	-228.3	-275.0	0.0

HORIZONTAL MEMBER STRESSES LL MAX POS BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-126.	-208.	-265.	-283.	-274.	-242.	-182.	-101.	-38.	-43.
2	-64.	-39.	-132.	-222.	-280.	-298.	-287.	-236.	-149.	-38.	-37.
3	-45.	-38.	-163.	-264.	-327.	-344.	-325.	-260.	-158.	-35.	-49.
4	-33.	-29.	-124.	-206.	-264.	-291.	-293.	-268.	-206.	-122.	0.

HORIZONTAL MEMBER STRESSES LL MAX POS TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	104.	171.	218.	233.	225.	199.	150.	83.	32.	35.
2	53.	32.	109.	183.	230.	246.	236.	194.	123.	31.	31.
3	37.	32.	134.	218.	269.	283.	267.	214.	130.	29.	41.
4	27.	23.	101.	168.	216.	238.	240.	219.	168.	99.	0.

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LL NO. 2. DEAD LOAD PLUS POSITIVE LIVE LOAD MOMENT ENVELOPE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	9950.	16683.	20728.	21694.	19874.	15156.	7640.	-2475.	-14235.	-26383.
2	-25603.	-10684.	3811.	14516.	20703.	22190.	18860.	10863.	-1758.	-18717.	-36586.
3	-38247.	-14579.	5630.	20273.	28988.	31591.	28098.	18344.	2691.	-18447.	-41072.
4	-40122.	-22014.	-4158.	10432.	21345.	28312.	31075.	29795.	24114.	14375.	0.

HORIZONTAL MEMBER STRESSES FOR DL+LL MAX POS BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-394.	-660.	-821.	-859.	-787.	-600.	-302.	98.	564.	1044.
2	1025.	423.	-151.	-575.	-820.	-878.	-747.	-430.	70.	741.	1448.
3	1514.	577.	-223.	-803.	-1148.	-1251.	-1112.	-726.	-107.	730.	1626.
4	1520.	816.	151.	-371.	-743.	-966.	-1040.	-978.	-776.	-454.	0.

HORIZONTAL MEMBER STRESSES FOR DL+LL MAX POS TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	324.	544.	675.	707.	648.	494.	249.	-81.	-464.	-860.
2	-843.	-348.	124.	473.	675.	723.	615.	354.	-57.	-610.	-1192.
3	-1246.	-475.	183.	661.	945.	1029.	916.	598.	88.	-601.	-1338.
4	-1240.	-666.	-123.	302.	606.	788.	849.	798.	634.	371.	0.

OUTPUT — Sample Problem 3

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LOAD DATA TRIAL 0

LINE	MEM	W OR P	LOAD CODE	A	B	FIXED END MOMENTS LEFT	RIGHT	DEFLT	COMMENTS
0010	1	14.037	P	61.0	0.0	0.	0.		DIAPH
0030	2	25.000	P	0.0	0.0	0.	0.		CAP WT.
0020	2	14.037	P	75.0	0.0	0.	0.		DIAPH

FIXED END MOMENTS TRIAL 0

MEM NO	FIXED END MOMENTS LT	RT	MEM NO	FIXED END MOMENTS LT	RT	MEM NO	FIXED END MOMENTS LT	RT
1	0.	-28246.	2	-24273.	0.	3	0.	0.

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*** SIDESWAY NOT CONSIDERED. ***

HORIZONTAL MEMBER MOMENTS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	7234.	12282.	15144.	15819.	14308.	10383.	4271.	-4026.	-14512.	-27235.
2	-25366.	-14243.	-5044.	2279.	7727.	11301.	12790.	12404.	10143.	6009.	0.

HORIZONTAL MEMBER STRESSES TRIAL 0 BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-531.	-901.	-1111.	-1161.	-1050.	-762.	-313.	295.	1019.	1093.
2	1577.	991.	370.	-167.	-567.	-829.	-938.	-910.	-744.	-441.	0.

HORIZONTAL MEMBER STRESSES TRIAL 0 TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	419.	712.	878.	917.	830.	602.	248.	-233.	-835.	-1533.
2	-1426.	-818.	-292.	132.	448.	655.	742.	719.	588.	348.	0.

VERTICAL MEMBER MOMENTS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
3	-935.	-654.	-374.	-93.	187.	467.	748.	1028.	1309.	1589.	1869.

HORIZONTAL MEMBER SHEARS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	514.1	379.1	244.1	109.2	-25.6	-160.8	-309.8	-444.7	-579.7	-715.2	-856.8

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*** SIDESWAY NOT CONSIDERED. ***

HORIZONTAL MEMBER SHEARS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
2	832.7	676.4	550.7	425.7	300.7	175.8	36.8	-88.2	-213.2	-338.1	-463.1

VERTICAL MEMBER SHEARS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
3	100.1	100.1	100.1	100.1	100.1	100.1	100.1	100.1	100.1	100.1	100.1

VERTICAL MEMBER REACTIONS TRIAL 0

MEM NO	LT REACTION	RT REACTION	MEMBER WEIGHT
3	1689.5	1689.5	0.0

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TRIAL  0

TANGENTIAL ROTATIONS - RADIANS - CLOCKWISE POSITIVE
   SPAN    LT. END     RT. END     SPAN    LT. END     RT. END     SPAN    LT. END     RT. END

     1     0.020637   -0.001442      2    -0.001443   -0.015073      3     0.000000   -0.001442

HORIZONTAL MEMBER DEFLECTIONS IN FEET AT 1/ 4 POINTS FROM LEFT END - DOWNWARD POSITIVE

     MEMBER  1    E=  750.     0.0          0.708        0.847        0.409        0.0

     MEMBER  2    E=  750.     0.0          0.236        0.549        0.474        0.0

VERTICAL MEMBER DEFLECTIONS IN FEET AT 1/ 4 POINTS FROM LEFT END.

     MEMBER  3    E=  750.     0.0          0.002        0.005        0.006        0.0
```

```
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LIVE LOAD DIAGNOSTICS

          NO ERRORS FOUND

SUPERSTRUCTURE LIVE LOAD          2 SPAN EXAMPLE W/INFL&PLT

               NUMBER OF LIVE LOAD LANES               RESISTING MOMENT OF          PLOT   PLOT    INFLU-
LINE MEM     SUPERSTRUCTURE   SUBSTRUCTURE                 UNIT STEEL               M & S SCALE   ENCE
 NO.  NO.    LT.END   RT.END  LT.END    RT.END         POSITIVE   NEGATIVE           ENV.          LINES  FIS

0010   1      2.430    2.430   1.0       1.0            4500.      5000.              1      0      YES    NO
       2      2.430    2.430   1.0       1.0            4500.      5000.

     LIVE     -----------TRUCK--------------    ---------LANE---------            NO.  LIVE
LINE LOAD      P1     D1    P2     D2     P3     UNIFORM   MOM.    SHEAR            LL   LOAD
  NO. NO.                                                   RIDER   RIDER  IMPACT LNS. SIDESWAY        COMMENTS

     1.        8.0   14.0  32.0   14.0   32.0    0.640     18.0    26.0    YES    0.0  NO     HS20-44 AASHO LOADING
                                                                                                WITHOUT ALTERNATIVE
```

Page 11 reports the input values for Superstructure Live Load input data. In this example influence lines have been requested as well as a moment and shear plot for live load number 1.

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INFLUENCE LINES FOR GIRDER MOMENT

AT 0.1 L - MEMBER 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	13.972	11.780	9.663	7.656	5.797	4.123	2.670	1.476	0.577	0.0
2	0.0	-0.329	-0.558	-0.692	-0.745	-0.728	-0.653	-0.530	-0.373	-0.192	0.0

AT 0.2 L - MEMBER 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	11.743	23.560	19.325	15.312	11.594	8.245	5.340	2.952	1.154	0.0
2	0.0	-0.659	-1.115	-1.385	-1.490	-1.456	-1.305	-1.061	-0.746	-0.385	0.0

AT 0.3 L - MEMBER 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	9.515	19.141	28.988	22.968	17.391	12.368	8.010	4.428	1.731	0.0
2	0.0	-0.988	-1.673	-2.077	-2.236	-2.184	-1.958	-1.591	-1.119	-0.577	0.0

AT 0.4 L - MEMBER 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	7.287	14.721	22.451	30.624	23.188	16.491	10.680	5.903	2.308	0.0
2	0.0	-1.318	-2.230	-2.769	-2.981	-2.912	-2.610	-2.121	-1.492	-0.769	0.0

AT 0.5 L - MEMBER 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	5.058	10.301	15.913	22.080	28.985	20.613	13.350	7.379	2.885	0.0
2	0.0	-1.647	-2.788	-3.461	-3.726	-3.641	-3.263	-2.652	-1.865	-0.962	0.0

Pages 12 through 17 provide the influence lines for moment, shears, and reactions. Plotted results for influence lines and Live load moment and shear envelopes are shown at the end of the output for this sample problem.

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INFLUENCE LINES FOR GIRDER MOMENT

AT 0.6 L - MEMBER 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	2.830	5.881	9.376	13.536	18.582	24.736	16.020	8.855	3.462	0.0
2	0.0	-1.977	-3.345	-4.154	-4.471	-4.369	-3.916	-3.182	-2.238	-1.154	0.0

AT 0.7 L - MEMBER 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	0.602	1.462	2.839	4.992	8.179	12.659	18.690	10.331	4.039	0.0
2	0.0	-2.306	-3.903	-4.846	-5.217	-5.097	-4.568	-3.712	-2.611	-1.346	0.0

AT 0.8 L - MEMBER 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-1.627	-2.958	-3.698	-3.552	-2.224	0.581	5.160	11.807	4.616	0.0
2	0.0	-2.636	-4.460	-5.538	-5.962	-5.825	-5.221	-4.243	-2.984	-1.539	0.0

AT 0.9 L - MEMBER 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-3.855	-7.378	-10.236	-12.096	-12.627	-11.496	-8.370	-2.917	5.193	0.0
2	0.0	-2.965	-5.018	-6.230	-6.707	-6.553	-5.873	-4.773	-3.357	-1.731	0.0

AT 1.0 L - MEMBER 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-6.083	-11.798	-16.773	-20.640	-23.030	-23.573	-21.900	-17.641	-10.430	0.0
2	0.0	-3.294	-5.575	-6.923	-7.452	-7.281	-6.526	-5.303	-3.730	-1.924	0.0

INFLUENCE LINES FOR GIRDER MOMENT

AT 0.0 L - MEMBER 2

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-2.244	-4.352	-6.188	-7.614	-8.496	-8.696	-8.079	-6.506	-3.648	0.0
2	0.0	-9.390	-15.690	-19.731	-21.240	-20.752	-18.600	-15.115	-10.632	-5.462	0.0

AT 0.1 L - MEMBER 2

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-2.020	-3.917	-5.569	-6.853	-7.646	-7.827	-7.271	-5.857	-3.463	0.0
2	0.0	5.049	-2.301	-7.258	-10.116	-11.177	-10.740	-9.104	-6.569	-3.430	0.0

AT 0.2 L - MEMBER 2

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-1.795	-3.482	-4.950	-6.092	-6.797	-6.957	-6.463	-5.206	-3.078	0.0
2	0.0	4.488	11.288	5.216	1.008	-1.602	-2.880	-3.092	-2.505	-1.366	0.0

AT 0.3 L - MEMBER 2

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-1.571	-3.047	-4.331	-5.330	-5.947	-6.087	-5.655	-4.556	-2.643	0.0
2	0.0	3.927	9.877	17.689	12.132	7.973	4.980	2.919	1.558	0.662	0.0

AT 0.4 L - MEMBER 2

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-1.347	-2.611	-3.713	-4.569	-5.098	-5.218	-4.847	-3.905	-2.309	0.0
2	0.0	3.366	8.466	15.162	23.256	17.549	12.840	8.931	5.621	2.711	0.0

INFLUENCE LINES FOR GIRDER MOMENT

AT 0.5 L - MEMBER 2

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-1.122	-2.176	-3.094	-3.807	-4.248	-4.348	-4.040	-3.254	-1.924	0.0
2	0.0	2.805	7.055	12.635	19.380	27.124	20.700	14.942	9.684	4.759	0.0

AT 0.6 L - MEMBER 2

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-0.898	-1.741	-2.475	-3.046	-3.398	-3.479	-3.232	-2.603	-1.539	0.0
2	0.0	2.244	5.644	10.108	15.504	21.699	28.560	20.954	13.747	6.807	0.0

AT 0.7 L - MEMBER 2

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-0.673	-1.306	-1.856	-2.284	-2.549	-2.609	-2.424	-1.952	-1.154	0.0
2	0.0	1.683	4.233	7.581	11.628	16.274	21.420	26.965	17.610	6.855	0.0

AT 0.8 L - MEMBER 2

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-0.449	-0.870	-1.238	-1.523	-1.699	-1.739	-1.616	-1.302	-0.770	0.0
2	0.0	1.122	2.822	5.054	7.752	10.849	14.280	17.977	21.874	10.904	0.0

AT 0.9 L - MEMBER 2

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-0.224	-0.435	-0.619	-0.761	-0.850	-0.870	-0.808	-0.651	-0.385	0.0
2	0.0	0.561	1.411	2.527	3.876	5.425	7.140	8.988	10.437	12.952	0.0

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INFLUENCE LINES FOR GIRDER SHEAR

AT LEFT END - MEMBER 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	1.000	0.862	0.727	0.596	0.473	0.358	0.254	0.165	0.091	0.036	0.0
2	0.0	-0.020	-0.034	-0.043	-0.046	-0.045	-0.040	-0.033	-0.023	-0.012	0.0

AT LEFT END - MEMBER 2

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	0.015	0.029	0.041	0.051	0.057	0.058	0.054	0.043	0.026	0.0
2	1.000	0.963	0.906	0.832	0.742	0.638	0.524	0.401	0.271	0.137	0.0

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INFLUENCE LINES

REACTION AT LT END MEMBER 1

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	1.000	0.862	0.727	0.596	0.473	0.358	0.254	0.165	0.091	0.036	0.0
2	0.0	-0.020	-0.034	-0.043	-0.046	-0.045	-0.040	-0.033	-0.023	-0.012	0.0

REACTION AT TOP OF COLUMN 3

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	0.153	0.302	0.445	0.578	0.699	0.803	0.889	0.952	0.990	1.000
2	1.000	0.983	0.940	0.874	0.788	0.683	0.564	0.434	0.294	0.148	0.0

MOMENT AT TOP OF COLUMN 3

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	3.839	7.445	10.585	13.026	14.534	14.877	13.821	11.133	6.562	0.0
2	0.0	-6.095	-10.315	-12.806	-13.788	-13.471	-12.074	-9.812	-6.901	-3.559	0.0

REACTION AT RT END MEMBER 2

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-0.015	-0.029	-0.041	-0.051	-0.057	-0.058	-0.054	-0.043	-0.026	0.0
2	0.0	0.037	0.094	0.168	0.258	0.362	0.476	0.599	0.729	0.863	1.000

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LL NO. 1. NEGATIVE LIVE LOAD MOMENT ENVELOPE AND ASSOCIATED SHEARS

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-172.	-344.	-517.	-689.	-861.	-1033.	-1205.	-1969.	-4240.	-7471.
SHEAR	0.0	-10.6	-10.6	-10.6	-10.6	-10.6	-10.6	-10.6	-45.3	-172.5	-224.8
2	-7029.	-4161.	-2174.	-1484.	-1272.	-1060.	-848.	-636.	-424.	-212.	0.
SHEAR	215.7	165.4	40.1	14.1	14.1	14.1	14.1	14.1	14.1	14.1	0.0

HORIZONTAL MEMBER STRESSES LL MAX NEG BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	13.	25.	38.	51.	63.	76.	88.	146.	298.	464.
2	437.	289.	160.	109.	93.	78.	62.	47.	31.	16.	0.

HORIZONTAL MEMBER STRESSES LL MAX NEG TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-10.	-20.	-30.	-40.	-50.	-60.	-70.	-115.	-244.	-421.
2	-396.	-239.	-126.	-86.	-74.	-61.	-49.	-37.	-25.	-12.	0.

OUTPUT — Sample Problem 3

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LL NO. 1. DEAD LOAD PLUS NEGATIVE LIVE LOAD MOMENT ENVELOPE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	7062.	11938.	14627.	15130.	13447.	9350.	3066.	-6016.	-18751.	-34706.
2	-32395.	-18404.	-7217.	795.	6455.	10241.	11941.	11766.	9719.	5797.	0.

HORIZONTAL MEMBER STRESSES FOR DL+LL MAX NEG BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-518.	-876.	-1073.	-1110.	-987.	-686.	-225.	441.	1316.	2157.
2	2013.	1280.	530.	-58.	-474.	-751.	-876.	-863.	-713.	-425.	0.

HORIZONTAL MEMBER STRESSES FOR DL+LL MAX NEG TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	409.	692.	848.	877.	780.	542.	178.	-349.	-1078.	-1954.
2	-1824.	-1057.	-418.	46.	374.	594.	692.	682.	564.	336.	0.

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LL NO. 1. POSITIVE LIVE LOAD MOMENT ENVELOPE AND ASSOCIATED SHEARS

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	2612.	4341.	5284.	5539.	5239.	4416.	3186.	1745.	478.	0.
SHEAR	0.0	161.2	134.0	92.5	67.6	-102.2	-124.0	-143.2	-159.3	-108.7	0.0
2	0.	445.	1601.	3008.	4142.	4889.	5152.	4903.	4025.	2420.	0.
SHEAR	0.0	109.2	159.2	142.9	123.5	101.5	-68.3	-93.1	-134.2	-161.3	0.0

HORIZONTAL MEMBER STRESSES LL MAX POS BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-192.	-319.	-388.	-406.	-384.	-324.	-234.	-128.	-34.	0.
2	0.	-31.	-122.	-221.	-304.	-359.	-376.	-360.	-295.	-176.	0.

HORIZONTAL MEMBER STRESSES LL MAX POS TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	151.	252.	306.	321.	304.	256.	185.	101.	27.	0.
2	0.	26.	96.	174.	240.	283.	299.	284.	233.	140.	0.

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LL NO. 1. DEAD LOAD PLUS POSITIVE LIVE LOAD MOMENT ENVELOPE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	9846.	16623.	20428.	21358.	19547.	14799.	7459.	-2282.	-14034.	-27235.
2	-25366.	-13798.	-3383.	5287.	11869.	16190.	17942.	17306.	14166.	8429.	0.

HORIZONTAL MEMBER STRESSES FOR DL+LL MAX POS BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-722.	-1220.	-1499.	-1567.	-1434.	-1086.	-547.	167.	965.	1693.
2	1577.	960.	248.	-388.	-871.	-1188.	-1316.	-1270.	-1040.	-616.	0.

HORIZONTAL MEMBER STRESSES FOR DL+LL MAX POS TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	571.	964.	1184.	1236.	1133.	858.	433.	-132.	-807.	-1533.
2	-1428.	-792.	-196.	307.	668.	939.	1040.	1003.	822.	489.	0.

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LL NO. 1. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 1	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	194.1	161.2	134.0	108.0	83.6	61.4	41.8	25.3	12.3	3.2	0.0
MOMENT	0.0	2611.7	4341.1	5246.9	5418.0	4974.0	4064.3	2669.2	1597.9	467.7	0.0
NEG. V	-11.7	-20.5	-40.0	-67.4	-93.6	-118.3	-140.8	-163.4	-194.7	-226.6	-258.4
MOMENT	556.5	1560.8	3442.2	4791.7	5327.9	5143.9	4363.3	3245.5	1020.5	-2041.0	-5674.6
RANGE	205.8	181.7	174.0	175.4	177.2	179.7	182.0	188.7	207.1	229.8	258.4

LL NO. 1. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 2	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	249.1	219.2	189.2	160.2	139.9	117.1	92.4	66.1	38.9	23.2	15.5
MOMENT	-5484.1	-2060.1	681.6	2965.0	4090.4	4792.6	4933.2	4401.0	2694.1	1367.5	645.2
NEG. V	0.0	-3.3	-12.5	-25.5	-42.1	-61.7	-83.9	-108.2	-134.2	-161.3	-189.2
MOMENT	0.0	440.5	1496.4	2682.5	3769.8	4628.2	5033.4	4868.7	4024.7	2419.9	0.0
RANGE	249.1	222.4	201.6	185.7	182.0	178.8	176.3	174.3	173.1	184.6	204.7

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LL NO. 1. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 1	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	708.1	549.3	378.1	217.1	57.8	-99.4	-268.0	-419.4	-567.4	-712.0	-856.8
NEG. V	502.4	358.6	204.1	41.8	-119.4	-279.0	-450.6	-608.2	-774.4	-941.8	-1115.2

LL NO. 1. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 2	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	1081.8	895.6	739.8	585.9	440.6	292.9	149.1	-22.1	-174.3	-314.9	-447.6
NEG. V	832.7	673.1	538.2	400.1	258.6	114.1	-47.1	-196.4	-347.3	-499.5	-652.3

IDENT 141 07 03 FRAME SYSTEM MAY, 02, 1975 PAGE 24

LL NO. 1. LIVE LOAD SUPPORT RESULTS

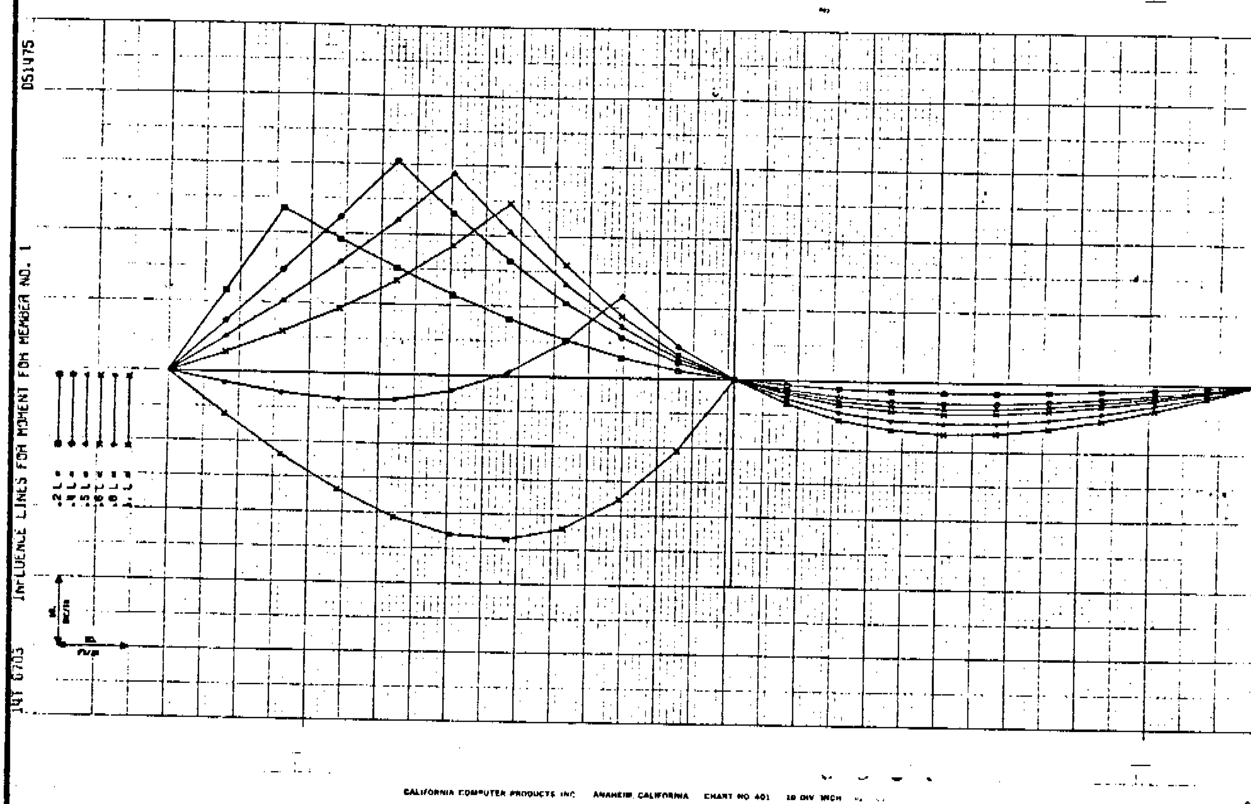
	MAX. AXIAL LOAD			MAX. LONGITUDINAL MOMENT		
	AXIAL LOAD	------MOMENT------ TOP	BOT.	AXIAL LOAD	------MOMENT------ TOP	BOT.
SUPPORT JT. 1						
POSITIVE	79.9	0.	0.	0.0	0.	0.
NEGATIVE	-4.8	0.	0.	0.0	0.	0.
MEMBER 3						
POSITIVE	178.3	161.	-80.	94.0	1493.	-746.
NEGATIVE	0.0	0.	0.	87.3	-1311.	656.
SUPPORT JT. 3						
POSITIVE	77.9	0.	0.	0.0	0.	0.
NEGATIVE	-6.4	0.	0.	0.0	0.	0.

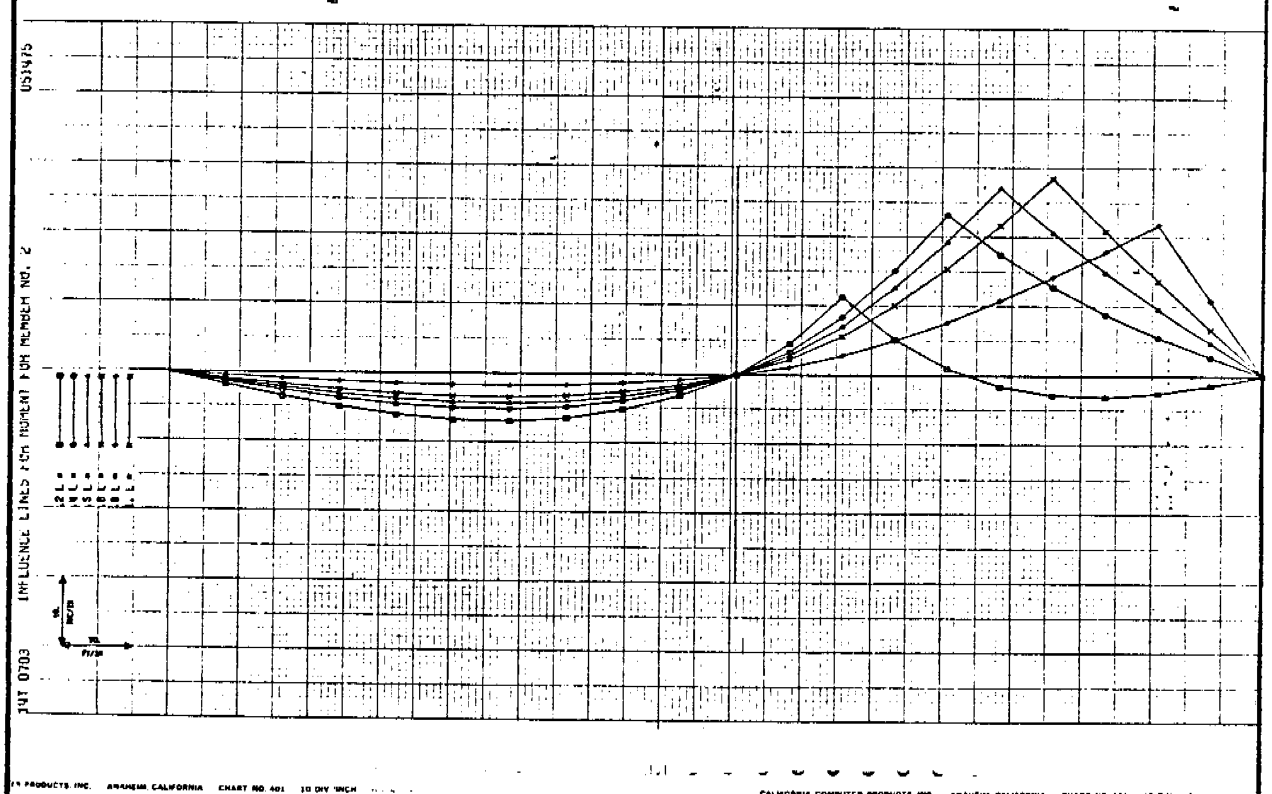
THE RATIO OF SUBSTRUCTURE / SUPERSTRUCTURE LOADING IS 0.412

***** BATCH TOTALS 15 FRAME UNITS 2 L.L. UNITS 8 PLOT UNITS 0 PRESTRESS UNITS COST= $ 5.60

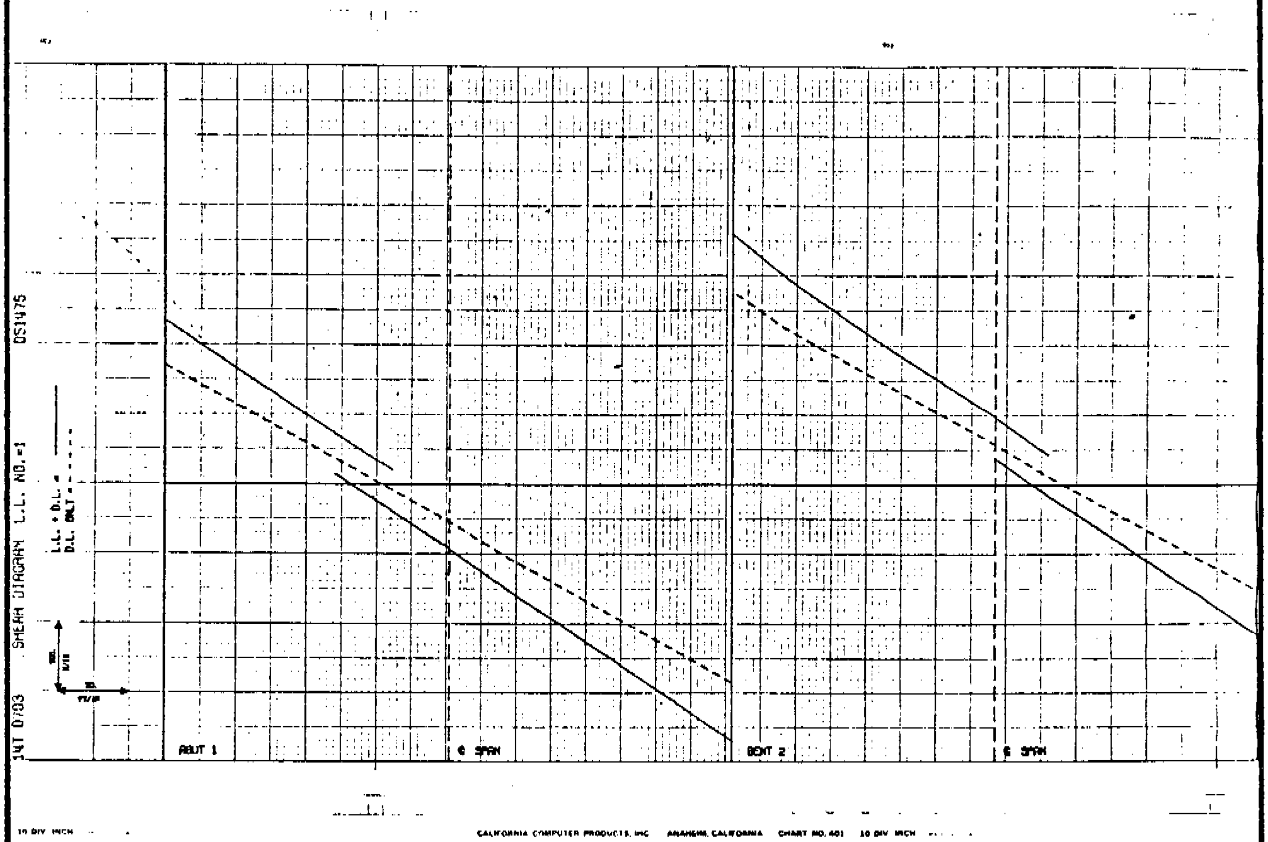
OUTPUT

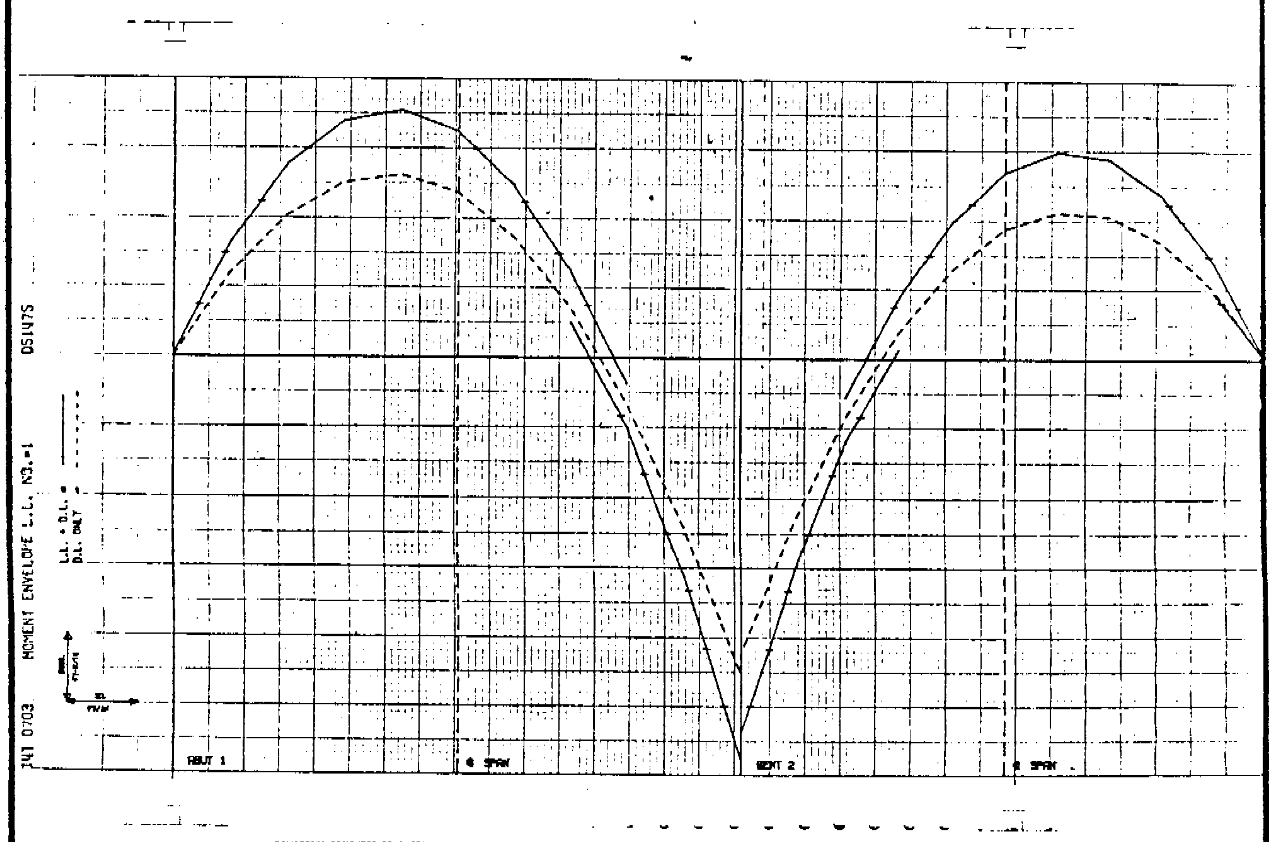
Sample Problem 3





OUTPUT Sample Problem 3





SAMPLE PROBLEM 4

PROBLEM

A. General

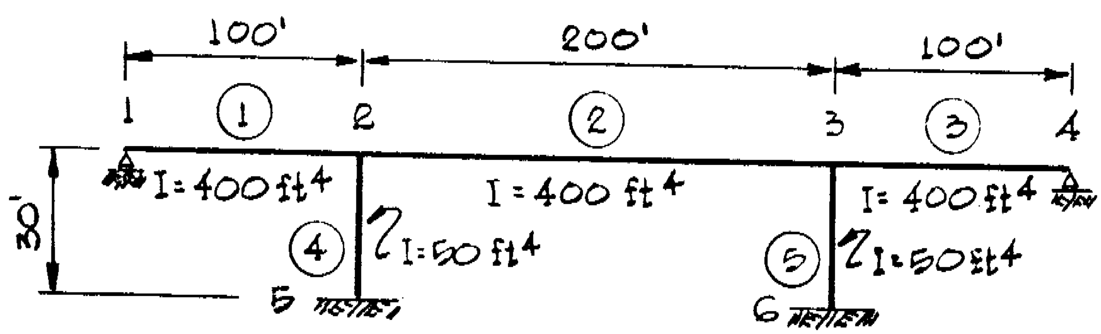
Three-span bridge with no expansion joints. Special maintenance overload truck to be automatically generated and moment and shear envelopes to be plotted.

B. Section Properties

All members prismatic as coded on Frame Description form. (See figure 8)

C. Loading

Dead loads coded on Frame Description as a uniform load. Live load as coded on Live Load Generator form.



DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - FRAME DESCRIPTION

DS-093 (REV 2-75)

BDEOAA

Page 1 of 2

Name Example #4

Phone

IDENT. (DIST. GR. BATCH PROB.)	SOURCE (DIST UNIT)	CHARGE (DIST UNIT)	EXPENDITURE AUTHORIZATION	SPECIAL DESIGNATION WHEN APPLICABLE	PROGRAM NUMBER
14T 0704	14033	14033	910002		B D E 0 3 5

S/C 2081, 7310 — S/C 2081

Update: Code	Line No.	Member No.	End Joint No. Lt.	End Joint No. Rt.	End Condition Lt.	End Condition Rt.	Direction	Length ft.	Min. I ft⁴	Hinge Location or Support Width ft	Dead Load Uniform k/ft.	Unit Wt. pcf	-K- Stiffness Factor Lt.	-K- Stiffness Factor Rt.	-C- Carry Over Factor Lt.	-C- Carry Over Factor Rt.	Recall Member R	Reverse	D.L. Deflections	Sidesway S
		1	1	2		P	G	100	400		3.500								20	
		2	2	3			G	200	↓		↓									
		3	3	4	P		G	100												
		4	5	2				300	500											
		5	6	3				300	500											

S/C 7310

Lt. Rt. Hinge Location Rt Lt.

END CONDITION
C = Cantilever
P = Pin
R = Roller

DIRECTION:
G or H - Horizontal

FRAME SYSTEM - Live Load Generator

DS-D126 (REV 75)

BDEOAA

IDENT DIST	GR. BATCH	PROB
14 T	07	04

S/C 7322, 7323

Page 2 of 2

Name Example #4

Phone

MEMBER DATA

Update: Code	Line No.	Member No.	Number of L.L. Lanes Superstructure Lt. End	Superstructure Rt. End	Substructure Lt.	Substructure Rt.	Plot Date: Resisting Moment of Unit Steel Positive	Negative	Moment & Shear Scale	Influence lines	COMMENTS
		1	13	15					1		
		2	15	17							
		3	17	19							

S/C 7322

Frame Description data with the horizontal members numbered consecutively starting with 01 must accompany this data.

Member Data -- When the Number of L L Lanes is given, it must be given for the left end of Superstructure Member 01. (Substructure Member 01 defaults to 1.0 when left blank.) Thereafter, it is assumed to be constant until another entry is made.

Live Load Data -- Leave L L No. 4 blank for Standard P13 truck or check P13 box on Form DS-D125 if only one live load lane desired

LIVE LOAD DATA

Update: Code	Line No.	L L No.	P_N Kips	D_1 Ft.	P_{N+1} Kips	D_2 Ft.	P_{N+2} Kips	D_3 Ft.	P_{N+3} Kips	D_4 Ft.	P_{N+4} Kips	D_5 Ft.	P_{N+5} Kips	D_6 Ft.	P_{N+6} Kips	Color Code	Over Load No. of Axles	Cooper Loading	✓ NO IMPACT	COMBINE	CARD CONTROL
		4													X						1
		4																			2
		5													X						1
		5																			2
		6													X						1
		6																			2

S/C 7323

OUTPUT

Sample Problem 4

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 1

FRAME DESCRIPTION

LINE NO.	MEM NO	JOINT NO. LT	JOINT NO. RT	END COND LT	END COND RT	DIR	SPAN	I	SUPPORT OR HINGE	E	DEAD LOAD UNIFORM	DEAD LOAD SEC	K LT	K RT	CARRY OVER FACTORS LT	CARRY OVER FACTORS RT	RECALL MEM
0010	1	1	2	P		G	100.0	400.00	0.0	0.	3.500	0.	0.0	0.0	0.0	0.0	
0020	2	2	3			G	200.0	400.00	0.0	0.	3.500	0.	0.0	0.0	0.0	0.0	
0030	3	3	4		P	G	200.0	400.00	0.0	0.	3.500	0.	0.0	0.0	0.0	0.0	
0040	4	5	2				30.0	50.00	0.0	0.	0.0	0.	0.0	0.0	0.0	0.0	
0050	5	6	3				30.0	50.00	0.0	0.	0.0	0.	0.0	0.0	0.0	0.0	

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 2

FRAME DIAGNOSTICS

NO ERRORS FOUND

FRAME PROPERTIES

MEM NO	JT LT	JT RT	END COND LT	END COND RT	DIR	SPAN	I	SUPPORT OR HINGE	E	CARRY OVER FACTORS LT	CARRY OVER FACTORS RT	DISTRIBUTION FACTORS LT	DISTRIBUTION FACTORS RT
1	1	2	P		G	100.0	400.00	0.0	750.	0.500	0.0	0.0	0.450
2	2	3			G	200.0	400.00	0.0	750.	0.500	0.500	0.300	0.367
3	3	4		P	G	200.0	400.00	0.0	750.	0.0	0.500	0.290	0.0
4	5	2				30.0	50.00	0.0	750.	0.500	0.500	0.0	0.250
5	6	3				30.0	50.00	0.0	750.	0.500	0.500	0.0	0.323

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 3

FIXED END MOMENTS TRIAL 0

MEM NO	FIXED END MOMENTS LT	FIXED END MOMENTS RT	MEM NO	FIXED END MOMENTS LT	FIXED END MOMENTS RT	MEM NO	FIXED END MOMENTS LT	FIXED END MOMENTS RT
1	0.	-4375.	2	-11667.	-11667.	3	-17500.	0.
4	0.	0.	5	0.	0.			

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 4

*** SIDESWAY NOT CONSIDERED. ***

HORIZONTAL MEMBER MOMENTS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	652.	1354.	1506.	1308.	759.	-139.	-1387.	-2985.	-4933.	-7231.
2	-6818.	-3087.	1244.	4175.	5706.	5837.	4566.	1899.	-2170.	-7639.	-14506.
3	-16083.	-8175.	-1666.	3442.	7150.	9459.	10367.	9875.	7983.	4692.	0.

WARNING - MEMBER DEPTHS WERE NOT USED FOR ALL MEMBERS SO STRESSES WERE NOT CALC.

VERTICAL MEMBER MOMENTS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
4	793.	555.	317.	79.	-159.	-397.	-635.	-873.	-1111.	-1349.	-1587.
5	787.	551.	315.	79.	-157.	-394.	-630.	-866.	-1102.	-1338.	-1575.

HORIZONTAL MEMBER SHEARS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	102.7	67.7	32.7	-2.3	-37.3	-72.3	-107.3	-142.3	-177.3	-212.3	-247.3
2	321.5	251.5	181.5	111.5	41.5	-28.5	-98.5	-168.5	-238.5	-308.5	-378.5
3	430.4	360.4	290.4	220.4	150.4	80.4	10.4	-59.6	-129.6	-199.6	-269.6

VERTICAL MEMBER SHEARS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
4	-79.3	-79.3	-79.3	-79.3	-79.3	-79.3	-79.3	-79.3	-79.3	-79.3	-79.3

Page 4 of the output produces a warning indicating that member stresses could not be calculated from the available input data. As a result of this situation the program omits calculation of the horizontal member stresses. To obtain member stresses the structural depth must be given by a depth entry on the Superstructure Sections input form or a part code 27 on the section properties by parts input form. Member depths using part code 27 and an arbitrary part code 26 requires and entry for the Y coordinate of the center of gravity of the arbitrary section.

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 5

*** SIDESWAY NOT CONSIDERED. ***

VERTICAL MEMBER SHEARS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
5	-78.7	-78.7	-78.7	-78.7	-78.7	-78.7	-78.7	-78.7	-78.7	-78.7	-78.7

VERTICAL MEMBER REACTIONS TRIAL 0

MEM NO	LT REACTION	RT REACTION	MEMBER WEIGHT
4	568.9	568.9	0.0
5	808.9	808.9	0.0

OUTPUT — Sample Problem 4

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 6

TRIAL 0

TANGENTIAL ROTATIONS - RADIANS - CLOCKWISE POSITIVE

SPAN	LT. END	RT. END	SPAN	LT. END	RT. END	SPAN	LT. END	RT. END
1	0.000566	0.002204	2	0.002204	0.002187	3	0.002187	-0.014597
4	-0.000000	0.002204	5	-0.000000	0.002187			

HORIZONTAL MEMBER DEFLECTIONS IN FEET AT 1/20 POINTS FROM LEFT END - DOWNWARD POSITIVE

MEMBER 1	E= 750.	0.0	0.003	0.005	0.008	0.009	0.010
		0.010	0.009	0.007	0.004	0.001	-0.003
		-0.007	-0.010	-0.014	-0.016	-0.018	-0.017
		-0.015	-0.009	0.0			
MEMBER 2	E= 750.	0.0	0.031	0.076	0.127	0.181	0.231
		0.275	0.310	0.333	0.342	0.338	0.320
		0.290	0.250	0.202	0.149	0.096	0.049
		0.012	-0.007	0.0			
MEMBER 3	E= 750.	0.0	0.039	0.105	0.191	0.288	0.388
		0.486	0.577	0.654	0.716	0.757	0.777
		0.773	0.746	0.695	0.621	0.526	0.413
		0.284	0.145	0.0			

VERTICAL MEMBER DEFLECTIONS IN FEET AT 1/20 POINTS FROM LEFT END.

Page 6 reports tangential rotations at the ends of each member. Deflections at the 1/20 points were requested on the Frame Description form and printed for each horizontal member.

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 7

TRIAL 0

MEMBER 4	E= 750.	0.0	-0.000	-0.001	-0.001	-0.002	-0.003
		-0.004	-0.005	-0.006	-0.007	-0.008	-0.009
		-0.010	-0.010	-0.010	-0.009	-0.008	-0.007
		-0.005	-0.003	0.0			
MEMBER 5	E= 750.	0.0	-0.000	-0.001	-0.001	-0.002	-0.003
		-0.004	-0.005	-0.006	-0.007	-0.008	-0.009
		-0.009	-0.010	-0.010	-0.009	-0.008	-0.007
		-0.005	-0.003	0.0			

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 8

LIVE LOAD DIAGNOSTICS

NO ERRORS FOUND

LIVE LOAD GENERATOR

LINE NO.	MEM NO.	NUMBER OF LIVE LOAD LANES SUPERSTRUCTURE LT.END	SUPERSTRUCTURE RT.END	SUBSTRUCTURE LT.END	SUBSTRUCTURE RT.END	RESISTING MOMENT OF UNIT STEEL POSITIVE	NEGATIVE	PLOT M & S ENV.	PLOT SCALE	INFLU-ENCE LINES	P13
0010	1	1.300	1.500	1.0	1.0	0.	0.	1	0	NO	YES
0020	2	1.500	1.700	1.0	1.0	0.	0.				
0030	3	1.700	1.900	1.0	1.0	0.	0.				

----- TRUCK LOADING -----

LINE NO.	LIVE LOAD NO	P1	D2	P3	D4	P5	D6	P7	D8	P9	D10	P11	D12	OVER LOAD	RRL	IMPACT	COMB	CARD CONTROL
	4.	26.0	18.0	48.0	18.0	48.0	18.0	48.0	18.0	48.0	18.0	48.0	18.0	0.		YES	00	

P13	D14	P15	D16	P17	D18	P19	D20	P21	D22	P23	D24	P25
48.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Page 8 reports the input data as coded on the Live Load Generator input sheet. In this example a standard P-13 family of trucks is assumed to be the liveload vehicles. The axle spacing and loads are generated and printed for the maximum length truck that is used in the live load analysis. Live load numbers 4 through 6 output values are similar to superstructure live load results. If a particular truck is to be moved across the superstructure, then an entry must be made in the overload field to indicate a match between the "P" loads given and the axle loads of the particular truck. Output for this option is labeled with appropriate titles to indicate that a special truck was used for the generation of moment and shear envelopes.

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 9

LL NO. 4. NEGATIVE LIVE LOAD MOMENT ENVELOPE AND ASSOCIATED SHEARS

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-734.	-1469.	-2203.	-2937.	-3671.	-4406.	-5140.	-5874.	-6608.	-7343.
SHEAR	0.0	-46.5	-46.5	-46.5	-46.5	-46.5	-46.5	-46.5	-46.5	-46.5	-46.5
2	-11422.	-5097.	-1161.	-965.	-1388.	-2494.	-3600.	-4707.	-5813.	-6919.	-9960.
SHEAR	224.2	164.8	7.7	7.7	-30.9	-30.9	-30.9	-30.9	-30.9	-30.9	-222.3
3	-15255.	-7324.	-3778.	-3305.	-2833.	-2361.	-1889.	-1417.	-944.	-472.	0.
SHEAR	237.9	199.2	14.6	14.6	14.6	14.6	14.6	14.6	14.6	14.6	0.0

OUTPUT

Sample Problem 4

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 10

LL NO. 4.

DEAD LOAD PLUS NEGATIVE LIVE LOAD MOMENT ENVELOPE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	118.	-115.	-697.	-1629.	-2912.	-4544.	-6526.	-8859.	-11541.	-14574.
2	-20240.	-8184.	63.	3210.	4318.	3343.	968.	-2806.	-7963.	-14558.	-24477.
3	-31338.	-15499.	-5444.	137.	4317.	7098.	8478.	8459.	7039.	4220.	0.

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 11

LL NO. 4.

POSITIVE LIVE LOAD MOMENT ENVELOPE AND ASSOCIATED SHEARS

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	1865.	3072.	3960.	4350.	4294.	3790.	2822.	1562.	1757.	1952.
SHEAR	0.0	136.9	105.9	72.1	40.1	-51.2	-84.2	-115.8	10.9	10.9	10.9
2	3037.	1930.	2910.	6706.	9313.	10397.	9854.	7719.	3971.	677.	547.
SHEAR	-30.9	-30.9	140.4	129.8	88.2	37.5	-69.5	-119.8	-159.5	-98.8	7.7
3	259.	670.	3460.	8670.	12957.	15626.	16514.	15524.	12534.	7369.	0.
SHEAR	-0.9	80.2	154.9	158.4	123.4	75.1	-30.5	-80.6	-140.3	-200.0	0.0

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 12

LL NO. 4.

DEAD LOAD PLUS POSITIVE LIVE LOAD MOMENT ENVELOPE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	2717.	4426.	5466.	5658.	5054.	3651.	1435.	-1423.	-3176.	-5279.
2	-5781.	-1156.	4154.	10881.	15019.	16234.	14423.	9618.	1801.	-6762.	-13961.
3	-15824.	-7505.	1814.	12112.	20106.	25085.	26881.	25399.	20517.	12060.	0.

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 13

LL NO. 4.

LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 1	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	231.7	186.5	146.8	112.3	82.2	57.6	37.5	21.8	19.5	19.5	19.5
MOMENT	0.0	1865.0	3019.4	3369.4	3286.1	2679.6	2248.3	1528.4	1561.7	1756.9	1952.1
NEG. V	-73.4	-73.4	-73.4	-73.4	-73.4	-94.9	-129.8	-168.4	-214.7	-264.8	-313.0
MOMENT	0.0	-734.3	-1468.5	-2202.8	-2937.0	3014.1	2978.3	2384.2	1115.1	-1146.1	-3339.3
RANGE	305.1	259.9	220.3	185.7	155.6	152.5	167.3	190.3	234.3	284.3	332.5

LL NO. 4.

LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 2	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	440.4	387.8	327.4	262.7	197.8	136.4	86.1	48.1	21.9	10.8	10.8
MOMENT	-9411.6	-3385.2	1756.0	5413.0	7275.7	7338.6	6135.1	4284.5	2345.2	331.3	547.4
NEG. V	-55.3	-55.3	-55.3	-55.3	-73.3	-120.3	-180.0	-247.6	-319.5	-391.7	-466.4
MOMENT	3030.0	1930.4	824.2	-282.0	5552.4	7010.5	7421.0	6159.8	2993.6	-2006.2	-6442.5
RANGE	495.7	443.1	382.7	318.1	271.1	256.7	266.1	295.7	341.3	402.5	471.2

LL NO. 4.

LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 3	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	531.9	486.0	430.2	365.5	293.0	217.1	147.7	90.2	45.6	23.6	23.6
MOMENT	-11620.1	-4669.5	1952.6	7296.3	10690.9	11699.9	10618.9	8147.6	4998.0	-472.2	0.0
NEG. V	-1.3	-3.1	-14.2	-32.6	-61.0	-101.3	-154.2	-217.1	-288.9	-368.4	-454.6
MOMENT	259.3	553.9	2269.0	4561.5	7319.8	10125.1	12334.4	13023.6	11554.3	7368.5	0.0
RANGE	533.2	489.1	444.4	398.0	354.0	318.3	301.9	307.3	334.6	392.0	478.2

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 14

LL NO. 4. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 1	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	334.4	254.2	179.5	110.0	44.8	-14.7	-69.8	-120.5	-157.6	-192.8	-227.8
NEG. V	29.3	-5.7	-40.7	-75.7	-110.7	-167.2	-237.1	-310.6	-392.1	-477.1	-560.3

LL NO. 4. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 2	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	762.0	639.4	508.9	374.3	239.3	108.0	-12.3	-120.3	-216.6	-297.6	-367.6
NEG. V	266.2	196.2	126.2	56.2	-31.8	-148.7	-278.5	-416.0	-557.9	-700.2	-836.8

LL NO. 4. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 3	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	962.3	846.4	720.6	585.9	443.4	297.5	158.1	30.6	-63.8	-176.0	-246.0
NEG. V	429.1	357.3	276.2	187.8	89.4	-20.6	-143.8	-276.6	-418.4	-568.0	-724.2

IDENT 141 07 04 FRAME SYSTEM MAY, 02, 1975 PAGE 15

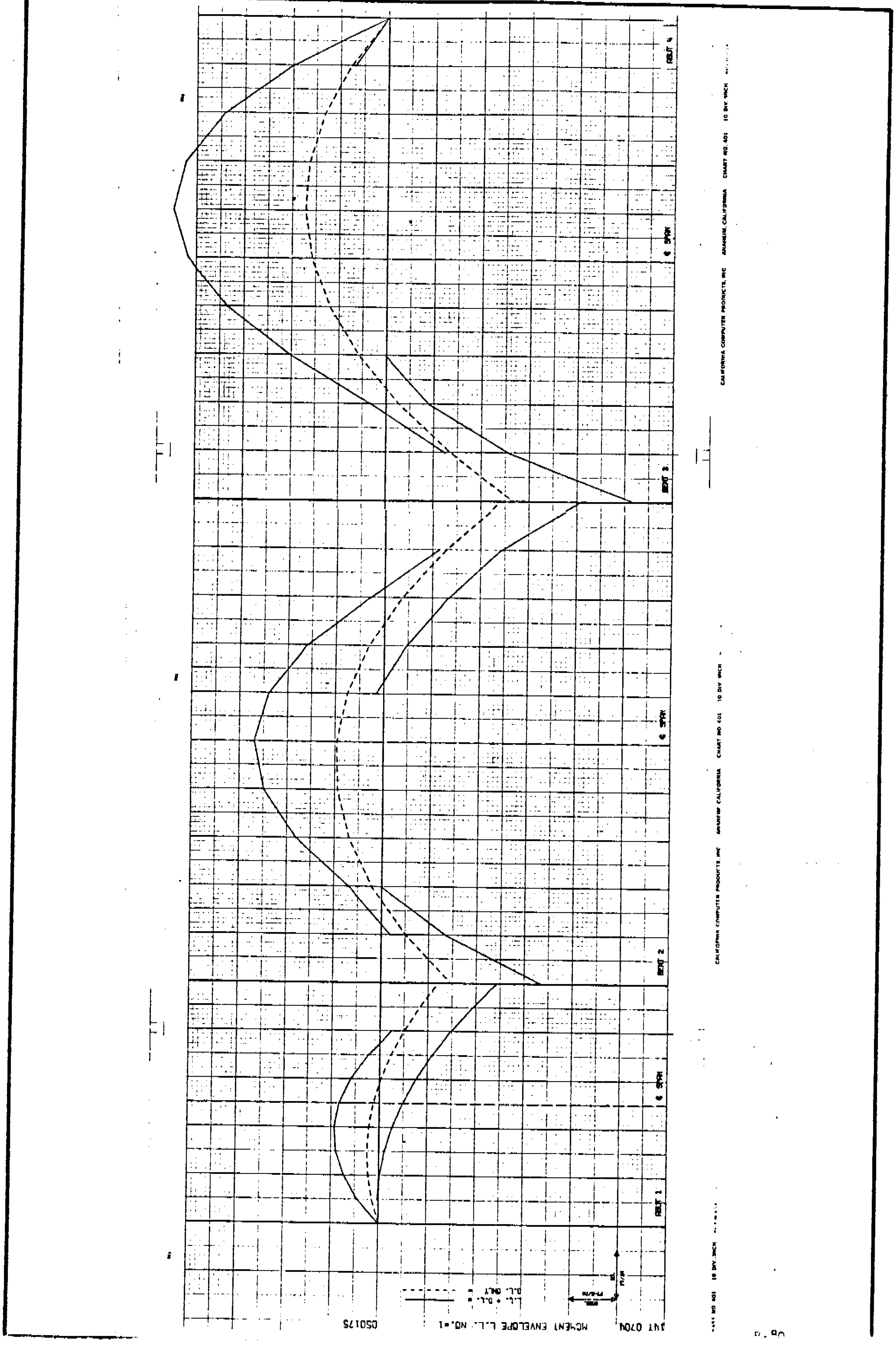
LL NO. 4. LIVE LOAD SUPPORT RESULTS

	MAX. AXIAL LOAD			MAX. LONGITUDINAL MOMENT		
	AXIAL LOAD	------MOMENT------ TOP	BOT.	AXIAL LOAD	------MOMENT------ TOP	BOT.
SUPPORT JT. 1						
POSITIVE	171.6	0.	0.	0.0	0.	0.
NEGATIVE	-46.5	0.	0.	0.0	0.	0.
MEMBER 4						
POSITIVE	347.6	-1125.	562.	202.2	1058.	-529.
NEGATIVE	-41.8	606.	-303.	270.7	-2581.	1290.
MEMBER 5						
POSITIVE	346.6	-1048.	524.	232.6	3236.	-1618.
NEGATIVE	-8.6	-205.	102.	272.4	-4041.	2020.
SUPPORT JT. 4						
POSITIVE	244.3	0.	0.	0.0	0.	0.
NEGATIVE	-14.6	0.	0.	0.0	0.	0.

***** BATCH TOTALS 15 FRAME UNITS 6 L.L. UNITS 6 PLOT UNITS 0 PRESTRESS UNITS COST= $ 7.20

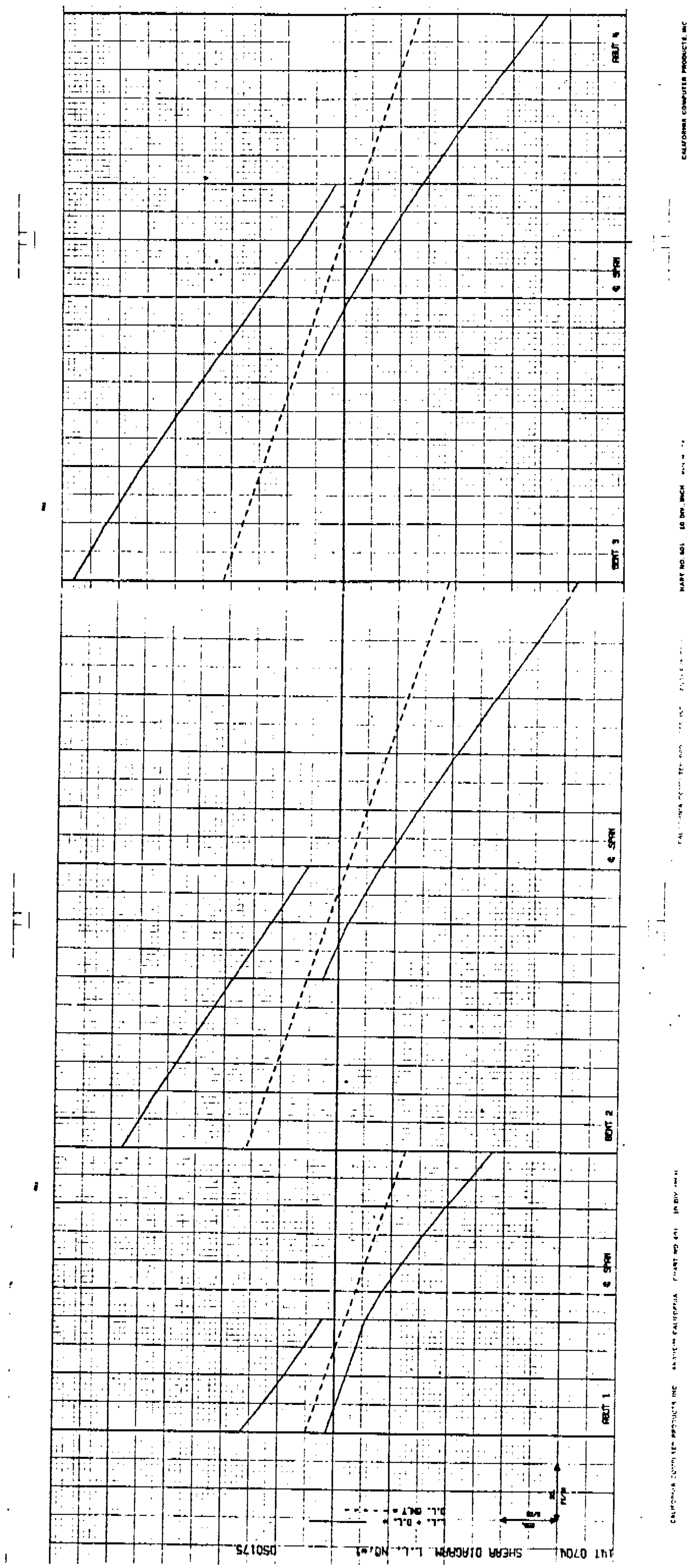
OUTPUT

Sample Problem 4



OUTPUT

Sample Problem 4



SAMPLE PROBLEM 5

PROBLEM

A. General

Six-span, two frames, prestressed bridge with one expansion joint. Prestress analysis to be computed by program.

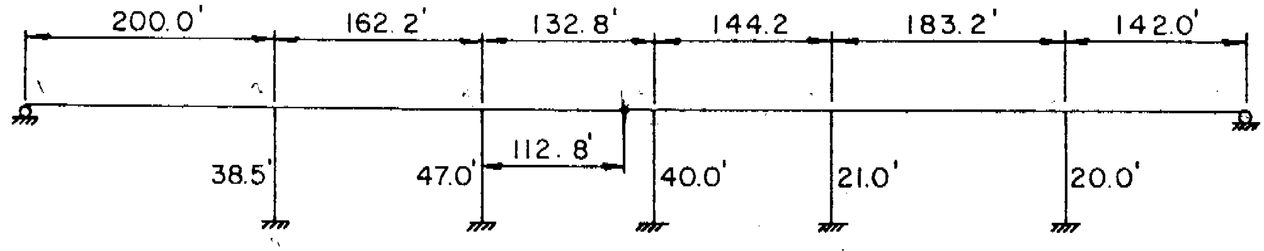
B. Section Properties

The columns are nonprismatic as shown in figure 9 and 10. The superstructure cross-section varies as shown on figure 9.

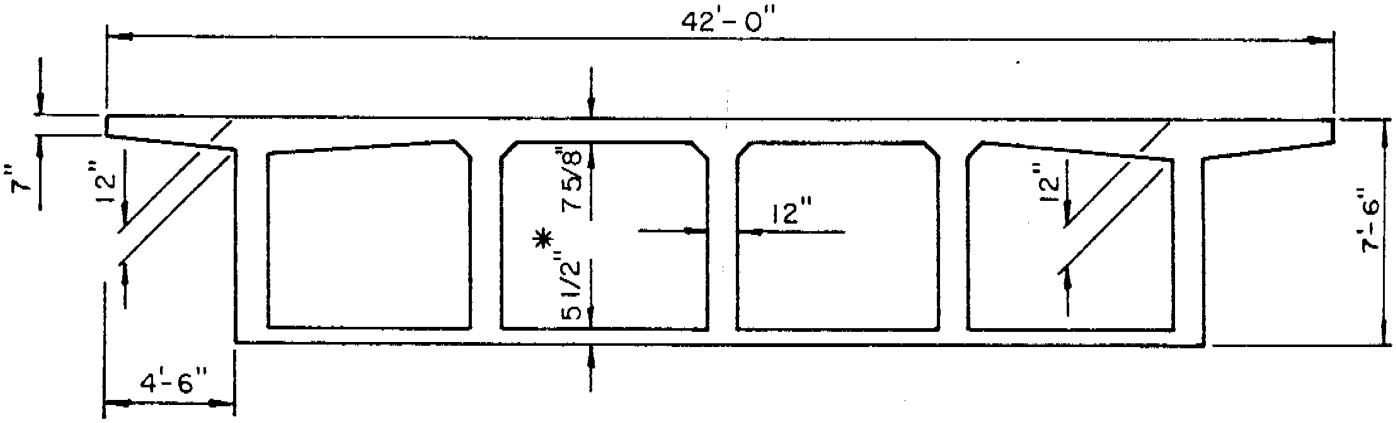
C. Loading

The dead loads are calculated from the unit weight of concrete times the cross-sectional areas generated by the program plus additional loads described on Load data form trial ØØ. Additional dead loads to be applied after prestressing are described on Load Data form under trial Ø1. Live loading to be applied to superstructure is 2.75 lanes of AASHTO HS20-44 loading without alternative.

EXAMPLE: TWO FRAME PRESTRESSED BRIDGE

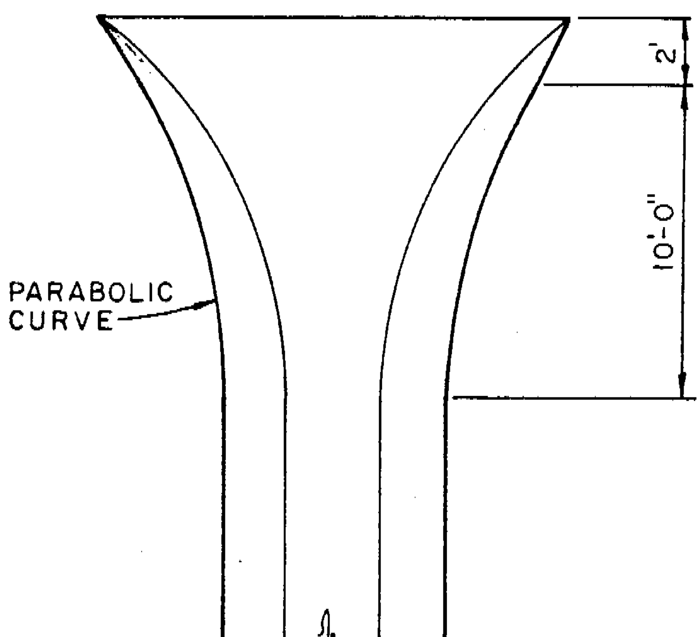


ELEVATION

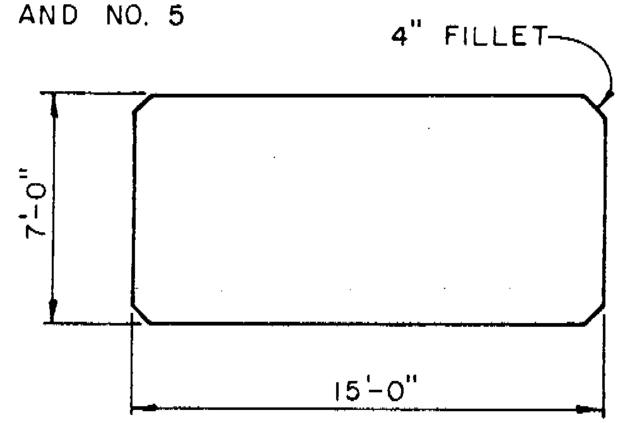


TYPICAL SECTION

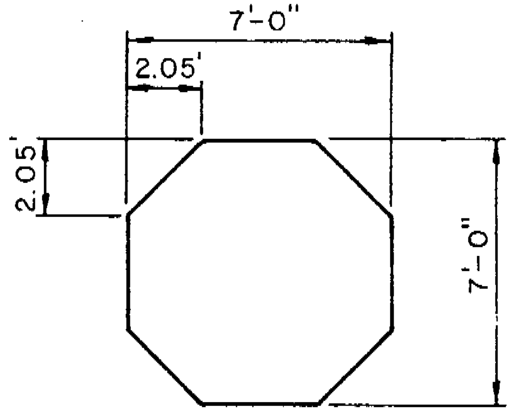
* 9" BOTTOM SLAB FLARE TO 0.1 PT. OF THE SPAN AT BENTS NO. 2 AND NO. 5



COLUMN ELEVATION

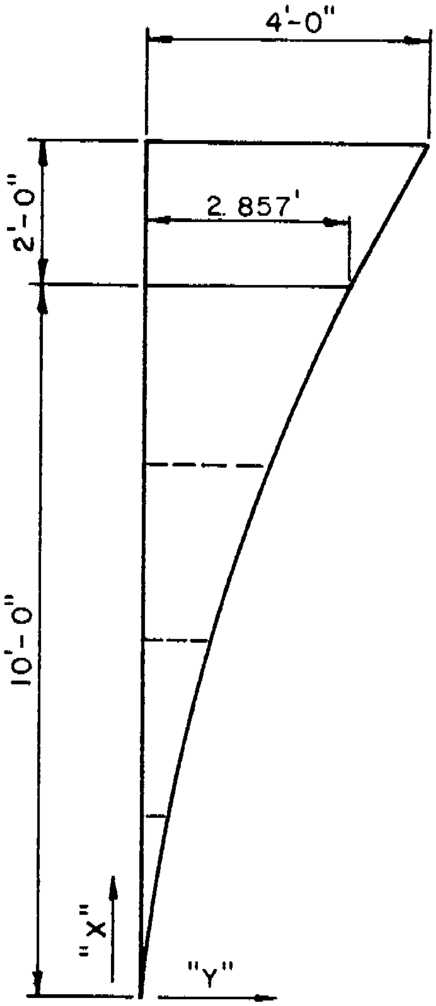


COLUMN AT TOP



COLUMN AT BASE

BENT COLUMNS



PARABOLIC CALCULATIONS

$Y = mx^2$ $\quad\quad X = \sqrt{y/m}$

SLOPE = $dy/dx = 2mx$

Horizontal distance = Parabolic distance + Slope X Run

$4' = mx^2 + (2mx) \times (2)$

$4' = 100m + 40m$ at $x = 10'$

$4' = 140m$ $\quad m = 1/35$

$Y = (1/35) \times 10^2 = 2.857'$

Fig. 16

Sample Problem 5

DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - FRAME DESCRIPTION

DS-D93 (REV 2 75)

BDEOAA

Page *1* of *9*

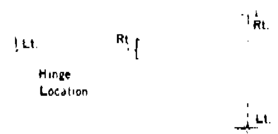
Name *EXAMPLE #5*

Phone *2091*

IDENT. (DIST. GR. BATCH PROB.)	SOURCE (DIST UNIT)	CHARGE (DIST UNIT)	EXPENDITURE AUTHORIZATION	SPECIAL DESIGNATION WHEN APPLICABLE	PROGRAM NUMBER
14T 2001	*1403314033*	*910002*			B D E 0 3 5
S.C 2091, 7310	S.C 2091				

Update Code	Line No.	Member No.	End Joint No. Lt.	End Joint No. Rt.	End Condition Lt.	End Condition Rt.	Direction	Length ft.	Min I ft⁴	Hinge Location or Support Width ft	Dead Load Uniform k/ft.	Dead Load Unit Wt. pcf	Stiffness Factor -K- Lt.	Stiffness Factor -K- Rt.	Carry Over Factor -C- Lt.	Carry Over Factor -C- Rt.	Recall Member	Recall Reverse R	D.L. Deflections	Sidesway S
		1	*1*	*2*	*2*		*G*	*2000*				*150*								*S*
		2	*2*	*3*				*1622*												
		3	*3*	*4*				*1328*		*11* [illegible]										
		4	*4*	*5*				*1442*												
		5	*5*	*6*				*1832*												
		6	*6*	*7*		*R*		*1420*												
		7	*8*	*2*				*385*												
		8	*9*	*3*				*470*												
		9	*10*	*4*				*400*												
		10	*11*	*5*				*210*												
		11	*12*	*6*				*200*												

S/C 7310



END CONDITION
C - Cantilever
P - Pin
R - Roller

DIRECTION
G or H - Horizontal

DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - SUPERSTRUCTURE SECTIONS

DS D112 (REV 4/75)

BDEOAA

Page *2* of *9*

Name *Example #5*

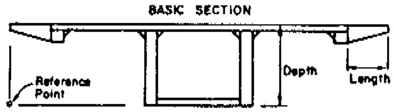
Phone

IDENT (DIST GROUP BATCH PROB.)	SOURCE (DIST. UNIT)	CHARGE (DIST. UNIT)	EXPENDITURE AUTHORIZATION	SPECIAL DESIGNATION WHEN APPLICABLE	PROGRAM NUMBER
14T 2001					B D E 0 3 5
S.C 2091, 7311	S.C 2091				

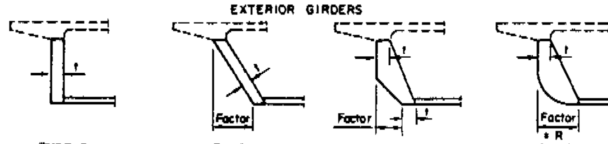
Update Code	Line No.	Member No.	Cross Section Location (FT)	Recall	Ref. Pt. Coord X (FT)	Ref. Pt. Coord Y (FT)	S.S. Data Width E.D.-E.D (FT)	S.S. Data (obscured)	Exterior Girders Left (Web Thick / Factor)	Exterior Girders Right (Type / Web Thick (IN) / Factor (FT))	Overhangs Left / Right (Length (FT), Ext. Thick (IN), Int. Thick (IN))	Store
		1	*00*	*1*			*420*	*7*[illegible]*2 550*[illegible]	[illegible]*012*	*012*	*45 71245 71*	*202*
		1	*1800*	*2*								
		1	*2000*	*01*			*420*	*7*[illegible]	[illegible]*2012*	*012*		*03*
		2	*00*	*03*								
		2	*162*	*02*								
		2	*1422*	*02*								
		2	*1622*	*03*								
		3	*00*	*03*								
		3	*200*	*02*								
		3	*1328*	*02*								
		4	*00*	*02*								
		4	*1442*	*03*								

S/C 7311

BASIC SECTION



EXTERIOR GIRDERS



TYPE 0 TYPE 1 TYPE 2 TYPE 3

TYPE 9 MEANS NO EXTERIOR GIRDER

DEPARTMENT OF TRANSPORTATION
FRAME SYSTEM - SUPERSTRUCTURE SECTIONS
DS D112 (REV 4/75)

BDEOAA

Page 3 of 9
Name *Example #5*
Phone

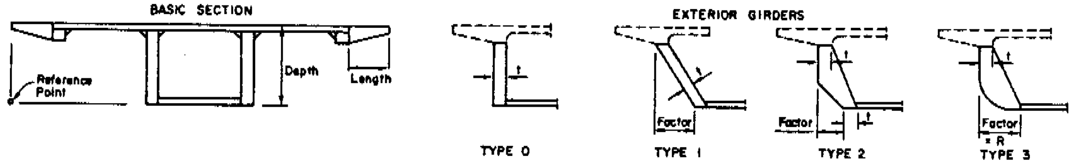
IDENT (DIST. GROUP BATCH PROB.): 14T 2001 — S/C 2091, 7311
SOURCE (DIST. UNIT) — S/C 2091 | CHARGE (DIST. UNIT) | EXPENDITURE AUTHORIZATION | SPECIAL DESIGNATION WHEN APPLICABLE | PROGRAM NUMBER: B D E Ø 3 5

UPDATE CODE	LINE NO.	MEMBER NO.	CROSS SECTION LOCATION (FT)	RECALL
		5	00	03
		5	183	02
		5	1649	02
		5	1832	03
		6	00	03
		6	1420	02
		7	00	04
		7	285	04
		7	335	07
		7	385	06
		7	405	05
		8	00	04

REF. PT. COORD. X (FT) Y (FT) — S.S. DATA WIDTH E.D.-E.D. (FT) — INT. GIRDERS THICK. (IN.) — EXTERIOR GIRDERS: LEFT WEB THICK (IN.), FACTOR (FT.); RIGHT TYPE, WEB THICK. (IN.), FACTOR (FT.) — OVERHANGS: LEFT LENGTH (FT.), EXT. THICK. (IN.), INT. THICK (IN.); RIGHT LENGTH (FT.), EXT. THICK. (IN.), INT. THICK (IN.) — STORE

S/C 7311

BASIC SECTION — EXTERIOR GIRDERS



TYPE 9 MEANS NO EXTERIOR GIRDER

DEPARTMENT OF TRANSPORTATION
FRAME SYSTEM - SUPERSTRUCTURE SECTIONS
DS D112 (REV 4/75)

BDEOAA

Page 4 of 9
Name *Example #5*
Phone

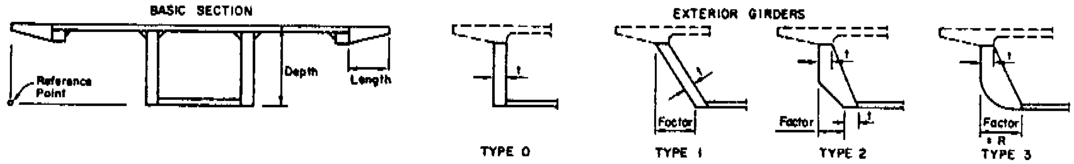
IDENT (DIST. GROUP BATCH PROB.): 14T 2001 — S/C 2091, 7311
SOURCE (DIST. UNIT) — S/C 2091 | CHARGE (DIST. UNIT) | EXPENDITURE AUTHORIZATION | SPECIAL DESIGNATION WHEN APPLICABLE | PROGRAM NUMBER: B D E Ø 3 5

UPDATE CODE	LINE NO.	MEMBER NO.	CROSS SECTION LOCATION (FT)	RECALL
		8	350	04
		8	400	07
		8	450	06
		8	470	05
		9	00	04
		9	280	04
		9	330	04
		9	380	06
		9	400	05
		10	00	04
		10	90	04
		10	140	07

REF. PT. COORD. X (FT) Y (FT) — S.S. DATA WIDTH E.D.-E.D. (FT) — INT. GIRDERS THICK. (IN.) — EXTERIOR GIRDERS: LEFT WEB THICK (IN.), FACTOR (FT.); RIGHT TYPE, WEB THICK. (IN.), FACTOR (FT.) — OVERHANGS: LEFT LENGTH (FT.), EXT. THICK. (IN.), INT. THICK (IN.); RIGHT LENGTH (FT.), EXT. THICK. (IN.), INT. THICK (IN.) — STORE

S/C 7311

BASIC SECTION — EXTERIOR GIRDERS



TYPE 9 MEANS NO EXTERIOR GIRDER

DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - SUPERSTRUCTURE SECTIONS

BDEOAA

DS D112 (REV 4/75)

Page 5 of 9

Name Example #5

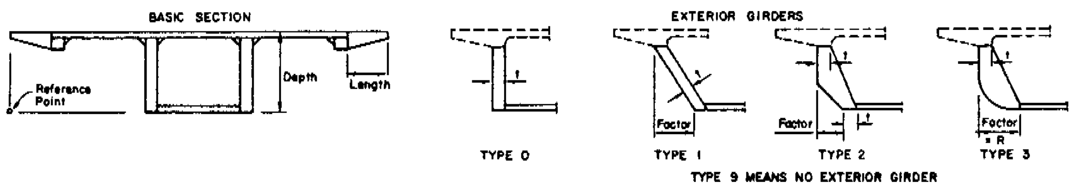
Phone

IDENT DIST	GROUP BATCH	PROB.	SOURCE DIST. UNIT	CHARGE DIST. UNIT	EXPENDITURE AUTHORIZATION	SPECIAL DESIGNATION WHEN APPLICABLE	PROGRAM NUMBER
14T	2001						BDE Ø35

S/C 2091, 7311 — S/C 2091

UPDATE CODE	LINE NO.	MEMBER NO.	CROSS SECTION LOCATION (FT)	RECALL	REF PT. COORD X (FT)	Y (FT)	S.S. DATA WIDTH E.D.-E.D. (FT.)	...	EXTERIOR GIRDERS LEFT	RIGHT	OVERHANGS LEFT	RIGHT	STORE
		10	19006										
		10	21005										
		11	0004										
		11	8004										
		11	13007										
		11	18006										
		11	20005										

S/C 7311



DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - SECTION PROPERTIES BY PARTS

BDEOAA

DS-D94 (REV 2 75)

Page 6 of 9

Name Example #5

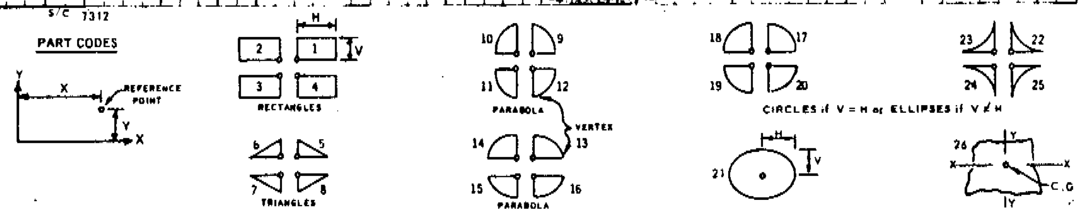
Phone

IDENT. DIST.	GROUP BATCH	PROB.	SOURCE DIST. UNIT	CHARGE DIST. UNIT	EXPENDITURE AUTHORIZATION	SPECIAL DESIGNATION WHEN APPLICABLE	PROGRAM NUMBER
14T	2ØØ1						BDE Ø35

S/C 2091, 7312 — S/C 2091

Update CODE	Line No.	Member No.	Cross Section Location ft	Recall	Sign + or -	Part Code	Vertical V or Depth D ft.	Horizontal H ft.	Ref. Pt. Coord. X	Y	Any Shape Ixx ft⁴	Iyy ft⁴	Store
		Ø	ØØ			8	Ø37	145Ø	[illegible]	6.87			Ø1
			ØØ		-	8	Ø37	[illegible]67					
			1Ø			1	7ØØ	[illegible]					
					-	5	2Ø5	[illegible]Ø5					
					-	6				7ØØ			
					-	7			7ØØ	7ØØ			
					-	8			7ØØ				Ø4
			2Ø			1	7ØØ	1[illegible]					
					-	5	Ø33	Ø33					
					-	6				7ØØ			
					-	7			[illegible]5ØØ	[illegible]			
					-	8			1[illegible]				Ø5

S/C 7312



DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - SECTION PROPERTIES BY PARTS

DS-D94 (REV 2 75)

BDEOAA

Page 7 of 9

Name *Example #5*

Phone

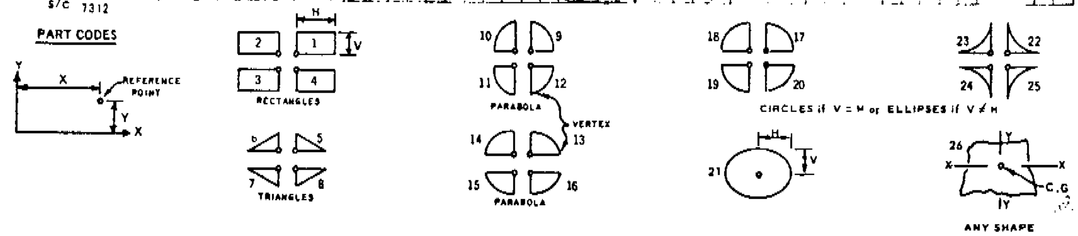
IDENT. (DIST., GROUP, BATCH, PROB.)	SOURCE (DIST., UNIT)	CHARGE (DIST., UNIT)	EXPENDITURE AUTHORIZATION	SPECIAL DESIGNATION WHEN APPLICABLE	PROGRAM NUMBER
14T 2001					BDEØ35

S/C 2091, 7312 — S/C 2091

CODE	Line No.	Member No.	Cross Section Location ft.	Recall	Sign + or −	Part Code	Vertical V or Depth D ft.	Horizontal H ft.	Ref. Pt. Coord. X ft.	Ref. Pt. Coord. Y ft.	Area ft.²	Ixx ft.⁴	Iyy ft.⁴	Store
		Ø	3Ø			1	7ØØ	12.31						
					−	5	Ø82	Ø82						
					−	6								
					−	7								
					−	8								Ø6
			4Ø			1	7ØØ	8.42						
					−	5	1.74	1.74						
					−	6								
					−	7								
					−	8								Ø7

7 S/C 7312

PART CODES



DEPARTMENT OF TRANSPORTATION

FRAME SYSTEM - SUPERSTRUCTURE LIVE LOAD

DS-D125 (REV 2 75)

BDEOAA

Page 8 of 9

Name *Example #5*

Phone

IDENT (DIST., GR., BATCH, PROB.)
14T 2001

S/C 7320, 7321

MEMBER DATA

CODE	Line No.	Member No.	Superstructure Lt. End	Superstructure Rt. End	Substructure Lt.	Substructure Rt.	Resisting Moment of Unit Steel Positive	Resisting Moment of Unit Steel Negative	Moment & Shear	Influence Lines ✓ P-13	COMMENTS
		1	2.750		27	27					

(Number of Live Load Lanes: Superstructure / Substructure; Plot Data)

Frame Description data with the horizontal members numbered consecutively starting with 01 must accompany this data.

Member Data – When the Number of L.L. Lanes is given, it must be given for the left end of Superstructure Member 01. (Substructure Member 01 defaults to 1.0 when left blank.) Thereafter, it is assumed to be constant until another entry is made.

Live Load Data – For AASHO HS20-44 loading, leave Truck and Lane data blank for L.L. No. 1. When this data is given, it replaces the HS20-44 loading. An entry for the Number of Live Load Lanes, overrides that given as Member Data. Data entries for L.L. No.'s 2 and 3 produce separate results in addition to L.L. No. 1.

Influence Lines – When checked a plot of the influence lines will be produced along with the printed results.

S/C 7320

LIVE LOAD DATA

CODE	Line No.	L.L. No.	Truck – (1 Lane) P_1 Kips	D_1 Ft.	P_2 Kips	D_2 Ft.	P_3 Kips	Uniform Kips/ft.	Moment Rider	Shear Rider Kips	No Impact ✓	Number of Live Load Lanes	COMMENTS
		1											
		2											
		3											

S/C 7321

DEPARTMENT OF TRANSPORTATION

IDENT
DIST GROUP BATCH PROB
14T 2001
S/C 7315

BDEOAA

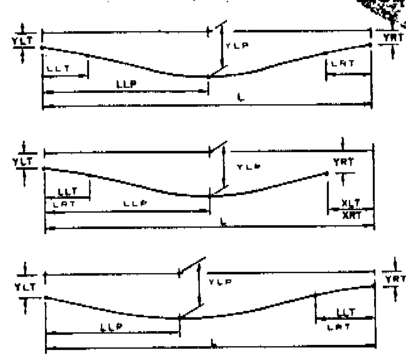
Page 9 of 9
Name *Example #5*
Phone

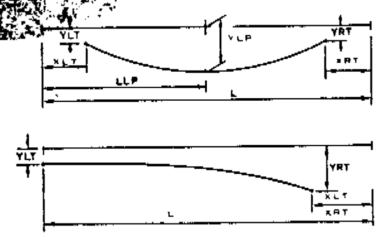
FRAME SYSTEM - PRESTRESSED DATA

DS-D150 Rev 3/75

CODE	Line No	Trial No	Frame No	Path No	Member No	LLT %	LLP %	LRT %	YLT ft.	YLP ft.	YRT ft.	XLT ft.	XRT ft	u X10⁻²	k X10⁻⁴	fs KSI	% Jack	End	Anchor Set LT ⅛ In	Anchor Set RT ⅛ In	Allow Tension Spec.	Allow Tension %	P-Jock KIPS	f'c KSI	% Shortening	Losses KSI
		1	1	1	1		40	10	300	650	125							L								
		1	1	1	2	10	50	10	125	500	150															
		1	1	1	3	10	60		150	400	300		200													
		1	2	1	3				275		150															
		1	2	1	4	10	50	10	150	500	125	1128														
		1	2	1	5	10	50	10	125	650	125															
		1	2	1	6	10	60		125	500	300							B								

S/C 7315





NOTE: "L" MUST BE THE TOTAL MEMBER LENGTH AS SHOWN ON "FRAME DESCRIPTION". LLP IS ALWAYS THE LENGTH FROM THE LEFT END TO THE LOW POINT. FOR A STRAIGHT TENDON YLT YLP AND YRT ARE REQUIRED INPUT.

IDENT 14T 20 01 FRAME SYSTEM MAY. 15, 1975 PAGE 1

FRAME DESCRIPTION

LINE NO.	MEM NO	JOINT NO. LT	JOINT NO. RT	END COND LT	END COND RT	DIR	SPAN	I	SUPPORT OR HINGE	E	DEAD LOAD UNIFORM	DEAD LOAD SEC	K LT	K RT	CARRY OVER FACTORS LT	CARRY OVER FACTORS RT	RECALL MEM
0010	1	1	2	R		G	200.0	0.0	0.0	0.	0.0	150.	0.0	0.0	0.0	0.0	
0020	2	2	3			G	162.2	0.0	0.0	0.	0.0	150.	0.0	0.0	0.0	0.0	
0030	3	3	4			G	132.8	0.0	112.8	0.	0.0	150.	0.0	0.0	0.0	0.0	
0040	4	4	5			G	144.2	0.0	0.0	0.	0.0	150.	0.0	0.0	0.0	0.0	
0050	5	5	6			G	183.2	0.0	0.0	0.	0.0	150.	0.0	0.0	0.0	0.0	
0060	6	6	7		R	G	142.0	0.0	0.0	0.	0.0	150.	0.0	0.0	0.0	0.0	
0070	7	8	2				38.5	0.0	7.5	0.	0.0	150.	0.0	0.0	0.0	0.0	
0080	8	9	3				47.0	0.0	7.5	0.	0.0	150.	0.0	0.0	0.0	0.0	
0090	9	10	4				40.0	0.0	7.5	0.	0.0	150.	0.0	0.0	0.0	0.0	
0100	10	11	5				21.0	0.0	7.5	0.	0.0	150.	0.0	0.0	0.0	0.0	
0110	11	12	6				20.0	0.0	7.5	0.	0.0	150.	0.0	0.0	0.0	0.0	

> Page 1 thru Page 55 - This is the output from Frame System which defines the frame, member and frame properties, dead load, added dead loads and live load results. Since a prestress design will utilize all of this information, users should carefully review it for accuracy and completeness.

IDENT 14T 20 01 FRAME SYSTEM MAY. 15, 1975 PAGE 2

SECTION PROPERTIES

LINE NO.	MEM	LOC	RECALL	+ -	CODE	V	H	X	Y	INERTIAS OF PARTS AREA	IXX	IYY	STORE
0020	0	0.0			8	0.37	14.50	0.0	6.87	0.0	0.0	0.0	01
0010	0	0.0		-	8	0.37	0.67	0.0	0.0	0.0	0.0	0.0	

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y
2.56	5.06	7.08	-6.11	28.57

LINE NO.	MEM	LOC	RECALL	+ -	CODE	V	H	X	Y	INERTIAS OF PARTS AREA	IXX	IYY	STORE
0040	0	1.0			1	7.00	7.00	0.0	0.0	0.0	0.0	0.0	
0030	0	1.0		-	5	2.05	2.05	0.0	0.0	0.0	0.0	0.0	
0070	0	1.0		-	6	2.05	2.05	0.0	7.00	0.0	0.0	0.0	
0060	0	1.0		-	7	2.05	2.05	7.00	7.00	0.0	0.0	0.0	
0050	0	1.0		-	8	2.05	2.05	7.00	0.0	0.0	0.0	0.0	04

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y
40.59	3.50	3.50	91.23	91.23

LINE NO.	MEM	LOC	RECALL	+ -	CODE	V	H	X	Y	INERTIAS OF PARTS AREA	IXX	IYY	STORE
0080	0	2.0			1	7.00	15.00	0.0	0.0	0.0	0.0	0.0	
0120	0	2.0		-	5	0.33	0.33	0.0	0.0	0.0	0.0	0.0	
0110	0	2.0		-	6	0.33	0.33	0.0	7.00	0.0	0.0	0.0	
0100	0	2.0		-	7	0.33	0.33	15.00	7.00	0.0	0.0	0.0	
0090	0	2.0		-	8	0.33	0.33	15.00	0.0	0.0	0.0	0.0	05

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y
104.78	7.50	3.50	426.08	1956.49

OUTPUT   Sample Problem 5

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IDENT  147 20 01                         FRAME SYSTEM                  MAY. 15, 1975                 PAGE   3

SECTION PROPERTIES
LINE                        +                                                    INERTIAS OF PARTS
 NO. MEM     LOC  RECALL  - CODE      V       H        X        Y        AREA         IXX         IYY    STORE
0170   0      3.0            1      7.00   12.71     0.0      0.0       0.0          0.0         0.0
0160   0      3.0         -  5      0.82    0.82     0.0      0.0       0.0          0.0         0.0
0150   0      3.0         -  6      0.82    0.82     0.0      0.0       0.0          0.0         0.0
0140   0      3.0         -  7      0.82    0.82     0.0      0.0       0.0          0.0         0.0
0130   0      3.0         -  8      0.82    0.82     0.0      0.0       0.0          0.0         0.0         06

               AREA          CENTROID LOCATION          MOMENT OF INERTIA ABOUT CENTROID
                                 X          Y                  X-X                 Y-Y
              87.63            6.45       3.55               346.42              1142.42

LINE                        +                                                    INERTIAS OF PARTS
 NO. MEM     LOC  RECALL  - CODE      V       H        X        Y        AREA         IXX         IYY    STORE
0200   0      4.0            1      7.00    8.42     0.0      0.0       0.0          0.0         0.0
0190   0      4.0         -  5      1.74    1.74     0.0      0.0       0.0          0.0         0.0
0180   0      4.0         -  6      1.74    1.74     0.0      0.0       0.0          0.0         0.0
0220   0      4.0         -  7      1.74    1.74     0.0      0.0       0.0          0.0         0.0
0210   0      4.0         -  8      1.74    1.74     0.0      0.0       0.0          0.0         0.0         07

               AREA          CENTROID LOCATION          MOMENT OF INERTIA ABOUT CENTROID
                                 X          Y                  X-X                 Y-Y
              52.88            4.69       3.90               154.95               225.55
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IDENT  147 20 01                         FRAME SYSTEM                  MAY. 15, 1975                 PAGE   4

SECTION PROPERTIES

LINE MEM     LOC  RECALL       X         Y          SUPERSTRUCTURE        SLAB THICKNESS      INT. GIRDER        STORE
                                                    WIDTH   DEPTH         TOP     BOTTOM      NO.  WEB
0010   1      0.0   01        0.0       0.0          42.0    7.50         7.62    5.50         3   12.            02

                         LT. EXT. GIRDER       RT. EXT. GIRDER        LT. OVERHANG           RT. OVERHANG
                         TYPE  WEB  FACTOR     TYPE  WEB  FACTOR    LENGTH  EXT.  INT.    LENGTH  EXT.  INT.
                          0    12.   0.0        0    12.   0.0        4.5    7.    12.      4.5    7.    12.
LINE                        +                                                    INERTIAS OF PARTS
 NO. MEM     LOC  RECALL  - CODE      V       H        X        Y        AREA         IXX         IYY    STORE
             RECALL  1                                5.06     7.08     2.56        -6.11       28.57

               AREA          CENTROID LOCATION          MOMENT OF INERTIA ABOUT CENTROID
                                 X          Y                  X-X                 Y-Y
              78.24            20.48      4.38               620.23             10539.61

LINE MEM     LOC  RECALL       X         Y          SUPERSTRUCTURE        SLAB THICKNESS      INT. GIRDER        STORE
                                                    WIDTH   DEPTH         TOP     BOTTOM      NO.  WEB
0020   1    180.0   02        0.0       0.0           0.0     0.0         0.0     0.0          0    0.

                         LT. EXT. GIRDER       RT. EXT. GIRDER        LT. OVERHANG           RT. OVERHANG
                         TYPE  WEB  FACTOR     TYPE  WEB  FACTOR    LENGTH  EXT.  INT.    LENGTH  EXT.  INT.
                          0    0.    0.0        0    0.    0.0        0.0    0.    0.       0.0    0.    0.
LINE                        +                                                    INERTIAS OF PARTS
 NO. MEM     LOC  RECALL  - CODE      V       H        X        Y        AREA         IXX         IYY    STORE
             RECALL  2                               20.46     4.38    78.24       620.23    10539.61

               AREA          CENTROID LOCATION          MOMENT OF INERTIA ABOUT CENTROID
                                 X          Y                  X-X                 Y-Y
              78.24            20.46      4.38               620.23             10539.66
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IDENT  14T 20 01                    FRAME SYSTEM                MAY. 15, 1975              PAGE   5

SECTION PROPERTIES

LINE MEM    LOC  RECALL      X       Y          SUPERSTRUCTURE      SLAB THICKNESS    INT. GIRDER      STORE
                                                WIDTH   DEPTH       TOP    BOTTOM      NO.  WEB
0030   1   200.0   01       0.0     0.0          42.0    7.50       7.62    9.00        3   12.          03

                        LT. EXT. GIRDER      RT. EXT. GIRDER       LT. OVERHANG          RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.    LENGTH  EXT.  INT.
                         0    12.   0.0       0    12.   0.0       0.0    0.    0.       0.0    0.    0.
LINE                         +                                          INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE      V       H        X        Y      AREA       IXX        IYY    STORE
           RECALL  1                                5.06     7.08    2.56      -6.11      28.57

            AREA           CENTROID LOCATION          MOMENT OF INERTIA ABOUT CENTROID
                              X        Y                   X-X              Y-Y
           91.75            20.56     3.72               796.94           15706.22


MEMBER  1 PROPERTIES

                        LENGTH          MIN INERTIA          STIFFNESS             CARRY OVER
                                                           LT          RT         LT        RT
                        200.0             620.23          4.041       4.181      0.516     0.499




IDENT  14T 20 01                    FRAME SYSTEM                MAY. 15, 1975              PAGE   6

SECTION PROPERTIES

LINE MEM    LOC  RECALL      X       Y          SUPERSTRUCTURE      SLAB THICKNESS    INT. GIRDER      STORE
                                                WIDTH   DEPTH       TOP    BOTTOM      NO.  WEB
0040   2     0.0   03       0.0     0.0           0.0     0.0       0.0     0.0         0   0.

                        LT. EXT. GIRDER      RT. EXT. GIRDER       LT. OVERHANG          RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.    LENGTH  EXT.  INT.
                         0     0.   0.0       0     0.   0.0       0.0    0.    0.       0.0    0.    0.
LINE                         +                                          INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE      V       H        X        Y      AREA       IXX        IYY    STORE
           RECALL  3                               20.56     3.72   91.75     796.94   15706.22

            AREA           CENTROID LOCATION          MOMENT OF INERTIA ABOUT CENTROID
                              X        Y                   X-X              Y-Y
           91.75            20.56     3.72               796.94           15706.29

LINE MEM    LOC  RECALL      X       Y          SUPERSTRUCTURE      SLAB THICKNESS    INT. GIRDER      STORE
                                                WIDTH   DEPTH       TOP    BOTTOM      NO.  WEB
0050   2    16.2   02       0.0     0.0           0.0     0.0       0.0     0.0         0   0.

                        LT. EXT. GIRDER      RT. EXT. GIRDER       LT. OVERHANG          RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.    LENGTH  EXT.  INT.
                         0     0.   0.0       0     0.   0.0       0.0    0.    0.       0.0    0.    0.
LINE                         +                                          INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE      V       H        X        Y      AREA       IXX        IYY    STORE
           RECALL  2                               20.48     4.38   78.24     620.23   10539.61

            AREA           CENTROID LOCATION          MOMENT OF INERTIA ABOUT CENTROID
                              X        Y                   X-X              Y-Y
           78.24            20.48     4.38               620.23           10539.66
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OUTPUT   Sample Problem 5

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IDENT  14T 20 01                   FRAME SYSTEM                    MAY. 15, 1975                PAGE    7

SECTION PROPERTIES

LINE MEM    LOC  RECALL      X        Y          SUPERSTRUCTURE        SLAB THICKNESS   INT. GIRDER        STORE
                                                 WIDTH   DEPTH         TOP     BOTTOM    NO.  WEB
0060   2    142.2   02       0.0      0.0          0.0    0.0          0.0      0.0      0    0.

                          LT. EXT. GIRDER      RT. EXT. GIRDER       LT. OVERHANG          RT. OVERHANG
                         TYPE  WEB  FACTOR     TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                          0    0.    0.0        0    0.    0.0      0.0    0.    0.      0.0    0.    0.
LINE                       +                                                INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE       V        H        X        Y       AREA       IXX        IYY    STORE
           RECALL  2                                  20.48    4.38    78.24     620.23   10539.61

          AREA           CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                            X          Y                    X-X                 Y-Y
         78.24            20.48      4.38                 620.23             10539.66


LINE MEM    LOC  RECALL      X        Y          SUPERSTRUCTURE        SLAB THICKNESS   INT. GIRDER        STORE
                                                 WIDTH   DEPTH         TOP     BOTTOM    NO.  WEB
0070   2    162.2   03       0.0      0.0          0.0    0.0          0.0      0.0      0    0.

                          LT. EXT. GIRDER      RT. EXT. GIRDER       LT. OVERHANG          RT. OVERHANG
                         TYPE  WEB  FACTOR     TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                          0    0.    0.0        0    0.    0.0      0.0    0.    0.      0.0    0.    0.
LINE                       +                                                INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE       V        H        X        Y       AREA       IXX        IYY    STORE
           RECALL  3                                  20.56    3.72    91.75     796.94   15706.22

          AREA           CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                            X          Y                    X-X                 Y-Y
         91.75            20.56      3.72                 796.94             15706.29



IDENT  14T 20 01                   FRAME SYSTEM                    MAY. 15, 1975                PAGE    8

MEMBER  2 PROPERTIES

                     LENGTH          MIN INERTIA           STIFFNESS              CARRY OVER
                                                          LT        RT           LT        RT
                     162.2             620.23            4.232     4.262        0.518     0.514



IDENT  14T 20 01                   FRAME SYSTEM                    MAY. 15, 1975                PAGE    9

SECTION PROPERTIES

LINE MEM    LOC  RECALL      X        Y          SUPERSTRUCTURE        SLAB THICKNESS   INT. GIRDER        STORE
                                                 WIDTH   DEPTH         TOP     BOTTOM    NO.  WEB
0080   3      0.0   03       0.0      0.0          0.0    0.0          0.0      0.0      0    0.

                          LT. EXT. GIRDER      RT. EXT. GIRDER       LT. OVERHANG          RT. OVERHANG
                         TYPE  WEB  FACTOR     TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                          0    0.    0.0        0    0.    0.0      0.0    0.    0.      0.0    0.    0.
LINE                       +                                                INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE       V        H        X        Y       AREA       IXX        IYY    STORE
           RECALL  3                                  20.56    3.72    91.75     796.94   15706.22

          AREA           CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                            X          Y                    X-X                 Y-Y
         91.75            20.56      3.72                 796.94             15706.29


LINE MEM    LOC  RECALL      X        Y          SUPERSTRUCTURE        SLAB THICKNESS   INT. GIRDER        STORE
                                                 WIDTH   DEPTH         TOP     BOTTOM    NO.  WEB
0090   3     20.0   02       0.0      0.0          0.0    0.0          0.0      0.0      0    0.

                          LT. EXT. GIRDER      RT. EXT. GIRDER       LT. OVERHANG          RT. OVERHANG
                         TYPE  WEB  FACTOR     TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                          0    0.    0.0        0    0.    0.0      0.0    0.    0.      0.0    0.    0.
LINE                       +                                                INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE       V        H        X        Y       AREA       IXX        IYY    STORE
           RECALL  2                                  20.48    4.38    78.24     620.23   10539.61

          AREA           CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                            X          Y                    X-X                 Y-Y
         78.24            20.48      4.38                 620.23             10539.66
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IDENT  14T 20 01                    FRAME SYSTEM                 MAY. 15, 1975                PAGE  10
SECTION PROPERTIES

LINE MEM    LOC  RECALL        X        Y          SUPERSTRUCTURE        SLAB THICKNESS    INT. GIRDER      STORE
                                                   WIDTH    DEPTH        TOP      BOTTOM    NO.  WEB
0100   3   132.8    02        0.0      0.0          0.0      0.0         0.0      0.0       0     0.

                      LT. EXT. GIRDER         RT. EXT. GIRDER        LT. OVERHANG            RT. OVERHANG
                      TYPE  WEB  FACTOR       TYPE  WEB  FACTOR      LENGTH  EXT.  INT.      LENGTH  EXT.  INT.
                       0     0.    0.0         0     0.    0.0        0.0     0.    0.        0.0     0.    0.
LINE                     +                                                   INERTIAS OF PARTS
 NO. MEM     LOC  RECALL - CODE      V      H        X        Y        AREA        IXX         IYY     STORE
             RECALL  2                              20.48    4.38     78.24      620.23     10539.61

          AREA           CENTROID LOCATION            MOMENT OF INERTIA ABOUT CENTROID
                            X         Y                   X-X                  Y-Y
         78.24            20.48      4.38               620.23               10539.66


MEMBER  3 PROPERTIES

             HINGE AT LOCATION 112.8
                  LENGTH             MIN INERTIA              STIFFNESS                  CARRY OVER
                                                              LT          RT             LT          RT
                  132.8                620.23                3.721       0.117          0.177       5.640



IDENT  14T 20 01                    FRAME SYSTEM                 MAY. 15, 1975                PAGE  11
SECTION PROPERTIES

LINE MEM    LOC  RECALL        X        Y          SUPERSTRUCTURE        SLAB THICKNESS    INT. GIRDER      STORE
                                                   WIDTH    DEPTH        TOP      BOTTOM    NO.  WEB
0110   4     0.0    02        0.0      0.0          0.0      0.0         0.0      0.0       0     0.

                      LT. EXT. GIRDER         RT. EXT. GIRDER        LT. OVERHANG            RT. OVERHANG
                      TYPE  WEB  FACTOR       TYPE  WEB  FACTOR      LENGTH  EXT.  INT.      LENGTH  EXT.  INT.
                       0     0.    0.0         0     0.    0.0        0.0     0.    0.        0.0     0.    0.
LINE                     +                                                   INERTIAS OF PARTS
 NO. MEM     LOC  RECALL - CODE      V      H        X        Y        AREA        IXX         IYY     STORE
             RECALL  2                              20.48    4.38     78.24      620.23     10539.61

          AREA           CENTROID LOCATION            MOMENT OF INERTIA ABOUT CENTROID
                            X         Y                   X-X                  Y-Y
         78.24            20.48      4.38               620.23               10539.66

LINE MEM    LOC  RECALL        X        Y          SUPERSTRUCTURE        SLAB THICKNESS    INT. GIRDER      STORE
                                                   WIDTH    DEPTH        TOP      BOTTOM    NO.  WEB
0120   4   144.2    03        0.0      0.0          0.0      0.0         0.0      0.0       0     0.

                      LT. EXT. GIRDER         RT. EXT. GIRDER        LT. OVERHANG            RT. OVERHANG
                      TYPE  WEB  FACTOR       TYPE  WEB  FACTOR      LENGTH  EXT.  INT.      LENGTH  EXT.  INT.
                       0     0.    0.0         0     0.    0.0        0.0     0.    0.        0.0     0.    0.
LINE                     +                                                   INERTIAS OF PARTS
 NO. MEM     LOC  RECALL - CODE      V      H        X        Y        AREA        IXX         IYY     STORE
             RECALL  3                              20.56    3.72     91.75      796.94     15706.22

          AREA           CENTROID LOCATION            MOMENT OF INERTIA ABOUT CENTROID
                            X         Y                   X-X                  Y-Y
         91.75            20.56      3.72               796.94               15706.29



IDENT  14T 20 01                    FRAME SYSTEM                 MAY. 15, 1975                PAGE  12
MEMBER  4 PROPERTIES

                  LENGTH             MIN INERTIA              STIFFNESS                  CARRY OVER
                                                              LT          RT             LT          RT
                  144.2                620.23                4.271       4.840          0.532       0.469
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OUTPUT Sample Problem 5

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IDENT  14T 20 01                        FRAME SYSTEM                  MAY. 15, 1975                PAGE  13

SECTION PROPERTIES
                                                  SUPERSTRUCTURE      SLAB THICKNESS    INT. GIRDER       STORE
LINE MEM     LOC  RECALL        X        Y        WIDTH    DEPTH      TOP      BOTTOM   NO.  WEB
0130   5     0.0   03          0.0      0.0        0.0      0.0       0.0       0.0      0    0.

                        LT. EXT. GIRDER      RT. EXT. GIRDER     LT. OVERHANG          RT. OVERHANG
                       TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                        0     0.   0.0       0     0.   0.0      0.0     0.    0.     0.0     0.    0.
                                                                       INERTIAS OF PARTS
LINE                        +
 NO. MEM     LOC  RECALL  - CODE       V       H        X        Y       AREA        IXX         IYY     STORE
            RECALL  3                                 20.56     3.72     91.75      796.94    15706.22

        AREA            CENTROID LOCATION              MOMENT OF INERTIA ABOUT CENTROID
                           X         Y                     X-X                 Y-Y
       91.75             20.56      3.72                  796.94             15706.29


                                                  SUPERSTRUCTURE      SLAB THICKNESS    INT. GIRDER       STORE
LINE MEM     LOC  RECALL        X        Y        WIDTH    DEPTH      TOP      BOTTOM   NO.  WEB
0140   5    18.3   02          0.0      0.0        0.0      0.0       0.0       0.0      0    0.

                        LT. EXT. GIRDER      RT. EXT. GIRDER     LT. OVERHANG          RT. OVERHANG
                       TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                        0     0.   0.0       0     0.   0.0      0.0     0.    0.     0.0     0.    0.
                                                                       INERTIAS OF PARTS
LINE                        +
 NO. MEM     LOC  RECALL  - CODE       V       H        X        Y       AREA        IXX         IYY     STORE
            RECALL  2                                 20.48     4.38     78.24      620.23    10539.61

        AREA            CENTROID LOCATION              MOMENT OF INERTIA ABOUT CENTROID
                           X         Y                     X-X                 Y-Y
       78.24             20.48      4.38                  620.23             10539.66



IDENT  14T 20 01                        FRAME SYSTEM                  MAY. 15, 1975                PAGE  14

SECTION PROPERTIES
                                                  SUPERSTRUCTURE      SLAB THICKNESS    INT. GIRDER       STORE
LINE MEM     LOC  RECALL        X        Y        WIDTH    DEPTH      TOP      BOTTOM   NO.  WEB
0150   5   164.9   02          0.0      0.0        0.0      0.0       0.0       0.0      0    0.

                        LT. EXT. GIRDER      RT. EXT. GIRDER     LT. OVERHANG          RT. OVERHANG
                       TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                        0     0.   0.0       0     0.   0.0      0.0     0.    0.     0.0     0.    0.
                                                                       INERTIAS OF PARTS
LINE                        +
 NO. MEM     LOC  RECALL  - CODE       V       H        X        Y       AREA        IXX         IYY     STORE
            RECALL  2                                 20.48     4.38     78.24      620.23    10539.61

        AREA            CENTROID LOCATION              MOMENT OF INERTIA ABOUT CENTROID
                           X         Y                     X-X                 Y-Y
       78.24             20.48      4.38                  620.23             10539.66

                                                  SUPERSTRUCTURE      SLAB THICKNESS    INT. GIRDER       STORE
LINE MEM     LOC  RECALL        X        Y        WIDTH    DEPTH      TOP      BOTTOM   NO.  WEB
0160   5   183.2   03          0.0      0.0        0.0      0.0       0.0       0.0      0    0.

                        LT. EXT. GIRDER      RT. EXT. GIRDER     LT. OVERHANG          RT. OVERHANG
                       TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                        0     0.   0.0       0     0.   0.0      0.0     0.    0.     0.0     0.    0.
                                                                       INERTIAS OF PARTS
LINE                        +
 NO. MEM     LOC  RECALL  - CODE       V       H        X        Y       AREA        IXX         IYY     STORE
            RECALL  3                                 20.56     3.72     91.75      796.94    15706.22

        AREA            CENTROID LOCATION              MOMENT OF INERTIA ABOUT CENTROID
                           X         Y                     X-X                 Y-Y
       91.75             20.56      3.72                  796.94             15706.29



IDENT  14T 20 01                        FRAME SYSTEM                  MAY. 15, 1975                PAGE  15

MEMBER  5 PROPERTIES

                    LENGTH          MIN INERTIA           STIFFNESS              CARRY OVER
                                                        LT          RT          LT          RT
                    183.2             620.23           4.225       4.225       0.515       0.515
```

IDENT 14T 20 01 FRAME SYSTEM MAY. 15, 1975 PAGE 16

SECTION PROPERTIES

LINE	MEM	LOC	RECALL	X	Y	SUPERSTRUCTURE WIDTH	SUPERSTRUCTURE DEPTH	SLAB THICKNESS TOP	SLAB THICKNESS BOTTOM	INT. GIRDER NO.	INT. GIRDER WEB	STORE
0170	6	0.0	03	0.0	0.0	0.0	0.0	0.0	0.0	0	0.	

LT. EXT. GIRDER TYPE	LT. EXT. GIRDER WEB	LT. EXT. GIRDER FACTOR	RT. EXT. GIRDER TYPE	RT. EXT. GIRDER WEB	RT. EXT. GIRDER FACTOR	LT. OVERHANG LENGTH	LT. OVERHANG EXT.	LT. OVERHANG INT.	RT. OVERHANG LENGTH	RT. OVERHANG EXT.	RT. OVERHANG INT.
0	0.	0.0	0	0.	0.0	0.0	0.	0.	0.0	0.	0.

LINE NO.	MEM	LOC	RECALL + - CODE	V	H	X	Y	AREA	IXX	IYY	STORE
RECALL 3						20.56	3.72	91.75	796.94	15706.22	

(INERTIAS OF PARTS)

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y
91.75	20.56	3.72	796.94	15706.29

LINE	MEM	LOC	RECALL	X	Y	SUPERSTRUCTURE WIDTH	SUPERSTRUCTURE DEPTH	SLAB THICKNESS TOP	SLAB THICKNESS BOTTOM	INT. GIRDER NO.	INT. GIRDER WEB	STORE
0180	6	142.0	02	0.0	0.0	0.0	0.0	0.0	0.0	0	0.	

LT. EXT. GIRDER TYPE	LT. EXT. GIRDER WEB	LT. EXT. GIRDER FACTOR	RT. EXT. GIRDER TYPE	RT. EXT. GIRDER WEB	RT. EXT. GIRDER FACTOR	LT. OVERHANG LENGTH	LT. OVERHANG EXT.	LT. OVERHANG INT.	RT. OVERHANG LENGTH	RT. OVERHANG EXT.	RT. OVERHANG INT.
0	0.	0.0	0	0.	0.0	0.0	0.	0.	0.0	0.	0.

LINE NO.	MEM	LOC	RECALL + - CODE	V	H	X	Y	AREA	IXX	IYY	STORE
RECALL 2						20.48	4.38	78.24	620.23	10539.61	

(INERTIAS OF PARTS)

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y
78.24	20.48	4.38	620.23	10539.66

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MEMBER 6 PROPERTIES

LENGTH	MIN INERTIA	STIFFNESS LT	STIFFNESS RT	CARRY OVER LT	CARRY OVER RT
142.0	620.23	4.840	4.271	0.469	0.532

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SECTION PROPERTIES

LINE	MEM	LOC	RECALL	X	Y	SUPERSTRUCTURE WIDTH	SUPERSTRUCTURE DEPTH	SLAB THICKNESS TOP	SLAB THICKNESS BOTTOM	INT. GIRDER NO.	INT. GIRDER WEB	STORE
0190	7	0.0	04	0.0	0.0	0.0	0.0	0.0	0.0	0	0.	

LT. EXT. GIRDER TYPE	LT. EXT. GIRDER WEB	LT. EXT. GIRDER FACTOR	RT. EXT. GIRDER TYPE	RT. EXT. GIRDER WEB	RT. EXT. GIRDER FACTOR	LT. OVERHANG LENGTH	LT. OVERHANG EXT.	LT. OVERHANG INT.	RT. OVERHANG LENGTH	RT. OVERHANG EXT.	RT. OVERHANG INT.
0	0.	0.0	0	0.	0.0	0.0	0.	0.	0.0	0.	0.

LINE NO.	MEM	LOC	RECALL + - CODE	V	H	X	Y	AREA	IXX	IYY	STORE
RECALL 4						3.50	3.50	40.59	91.23	91.23	

(INERTIAS OF PARTS)

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y
40.59	3.50	3.50	91.23	91.23

LINE	MEM	LOC	RECALL	X	Y	SUPERSTRUCTURE WIDTH	SUPERSTRUCTURE DEPTH	SLAB THICKNESS TOP	SLAB THICKNESS BOTTOM	INT. GIRDER NO.	INT. GIRDER WEB	STORE
0200	7	28.5	04	0.0	0.0	0.0	0.0	0.0	0.0	0	0.	

LT. EXT. GIRDER TYPE	LT. EXT. GIRDER WEB	LT. EXT. GIRDER FACTOR	RT. EXT. GIRDER TYPE	RT. EXT. GIRDER WEB	RT. EXT. GIRDER FACTOR	LT. OVERHANG LENGTH	LT. OVERHANG EXT.	LT. OVERHANG INT.	RT. OVERHANG LENGTH	RT. OVERHANG EXT.	RT. OVERHANG INT.
0	0.	0.0	0	0.	0.0	0.0	0.	0.	0.0	0.	0.

LINE NO.	MEM	LOC	RECALL + - CODE	V	H	X	Y	AREA	IXX	IYY	STORE
RECALL 4						3.50	3.50	40.59	91.23	91.23	

(INERTIAS OF PARTS)

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y
40.59	3.50	3.50	91.23	91.23

OUTPUT Sample Problem 5

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IDENT  14T 20 01                   FRAME SYSTEM               MAY. 15, 1975               PAGE  19

SECTION PROPERTIES

LINE MEM    LOC  RECALL       X        Y          SUPERSTRUCTURE       SLAB THICKNESS    INT. GIRDER       STORE
                                                  WIDTH   DEPTH        TOP     BOTTOM    NO.   WEB
0210   7    33.5   07        0.0      0.0          0.0     0.0         0.0      0.0       0     0.

                         LT. EXT. GIRDER      RT. EXT. GIRDER     LT. OVERHANG        RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                         0     0.   0.0       0     0.   0.0      0.0     0.    0.      0.0    0.    0.
LINE                      +                                                 INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE       V       H        X        Y       AREA        IXX          IYY    STORE
           RECALL  7                                4.69     3.90     52.88      154.95       225.55

            AREA           CENTROID LOCATION            MOMENT OF INERTIA ABOUT CENTROID
                              X          Y                     X-X               Y-Y
           52.88            4.69       3.90                  154.95            225.55


LINE MEM    LOC  RECALL       X        Y          SUPERSTRUCTURE       SLAB THICKNESS    INT. GIRDER       STORE
                                                  WIDTH   DEPTH        TOP     BOTTOM    NO.   WEB
0220   7    38.5   06        0.0      0.0          0.0     0.0         0.0      0.0       0     0.

                         LT. EXT. GIRDER      RT. EXT. GIRDER     LT. OVERHANG        RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                         0     0.   0.0       0     0.   0.0      0.0     0.    0.      0.0    0.    0.
LINE                      +                                                 INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE       V       H        X        Y       AREA        IXX          IYY    STORE
           RECALL  6                                6.45     3.55     87.63      346.42      1142.42

            AREA           CENTROID LOCATION            MOMENT OF INERTIA ABOUT CENTROID
                              X          Y                     X-X               Y-Y
           87.63            6.45       3.55                  346.42           1142.42



IDENT  14T 20 01                   FRAME SYSTEM               MAY. 15, 1975               PAGE  20

SECTION PROPERTIES

LINE MEM    LOC  RECALL       X        Y          SUPERSTRUCTURE       SLAB THICKNESS    INT. GIRDER       STORE
                                                  WIDTH   DEPTH        TOP     BOTTOM    NO.   WEB
0230   7    40.5   05        0.0      0.0          0.0     0.0         0.0      0.0       0     0.

                         LT. EXT. GIRDER      RT. EXT. GIRDER     LT. OVERHANG        RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                         0     0.   0.0       0     0.   0.0      0.0     0.    0.      0.0    0.    0.
LINE                      +                                                 INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE       V       H        X        Y       AREA        IXX          IYY    STORE
           RECALL  5                                7.50     3.50    104.78      426.08      1956.49

            AREA           CENTROID LOCATION            MOMENT OF INERTIA ABOUT CENTROID
                              X          Y                     X-X               Y-Y
          104.78            7.50       3.50                  426.08           1956.50


MEMBER  7 PROPERTIES

WARNING - MEMBER LENGTHS DISAGREE. THAT GIVEN IN FRAME DESCRIPTION IS USED.
                        LENGTH          MIN INERTIA          STIFFNESS                 CARRY OVER
                                                          LT          RT            LT          RT

                         38.5              91.23         4.487       6.800         0.703       0.464
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IDENT  141 20 01                      FRAME SYSTEM                    MAY. 15, 1975                PAGE  21
SECTION PROPERTIES

LINE MEM    LOC  RECALL        X        Y          SUPERSTRUCTURE        SLAB THICKNESS     INT. GIRDER         STORE
                                                   WIDTH    DEPTH        TOP      BOTTOM     NO.  WEB
0240   8     0.0   04         0.0      0.0           0.0      0.0        0.0       0.0         0    0.

                         LT. EXT. GIRDER        RT. EXT. GIRDER        LT. OVERHANG            RT. OVERHANG
                         TYPE  WEB   FACTOR     TYPE  WEB   FACTOR    LENGTH  EXT.  INT.     LENGTH  EXT.  INT.
                          0     0.    0.0        0     0.    0.0       0.0     0.    0.        0.0    0.    0.
LINE                        +                                                  INERTIAS OF PARTS
 NO. MEM     LOC  RECALL - CODE        V       H         X        Y       AREA         IXX          IYY    STORE
            RECALL  4                                  3.50     3.50     40.59        91.23        91.23

              AREA            CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                                  X         Y                  X-X                    Y-Y
            40.59               3.50      3.50                91.23                  91.23

LINE MEM    LOC  RECALL        X        Y          SUPERSTRUCTURE        SLAB THICKNESS     INT. GIRDER         STORE
                                                   WIDTH    DEPTH        TOP      BOTTOM     NO.  WEB
0250   8    35.0   04         0.0      0.0           0.0      0.0        0.0       0.0         0    0.

                         LT. EXT. GIRDER        RT. EXT. GIRDER        LT. OVERHANG            RT. OVERHANG
                         TYPE  WEB   FACTOR     TYPE  WEB   FACTOR    LENGTH  EXT.  INT.     LENGTH  EXT.  INT.
                          0     0.    0.0        0     0.    0.0       0.0     0.    0.        0.0    0.    0.
LINE                        +                                                  INERTIAS OF PARTS
 NO. MEM     LOC  RECALL - CODE        V       H         X        Y       AREA         IXX          IYY    STORE
            RECALL  4                                  3.50     3.50     40.59        91.23        91.23

              AREA            CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                                  X         Y                  X-X                    Y-Y
            40.59               3.50      3.50                91.23                  91.23


IDENT  141 20 01                      FRAME SYSTEM                    MAY. 15, 1975                PAGE  22
SECTION PROPERTIES

LINE MEM    LOC  RECALL        X        Y          SUPERSTRUCTURE        SLAB THICKNESS     INT. GIRDER         STORE
                                                   WIDTH    DEPTH        TOP      BOTTOM     NO.  WEB
0260   8    40.0   07         0.0      0.0           0.0      0.0        0.0       0.0         0    0.

                         LT. EXT. GIRDER        RT. EXT. GIRDER        LT. OVERHANG            RT. OVERHANG
                         TYPE  WEB   FACTOR     TYPE  WEB   FACTOR    LENGTH  EXT.  INT.     LENGTH  EXT.  INT.
                          0     0.    0.0        0     0.    0.0       0.0     0.    0.        0.0    0.    0.
LINE                        +                                                  INERTIAS OF PARTS
 NO. MEM     LOC  RECALL - CODE        V       H         X        Y       AREA         IXX          IYY    STORE
            RECALL  7                                  4.69     3.90     52.88       154.95       225.55

              AREA            CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                                  X         Y                  X-X                    Y-Y
            52.88               4.69      3.90               154.95                 225.55

LINE MEM    LOC  RECALL        X        Y          SUPERSTRUCTURE        SLAB THICKNESS     INT. GIRDER         STORE
                                                   WIDTH    DEPTH        TOP      BOTTOM     NO.  WEB
0270   8    45.0   06         0.0      0.0           0.0      0.0        0.0       0.0         0    0.

                         LT. EXT. GIRDER        RT. EXT. GIRDER        LT. OVERHANG            RT. OVERHANG
                         TYPE  WEB   FACTOR     TYPE  WEB   FACTOR    LENGTH  EXT.  INT.     LENGTH  EXT.  INT.
                          0     0.    0.0        0     0.    0.0       0.0     0.    0.        0.0    0.    0.
LINE                        +                                                  INERTIAS OF PARTS
 NO. MEM     LOC  RECALL - CODE        V       H         X        Y       AREA         IXX          IYY    STORE
            RECALL  6                                  6.45     3.55     87.63       346.42      1142.42

              AREA            CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                                  X         Y                  X-X                    Y-Y
            87.63               6.45      3.55               346.42                1142.42
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IDENT  14T 20 01                    FRAME SYSTEM                  MAY. 15, 1975                 PAGE  23

SECTION PROPERTIES

LINE MEM    LOC  RECALL        X        Y          SUPERSTRUCTURE        SLAB THICKNESS    INT. GIRDER       STORE
                                                    WIDTH    DEPTH        TOP     BOTTOM     NO.  WEB
0280   8    47.0   05        0.0      0.0          0.0      0.0          0.0     0.0         0    0.

                        LT. EXT. GIRDER     RT. EXT. GIRDER      LT. OVERHANG           RT. OVERHANG
                        TYPE  WEB  FACTOR   TYPE  WEB  FACTOR   LENGTH  EXT.  INT.    LENGTH  EXT.  INT.
                         0     0.   0.0      0     0.   0.0      0.0    0.    0.      0.0     0.    0.
LINE                    +                                                  INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE      V       H        X       Y       AREA        IXX         IYY    STORE
           RECALL  5                                7.50    3.50   104.78      426.08     1956.49

             AREA          CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                              X         Y                   X-X                  Y-Y
           104.78            7.50      3.50               426.08               1956.50


MEMBER  8 PROPERTIES

                     LENGTH           MIN INERTIA           STIFFNESS                  CARRY OVER
                                                          LT          RT              LT         RT
                      47.0               91.23           4.436       6.374           0.679      0.472



IDENT  14T 20 01                    FRAME SYSTEM                  MAY. 15, 1975                 PAGE  24

SECTION PROPERTIES

LINE MEM    LOC  RECALL        X        Y          SUPERSTRUCTURE        SLAB THICKNESS    INT. GIRDER       STORE
                                                    WIDTH    DEPTH        TOP     BOTTOM     NO.  WEB
0290   9     0.0   04        0.0      0.0          0.0      0.0          0.0     0.0         0    0.

                        LT. EXT. GIRDER     RT. EXT. GIRDER      LT. OVERHANG           RT. OVERHANG
                        TYPE  WEB  FACTOR   TYPE  WEB  FACTOR   LENGTH  EXT.  INT.    LENGTH  EXT.  INT.
                         0     0.   0.0      0     0.   0.0      0.0    0.    0.      0.0     0.    0.
LINE                    +                                                  INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE      V       H        X       Y       AREA        IXX         IYY    STORE
           RECALL  4                                3.50    3.50    40.59       91.23       91.23

             AREA          CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                              X         Y                   X-X                  Y-Y
           40.59             3.50      3.50                91.23                91.23


LINE MEM    LOC  RECALL        X        Y          SUPERSTRUCTURE        SLAB THICKNESS    INT. GIRDER       STORE
                                                    WIDTH    DEPTH        TOP     BOTTOM     NO.  WEB
0300   9    28.0   04        0.0      0.0          0.0      0.0          0.0     0.0         0    0.

                        LT. EXT. GIRDER     RT. EXT. GIRDER      LT. OVERHANG           RT. OVERHANG
                        TYPE  WEB  FACTOR   TYPE  WEB  FACTOR   LENGTH  EXT.  INT.    LENGTH  EXT.  INT.
                         0     0.   0.0      0     0.   0.0      0.0    0.    0.      0.0     0.    0.
LINE                    +                                                  INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE      V       H        X       Y       AREA        IXX         IYY    STORE
           RECALL  4                                3.50    3.50    40.59       91.23       91.23

             AREA          CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                              X         Y                   X-X                  Y-Y
           40.59             3.50      3.50                91.23                91.23
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OUTPUT

Sample Problem 5

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IDENT  14T 20 C1                FRAME SYSTEM                 MAY. 15, 1975                  PAGE  25

SECTION PROPERTIES

LINE MEM    LOC  RECALL        X         Y         SUPERSTRUCTURE       SLAB THICKNESS    INT. GIRDER        STORE
                                                   WIDTH    DEPTH       TOP     BOTTOM     NO.  WEB
0310   9    35.0   04         0.0      0.0          0.0      0.0        0.0      0.0        0    0.

                         LT. EXT. GIRDER      RT. EXT. GIRDER      LT. OVERHANG         RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                         0     0.    0.0      0     0.    0.0      0.0    0.    0.      0.0    0.    0.
LINE                      +                                              INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE       V        H        X        Y      AREA         IXX         IYY    STORE
           RECALL  4                                  3.50     3.50    40.59        91.23       91.23

             AREA            CENTROID LOCATION            MOMENT OF INERTIA ABOUT CENTROID
                                X        Y                     X-X                  Y-Y
            40.59             3.50     3.50                   91.23                91.23


LINE MEM    LOC  RECALL        X         Y         SUPERSTRUCTURE       SLAB THICKNESS    INT. GIRDER        STORE
                                                   WIDTH    DEPTH       TOP     BOTTOM     NO.  WEB
0320   9    28.0   06         0.0      0.0          0.0      0.0        0.0      0.0        0    0.

                         LT. EXT. GIRDER      RT. EXT. GIRDER      LT. OVERHANG         RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                         0     0.    0.0      0     0.    0.0      0.0    0.    0.      0.0    0.    0.
LINE                      +                                              INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE       V        H        X        Y      AREA         IXX         IYY    STORE
           RECALL  6                                  6.45     3.55    87.63       346.42     1142.42

             AREA            CENTROID LOCATION            MOMENT OF INERTIA ABOUT CENTROID
                                X        Y                     X-X                  Y-Y
            87.63             6.45     3.55                  346.42              1142.42




IDENT  14T 20 C1                FRAME SYSTEM                 MAY. 15, 1975                  PAGE  26

SECTION PROPERTIES

LINE MEM    LOC  RECALL        X         Y         SUPERSTRUCTURE       SLAB THICKNESS    INT. GIRDER        STORE
                                                   WIDTH    DEPTH       TOP     BOTTOM     NO.  WEB
0330   9    40.0   05         0.0      0.0          0.0      0.0        0.0      0.0        0    0.

                         LT. EXT. GIRDER      RT. EXT. GIRDER      LT. OVERHANG         RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                         0     0.    0.0      0     0.    0.0      0.0    0.    0.      0.0    0.    0.
LINE                      +                                              INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE       V        H        X        Y      AREA         IXX         IYY    STORE
           RECALL  5                                  7.50     3.50   104.78       426.08     1956.49

             AREA            CENTROID LOCATION            MOMENT OF INERTIA ABOUT CENTROID
                                X        Y                     X-X                  Y-Y
           104.78             7.50     3.50                  426.08              1956.50

MEMBER  9 PROPERTIES

                   LENGTH          MIN INERTIA           STIFFNESS                 CARRY OVER
                                                       LT          RT            LT          RT
                    40.0              91.23          4.365       5.940         0.653       0.482
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IDENT  14T 20 01                  FRAME SYSTEM                    MAY. 15, 1975                PAGE  27

SECTION PROPERTIES

LINE MEM    LOC  RECALL       X        Y          SUPERSTRUCTURE        SLAB THICKNESS   INT. GIRDER       STORE
                                                  WIDTH   DEPTH         TOP     BOTTOM    NO.  WEB
0340  10     0.0   04       0.0      0.0           0.0     0.0          0.0      0.0       0    0.

                         LT. EXT. GIRDER      RT. EXT. GIRDER      LT. OVERHANG          RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                          0    0.    0.0       0    0.    0.0       0.0   0.    0.       0.0   0.    0.
LINE                      +                                              INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE       V       H        X        Y      AREA        IXX         IYY   STORE
           RECALL  4                                 3.50     3.50    40.59       91.23       91.23

             AREA            CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                                  X        Y                    X-X                 Y-Y
            40.59               3.50     3.50                  91.23               91.23


LINE MEM    LOC  RECALL       X        Y          SUPERSTRUCTURE        SLAB THICKNESS   INT. GIRDER       STORE
                                                  WIDTH   DEPTH         TOP     BOTTOM    NO.  WEB
0350  10     9.0   04       0.0      0.0           0.0     0.0          0.0      0.0       0    0.

                         LT. EXT. GIRDER      RT. EXT. GIRDER      LT. OVERHANG          RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                          0    0.    0.0       0    0.    0.0       0.0   0.    0.       0.0   0.    0.
LINE                      +                                              INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE       V       H        X        Y      AREA        IXX         IYY   STORE
           RECALL  4                                 3.50     3.50    40.59       91.23       91.23

             AREA            CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                                  X        Y                    X-X                 Y-Y
            40.59               3.50     3.50                  91.23               91.23




IDENT  14T 20 01                  FRAME SYSTEM                    MAY. 15, 1975                PAGE  28

SECTION PROPERTIES

LINE MEM    LOC  RECALL       X        Y          SUPERSTRUCTURE        SLAB THICKNESS   INT. GIRDER       STORE
                                                  WIDTH   DEPTH         TOP     BOTTOM    NO.  WEB
0360  10    14.0   07       0.0      0.0           0.0     0.0          0.0      0.0       0    0.

                         LT. EXT. GIRDER      RT. EXT. GIRDER      LT. OVERHANG          RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                          0    0.    0.0       0    0.    0.0       0.0   0.    0.       0.0   0.    0.
LINE                      +                                              INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE       V       H        X        Y      AREA        IXX         IYY   STORE
           RECALL  7                                 4.69     3.90    52.86      154.95      225.55

             AREA            CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                                  X        Y                    X-X                 Y-Y
            52.86               4.69     3.90                 154.95              225.55

LINE MEM    LOC  RECALL       X        Y          SUPERSTRUCTURE        SLAB THICKNESS   INT. GIRDER       STORE
                                                  WIDTH   DEPTH         TOP     BOTTOM    NO.  WEB
0370  10    19.0   06       0.0      0.0           0.0     0.0          0.0      0.0       0    0.

                         LT. EXT. GIRDER      RT. EXT. GIRDER      LT. OVERHANG          RT. OVERHANG
                        TYPE  WEB  FACTOR    TYPE  WEB  FACTOR   LENGTH  EXT.  INT.   LENGTH  EXT.  INT.
                          0    0.    0.0       0    0.    0.0       0.0   0.    0.       0.0   0.    0.
LINE                      +                                              INERTIAS OF PARTS
 NO. MEM    LOC  RECALL - CODE       V       H        X        Y      AREA        IXX         IYY   STORE
           RECALL  6                                 6.45     3.55    87.63      346.42     1142.42

             AREA            CENTROID LOCATION           MOMENT OF INERTIA ABOUT CENTROID
                                  X        Y                    X-X                 Y-Y
            87.63               6.45     3.55                 346.42             1142.42
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SECTION PROPERTIES

LINE MEM LOC RECALL X Y SUPERSTRUCTURE (WIDTH DEPTH) SLAB THICKNESS (TOP BOTTOM) INT. GIRDER (NO. WEB) STORE
0380 10 21.0 05 0.0 0.0 0.0 0.0 0.0 0.0 0 0.

LT. EXT. GIRDER (TYPE WEB FACTOR) RT. EXT. GIRDER (TYPE WEB FACTOR) LT. OVERHANG (LENGTH EXT. INT.) RT. OVERHANG (LENGTH EXT. INT.)
0 0. 0.0 0 0. 0.0 0.0 0. 0. 0.0 0. 0.

LINE NO. MEM LOC RECALL + CODE V H INERTIAS OF PARTS: X Y AREA IXX IYY STORE
RECALL 5 7.50 3.50 104.78 426.08 1956.49

AREA 104.78
CENTROID LOCATION X 7.50 Y 3.50
MOMENT OF INERTIA ABOUT CENTROID X-X 426.08 Y-Y 1956.50

MEMBER 10 PROPERTIES

LENGTH 21.0
MIN INERTIA 91.23
STIFFNESS LT 4.710 RT 9.655
CARRY OVER LT 0.820 RT 0.400

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SECTION PROPERTIES

LINE MEM LOC RECALL X Y SUPERSTRUCTURE (WIDTH DEPTH) SLAB THICKNESS (TOP BOTTOM) INT. GIRDER (NO. WEB) STORE
0390 11 0.0 04 0.0 0.0 0.0 0.0 0.0 0.0 0 0.

LT. EXT. GIRDER (TYPE WEB FACTOR) RT. EXT. GIRDER (TYPE WEB FACTOR) LT. OVERHANG (LENGTH EXT. INT.) RT. OVERHANG (LENGTH EXT. INT.)
0 0. 0.0 0 0. 0.0 0.0 0. 0. 0.0 0. 0.

LINE NO. MEM LOC RECALL + CODE V H INERTIAS OF PARTS: X Y AREA IXX IYY STORE
RECALL 4 3.50 3.50 40.59 91.23 91.23

AREA 40.59
CENTROID LOCATION X 3.50 Y 3.50
MOMENT OF INERTIA ABOUT CENTROID X-X 91.23 Y-Y 91.23

LINE MEM LOC RECALL X Y SUPERSTRUCTURE (WIDTH DEPTH) SLAB THICKNESS (TOP BOTTOM) INT. GIRDER (NO. WEB) STORE
0400 11 8.0 04 0.0 0.0 0.0 0.0 0.0 0.0 0 0.

LT. EXT. GIRDER (TYPE WEB FACTOR) RT. EXT. GIRDER (TYPE WEB FACTOR) LT. OVERHANG (LENGTH EXT. INT.) RT. OVERHANG (LENGTH EXT. INT.)
0 0. 0.0 0 0. 0.0 0.0 0. 0. 0.0 0. 0.

LINE NO. MEM LOC RECALL + CODE V H INERTIAS OF PARTS: X Y AREA IXX IYY STORE
RECALL 4 3.50 3.50 40.59 91.23 91.23

AREA 40.59
CENTROID LOCATION X 3.50 Y 3.50
MOMENT OF INERTIA ABOUT CENTROID X-X 91.23 Y-Y 91.23

OUTPUT

Sample Problem 5

SECTION PROPERTIES

LINE	MEM	LOC	RECALL	X	Y	SUPERSTRUCTURE WIDTH	SUPERSTRUCTURE DEPTH	SLAB THICKNESS TOP	SLAB THICKNESS BOTTOM	INT. GIRDER NO.	INT. GIRDER WEB	STORE
0410	11	13.0	07	0.0	0.0	0.0	0.0	0.0	0.0	0	0.	

LT. EXT. GIRDER TYPE	LT. EXT. GIRDER WEB	LT. EXT. GIRDER FACTOR	RT. EXT. GIRDER TYPE	RT. EXT. GIRDER WEB	RT. EXT. GIRDER FACTOR	LT. OVERHANG LENGTH	LT. OVERHANG EXT.	LT. OVERHANG INT.	RT. OVERHANG LENGTH	RT. OVERHANG EXT.	RT. OVERHANG INT.
0	0.	0.0	0	0.	0.0	0.0	0.	0.	0.0	0.	0.

INERTIAS OF PARTS

LINE NO.	MEM	LOC	RECALL	+ − CODE	V	H	X	Y	AREA	IXX	IYY	STORE
RECALL 7							4.69	3.90	52.88	154.95	225.55	

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y
52.88	4.69	3.90	154.95	225.55

LINE	MEM	LOC	RECALL	X	Y	SUPERSTRUCTURE WIDTH	SUPERSTRUCTURE DEPTH	SLAB THICKNESS TOP	SLAB THICKNESS BOTTOM	INT. GIRDER NO.	INT. GIRDER WEB	STORE
0420	11	18.0	06	0.0	0.0	0.0	0.0	0.0	0.0	0	0.	

LT. EXT. GIRDER TYPE	LT. EXT. GIRDER WEB	LT. EXT. GIRDER FACTOR	RT. EXT. GIRDER TYPE	RT. EXT. GIRDER WEB	RT. EXT. GIRDER FACTOR	LT. OVERHANG LENGTH	LT. OVERHANG EXT.	LT. OVERHANG INT.	RT. OVERHANG LENGTH	RT. OVERHANG EXT.	RT. OVERHANG INT.
0	0.	0.0	0	0.	0.0	0.0	0.	0.	0.0	0.	0.

INERTIAS OF PARTS

LINE NO.	MEM	LOC	RECALL	+ − CODE	V	H	X	Y	AREA	IXX	IYY	STORE
RECALL 6							6.45	3.55	87.63	346.42	1142.42	

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y
87.63	6.45	3.55	346.42	1142.42

SECTION PROPERTIES

LINE	MEM	LOC	RECALL	X	Y	SUPERSTRUCTURE WIDTH	SUPERSTRUCTURE DEPTH	SLAB THICKNESS TOP	SLAB THICKNESS BOTTOM	INT. GIRDER NO.	INT. GIRDER WEB	STORE
0430	11	20.0	05	0.0	0.0	0.0	0.0	0.0	0.0	0	0.	

LT. EXT. GIRDER TYPE	LT. EXT. GIRDER WEB	LT. EXT. GIRDER FACTOR	RT. EXT. GIRDER TYPE	RT. EXT. GIRDER WEB	RT. EXT. GIRDER FACTOR	LT. OVERHANG LENGTH	LT. OVERHANG EXT.	LT. OVERHANG INT.	RT. OVERHANG LENGTH	RT. OVERHANG EXT.	RT. OVERHANG INT.
0	0.	0.0	0	0.	0.0	0.0	0.	0.	0.0	0.	0.

INERTIAS OF PARTS

LINE NO.	MEM	LOC	RECALL	+ − CODE	V	H	X	Y	AREA	IXX	IYY	STORE
RECALL 5							7.50	3.50	104.78	426.08	1956.49	

AREA	CENTROID LOCATION X	CENTROID LOCATION Y	MOMENT OF INERTIA ABOUT CENTROID X-X	MOMENT OF INERTIA ABOUT CENTROID Y-Y
104.78	7.50	3.50	426.08	1956.50

MEMBER 11 PROPERTIES

LENGTH	MIN INERTIA	STIFFNESS LT	STIFFNESS RT	CARRY OVER LT	CARRY OVER RT
20.0	91.23	4.727	9.913	0.825	0.393

FRAME DIAGNOSTICS

NO ERRORS FOUND

FRAME PROPERTIES

MEM NO	JT LT	JT RT	END COND LT	END COND RT	DIR	SPAN	I	SUPPORT OR HINGE	E	CARRY OVER FACTORS LT	CARRY OVER FACTORS RT	DISTRIBUTION FACTORS LT	DISTRIBUTION FACTORS RT
1	1	2	R		G	200.0	620.23	0.0	750.	0.516	0.0	0.0	0.230
2	2	3			G	162.2	620.23	0.0	750.	0.518	0.514	0.386	0.354
3	3	4			G	132.8	620.23	112.8	750.	0.177	5.640	0.377	0.017
4	4	5			G	144.2	620.23	0.0	750.	0.532	0.469	0.566	0.270
5	5	6			G	183.2	620.23	0.0	750.	0.515	0.515	0.186	0.190
6	6	7		R	G	142.0	620.23	0.0	750.	0.0	0.532	0.210	0.0
7	8	2				38.5	91.23	7.5	750.	0.703	0.464	0.0	0.384
8	9	3				47.0	91.23	7.5	750.	0.679	0.472	0.0	0.269
9	10	4				40.0	91.23	7.5	750.	0.653	0.482	0.0	0.417
10	11	5				21.0	91.23	7.5	750.	0.820	0.400	0.0	0.544
11	12	6				20.0	91.23	7.5	750.	0.825	0.393	0.0	0.600

IDENT 14T 20 01 FRAME SYSTEM MAY. 15, 1975 PAGE 34

FIXED END MOMENTS TRIAL 0

MEM NO	FIXED END MOMENTS LT	FIXED END MOMENTS RT	MEM NO	FIXED END MOMENTS LT	FIXED END MOMENTS RT	MEM NO	FIXED END MOMENTS LT	FIXED END MOMENTS RT
1	0.	-60576.	2	-26256.	-26524.	3	-20028.	-12058.
4	-20635.	-23548.	5	-33583.	-33563.	6	-33474.	0.
7	0.	0.	8	0.	0.	9	0.	0.
10	0.	0.	11	0.	0.			

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SIDESWAY DIAGNOSTICS

NO ERRORS FOUND

RESULTS OF 1 INCH SWAY TO THE RIGHT

VERTICAL MEMBER	SHEAR (KIPS)	MOMENTS (FT-KIPS) LT	MOMENTS (FT-KIPS) RT
7	717.0	-13325.	14280.
8	448.5	-9806.	11274.
9	716.6	-13484.	15180.
10	4629.0	-44611.	52598.
11	4826.0	-46064.	50456.

BASED ON E = 3000 KSI

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*** SIDESWAY INCLUDED. ***

HORIZONTAL MEMBER MOMENTS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	16068.	27443.	34122.	36107.	33398.	25995.	13897.	-2895.	-24381.	-50702. (-45707.)
2	-43713. (-34781.)	-26977.	-13420.	-2951.	4430.	8724.	9930.	8049.	3080.	-4978.	-16259. (-13820.)
3	-21028. (-18071.)	-10682.	-2531.	3544.	7550.	9486.	9352.	7148.	2875.	-3468.	-11880. (-10098.)
4	-14633. (-12437.)	-4388.	3374.	8611.	11281.	11343.	8753.	3471.	-4546.	-15341.	-28955. (-25423.)
5	-31267. (-27646.)	-13817.	-423.	9032.	14548.	16126.	13764.	7464.	-2775.	-16953.	-35187. (-31403.)
6	-32654. (-28875.)	-17755.	-5391.	4281.	11299.	15707.	17543.	16850.	13668.	8038.	0.

HORIZONTAL MEMBER STRESSES TRIAL 0 BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-789.	-1347.	-1675.	-1772.	-1639.	-1276.	-682.	142.	1197.	1480.
2	1288.	1324.	659.	145.	-217.	-428.	-487.	-395.	-151.	225.	447.
3	585.	454.	124.	-174.	-371.	-466.	-459.	-351.	-141.	170.	496.
4	610.	206.	-152.	-372.	-467.	-450.	-333.	-127.	160.	517.	823.
5	895.	678.	21.	-443.	-714.	-791.	-675.	-366.	136.	832.	1017.
6	935.	598.	189.	-156.	-430.	-623.	-726.	-727.	-615.	-378.	-0.

OUTPUT Sample Problem 5

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HORIZONTAL MEMBER STRESSES TRIAL 0 TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	561.	558.	1191.	1260.	1166.	907.	465.	-101.	-651.	-1507.
2	-1512.	-941.	-468.	-103.	155.	304.	347.	281.	107.	-172.	-456.
3	-596.	-365.	-88.	124.	263.	331.	326.	249.	100.	-121.	-352.
4	-434.	-152.	116.	295.	384.	384.	294.	116.	-151.	-508.	-838.
5	-912.	-482.	-15.	315.	508.	563.	460.	260.	-97.	-592.	-1036.
6	-952.	-588.	-179.	143.	380.	531.	597.	577.	471.	279.	0.

VERTICAL MEMBER MOMENTS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
7	-349.	385.	1118.	1852.	2586.	3320.	4054.	4788.	5521.	6255.	6989.
8	4190.	3294.	2398.	1502.	606.	-290.	-1185.	-2081.	-2977.	-3873.	-4769.
9	1103.	717.	332.	-54.	-439.	-825.	-1210.	-1596.	-1981.	-2367.	-2752.
10	73.	-165.	-404.	-642.	-881.	-1119.	-1357.	-1596.	-1834.	-2073.	-2311.
11	-1865.	-1445.	-1026.	-606.	-186.	234.	654.	1073.	1493.	1913.	2333.

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*** SIDESWAY INCLUDED. ***

HORIZONTAL MEMBER SHEARS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	920.8	686.1	451.3	216.6	-18.1	-252.8	-487.5	-722.3	-957.0	-1191.7	-1446.7
2	1137.7	931.0	740.6	550.3	359.9	169.5	-20.8	-211.2	-401.5	-592.7	-802.6
3	867.4	693.6	535.4	379.6	223.7	67.8	-88.0	-243.9	-399.7	-555.6	-711.4
4	795.5	624.8	451.2	274.7	95.2	-87.1	-272.4	-460.7	-651.8	-845.9	-1042.9
5	1072.2	838.6	623.6	408.6	193.6	-21.4	-236.4	-451.4	-666.4	-881.4	-1115.0
6	1160.5	966.5	775.4	587.2	401.8	219.4	39.8	-137.0	-310.8	-481.8	-649.9

VERTICAL MEMBER SHEARS TRIAL 0

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
7	190.6	190.6	190.6	190.6	190.6	190.6	190.6	190.6	190.6	190.6	190.6
8	-190.6	-190.6	-190.6	-190.6	-190.6	-190.6	-190.6	-190.6	-190.6	-190.6	-190.6
9	-96.4	-96.4	-96.4	-96.4	-96.4	-96.4	-96.4	-96.4	-96.4	-96.4	-96.4
10	-113.5	-113.5	-113.5	-113.5	-113.5	-113.5	-113.5	-113.5	-113.5	-113.5	-113.5
11	209.9	209.9	209.9	209.9	209.9	209.9	209.9	209.9	209.9	209.9	209.9

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VERTICAL MEMBER REACTIONS TRIAL 0

MEM NO	LT REACTION	RT REACTION	MEMBER WEIGHT
7	2860.3	2584.4	275.9
8	1999.8	1670.0	329.8
9	1784.0	1507.0	277.9
10	2286.5	2115.0	171.4
11	2440.8	2275.5	165.3

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IDENT  14T 20 01                  FRAME SYSTEM              MAY. 15, 1975            PAGE  40
TRIAL  0

TANGENTIAL ROTATIONS - RADIANS - CLOCKWISE POSITIVE
   SPAN    LT. END     RT. END     SPAN    LT. END     RT. END     SPAN    LT. END     RT. END

     1    0.033285   -0.009498       2   -0.009497   -0.000946       3   -0.000946    0.002327

     4    0.002327    0.001313       5    0.001314    0.000362       6    0.000362   -0.010125

     7    0.000000   -0.009497       8   -0.000000   -0.000946       9   -0.000000    0.002327

    10    0.000000    0.001313      11    0.000000    0.000362

HORIZONTAL MEMBER DEFLECTIONS IN FEET AT 1/ 4 POINTS FROM LEFT END - DOWNWARD POSITIVE

     MEMBER  1    E=  750.     0.0          1.424       1.768       0.956       0.0

     MEMBER  2    E=  750.     0.0         -0.054       0.118       0.115       0.0

     MEMBER  3    E=  750.     0.0          0.057       0.117       0.036       0.0

             LONG HINGE      LT      1/4     1/2      3/4      RT
                            0.0    0.043   0.111    0.091   -0.024

     MEMBER  4    E=  750.     0.0          0.145       0.202       0.090       0.0

     MEMBER  5    E=  750.     0.0          0.296       0.502       0.267       0.0

     MEMBER  6    E=  750.     0.0          0.165       0.352       0.301       0.0

VERTICAL MEMBER DEFLECTIONS IN FEET AT 1/ 4 POINTS FROM LEFT END.



IDENT  14T 20 01                  FRAME SYSTEM              MAY. 15, 1975            PAGE  41
TRIAL  0

     MEMBER  7    E=  750.     0.0         -0.001      -0.016      -0.063      -0.144

     MEMBER  8    E=  750.     0.0         -0.024      -0.076      -0.123      -0.144

     MEMBER  9    E=  750.     0.0         -0.004      -0.009      -0.006       0.012

     MEMBER 10    E=  750.     0.0          0.000       0.002       0.006       0.012

     MEMBER 11    E=  750.     0.0          0.002       0.006       0.010       0.012



IDENT  14T 20 01                  FRAME SYSTEM              MAY. 15, 1975            PAGE  42
LIVE LOAD DIAGNOSTICS

          NO ERRORS FOUND

SUPERSTRUCTURE LIVE LOAD

                 NUMBER OF LIVE LOAD LANES               RESISTING MOMENT OF     PLOT   PLOT   INFLU-
LINE MEM     SUPERSTRUCTURE   SUBSTRUCTURE                   UNIT STEEL          M & S  SCALE  ENCE
 NO.  NO.    LT.END  RT.END   LT.END   RT.END           POSITIVE   NEGATIVE     ENV.          LINES  P13

0010   1     2.750   2.750     2.7      2.7                0.         0.         0      0      NO     NO
       2     2.750   2.750     2.7      2.7                0.         0.
       3     2.750   2.750     2.7      2.7                0.         0.
       4     2.750   2.750     2.7      2.7                0.         0.
       5     2.750   2.750     2.7      2.7                0.         0.
       6     2.750   2.750     2.7      2.7                0.         0.

      LIVE   -----------TRUCK---------------      ---------LANE---------         NO.  LIVE
LINE  LOAD    P1     D1     P2     D2     P3     UNIFORM   MOM.    SHEAR         LL   LOAD
 NO.  NO.                                                  RIDER   RIDER  IMPACT LNS. SIDESWAY     COMMENTS

    1.        8.0   14.0   32.0   14.0   32.0     0.640    18.0    26.0   YES    0.0  NO       HS20-44 AASHO LOADIN
                                                                                                  WITHOUT ALTERNATIV
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IDENT 14T 20 01 FRAME SYSTEM MAY. 15, 1975 PAGE 43

LL NO. 1. NEGATIVE LIVE LOAD MOMENT ENVELOPE AND ASSOCIATED SHEARS

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-169.	-338.	-507.	-676.	-845.	-1014.	-1183.	-2492.	-6153.	-11379.
										(	-10386.)
SHEAR	0.0	-8.5	-8.5	-8.5	-8.5	-8.5	-8.5	-8.5	-71.9	-225.7	-294.2
2	-9133.	-5702.	-3568.	-2812.	-2416.	-2019.	-1623.	-1226.	-1556.	-3416.	-6517.
(	-8326.)									(	-5791.)
SHEAR	242.2	174.1	26.7	24.5	24.5	24.5	24.5	24.5	-9.9	-154.7	-220.4
3	-5977.	-3646.	-2325.	-1914.	-1562.	-1214.	-866.	-519.	-171.	-1396.	-4156.
(	-5310.)									(	-3532.)
SHEAR	202.8	142.8	-11.3	-32.6	-33.1	-33.2	-33.2	-33.3	-33.3	-207.8	-207.6
4	-4414.	-2244.	-1663.	-1451.	-1402.	-1353.	-1304.	-1255.	-2035.	-3995.	-6652.
(	-3803.)									(	-6110.)
SHEAR	198.2	39.1	22.8	2.9	2.9	2.9	2.9	2.9	-41.8	-168.2	-222.9
5	-7768.	-3960.	-1505.	-679.	-685.	-699.	-713.	-737.	-1610.	-4113.	-7964.
(	-6977.)									(	-7165.)
SHEAR	240.6	177.4	32.6	9.4	-0.8	-0.8	-0.8	-11.8	-35.1	-175.9	-242.9
6	-7336.	-4354.	-2181.	-1213.	-1040.	-866.	-693.	-520.	-347.	-173.	0.
(	-6550.)										
SHEAR	235.3	184.5	119.1	12.2	12.2	12.2	12.2	12.2	12.2	12.2	0.0

HORIZONTAL MEMBER STRESSES LL MAX NEG BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	8.	17.	25.	33.	41.	50.	58.	122.	302.	336.
2	270.	280.	175.	138.	119.	99.	80.	60.	76.	155.	187.
3	172.	155.	114.	94.	77.	60.	43.	25.	8.	69.	173.
4	167.	105.	75.	63.	58.	54.	50.	46.	71.	135.	198.
5	226.	194.	74.	35.	34.	34.	35.	36.	79.	202.	232.
6	212.	147.	77.	44.	40.	34.	29.	22.	16.	8.	0.

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HORIZONTAL MEMBER STRESSES LL MAX NEG TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-6.	-12.	-18.	-24.	-29.	-35.	-41.	-87.	-215.	-343.
2	-275.	-199.	-125.	-98.	-84.	-70.	-57.	-43.	-54.	-118.	-191.
3	-175.	-124.	-81.	-67.	-55.	-42.	-30.	-18.	-6.	-49.	-123.
4	-133.	-78.	-57.	-50.	-48.	-46.	-44.	-42.	-68.	-132.	-201.
5	-230.	-138.	-53.	-24.	-24.	-24.	-25.	-26.	-56.	-144.	-236.
6	-216.	-144.	-73.	-41.	-35.	-29.	-24.	-18.	-12.	-6.	0.

IDENT 14T 20 C1 FRAME SYSTEM MAY. 15, 1975 PAGE 45

LL NO. 1. DEAD LOAD PLUS NEGATIVE LIVE LOAD MOMENT ENVELOPE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	15899.	27105.	33615.	35431.	32553.	24981.	12714.	-5387.	-30534.	-62081. (-56094.)
2	-52645. (-48108.)	-32679.	-16988.	-5764.	2014.	6705.	8307.	6823.	1524.	-8394.	-22776. (-19411.)
3	-27006. (-23382.)	-14328.	-4854.	1630.	5988.	8272.	8486.	6630.	2704.	-4864.	-16036. (-13630.)
4	-19047. (-16189.)	-6653.	1710.	7160.	9879.	9990.	7445.	2216.	-6581.	-19336.	-35607. (-31533.)
5	-39035. (-34624.)	-17777.	-1928.	8353.	13863.	15427.	13052.	6727.	-4385.	-21066.	-43151. (-38568.)
6	-40190. (-35425.)	-22109.	-7572.	3068.	10260.	14640.	16850.	16330.	13321.	7864.	0.

HORIZONTAL MEMBER STRESSES FOR DL+LL MAX NEG BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-780.	-1330.	-1650.	-1739.	-1596.	-1226.	-624.	264.	1498.	1816.
2	1558.	1604.	834.	283.	-99.	-329.	-408.	-335.	-75.	380.	628.
3	757.	609.	238.	-60.	-294.	-406.	-416.	-325.	-133.	239.	669.
4	794.	312.	-77.	-309.	-409.	-396.	-284.	-81.	231.	652.	1021.
5	1121.	872.	95.	-410.	-680.	-757.	-641.	-330.	215.	1034.	1249.
6	1147.	745.	266.	-112.	-391.	-589.	-697.	-705.	-600.	-370.	-0.

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HORIZONTAL MEMBER STRESSES FOR DL+LL MAX NEG TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	555.	946.	1173.	1237.	1136.	872.	444.	-188.	-1066.	-1850.
2	-1586.	-1140.	-593.	-201.	70.	234.	290.	238.	53.	-289.	-640.
3	-771.	-489.	-169.	57.	209.	289.	296.	231.	94.	-170.	-476.
4	-565.	-230.	59.	245.	336.	338.	251.	74.	-219.	-641.	-1040.
5	-1142.	-620.	-67.	291.	484.	538.	455.	235.	-153.	-735.	-1272.
6	-1168.	-732.	-252.	103.	345.	502.	573.	559.	459.	273.	0.

IDENT 14T 20 01 FRAME SYSTEM MAY. 15, 1975 PAGE 47

LL NO. 1. POSITIVE LIVE LOAD MOMENT ENVELOPE AND ASSOCIATED SHEARS

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	3859.	6594.	8221.	8767.	8269.	6777.	4372.	2402.	716.	234.
SHEAR	0.0	172.7	124.2	76.1	-28.8	-76.0	-122.5	-161.7	-179.2	-121.0	1.2
2	627.	846.	2360.	3724.	4589.	4836.	4528.	3612.	2227.	1517.	1830.
SHEAR	-14.8	70.9	164.1	138.2	109.8	-83.5	-112.8	-140.9	-166.2	-46.4	33.1
3	1227.	1402.	2213.	3259.	4053.	4341.	4049.	3080.	1247.	169.	500.
SHEAR	-9.3	70.9	107.6	90.5	117.6	-75.2	-107.1	-155.2	-190.2	19.6	19.6
4	675.	1180.	2779.	3911.	4468.	4463.	3958.	2966.	1650.	869.	984.
SHEAR	-15.4	197.1	153.0	124.6	95.3	-97.5	-125.7	-151.7	-174.3	-58.8	14.9
5	709.	823.	1964.	3507.	4547.	4879.	4541.	3495.	1949.	675.	525.
SHEAR	-8.9	64.4	168.9	142.7	112.8	-81.5	-113.1	-143.0	-169.1	-65.9	7.2
6	136.	419.	1487.	2897.	4126.	4971.	5305.	5106.	4228.	2564.	0.
SHEAR	-0.7	71.3	114.3	165.1	143.4	118.3	-73.7	-102.3	-148.9	-180.6	0.0

HORIZONTAL MEMBER STRESSES LL MAX POS BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-189.	-324.	-403.	-430.	-406.	-333.	-215.	-118.	-35.	-8.
2	-20.	-42.	-116.	-183.	-225.	-237.	-222.	-177.	-109.	-69.	-59.
3	-40.	-60.	-109.	-160.	-199.	-213.	-199.	-151.	-61.	-8.	-25.
4	-33.	-55.	-125.	-169.	-185.	-177.	-151.	-108.	-58.	-29.	-32.
5	-23.	-40.	-96.	-172.	-223.	-239.	-223.	-171.	-96.	-33.	-17.
6	-4.	-14.	-52.	-106.	-157.	-197.	-219.	-220.	-190.	-120.	0.

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HORIZONTAL MEMBER STRESSES LL MAX POS TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	135.	230.	287.	306.	289.	237.	153.	84.	25.	6.
2	21.	30.	82.	130.	160.	169.	158.	126.	78.	52.	60.
3	40.	48.	77.	114.	141.	151.	141.	107.	44.	6.	17.
4	24.	41.	96.	134.	152.	151.	133.	99.	55.	29.	32.
5	23.	29.	69.	122.	159.	170.	158.	122.	68.	24.	17.
6	5.	14.	50.	97.	139.	168.	180.	175.	146.	89.	0.

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LL NO. 1. DEAD LOAD PLUS POSITIVE LIVE LOAD MOMENT ENVELOPE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	19928.	34037.	42343.	44874.	41668.	32772.	18270.	-493.	-23665.	-50468. (-45381.)
2	-43086. (-39103.)	-26131.	-11060.	773.	9019.	13559.	14458.	11661.	5307.	-3462.	-14429. (-12264.)
3	-19802. (-16831.)	-9280.	-318.	6803.	11603.	13827.	13401.	10228.	4123.	-3299.	-11380. (-9672.)
4	-13957. (-11863.)	-3208.	6153.	12522.	15749.	15806.	12711.	6437.	-2896.	-14473.	-27971. (-24466.)
5	-30557. (-26512.)	-12994.	1541.	12539.	19095.	21004.	18305.	10959.	-826.	-16278.	-34661. (-30846.)
6	-32717. (-28664.)	-17336.	-3904.	7177.	15426.	20678.	22848.	21956.	17895.	10601.	0.

HORIZONTAL MEMBER STRESSES FOR DL+LL MAX POS BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-978.	-1670.	-2078.	-2202.	-2045.	-1608.	-897.	24.	1161.	1469.
2	1266.	1282.	543.	-38.	-443.	-665.	-710.	-572.	-260.	157.	397.
3	545.	394.	16.	-334.	-569.	-679.	-658.	-502.	-202.	162.	475.
4	582.	151.	-277.	-540.	-652.	-627.	-484.	-235.	102.	488.	792.
5	871.	638.	-76.	-615.	-937.	-1031.	-898.	-538.	41.	799.	999.
6	928.	584.	137.	-262.	-587.	-821.	-945.	-947.	-806.	-498.	-0.

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HORIZONTAL MEMBER STRESSES FOR DL+LL MAX POS TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	695.	1188.	1478.	1566.	1454.	1144.	638.	-17.	-826.	-1497.
2	-1290.	-912.	-386.	27.	315.	473.	505.	407.	165.	-119.	-404.
3	-555.	-317.	-11.	237.	405.	483.	468.	357.	144.	-115.	-336.
4	-414.	-111.	212.	428.	536.	535.	428.	215.	-96.	-479.	-807.
5	-887.	-453.	54.	438.	666.	733.	639.	382.	-29.	-568.	-1017.
6	-945.	-574.	-130.	240.	519.	699.	777.	751.	616.	367.	0.

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LL NO. 1. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 1	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	246.6	197.3	153.9	122.1	94.6	69.5	47.4	28.7	14.1	4.2	1.3
MOMENT	0.0	3304.6	4910.0	7325.0	7566.9	6950.2	5664.4	4022.4	2259.9	-339.1	255.3
NEG. V	-9.3	-20.9	-48.4	-79.0	-108.3	-135.6	-165.2	-204.9	-246.6	-289.2	-332.0
MOMENT	537.1	2280.8	5070.4	6834.0	7481.8	7150.1	7186.0	5074.1	1603.4	-3216.3	-9284.7
RANGE	255.9	218.2	202.3	201.1	202.9	205.1	212.6	233.6	260.7	293.5	333.3

LL NO. 1. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 2	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	283.1	245.3	207.9	172.2	139.2	109.8	84.8	64.5	49.2	44.0	43.1
MOMENT	-7318.4	-3410.2	-548.4	1285.6	2204.2	2391.8	2087.2	1564.3	1114.2	2544.1	3149.2
NEG. V	-16.2	-17.1	-27.8	-45.9	-72.2	-100.9	-130.3	-158.9	-188.9	-226.2	-263.7
MOMENT	1341.2	1179.4	2139.4	3372.4	4310.9	4694.1	4435.3	3550.0	1705.9	-1169.0	-5001.3
RANGE	299.3	262.5	235.6	218.1	211.4	210.7	215.1	223.5	238.1	270.2	306.8

LL NO. 1. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 3	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	244.0	212.0	186.2	162.5	133.3	101.2	67.2	45.8	28.4	27.6	27.4
MOMENT	-4520.9	-1698.4	1951.0	3186.6	3949.2	4064.6	3397.8	533.0	746.2	1072.6	1436.2
NEG. V	-11.6	-14.8	[illegible]	-39.0	-63.1	-91.0	-121.9	-155.2	-190.2	-218.4	-234.7
MOMENT	1349.5	1571.9	2298.0	2844.6	3763.9	4220.4	4038.1	3079.9	1247.5	-761.5	-2566.8
RANGE	255.5	226.8	212.2	201.5	196.3	192.2	189.1	201.0	218.6	245.9	262.2

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LL NO. 1. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 4	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	237.0	200.6	170.1	141.3	112.1	83.8	57.7	40.1	27.6	24.8	24.2
MOMENT	-3195.1	-535.0	2773.3	3861.8	4361.3	4268.2	3654.3	842.7	372.5	1756.8	2043.7
NEG. V	-20.5	-24.3	-37.8	-56.5	-85.0	-114.2	-142.9	-169.8	-196.9	-230.6	-263.9
MOMENT	1301.8	1456.7	2479.2	3488.9	4207.1	4327.2	3877.8	2903.0	894.5	-1834.6	-5307.3
RANGE	257.4	224.9	207.9	197.8	197.0	198.0	200.6	209.9	224.5	255.4	288.1

LL NO. 1. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 5	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.5 PT	RIGHT
POS. V	277.5	237.0	195.9	161.0	130.4	98.8	68.4	41.2	21.4	11.6	10.4
MOMENT	-6135.6	-1748.9	1370.0	3436.0	4452.6	4737.2	4271.9	3197.9	334.3	-84.0	982.7
NEG. V	-12.3	-13.4	-23.2	-41.4	-68.6	-99.1	-130.7	-161.3	-198.0	-239.1	-279.5
MOMENT	1202.7	1112.3	2142.1	3209.1	4279.2	4738.1	4446.5	3423.9	1832.0	-1672.3	-6303.2
RANGE	289.8	250.4	219.1	202.4	199.1	198.0	199.1	202.4	219.4	250.7	289.9

LL NO. 1. LIVE LOAD SHEAR ENVELOPES AND ASSOCIATED MOMENTS

MEMBER 6	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	273.2	241.3	208.8	184.5	161.6	135.6	107.1	76.4	44.3	23.8	13.3
MOMENT	-5679.3	-2102.7	794.6	2834.3	4065.0	4866.9	5077.9	4564.4	3222.9	1576.9	510.4
NEG. V	-1.1	-3.9	-12.3	-26.1	-44.1	-65.9	-91.0	-118.8	-148.9	-180.6	-213.3
MOMENT	150.6	496.5	1395.3	2594.3	3760.5	4681.2	5168.6	5061.7	4227.6	2563.8	0.0
RANGE	274.3	245.2	221.1	210.6	205.8	201.6	198.0	195.2	193.2	204.4	226.6

Sample Problem 5

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LL NO. 1. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 1	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	1167.4	883.4	605.2	338.7	76.5	-183.3	-440.2	-693.5	-942.9	-1187.5	-1445.4
NEG. V	911.6	665.2	403.0	137.6	-126.4	-388.5	-652.7	-927.2	-1203.5	-1460.9	-1778.7

LL NO. 1. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 2	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	1420.9	1176.3	948.5	722.4	499.1	279.4	64.0	-146.6	-352.3	-548.7	-759.5
NEG. V	1121.6	913.8	712.8	504.3	287.7	68.7	-151.1	-370.1	-590.4	-818.9	-1066.3

LL NO. 1. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 3	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	1111.4	905.6	723.6	542.0	357.0	169.1	-20.8	-198.1	-371.3	-528.0	-684.0
NEG. V	855.8	678.7	511.4	340.6	160.6	-23.1	-209.9	-399.1	-589.9	-774.0	-946.1

LL NO. 1. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 4	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	1032.5	825.4	621.3	416.0	207.3	-3.4	-214.8	-420.6	-624.2	-821.1	-1016.7
NEG. V	775.1	600.5	413.5	218.2	10.3	-201.3	-415.3	-630.4	-848.7	-1076.5	-1306.8

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LL NO. 1. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 5	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	1349.7	1075.6	815.5	569.6	324.0	77.4	-168.1	-410.3	-645.0	-869.8	-1104.6
NEG. V	1059.8	825.2	600.4	367.2	125.0	-120.5	-367.1	-612.7	-864.4	-1120.5	-1394.5

LL NO. 1. DEAD LOAD PLUS LIVE LOAD SHEAR ENVELOPE

MEMBER 6	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
POS. V	1433.7	1207.8	984.2	771.7	563.4	355.0	146.8	-60.5	-266.5	-458.0	-636.6
NEG. V	1159.4	962.6	763.1	561.1	357.7	153.4	-51.2	-255.8	-459.7	-662.3	-863.2

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LL NO. 1. LIVE LOAD SUPPORT RESULTS

		MAX. AXIAL LOAD			MAX. LONGITUDINAL MOMENT		
		AXIAL	------MOMENT------		AXIAL	------MOMENT------	
		LOAD	TOP	BOT.	LOAD	TOP	BOT.
SUPPORT JT. 1							
	POSITIVE	246.6	0.	0.	0.0	0.	0.
	NEGATIVE	-9.3	0.	0.	0.0	0.	0.
MEMBER 7							
	POSITIVE	532.8	2541.	-1180.	313.2	5357.	-2487.
	NEGATIVE	-17.4	427.	-198.	211.7	-2829.	1313.
MEMBER 8							
	POSITIVE	423.7	480.	-227.	227.2	2119.	-1001.
	NEGATIVE	-54.7	-660.	312.	153.5	-2056.	971.
MEMBER 9							
	POSITIVE	394.9	115.	-55.	211.9	1988.	-958.
	NEGATIVE	-43.7	119.	-58.	160.0	-2468.	1189.
MEMBER 10							
	POSITIVE	458.3	-828.	331.	206.5	3998.	-1600.
	NEGATIVE	-33.8	-431.	173.	233.1	-5051.	2021.
MEMBER 11							
	POSITIVE	469.7	624.	-245.	244.9	4938.	-1943.
	NEGATIVE	-11.4	-429.	169.	225.3	-4608.	1813.
SUPPORT JT. 7							
	POSITIVE	213.3	0.	0.	0.0	0.	0.
	NEGATIVE	-13.3	0.	0.	0.0	0.	0.

THE RATIO OF SUBSTRUCTURE / SUPERSTRUCTURE LOADING IS 1.000

OUTPUT Sample Problem 5

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INPUT PRESTRESSED DATA

TRIAL 1 FRAME 1 PATH 1

LINE NO.	MEM NO.	LLT	LLP	LRT	YLT	YLP	YRT	U	K
0010	1	0.0	0.40	0.10	3.00	6.50	1.25	0.25	0.0002
0020	2	0.10	0.50	0.10	1.25	5.00	1.50	0.25	0.0002
0030	3	0.10	0.60	0.0	1.50	4.00	3.00	0.25	0.0002

XLT(FT) = 0.0 XRT(FT) = 20.0 STEEL STRESS(KSI) = 270. JACKING % = .75 JACKING ENDS = L

ANCHOR SET(IN); LEFT = 0.625 RIGHT = 0.0 CONC. STRENGTH(PSI) = 3500. ALLOW. TENSION(PSI) = -355.

P-JACK(KIPS) = 0. SHORTENING PERCENT= 100 TOTAL LOSSES(KSI) = 32

****

****** THE ANSWERS ARE UNCHECKED AND THE USER IS RESPONSIBLE FOR CHECKING THEM. ******

****

Page 56 - The input prestress data has been printed with any program default values shown. Note the warning! The prestress routines are very complex and unwary users may be able to force a wrong solution from the program.

IDENT 14T 20 01 FRAME SYSTEM MAY. 15, 1975 PAGE 57

CABLE PATH OFFSETS

TRIAL 1 FRAME 1 PATH 1

MEMBER	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	3.00	4.53	5.63	6.28	6.50	6.32	5.80	4.92	3.70	2.12	1.25
2	1.25	2.00	3.31	4.25	4.81	5.00	4.83	4.30	3.43	2.20	1.50
3	1.50	1.92	2.67	3.25	3.67	3.92	4.00	3.84	3.36	0.0	0.0

Page 57 - The input cable path points of inflection have been analyzed, and converted to cable path offsets (in feet from the top of deck) at 10th points of the full span. If no cable path exists at a 10th point, the offset is printed as zero. (see 0.9 point of Span 3).

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CABLE PATH ECCENTRICITIES

TRIAL 1 FRAME 1 PATH 1

MEMBER	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	-0.117	1.414	2.508	3.164	3.383	3.208	2.683	1.808	0.583	-0.992	-2.534
2	-2.534	-1.117	0.196	1.133	1.696	1.883	1.708	1.183	0.308	-1.043	-2.284
3	-2.284	-1.425	-0.450	0.133	0.550	0.800	0.883	0.722	0.240	0.0	0.0

Page 58 - Locations of the neutral axis and structure depth have been calculated from the section properties input. These values are now combined with the cable path offsets to obtain the eccentricities. A minus sign indicates the cable path is above the neutral axis.

IDENT 14T 20 01 FRAME SYSTEM MAY. 15, 1975 PAGE 59

FORCE COEFFICIENTS

TRIAL 1 FRAME 1 PATH 1

MEMBER	LEFT	.1PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.728	0.738	0.747	0.756	0.765	0.772	0.780	0.782	0.774	0.766	0.746
2	0.746	0.727	0.718	0.711	0.703	0.695	0.689	0.682	0.674	0.667	0.650
3	0.650	0.637	0.632	0.628	0.623	0.619	0.614	0.608	0.602	0.0	0.0

THE POINT OF NO MOVEMENT IS IN SPAN 3, 112.80 FEET FROM THE LEFT END OF THE SPAN

THE LEFT ANCHOR SET LENGTH IS 111.

THE RIGHT ANCHOR SET LENGTH IS 0.

THE FORCE COEF. AT THE LEFT END IS 0.728

THE FORCE COEF. AT THE RIGHT END IS 0.598

Page 59 - Friction and wobble losses have been obtained from the cable path offsets and used to calculate the force coefficients. If no cable exists at a 10th point, a value of zero is printed. Since the cable path may not begin or end on an even 10th point, the force coefficients at the cable ends are also shown. Anchor set lengths in feet and the location of the point of no movement of the prestress tendon in its duct are also printed. Error or warning messages may be printed if losses or anchor sets are excessive.

IDENT 14T 20 C1 FRAME SYSTEM MAY. 15, 1975 PAGE 60

SECONDARY MOMENTS

TRIAL 1 FRAME 1 PATH 1

FEM"S DUE TO SECONDARY EFFECTS BEFORE BALANCING

MEMBER	LEFT END	RIGHT END
1	0.0	1.444
2	0.188	0.390
3	-0.316	0.056

DEM"S DUE TO SECONDARY EFFECTS

MEMBER	LEFT END	RIGHT END
1	0.0	1.175
2	0.725	-0.010
3	-0.136	0.024
4	0.013	-0.006
5	-0.001	0.001
6	0.000	0.0

Page 60 - The secondary prestress fixed-end moments and the secondary prestress distributed end moments are printed out mainly to assist users in checking their answers.

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P/S MOMENT COEF.

TRIAL 1 FRAME 1 PATH 1

*** SIDESWAY INCLUDED. DEAD LOAD WAS SWAYED. ***
ADJUSTED FOR LOSSES & SECONDARY MOMENTS BUT NO SHORTENING

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0852	-0.9341	-1.6552	-2.0655	-2.1528	-1.9326	-1.4394	-0.6498	0.4216	1.7420	2.9806
2	2.7888	1.6067	0.5495	-0.2197	-0.7108	-0.9327	-0.9050	-0.6394	-0.1455	0.6534	1.3369
3	1.4144	0.8467	0.2315	-0.1285	-0.3793	-0.5233	-0.5627	-0.4516	-0.1484	0.0041	0.0123
4	0.0070	0.0060	0.0050	0.0040	0.0030	0.0020	0.0010	-0.0000	-0.0010	-0.0020	-0.0030
5	-0.0005	-0.0004	-0.0004	-0.0003	-0.0003	-0.0002	-0.0001	-0.0001	-0.0000	0.0000	0.0001
6	0.0002	0.0002	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001	0.0000	0.0000	0.0000

Page 61 - Moment coefficients are obtained by combining the Pe moments with the distributed secondary moments. Losses and sidesway will be included, but prestressed elastic shortening is not included. Note that the effects of prestressing carry over to other frames.

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FEM"S & DELTA"S IN COLUMNS DUE TO SHORTENING - PJACK = 1

TRIAL 1 FRAME 1 PATH 1

MEM NO	FEM LT. END	FEM RT. END	DELTA TOP OF COL. (POSITIVE TO RIGHT)
7	-0.258312265	0.336459100	0.000005084
8	0.267569959	-0.337226868	-0.000008056

***** POINT OF NO MOVEMENT IS 62.42 FEET FROM THE LEFT END OF SPAN 2 *****

Page 62 - Deflections and Fixed-end moments due to prestress elastic shortening are printed here. The values shown are always for 100% of the elastic shortening, even if a lesser value was requested. The reduction to less than 100% elastic shortening does not occur until the final prestress moment coefficients are calculated.

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P/S MOMENT COEF.

TRIAL 1 FRAME 1 PATH 1

ADJUSTED FOR LOSSES & SECONDARY MOMENTS & SHORTENING

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0852	-0.9436	-1.6741	-2.0939	-2.1907	-1.9799	-1.4961	-0.7160	0.3459	1.6569	2.8860
2	2.8707	1.6871	0.6285	-0.1422	-0.6347	-0.8580	-0.8318	-0.5676	-0.0751	0.7224	1.4045
3	1.2574	0.7082	0.1115	-0.2301	-0.4624	-0.5879	-0.6088	-0.4792	-0.1575	0.0135	0.0402
4	0.0228	0.0195	0.0162	0.0130	0.0097	0.0064	0.0032	-0.0001	-0.0034	-0.0066	-0.0099
5	-0.0016	-0.0014	-0.0013	-0.0011	-0.0009	-0.0007	-0.0005	-0.0003	-0.0001	0.0001	0.0003
6	0.0008	0.0007	0.0006	0.0005	0.0005	0.0004	0.0003	0.0002	0.0002	0.0001	0.0000

Page 63 - These prestressed moment coefficients are the final coefficients with all losses, including the input percent of elastic shortening. These are the values used to determine the prestress force and the prestress moments, shears, stresses, and reactions.

IDENT 147 20 01 FRAME SYSTEM MAY. 15, 1975 PAGE 64

TRIAL 1 FRAME 1 PATH 1

HORIZONTAL MEMBER STRESSES PRESTRESS ONLY BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	637.	1177.	1563.	1789.	1847.	1745.	1502.	1101.	545.	-140.	-390.
2	-384.	-152.	247.	738.	985.	1093.	1073.	930.	669.	260.	39.
3	89.	246.	533.	705.	821.	882.	889.	816.	644.	-7.	-21.
4	-12.	-10.	-8.	-6.	-4.	-3.	-1.	0.	1.	2.	3.
5	1.	1.	1.	1.	0.	0.	0.	0.	0.	-0.	-0.
6	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.

HORIZONTAL MEMBER STRESSES PRESTRESS ONLY TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	712.	343.	63.	-63.	-90.	-6.	180.	468.	850.	1325.	1596.
2	1591.	1259.	902.	612.	424.	334.	338.	428.	603.	866.	1005.
3	954.	818.	632.	502.	412.	362.	350.	392.	504.	5.	15.
4	8.	7.	6.	5.	3.	2.	1.	-0.	-1.	-2.	-3.
5	-1.	-1.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	0.	0.
6	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.

Page 64 - All information is now available to obtain the prestress jacking force. This force is calculated and stressed are obtained and printed here.

OUTPUT — Sample Problem 5

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TRIAL 1 FRAME 1 PATH 1

HORIZONTAL MEMBER STRESSES DL + P/S FOR BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	637.	388.	216.	114.	75.	106.	227.	419.	687.	1056.	1090.
2	904.	1132.	1005.	882.	767.	665.	586.	535.	518.	485.	486.
3	674.	700.	657.	532.	451.	416.	430.	465.	503.	163.	475.
4	599.	197.	-160.	-377.	-471.	-453.	-335.	-127.	161.	519.	827.
5	896.	679.	21.	-443.	-714.	-791.	-675.	-366.	136.	832.	1017.
6	935.	598.	189.	-157.	-430.	-623.	-726.	-727.	-615.	-378.	-0.

HORIZONTAL MEMBER STRESSES DL + P/S FOR TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	712.	903.	1041.	1128.	1170.	1160.	1087.	953.	749.	474.	89.
2	279.	358.	434.	509.	578.	639.	685.	709.	710.	694.	550.
3	358.	453.	543.	626.	676.	693.	677.	642.	605.	-116.	-338.
4	-426.	-145.	122.	299.	387.	386.	296.	116.	-153.	-511.	-842.
5	-912.	-483.	-15.	315.	507.	563.	480.	260.	-97.	-592.	-1035.
6	-952.	-588.	-179.	143.	380.	531.	597.	577.	471.	279.	0.

Pages 65, 66, 67, and 68 - Stresses due to the various load combinations are calculated and printed. The MIN PJACK is designed so that the combined DL + ADDED DL + LL + I + P/S stresses sum up to the allowable tension. Then the DL + P/S stresses and the DL + ADDED DL + P/S stresses are checked to see that zero tension is not exceeded. The critical location of PJACK design is found on Page 67 at the 0.4 point of Span 1, bottom fiber stress. The stress here is at the maximum tension allowable of -355 KSI.

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TRIAL 1 FRAME 1 PATH 1

HORIZONTAL MEMBER STRESSES DL + ADDED DL + P/S FOR BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	637.	388.	216.	114.	75.	106.	227.	419.	687.	1056.	1090.
2	904.	1132.	1005.	882.	767.	665.	586.	535.	518.	485.	486.
3	674.	700.	657.	532.	451.	416.	430.	465.	503.	163.	475.
4	599.	197.	-160.	-377.	-471.	-453.	-335.	-127.	161.	519.	827.
5	896.	679.	21.	-443.	-714.	-791.	-675.	-366.	136.	832.	1017.
6	935.	598.	189.	-157.	-430.	-623.	-726.	-727.	-615.	-378.	-0.

HORIZONTAL MEMBER STRESSES DL + ADDED DL + P/S FOR TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	712.	903.	1041.	1128.	1170.	1160.	1087.	953.	749.	474.	89.
2	279.	358.	434.	509.	578.	639.	685.	709.	710.	694.	550.
3	358.	453.	543.	626.	676.	693.	677.	642.	605.	-116.	-338.
4	-426.	-145.	122.	299.	387.	386.	296.	116.	-153.	-511.	-842.
5	-912.	-483.	-15.	315.	507.	563.	480.	260.	-97.	-592.	-1035.
6	-952.	-586.	-179.	143.	380.	531.	597.	577.	471.	279.	0.

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TRIAL 1 FRAME 1 PATH 1

HORIZONTAL MEMBER STRESSES DL + ADDED DL + MAX POS LL + I + P/S BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	637.	199.	-107.	-289.	-355.	-300.	-106.	204.	569.	1021.	1080.
2	882.	1090.	889.	700.	542.	427.	364.	358.	409.	416.	436.
3	634.	641.	549.	372.	252.	203.	231.	314.	441.	155.	454.
4	570.	141.	-265.	-546.	-656.	-630.	-485.	-235.	103.	490.	796.
5	872.	638.	-75.	-615.	-937.	-1030.	-898.	-538.	41.	799.	999.
6	928.	584.	137.	-263.	-588.	-821.	-945.	-947.	-806.	-498.	-0.

HORIZONTAL MEMBER STRESSES DL + ADDED DL + MAX POS LL + I + P/S TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	712.	1038.	1271.	1415.	1476.	1449.	1323.	1105.	833.	499.	100.
2	301.	387.	516.	639.	738.	807.	843.	835.	788.	747.	601.
3	399.	501.	621.	739.	817.	845.	818.	749.	648.	-110.	-323.
4	-406.	-104.	218.	433.	539.	537.	429.	215.	-98.	-482.	-810.
5	-888.	-454.	53.	437.	666.	733.	639.	382.	-29.	-568.	-1017.
6	-945.	-574.	-130.	240.	519.	699.	777.	751.	616.	367.	0.

IDENT 14T 2C 01 FRAME SYSTEM MAY. 15, 1975 PAGE 68

TRIAL 1 FRAME 1 PATH 1

HORIZONTAL MEMBER STRESSES DL + ADDED DL + MAX NEG LL + I + P/S BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	637.	397.	233.	139.	108.	147.	276.	477.	809.	1358.	1426.
2	1173.	1411.	1160.	1020.	886.	764.	666.	595.	594.	639.	667.
3	846.	855.	771.	625.	527.	476.	472.	491.	511.	232.	648.
4	783.	302.	-85.	-315.	-413.	-399.	-285.	-81.	232.	654.	1024.
5	1122.	873.	95.	-409.	-680.	-757.	-640.	-330.	215.	1034.	1249.
6	1147.	745.	266.	-112.	-391.	-589.	-697.	-705.	-600.	-370.	-0.

HORIZONTAL MEMBER STRESSES DL + ADDED DL + MAX NEG LL + I + P/S FOR TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	712.	898.	1029.	1110.	1147.	1130.	1051.	911.	662.	259.	-254.
2	4.	159.	309.	411.	494.	566.	628.	666.	656.	577.	365.
3	183.	328.	462.	559.	621.	651.	646.	624.	599.	-165.	-461.
4	-557.	-273.	65.	250.	339.	340.	252.	74.	-220.	-643.	-1043.
5	-1147.	-621.	-66.	291.	484.	538.	455.	235.	-153.	-735.	-1272.
6	-1166.	-732.	-252.	103.	345.	502.	573.	559.	459.	273.	0.

**** MIN PJACK = 10529. KIPS CONC STRENGTH @ 28 DAYS = 3691. PSI @ STRESSING = 2128. PSI ****

Page 68 – The value of the required PJACK and the required concrete strength is shown here.

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TRIAL 1 FRAME 1 PATH 1

HORIZONTAL MEMBER MOMENTS DUE TO P/S

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	597.	-9935.	-17627.	-22047.	-23066.	-20847.	-15753.	-7539.	3642.	17446.	30388.
2	30226.	17764.	6618.	-1497.	-6683.	-9034.	-8758.	-5976.	-791.	7606.	14788.
3	13240.	7457.	1174.	-2422.	-4869.	-6190.	-6411.	-5046.	-1659.	142.	423.
4	240.	205.	171.	137.	102.	68.	33.	-1.	-36.	-70.	-104.
5	-17.	-15.	-13.	-11.	-9.	-7.	-5.	-3.	-1.	1.	3.
6	8.	7.	7.	6.	5.	4.	3.	2.	2.	1.	0.

VERTICAL MEMBER MOMENTS DUE TO P/S

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
7	-2268.	-2057.	-1847.	-1636.	-1426.	-1215.	-1004.	-794.	-583.	-372.	-162.
8	1023.	766.	509.	252.	-5.	-263.	-520.	-777.	-1034.	-1291.	-1548.
9	87.	60.	33.	6.	-21.	-48.	-75.	-102.	-129.	-156.	-183.
10	-41.	-28.	-15.	-2.	10.	23.	36.	49.	62.	74.	87.
11	-8.	-7.	-6.	-4.	-3.	-2.	-1.	1.	2.	3.	5.

Page 69 - Moments in all members due to prestress are printed here. The prestressing effects in other frames is also shown.

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TRIAL 1 FRAME 1 PATH 1

TANGENTIAL ROTATIONS - RADIANS - CLOCKWISE POSITIVE

SPAN	LT. END	RT. END	SPAN	LT. END	RT. END	SPAN	LT. END	RT. END
1	-0.020667	0.004529	2	0.004529	0.000478	3	0.000478	0.000128
4	0.000128	-0.000014	5	-0.000014	0.000005	6	0.000005	-0.000003
7	-0.003030	0.001499	8	0.000462	0.000940	9	-0.000002	0.000126
10	-0.000004	-0.000018	11	-0.000004	0.000001			

HORIZONTAL MEMBER DEFLECTIONS IN FEET AT 1/ 4 POINTS FROM LEFT END - DOWNWARD POSITIVE

MEMBER 1	E= 750.	0.0	-0.888	-1.085	-0.561	0.0
MEMBER 2	E= 750.	0.0	-0.042	-0.173	-0.116	0.0
MEMBER 3	E= 750.	0.0	-0.045	-0.090	-0.043	0.0

LONG HINGE	LT	1/4	1/2	3/4	RT
	0.0	-0.034	-0.084	-0.076	-0.003

MEMBER 4	E= 750.	0.0	0.003	0.002	0.001	0.0
MEMBER 5	E= 750.	0.0	-0.000	-0.000	-0.000	0.0
MEMBER 6	E= 750.	0.0	0.000	0.000	0.000	0.0

VERTICAL MEMBER DEFLECTIONS IN FEET AT 1/ 4 POINTS FROM LEFT END.

Pages 70-71 - Deflections and rotations due to prestressing only are printed here. This completes the output for a given Trial, Frame, and Path.

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TRIAL 1 FRAME 1 PATH 1

MEMBER 7	E=	750.	0.0	-0.019	-0.022	-0.014	0.0
MEMBER 8	E=	750.	0.0	-0.000	-0.006	-0.008	0.0
MEMBER 9	E=	750.	0.0	-0.000	-0.001	-0.001	0.0
MEMBER 10	E=	750.	0.0	0.000	0.000	0.000	0.0
MEMBER 11	E=	750.	0.0	-0.000	-0.000	-0.000	0.0

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INPUT PRESTRESSED DATA

TRIAL 1 FRAME 2 PATH 1

LINE NO.	MEM NO.	LLT	LLP	LRT	YLT	YLP	YRT	U	K
0040	3	0.0	0.0	0.0	2.75	0.0	1.50	0.25	0.0002
0050	4	0.10	0.50	0.10	1.50	5.00	1.25	0.25	0.0002
0060	5	0.10	0.50	0.10	1.25	6.50	1.25	0.25	0.0002
0070	6	0.10	0.60	0.0	1.25	5.00	3.00	0.25	0.0002

XLT(FT) = 112.0 XRT(FT) = 0.0 STEEL STRESS(KSI) = 270. JACKING % = .75 JACKING ENDS = B

ANCHOR SET(IN); LEFT = 0.625 RIGHT = 0.625 CONC. STRENGTH(PSI) = 3500. ALLOW. TENSION(PSI) = -355.

P-JACK(KIPS) = 0. SHORTENING PERCENT= 100 TOTAL LOSSES(KSI) = 32

****

****** THE ANSWERS ARE UNCHECKED AND THE USER IS RESPONSIBLE FOR CHECKING THEM. ******

****

Pages 72 thru 87 - The output for Frame 2 is basically the same as the output for Frame 1. Page 84 contains a note warning the user that the initial condition controlled design. This means that the maximum allowable tension stress of -355 KSI will not appear, but a value of zero will appear in the initial stresses. This zero stress shows on Page 81, top fiber stresses, left end of member six.

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CABLE PATH OFFSETS

TRIAL 1 FRAME 2 PATH 1

MEMBER	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.05	1.50
4	1.50	2.20	3.42	4.30	4.82	5.00	4.81	4.25	3.31	2.00	1.25
5	1.25	2.30	4.14	5.45	6.24	6.50	6.24	5.45	4.14	2.30	1.25
6	1.25	1.88	3.00	3.87	4.50	4.87	5.00	4.88	4.50	3.88	3.00

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CABLE PATH ECCENTRICITIES

TRIAL 1 FRAME 2 PATH 1

MEMBER	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.066	-1.617
4	-1.617	-0.974	0.175	0.983	1.441	1.549	1.295	0.666	-0.338	-1.718	-2.534
5	-2.534	-0.817	1.021	2.333	3.121	3.383	3.121	2.333	1.021	-0.817	-2.534
6	-2.534	-1.843	-0.651	0.291	0.983	1.424	1.616	1.558	1.250	0.691	-0.117

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FORCE COEFFICIENTS

TRIAL 1 FRAME 2 PATH 1

MEMBER	LEFT	.1PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.661	0.684
4	0.684	0.704	0.713	0.722	0.730	0.738	0.741	0.733	0.725	0.716	0.695
5	0.695	0.673	0.672	0.681	0.690	0.698	0.707	0.716	0.726	0.736	0.760
6	0.760	0.780	0.778	0.771	0.764	0.757	0.751	0.744	0.737	0.730	0.722

THE POINT OF NO MOVEMENT IS IN SPAN 5, 28.30 FEET FROM THE LEFT END OF THE SPAN

THE LEFT ANCHOR SET LENGTH IS 152.

THE RIGHT ANCHOR SET LENGTH IS 93.

THE FORCE COEFF. AT THE LEFT END IS 0.644

THE FORCE COEFF. AT THE RIGHT END IS 0.722

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SECONDARY MOMENTS

TRIAL 1 FRAME 2 PATH 1

FEM"S DUE TO SECONDARY EFFECTS BEFORE BALANCING

MEMBER	LEFT END	RIGHT END
3	0.047	-0.008
4	0.311	-0.136
5	0.908	0.891
6	-0.049	0.0

DEM"S DUE TO SECONDARY EFFECTS

MEMBER	LEFT END	RIGHT END
1	0.0	-0.001
2	-0.004	0.010
3	0.018	-0.003
4	0.071	0.213
5	0.808	0.797
6	0.171	0.0

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P/S MOMENT COEF.

TRIAL 1 FRAME 2 PATH 1

*** SIDESWAY INCLUDED. DEAD LOAD WAS SWAYED. ***
ADJUSTED FOR LOSSES & SECONDARY MOMENTS BUT NO SHORTENING

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-0.0001	-0.0001	-0.0002	-0.0002	-0.0003	-0.0004	-0.0004	-0.0005	-0.0005	-0.0006
2	-0.0050	-0.0034	-0.0018	-0.0002	0.0015	0.0031	0.0047	0.0063	0.0079	0.0095	0.0112
3	0.0179	0.0158	0.0137	0.0116	0.0095	0.0074	0.0052	0.0031	0.0010	0.7036	1.1026
4	1.1788	0.7795	-0.0242	-0.5954	-0.9243	-1.0023	-0.8051	-0.3195	0.4273	1.4261	1.9704
5	2.5718	1.3592	0.1218	-0.7828	-1.3491	-1.5580	-1.4056	-0.8725	0.0565	1.3972	2.7200
6	2.0496	1.5934	0.6452	-0.1026	-0.6464	-0.9913	-1.1442	-1.1068	-0.8860	-0.4871	0.0845

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FEM"S & DELTA"S IN COLUMNS DUE TO SHORTENING - PJACK = 1

TRIAL 1 FRAME 2 PATH 1

MEM NO	FEM LT. END	FEM RT. END	DELTA TOP OF COL. (POSITIVE TO RIGHT)
9	-0.764239132	0.928301811	0.000017126
10	-1.106619835	1.744941711	0.000005777
11	1.959242821	-3.137096405	-0.000009219

***** POINT OF NO MOVEMENT IS 76.96 FEET FROM THE LEFT END OF SPAN 5 *****

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P/S MOMENT COEF.

TRIAL 1 FRAME 2 PATH 1

ADJUSTED FOR LOSSES & SECONDARY MOMENTS & SHORTENING

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.0	-0.0002	-0.0004	-0.0006	-0.0008	-0.0010	-0.0011	-0.0013	-0.0015	-0.0017	-0.0019
2	-0.0161	-0.0109	-0.0057	-0.0005	0.0047	0.0099	0.0151	0.0203	0.0255	0.0307	0.0359
3	0.0575	0.0507	0.0440	0.0372	0.0304	0.0237	0.0169	0.0101	0.0033	0.7012	1.0956
4	1.8234	1.2933	0.3487	-0.3633	-0.8331	-1.0519	-0.9956	-0.6508	-0.0449	0.8130	1.2165
5	2.6360	1.4575	0.2542	-0.6162	-1.1484	-1.3232	-1.1366	-0.5694	0.3936	1.7685	3.1253
6	1.4376	0.9976	0.1156	-0.5660	-1.0436	-1.3223	-1.4090	-1.3054	-1.0184	-0.5533	0.0845

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TRIAL 1 FRAME 2 PATH 1

HORIZONTAL MEMBER STRESSES PRESTRESS ONLY BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	0.	0.	0.	0.	0.	1.	1.	1.	1.	1.
2	5.	5.	3.	0.	-2.	-4.	-7.	-9.	-11.	-13.	-11.
3	-17.	-20.	-20.	-17.	-14.	-11.	-8.	-5.	-1.	220.	63.
4	-266.	6.	413.	695.	863.	926.	885.	743.	527.	251.	120.
5	-297.	-107.	428.	823.	1067.	1151.	1076.	831.	409.	-194.	-396.
6	100.	239.	514.	742.	918.	1037.	1095.	1081.	990.	814.	544.

HORIZONTAL MEMBER STRESSES PRESTRESS ONLY TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-0.	-1.	-1.
2	-5.	-3.	-2.	-0.	1.	3.	5.	6.	8.	10.	11.
3	17.	16.	14.	12.	10.	7.	5.	3.	1.	755.	898.
4	1131.	964.	664.	440.	293.	224.	237.	329.	499.	744.	841.
5	1266.	1004.	622.	353.	192.	143.	209.	397.	709.	1153.	1457.
6	952.	844.	585.	382.	239.	155.	131.	164.	255.	404.	609.

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TRIAL 1 FRAME 2 PATH 1

HORIZONTAL MEMBER STRESSES DL + P/S FOR BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	637.	388.	217.	114.	76.	106.	227.	419.	687.	1057.	1091.
2	508.	1136.	1008.	883.	765.	660.	579.	526.	506.	472.	476.
3	657.	681.	638.	515.	437.	406.	422.	461.	501.	383.	538.
4	233.	203.	253.	318.	392.	473.	550.	616.	686.	770.	946.
5	598.	572.	449.	380.	354.	360.	400.	464.	546.	637.	620.
6	1034.	837.	703.	585.	488.	414.	369.	354.	374.	436.	544.

HORIZONTAL MEMBER STRESSES DL + P/S FOR TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	712.	903.	1041.	1128.	1170.	1160.	1086.	952.	749.	473.	88.
2	274.	354.	432.	509.	580.	642.	689.	716.	718.	704.	560.
3	376.	469.	557.	638.	686.	701.	682.	645.	606.	639.	560.
4	706.	819.	786.	739.	680.	610.	533.	445.	347.	233.	-0.
5	354.	521.	606.	668.	699.	705.	690.	657.	613.	562.	422.
6	0.	256.	406.	526.	619.	687.	728.	741.	726.	682.	609.

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TRIAL 1 FRAME 2 PATH 1

HORIZONTAL MEMBER STRESSES DL + ADDED DL + P/S FOR BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	637.	388.	217.	114.	76.	106.	227.	419.	687.	1057.	1091.
2	908.	1136.	1008.	883.	765.	660.	579.	526.	506.	472.	476.
3	657.	681.	638.	515.	437.	406.	422.	461.	501.	383.	538.
4	333.	203.	253.	318.	392.	473.	550.	616.	686.	770.	946.
5	598.	572.	449.	380.	354.	360.	400.	464.	546.	637.	620.
6	1034.	837.	703.	585.	468.	414.	369.	354.	374.	436.	544.

HORIZONTAL MEMBER STRESSES DL + ADDED DL + P/S FOR TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	712.	903.	1041.	1128.	1170.	1160.	1086.	952.	745.	473.	88.
2	274.	354.	432.	509.	580.	642.	689.	716.	718.	704.	560.
3	376.	469.	557.	638.	686.	701.	682.	645.	606.	639.	560.
4	706.	819.	786.	739.	680.	610.	533.	445.	347.	233.	-0.
5	354.	521.	606.	668.	699.	705.	690.	657.	613.	562.	422.
6	0.	256.	406.	526.	619.	687.	728.	741.	726.	682.	609.

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TRIAL 1 FRAME 2 PATH 1

HORIZONTAL MEMBER STRESSES DL + ADDED DL + MAX POS LL + I + P/S BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	637.	199.	-107.	-289.	-355.	-299.	-105.	205.	569.	1022.	1080.
2	866.	1095.	892.	700.	540.	423.	357.	349.	397.	404.	425.
3	617.	671.	529.	355.	238.	193.	223.	310.	440.	375.	517.
4	305.	147.	128.	149.	207.	296.	400.	507.	630.	741.	915.
5	575.	532.	353.	208.	131.	121.	178.	293.	450.	604.	602.
6	1027.	823.	650.	479.	331.	217.	149.	133.	184.	316.	544.

HORIZONTAL MEMBER STRESSES DL + ADDED DL + MAX POS LL + I + P/S TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	712.	1038.	1271.	1415.	1476.	1448.	1323.	1105.	833.	498.	99.
2	297.	384.	515.	639.	740.	811.	847.	842.	796.	756.	612.
3	416.	517.	635.	751.	827.	852.	823.	753.	649.	644.	575.
4	726.	860.	882.	873.	832.	761.	666.	544.	402.	262.	31.
5	378.	550.	675.	790.	858.	876.	848.	779.	681.	585.	440.
6	7.	270.	456.	622.	758.	855.	908.	916.	872.	771.	609.

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TRIAL 1 FRAME [illegible] PATH 1

HORIZONTAL MEMBER STRESSES DL + ADDED DL + MAX NEG LL + I + P/S BOTTOM FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	637.	347.	233.	139.	109.	148.	277.	477.	810.	1359.	1427.
2	1178.	1416.	1183.	1021.	884.	759.	659.	586.	583.	627.	657.
3	829.	835.	752.	609.	514.	465.	465.	486.	510.	452.	711.
4	517.	308.	328.	380.	450.	527.	600.	662.	759.	905.	1144.
5	824.	766.	523.	413.	387.	395.	435.	501.	625.	839.	852.
6	1246.	984.	779.	629.	527.	448.	398.	376.	390.	444.	544.

HORIZONTAL MEMBER STRESSES DL + ADDED DL + MAX NEG LL + I + P/S FOR TOP FIBRE

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	712.	897.	1029.	1110.	1147.	1130.	1051.	911.	662.	259.	-254.
2	-0.	155.	308.	410.	495.	571.	633.	673.	664.	586.	376.
3	200.	344.	476.	571.	631.	658.	652.	627.	600.	590.	437.
4	575.	742.	729.	690.	632.	565.	489.	403.	279.	101.	-202.
5	124.	383.	554.	644.	676.	681.	665.	631.	556.	418.	186.
6	-216.	111.	333.	485.	584.	657.	704.	723.	714.	676.	609.

**** MIN PJACK = 9075. KIPS CONC STRENGTH @ 28 DAYS = 3116. PSI @ STRESSING = 1880. PSI ****

**** REDESIGN HAS TAKEN PLACE FOR PJACK TO ELIMINATE TENSION UNDER (DL + ADDED DL + P/S) CONDITION.
**** POINT OF CONTROL CAN BE FOUND UNDER (DL + ADDED DL + P/S) STRESSES.

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TRIAL 1 FRAME 2 PATH 1

HORIZONTAL [illegible] MOMENTS DUE TO P/S

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
1	0.	-2.	-3.	-5.	-7.	-9.	-10.	-12.	-14.	-16.	-17.
2	-146.	-99.	-52.	-5.	43.	90.	137.	184.	232.	279.	326.
3	522.	460.	399.	338.	276.	215.	153.	92.	30.	6363.	9942.
4	16638.	11736.	3164.	-3297.	-7560.	-9546.	-9035.	-5906.	-407.	7378.	11039.
5	23921.	13227.	2307.	-5592.	-10422.	-12006.	-10315.	-5167.	3572.	16049.	28362.
6	13046.	9054.	1049.	-5136.	-9471.	-12000.	-12787.	-11847.	-9242.	-5021.	767.

VERTICAL [illegible] MOMENTS DUE TO P/S

MEM NO	LEFT	.1 PT	.2 PT	.3 PT	.4 PT	.5 PT	.6 PT	.7 PT	.8 PT	.9 PT	RIGHT
7	90.	68.	46.	24.	3.	-19.	-41.	-63.	-85.	-107.	-129.
8	-72.	-45.	-19.	8.	35.	62.	89.	115.	142.	169.	196.
9	-6200.	-4910.	-3621.	-2331.	-1042.	248.	1538.	2827.	4117.	5406.	6696.
10	-9232.	-7020.	-4809.	-2598.	-386.	1825.	4036.	6248.	8459.	10670.	12882.
11	12192.	9441.	6691.	3940.	1189.	-1562.	-4313.	-7063.	-9814.	-12565.	-15316.

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TRIAL 1 FRAME 2 PATH 1

TANGENTIAL ROTATIONS - RADIANS - CLOCKWISE POSITIVE

SPAN	LT. END	RT. END	SPAN	LT. END	RT. END	SPAN	LT. END	RT. END
1	-0.000009	0.000017	2	0.000017	-0.000194	3	-0.000194	0.001375
4	0.001375	0.001002	5	0.001002	-0.002328	6	-0.002328	0.007394
7	0.000039	0.000056	8	0.000032	-0.000162	9	-0.004017	-0.002641
10	-0.002746	-0.001745	11	0.003921	0.001593			

HORIZONTAL MEMBER DEFLECTIONS IN FEET AT 1/ 4 POINTS FROM LEFT END - DOWNWARD POSITIVE

MEMBER 1	E= 750.	0.0	-0.000	-0.001	-0.001	0.0
MEMBER 2	E= 750.	0.0	0.002	0.004	0.005	0.0
MEMBER 3	E= 750.	0.0	-0.010	-0.026	-0.045	0.0

LONG HINGE	LT	1/4	1/2	3/4	RT
	0.0	-0.008	-0.020	-0.036	-0.053

MEMBER 4	E= 750.	0.0	-0.068	-0.151	-0.095	0.0
MEMBER 5	E= 750.	0.0	-0.170	-0.323	-0.154	0.0
MEMBER 6	E= 750.	0.0	-0.153	-0.282	-0.227	0.0

VERTICAL MEMBER DEFLECTIONS IN FEET AT 1/ 4 POINTS FROM LEFT END.

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TRIAL 1 FRAME 2 PATH 1

MEMBER 7	E= 750.	0.0	0.000	-0.000	-0.000	0.0
MEMBER 8	E= 750.	0.0	0.001	0.002	0.001	0.0
MEMBER 9	E= 750.	0.0	-0.014	0.002	0.015	0.0
MEMBER 10	E= 750.	0.0	-0.004	0.002	0.005	0.0
MEMBER 11	E= 750.	0.0	0.007	0.001	-0.004	0.0

***** BATCH TOTALS 103 FRAME UNITS 6 L.L. UNITS 0 PLOT UNITS 7 PRESTRESS UNITS COST= $ 7.36

SYSTEM DOCUMENTATION

A complete package of system documentation may be obtained for the program Frame System by sending a request and a 9-track magnetic tape to:

California Department of Transportation
Division of Structures
Bridge Computer Services
Box 1499
Sacramento, California 95807