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INRESB-3D
A COMPUTER PROGRAM FOR INELASTIC ANALYSIS OF REINFORCED-CONCRETE STEEL BUILDINGS SUBJECTED TO 3-DIMENSIONAL GROUND MOTIONS

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August, 1979

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This report is a user's guide for the computer program, INRESB-3D, for analyzing elastic and inelastic building systems subjected to the simultaneous input of static loads and multicomponent earthquake motions, which can be applied in any direction of the structural plane. The building systems may have elevator cores, floor diaphragms, and shear walls of reinforced concrete, as well as beams, columns, and bracings. The computer program has been developed to achieve efficiency in both computation and data preparation. The output solutions include the static results of member forces and nodal displacements, as well as the dynamic results of member forces, nodal displacements, ductility factors, excursion ratios, seismic input energies, dissipated energies, and the options of plotting some of the dynamic results. The report includes the program list, a description of the program, instructions for data preparation, and a guide to modify the program's capacity.

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ABSTRACT

This report has been prepared as a user's guide for the computer program, INRESB-3D, for analyzing elastic and inelastic building systems subjected to the simultaneous input of static loads and multi-component earthquake motions, which can be applied in any direction of the structural plane.

The building systems may have elevator cores, floor diaphragms, and shear walls of the reinforced concrete, as well as steel beams, columns, and bracings. The stiffness matrices are derived from the Ramberg-Osgood hysteresis for steel and Takeda's model for concrete. The geometric matrix is formulated for large deflections by considering the second-order effect on the bending moments. The interacting forces on the yielding surfaces of the members are included.

The computer program has been comprehensively developed for achieving efficiency in both computation and data preparation. The output solutions include the static results of member forces and nodal displacements as well as the dynamic results of members forces, nodal displacements, ductility factors, excursion ratios, seismic input energies, dissipated energies, and the options of plotting some of the dynamic results.

The main features of the report include the program list, a description of the program, instructions for data preparation, and a guide to modify the program's capacity.

ACKNOWLEDGMENTS

This is the second of two final reports on a research project sponsored by the National Science Foundation under Grant No. ENV-7518372-A01. The authors deeply appreciate the financial support and the continuous encouragement and advice that Dr. S.C. Liu, Program Manager, provided during the course of the investigation. They also wish to thank Dr. J.H. Senne, Chairman of the Department of Civil Engineering, for providing facilities and a substantial amount of computer time for this project. Finally, Mrs. Margot Lewis' expert typing is gratefully acknowledged.

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I. INTRODUCTION

This publication is the second report of a research project sponsored by the National Science Foundation under Grant No. NSF ENV 7518372 A01. The first report* contains a description of the detailed investigation, which involves structural models, mathematical formulations, numerical procedures, and the response behavior of various types of elastic and inelastic building systems. This report is mainly a user's guide for the computer program, INRESB-3D (INelastic Analysis of REinforced Concrete and Steel Building Systems for 3-Dimensional Ground Motions), which is a part of the total project. Thus, the second report contains only four major topics that are included in Chapters II through V. Chapter II contains a brief description of the computer program, provides steps for the solution of problems and explains individual subroutines. Chapter III contains the program list and instructions for preparing the input data. Chapter IV includes two typical structural examples, sample printouts of the input and output data, and an interpretation of the output. Chapter V shows the program's capacity by describing the variables in the fixed commons and dimensions for which the necessary procedures of changing the program's capacity are discussed.

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*Investigation of the Effect of 3-D Parametric Earthquake Motions on Stability of Elastic and Inelastic Building Systems, by Franklin Y. Cheng and Prasert Kitipitayangkul, August, 1979, Civil Engineering, University of Missouri-Rolla. Final Report No. 1 prepared for the National Science Foundation.

II. DESCRIPTION OF INRESB-3D COMPUTER PROGRAM

A. NUMERICAL PROCEDURES

The INRESB-3D program, which is composed of a main program and 22 subroutines, is capable of analyzing building systems subject to static loads, multicomponent seismic excitations, or a combined action of static load and earthquake motions. The horizontal earthquake components can be applied in any direction of the structural phase. The static loads can be two independent lateral forces and four independent vertical forces for which the analytical results can be expressed in a number of combinations. When the static load is considered in the seismic response, the static displacements and internal forces of the last combined results are used as the initial condition for the dynamic analysis. The numerical procedures are explained in the sequence of seven major steps outlined in Fig. 1. The pertinent subroutines used in each step are shown in the diagrams of Fig. 2.

Step 1--Read and Write Input Data. The MAIN program reads in the type of structural analyses and structural information in accordance with input Codes I and II in Chapter III. The rest of the data are read in by using the subroutine INFORM. All the input data are printed out for a double check of their correctness. Because the subroutine INFORM can generate the columns having the same structural properties and the beams having the same properties and vertical loads, the subroutine GENERA is called from INFORM to print the generated information.

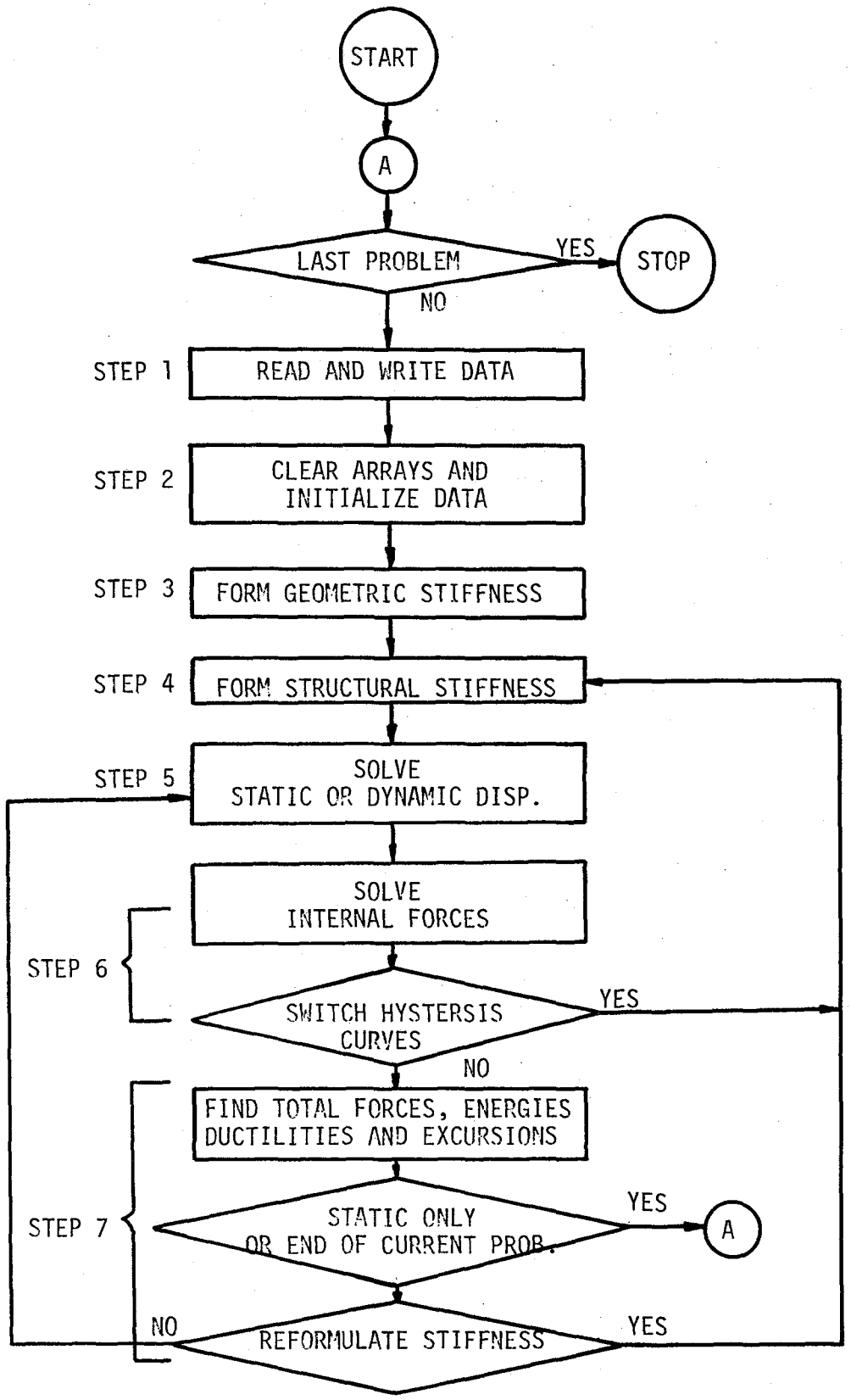
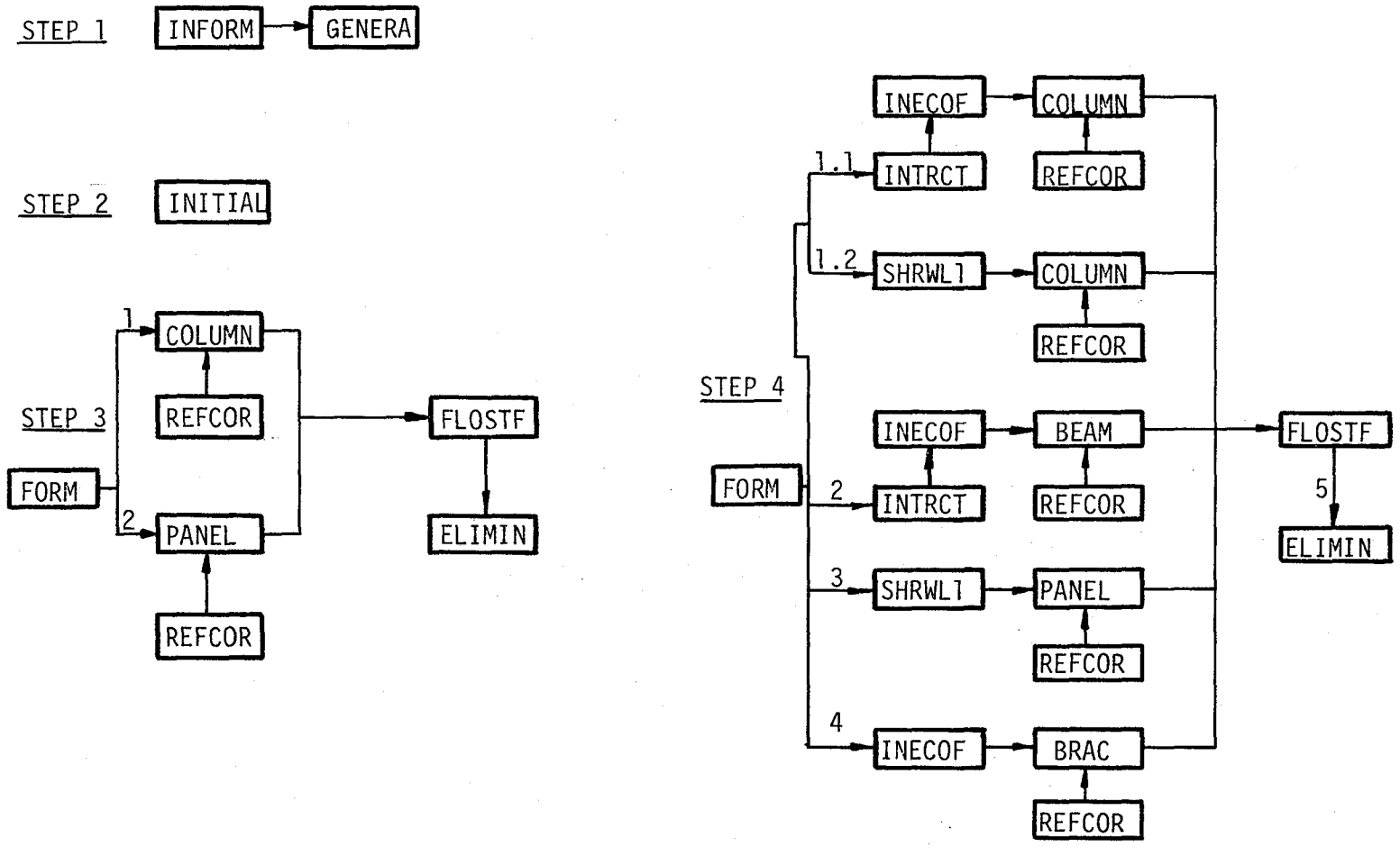
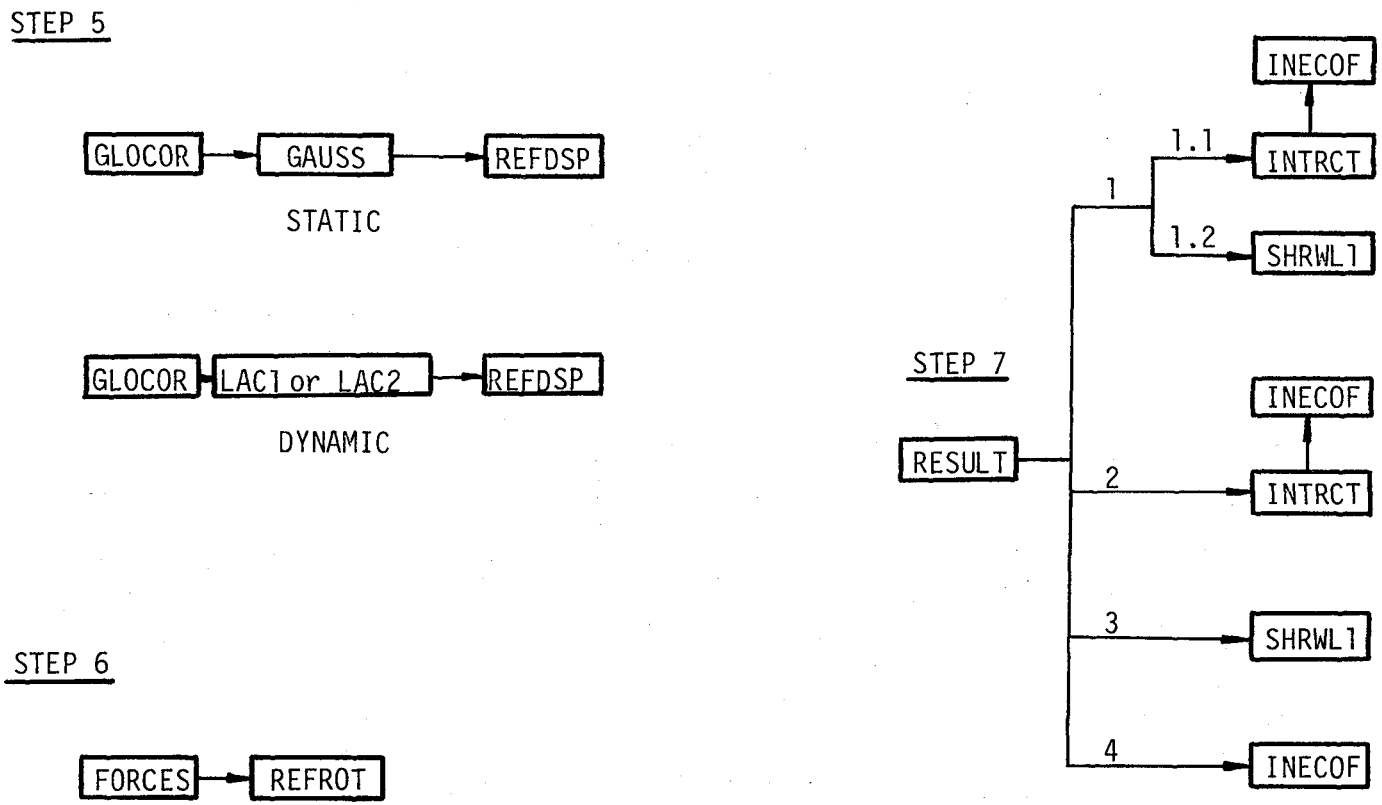


Fig. 1. Flow Chart of INRESB-3D Program



(a) Partial Diagram of Fig. 2

Fig. 2. Detailed Diagrams for Fig. 1



(b) Partial Diagram of Fig. 2

Fig. 2 Detailed Diagram for Fig. 1 (Continued)

Step 2--Clear Arrays and Initializing Input Data. Because the program can solve as many of the problems as the user desires for each input service, all the numerical arrays must be clear before each of the problems is processed. For shear walls and shear panels, the rule numbers and the associated stiffnesses have to be determined on the basis of the past response results, thus the initial information for yield moments and their corresponding slopes must be provided so that the first half-cycle can be analyzed. Detailed steps can be found in the description of the subroutine INITIAL.

Step 3--Form Geometric Stiffness. The geometric stiffness is a result of both the dead loads and the inertial forces associated with the vertical ground accelerations acting on vertical members. If the vertical ground motion is not included in the analysis, then the geometric stiffness is constant. For computational efficiency, the geometric stiffness is formulated only once in terms of the lumped masses acting on the vertical members. The actual geometric stiffness is a product of the original matrix and the coefficient of gravity acceleration plus the vertical ground acceleration for each time-step.

The detailed procedures for formulating a typical floor are sketched in Step 3 of Fig. 2. The formulation starts at the roof of the structure and then progresses floor-by-floor to ground level. For any floor level, the stiffnesses of the columns and shear-walls are determined by using the subroutines COLUMN and REFCOR. These stiffnesses are then added to the floor stiffness in accordance with the subroutine FLOSTF. After the floor sitffness, which is

contributed to by the columns and shear walls, is established, the subroutines, PANEL, REFCOR, and FLOSTF, are called for the panel stiffnesses. The final floor stiffness is added to the system's geometric matrix by using the subroutine ELIMIN. The procedures are repeated for the next lower floor level until the ground level is reached.

Step 4--Form Structural Stiffness. The formulation of structural stiffness depends on the loading stages and can be classified as initial stiffness and modified stiffness. At the beginning, the initial stiffness includes the effect of static response, if any, of axial forces and bending moments. The stiffness is then checked for each time-step, if it is necessary to be modified for any of the following conditions: 1) Whether the hysteresis loop of a steel member changes from skeleton to branch, from branch to branch (opposite direction), or from branch to skeleton. The force and deformation at the point, when the change occurs, are used in formulating the modified stiffness for which the origin corresponds to that point. 2) Whether any shear wall or shear panel has inelastic stiffness changes. When a new rule number is used, the stiffness must be modified accordingly. 3) Whether the difference between the previous stiffness and the current stiffness of Ramberg-Osgood material is greater than the tolerance limit. The tolerance is an input datum, which is used so that one does not need to change the stiffness for every time-step.

The numerical procedures, which are composed of five parts, are illustrated in Fig. 2. Parts 1 through 4 correspond to the formulation of the member stiffnesses of the columns, beams,

shear walls, shear panels, and diagonal bracings. These are then added to the floor stiffness. In part 5, the rotational degrees of freedom at the joints are eliminated by using the subroutine ELIMIN. For steel elements, the subroutine INTRCT is used to find the reduced plastic capacities, which are then used in the subroutine INECOF to form the stiffness coefficients. The stiffness coefficients of concrete elements are formed by using the subroutine SHRWL1. The stiffness coefficients are then expressed in the reference coordinates used in the subroutine REFCOR. Before part 5 is executed, the subroutine FLOSTF is used to add the stiffnesses of the individual members to the floor stiffness. The structural stiffness is determined after the ground floor stiffness is obtained.

Step 5--Solution for Static or Dynamic Displacements. The problem of static displacements is solved only once at the beginning. For this, the subroutine GLOCOR is used to transform the geometric and the structural stiffnesses from reference coordinates to global coordinates. The independent static lateral forces and vertical nodal loads are added in static loading arrays. Then by applying the Gaussian elimination in the subroutine GAUSS, the static loads can be used to find the global displacements. The REFDSP subroutine is then employed to transform the global displacements back to the reference coordinates.

For the dynamic case, the displacements are repeatedly calculated in accordance with the number of incremental time-steps as well as with the number of changing hysteresis curves. There are two optional methods of finding the displacements. These are the

step-by-step integration method and the improved step-by-step integration method, which are represented by the subroutines LAC1 and LAC2 respectively.

Step 6--Solution for Internal Forces. The static internal forces are solved only once at the beginning of each problem. The internal deformations and their associated forces are obtained by using backward substitution from the base of the structure. The combinations of static response are performed after the forces corresponding to all independent forces are found. The last combined static results are used as the initial conditions for dynamic response analysis.

The incremental dynamic forces are obtained in the same manner as in the static case. Before adding the incremental forces to the previous results, one should determine if there is any interchange between the hysteresis curves. If there is any interchange between the skeleton curve and branch curve, the internal deformations and forces have to be recalculated on the basis of the new stiffness coefficients for which steps 4, 5, and 6 must be repeated. The addition of the resulting forces is performed in step 7 in which the correction of the internal forces of reinforced concrete members is also made.

Step 7--Total Forces, Energies, Ductilities, Excursions, and Printout of Results. The results of static response are printed out in this step. The energies, ductilities, and excursions of all the members are calculated, and the incremental dynamic forces of the steel members are added to the results at the end of the previous time-step. For reinforced concrete members, the rule

numbers are checked at the end of each time-step. If there is no change in the rule numbers, the incremental forces are added to the previous forces. If there is any change in the rule numbers during loading, unloading, and load reversal, a new spring stiffness has to be formed for the next step. For the loading case having the moment, M_T, greater than the yield moment, M_y, the correct moment, M_{ac}, is set equal to the yield moment, M_y, plus the fraction of the new incremental moment as $(1-f)\Delta M_n$. The new incremental moment, ΔM_n, is obtained from the new spring associated with the new rule number. The fraction, f, is $(M_T-M_y)/\Delta M$ in which ΔM is the incremental moment in the last time-step for M_T. This correction technique is also applied to the load reversal for which the moment should ideally approach zero; then the new rule begins. The correction of over-shooting yields an unbalanced shear, $(M_T-M_{ac})/L$, which should be combined with the dynamic load in subroutine LAC1 or LAC2 for the next time-step of the analysis. The unbalanced shear induces moments, which should also be included in the load matrix.

The difference between the current steel stiffness and the previous stiffness should be compared with a tolerance. If the difference is within the limit, steps 5, 6, and 7 are repeated for the next time-step, otherwise step 4 is executed.

All the response results at certain time intervals should be printed according to the input instructions. The information for plotting is kept on the disc. The maximum forces and displacements for each problem are then printed out at the end of each problem.

B. DESCRIPTION OF SUBROUTINES

The subroutines are depicted in the order in which they first appear in the seven steps shown in Figs. 1 and 2. Thus, some relations can be seen between the previous section on numerical procedures and this section on subroutines.

1. Subroutine INFORM. This subroutine is called from the MAIN program to read in all input data except for input codes I and II, which are in the MAIN program. The input information is printed out to check its correctness. The subroutine GENERA is called to generate the beam location, the column location, and the beam loads for the common members.

2. Subroutine GENERA. This subroutine is called from the subroutine INFORM to generate the beams and columns for those elements having the same properties in each group.

3. Subroutine INITIAL. This subroutine is called from the MAIN program to clear arrays and to initialize data. The arrays include all the member forces, structural displacements, and stiffness coefficients. The initialized data consist of the primary slopes of the inelastic springs, yield moments and rotation, and the rule numbers for the reinforced concrete elements.

4. Subroutine FORM. This subroutine is called from the MAIN program to formulate the geometric stiffness and the structural stiffness for which the details are given in steps 3 and 4 of the previous section.

5. Subroutine COLUMN. The subroutine FORM calls for COLUMN to form the geometric stiffnesses and the structural stiffnesses

of the steel columns and shear walls for which the subroutine REFCOR is used.

6. Subroutine BEAM. The subroutine FORM calls for the subroutine BEAM, which then calls for REFCOR to form the structural stiffness in reference coordinates.

7. Subroutine PANEL. This subroutine, which is similar to the subroutine COLUMNS, is used to form the geometric and structural stiffnesses for the panels.

8. Subroutine BRAC. As in other subroutines for the member elements, this subroutine is used to form the structural stiffnesses of the bracing members in reference coordinates.

9. Subroutine REFCOR. This subroutine is called from the subroutines COLUMN, BEAM, PANEL, and BRAC to transform the matrices relating the member-end deformations to the deformations at the center of rigid zone, if any. The matrices are then transferred to the reference coordinates.

10. Subroutine FLOSTF. This subroutine is called from the subroutine FORM to set the member stiffnesses and the fixed-end forces of the beams in proper arrays for a typical floor of a system. The specific arrays are assigned for certain stiffness elements, which depend on the degrees of freedom associated with the elements that are to be eliminated or saved.

11. Subroutine ELIMIN. This subroutine is called from the subroutine FORM after the subroutine FLOSTF is executed. The stiffnesses associated with the degrees of freedom to be saved are added to the structural stiffness, and then the Gaussian elimination is begun. The effects of elimination, or the so-called sway effects,

on the static vertical load are computed. The elimination is applied only for the structural stiffness, not the geometric stiffness.

12. Subroutine GLOCOR. This subroutine is called from the MAIN program to transform the geometric stiffness and structural stiffness from the reference coordinates to the global coordinates at the mass center. The transformation for a typical floor includes the lateral and rotational floor stiffnesses and their coupling as well as the sway effects. The subroutine GAUSS is called to solve for the static displacements of six possible independent displacements, such as two sets of lateral forces and four sets of vertical loads.

13. Subroutine GAUSS. This subroutine is called from the subroutine GLOCOR to compute the static displacements for which the forward elimination and backward substitution are used.

14. Subroutine LAC1. This subroutine is called from the MAIN program to calculate the incremental ground displacements and the incremental structural response. Energies due to the second-order effect and damping are computed in this subroutine. This is an optional subroutine based on the step-by-step method of the linear acceleration method.

15. Subroutine LAC2. This subroutine is similar to LAC1 and is used as an optional subroutine based on the improved step-by-step method.

16. Subroutine REFDSP. This subroutine is called from the MAIN program to transform in a floor-by-floor process the lateral and rotational displacements from global coordinates to reference coordiantes.

17. Subroutine FORCES. This subroutine is called from the MAIN program 1) to compute the internal forces of members for static and dynamic cases, 2) to determine the paths of force-deformation in the steel members depending on whether a skeleton curve or a branch is used, and 3) to combine the static responses according to the loading cases in the input data.

In calculating the internal forces, the rotations of the members in reference coordinates can be computed floor by floor by using the fix-supported conditions and the known vertical and lateral displacements. The local deformations and the internal forces are then found at the same time by starting on the first floor.

The loading and the load reversal of the steel members are examined by using the following two checks at every time-step: 1) The previous and current signs of the internal forces for each member are compared. If the signs are the same, it signifies that the forces stay on the same path; the incremental forces can be added to the previous results. Otherwise, the forces obtained at this time step are recorded as previous forces and then used in reformulating the stiffness for the new forces. The sign of the new forces is checked with that of the forces just recorded. If the sign is the same, the incremental forces have to be added to the previous forces. Otherwise, the stiffness has to be reformulated and the sign rechecked. 2) The reverse loading on the branch curve is checked whether the total force on the branch curve at a given time-step is greater than the maximum force recorded earlier on the skeleton curve. If it is greater than the maximum force,

then a new stiffness must be reformulated on the basis of the skeleton curve from which the force is obtained for that time-step.

18. Subroutine REFROT. This subroutine is called from the subroutine FORCES to compute the local static and dynamic displacements of members. Member forces for different static loading combinations are computed and then printed out.

19. Subroutine RESULT. This subroutine is called from the MAIN program for the following purposes: 1) to find the total forces of the steel members, 2) to compute the energies, ductilities, and excursions, 3) to compute the inelastic spring stiffness and the total forces of the reinforced concrete members, 4) to compute the percentage of the difference between the stiffness at the previous time-step and the current stiffness and then to compare the percentage with the tolerance, 5) to search for maximum forces and maximum displacements, 6) to print out energies, member forces, lateral and rotational displacements, velocities, and accelerations, 7) to print out ductilities and excursions, 8) to write the data on the disc for plotting, and 9) to print out the maximum forces of the individual members and the maximum displacements of the structure.

This subroutine is called only if the incremental forces of the steel members can be added to the previous forces. That is, the checks in the subroutine FORCES have been passed.

The calculations for the internal forces of the reinforced concrete members have already been discussed in step 7 of the numerical procedures.

20. Subroutine INECOF. This subroutine is called from the subroutines FORM and RESULT to formulate the stiffness coefficients of the steel members in local coordinates. This subroutine is called four times for 1) the coefficient parameters (Eq. 3.26 in Ref. 1) at end-i, 2) the coefficient parameters (Eq. 3.26 in Ref. 1) at end-j and the flexural stiffness at both ends, 3) the axial stiffness, and 4) the torsional stiffness.

21. Subroutine INTRCT. This subroutine is called from the subroutines FORM and RESULT to find the reduced plastic moment capacities in the major and minor axes of the steel members.

22. Subroutine SHRWL1. This subroutine is called from the subroutines FORM and RESULT to formulate the stiffness of the concrete members. The flexibility coefficients of the elastic member elements are first added to the flexibility coefficients of inelastic springs from which the inverse becomes the stiffness coefficients of the member.

III. DESCRIPTION OF INPUT DATA AND FORTRAN IV LISTING OF THE PROGRAM

A. CONTENTS OF THE INPUT INSTRUCTIONS

The input instructions include the following 27 input codes which are outlined in this section. The next section contains the specific requirements for preparing the input data for each code.

I. TYPE OF ANALYSIS

II. STRUCTURAL INFORMATION

III. STORY DATA AND STATIC LATERAL LOADS

IV. STATIC VERTICAL LOADS AT NODAL POINTS

V. EARTHQUAKE ACCELERATION INPUT AND PRINTOUT

VI. DIRECTION OF EARTHQUAKE ACCELERATION INPUT

VII. EARTHQUAKE ACCELERATION INTERVAL

VIII. EARTHQUAKE ACCELERATIONS IN X-DIRECTION

IX. EARTHQUAKE ACCELERATIONS IN Y-DIRECTION

X. EARTHQUAKE ACCELERATIONS IN Z-DIRECTION

XI. LUMPED MASSES AT NODAL POINTS

XII. VERTICAL COLUMN LINE COORDINATES

XIII. COLUMN PROPERTIES

- a. Steel Column Properties Group
- b. Concrete Element Properties Group

XIV. YIELDING MOMENTS OF CONCRETE ELEMENTS

XV. BEAM PROPERTIES

XVI. FIXED-END BEAM LOADS

XVII. BEAM IDENTIFICATION

XVIII. COLUMN IDENTIFICATION

XIX. PANEL ELEMENT IDENTIFICATION

XX. BRACING ELEMENT IDENTIFICATION

XXI. INTEGRATION INFORMATION

XXII. ANGLE OF COLUMN AXIS

XXIII. GENERAL CONTROL INFORMATION

XXIV. STATIC LOAD COMBINATION

XXV. CONTROL OF PRINTING RESULTS

XXVI. CONTROL OF PLOTTING RESULTS

XXVII. CONTROL OF NUMBER OF PROBLEMS

B. INSTRUCTIONS FOR INPUT DATA

The detailed instructions for each of the 27 input codes are as follows:

I. TYPE OF ANALYSIS (I5)

Columns	Entry
1-5	Eq. 1; Static analysis only.
	Eq. 2; Static analysis plus dynamic analysis. The result of the static analysis will be the initial information for the dynamic analysis. For dynamic analysis only, input the code equal to 2 and the zero static load indicated in Codes III and IV.

II. STRUCTURAL INFORMATION (8I5, 10A4)

1-5	Number of stories in the structure (not including the ground level).
6-10	Number of vertical column lines in the structure.
11-15	Number of bays in the structure.
16-20	Number of seats of different column properties.
21-25	Number of sets of different beam properties.

Columns	Entry
26-30	Number of sets of different fixed-end moments and shears occasioned by vertical loads acting on the beams.
31-35	Number of infill shear panels in the structure.
36-40	Number of bracing elements in the structure.
41-80	Structure identification information to be printed with the output.

III. STORY DATA AND STATIC LATERAL LOAD (A5, 5X, 7F10.0/8F10.0)

Prepare two cards for each level from top to base of the structure.

1-5	Identification level to be used.
6-10	Blank.
11-20	Story height.
21-30	Translation mass.
31-40	Rotational mass moment of inertia about vertical axis through the mass center of the floor.
41-50	X-distance from reference point to mass center.
51-60	Y-direction from reference point to mass center.
61-70	External story stiffness in X-direction.
71-80	External story stiffness in Y-direction.
1-10	Static lateral load case A in X-direction.
11-20	Static lateral load case A in Y-direction.
21-30	X-distance from reference point to the static lateral load case A.
31-40	Y-distance from reference point to the static lateral load case A.
41-50	Static lateral load case B in X-direction.
51-60	Static lateral load case B in Y-direction.

Columns	Entry
61-70	X-distance from reference point to the static lateral load case B.
71-80	Y-distance from reference point to the static lateral load case B.

IV. STATIC VERTICAL LOAD AT NODAL POINT (8F10.0)

Total number of cards to be supplied at this stage must be equal to the number of stories in the structure times the number of the vertical column lines in the structure and divided by 8. For a structure having M columns and N levels, the input data cards should be arranged as follows:

Columns	Entry
1-10	Static vertical load at column line 1 level N (top floor).
11-20	Static vertical load at column line 2 level N.
.	Static vertical load at column line . level N.
.	Static vertical load at column line M level N.
.	Static vertical load at column line 1 level N-1.
.	Static vertical load at column line 2 level N-1.
.	Static vertical load at column line. level N-1.
.	Static vertical load at column line M level N-1.
.	Static vertical load at column line 1 level ..
.	Static vertical load at column line 2 level ..
.	Static vertical load at column line . level ..
.	Static vertical load at column line M level ..
.	Static vertical load at column line 1 level 1.
.	Static vertical load at column line 2 level 1.
.	Static vertical load at column line . level 1.

Columns Entry

. Static vertical load at column line M level 1.

V. EARTHQUAKE ACCELERATION INPUT AND PRINTOUT (2I5)

Omit input V, VI, VII, VIII, IX and X if the analysis type is 1 in input Code I.

1-5 Total number of earthquake acceleration recores in one direction. (Each direction has the same number of records.)

6-10 Printout earthquake acceleration records code.

Eq. 0; No earthquake acceleration records printout.

Eq. 1; Earthquake acceleration records printout.

VI. DIRECTION OF EARTHQUAKE ACCELERATION INPUT (3I5)

1-5 Earthquake acceleration in X-direction.

Eq. 0; No input earthquake acceleration in X-direction.

Eq. 1; Input earthquake acceleration in X-direction.

6-10 Earthquake acceleration in Y-direction.

Eq. 0; No input earthquake acceleration in Y-direction.

Eq. 1; Input earthquake acceleration in Y-direction.

11-15 Earthquake accelerations in Z-direction.

Eq. 0; No input earthquake acceleration in Z-direction.

Eq. 1; Input earthquake acceleration in Z-direction.

VII. EARTHQUAKE ACCELERATION INTERVAL (F10.0)

The computer will generate the time interval for all the earthquake acceleration records; the time interval for each direction of earthquake acceleration must be the same.

1-10 Time interval of earthquake accelerations for each direction.

VIII. EARTHQUAKE ACCELERATIONS IN X-DIRECTION (8F9.0)

Columns	Entry
1-9	Earthquake acceleration record number 1.
10-18	Earthquake acceleration record number 2.
.	Earthquake acceleration record number ..
.	Earthquake acceleration record number N.

Note: 1. Omit this input if the earthquake in the X-direction is coded 0 in input Code VI.

2. N = total number of earthquake acceleration records (see input Code V).

3. Total number of cards to be supplied = N/8 (integer number).

IX. EARTHQUAKE ACCELERATION IN Y-DIRECTION (8F9.0)

1-9	Earthquake acceleration record number 1.
10-18	Earthquake acceleration record number 2.
.	Earthquake acceleration record number ..
.	Earthquake acceleration record number N.

Note: 1. Omit this input if earthquake in Y-direction is coded 0 in input Code VI.

2. N = total number of earthquake acceleration records (see Code V).

3. Total number of cards to be supplied = N/8 (integer number).

X. EARTHQUAKE ACCELERATION IN Z-DIRECTION (8F9.0)

1-9	Earthquake acceleration record number 1.
10-18	Earthquake acceleration record number 2.
.	Earthquake acceleration record number ..
.	Earthquake acceleration record number N.

Note: 1. Omit this input if earthquake in Z-direction is coded 0 in Code VI.

2. N = total number of earthquake acceleration records (see Code V).

3. Total number of cards to be supplied = N/8 (integer number).

XI. LUMPED MASSES AT NODAL POINTS (8F10.0)

Two data sets of lumped masses at the structural nodal points are read in. The first set is for the geometric stiffness formulation for which the lumped masses along each column line should be accumulated from the top of the structure to the first floor. The second set is for the mass matrix for which the lumped masses along each column line are based on the masses distributed on the individual floors.

The input format for each set is the same as input Code IV. Thus the total number of cards to be supplied should be twice the total number of cards in input IV.

XII. VERTICAL COLUMN LINE COORDINATES (I5, 2F10.0)

Columns	Entry
1-5	Column line identification number.
6-15	X-distance from reference point to the column line.
16-25	Y-distance from reference point to the column line.

The total number of cards equal to the total number of vertical column lines in the structure (see input II).

XIII. COLUMN PROPERTIES (I5, F15.0, 2F10.0, 5F5.0, F15.0/7F10.0)

The properties of steel columns (WF) and concrete elements can be read in by using two groups of identification (ID).

a. Steel Column Properties Group. One column must be supplied for each group of different columns of the structure.

Columns	Entry
1-5	Identification number (1-20) for this column property set.
6-20	Modulus of elasticity.
21-30	Axial area.
31-40	Blank.
41-45	Blank.
46-50	Torsional inertia.
51-55	Flexural inertia for bending in the major axis.
56-60	Flexural inertia for bending in the minor axis.
61-65	Rigid zone depth at the top of the column (for both axes).
66-80	Rigid zone depth at the bottom of the column (for both axes).
1-10	Depth (WF) of the cross section.
11-20	Flange width.
21-30	Flange thickness.
31-40	Web thickness.
41-50	Plastic section modulus about major axis.
51-60	Plastic section modulus about minor axis.
61-70	Plastic torsional capacity.

b. Concrete Element Properties Group. One member must be supplied for each group of different elements in a structure.

1-5	Identification number (21-40) for this member property set.
6-20	EI_x - modulus of elasticity times major moment of inertia.
21-30	EA - modulus of elasticity times cross sectional area.
31-40	EI_y - modulus of elasticity times minor moment of inertia.

Columns	Entry
41-45	K_{II} - stiffness factor (For a prismatic member K_{II} = 4; for a nonprismatic member, input the appropriate coefficient.)
46-50	K_{JJ} - stiffness factor (same as K_{II} in col. 41-45).
51-55	K_{IJ} - stiffness factor (For a prismatic member K_{IJ} = 2; for a nonprismatic member, input the appropriate coefficient.)
56-60	Strain hardening ratio for inelastic flexure at node I. This strain hardening ratio will apply directly to the hinge moment-rotation relationship, if the hinge stiffness at node I is given in column 66-80 of this card. Otherwise this ratio will apply to the overall column end moment-rotation relationship.
61-65	Strain hardening ratio for inelastic flexure at node J. This ratio will have the same application as in column 56-60.
66-80	Hinge stiffness at node I. The computer will provide the hinge properties if hinge stiffness is not supplied (input 0).
1-10	Hinge stiffness at node J. This propertye must be input, if hinge stiffness at node I is supplied. Otherwise input 0.
11-20	Unloading stiffness parameter for end I. Input 0 for unloading according to the simplified Takeda model.
21-30	Unloading stiffness parameter for end J. Input 0 for unloading according to the simplified Takeda model.

Columns	Entry
31-40	Loading parameter for end I. Input 0 for reloading according to the simplified Takeda model.
41-50	Loading parameter for end J. Input 0 for reloading according to the simplified Takeda model.
51-60	GJ-shear modulus of elasticity times torsional moment of inertia.
61-70	Loading exponential parameter.

Omit XIIIb, if no concrete elements are in the structure.

XIV. YIELDING MOMENTS OF CONCRETE ELEMENTS (4F10.0)

Omit this input if the structure does not have any concrete element.

1-10	Positive yield moment at end I.
11-20	Negative yield moment at end I.
21-30	Positive yield moment at end J.
31-40	Negative yield moment at end J.

One card for each different concrete element property. The total number of cards input must be equal to the total numbers of concrete element properties.

XV. BEAM PROPERTIES (I5, F15.0, F5.0, 2F10.0, 7F5.0)

One card must be supplied for each group of different beams in the structure.

1-5	Identification number (1-5) for this beam property set.
6-20	Modulus of elasticity.
21-25	Blank.
26-35	Torsional inertia.
36-45	Flexural inertia.

Columns	Entry
46-50	K_{II} - stiffness factor (For a prismatic member K_{II} = 4; for a nonprismatic member, input the appropriate coefficient.)
51-55	K_{JJ} - stiffness factor (Same as K_{II} in col. 46-50).
56-60	K_{IJ} - stiffness factor (For a prismatic member K_{IJ} = 2; for nonprismatic member, input the appropriate coefficient.)
61-65	Rigid zone at end I.
66-70	Rigid zone at end J.
71-75	Plastic section modulus.
76-80	Plastic torsional capacity.

XVI. FIXED-END BEAM LOADS (2I5, 5F10.0)

One card must be supplied for each different type of vertical loads on the beams. Input fixed-end moments and shears for nonuniform vertical loads or for directly applied end-moments or shears. The computer will generate the fixed-end moments and shears for uniform load case. Omit this input, if number of sets of different fixed-end moments equal 0 in column 26-30 of input Code II.

1-5	Identification number for this vertical loading set.
6-10	Input code. Eq. 0; Fixed-end forces are applied at the column faces. Eq. 1; Fixed-end forces are applied at the column centerlines.
11-20	Fixed-end moment at node I.
21-30	Fixed-end shear at node I.
31-40	Fixed-end moment at node J.
41-50	Fixed-end shear at node J.

Columns	Entry
51-60	Uniform load, per unit length, acting downward yields fixed-end forces.

XVII. BEAM IDENTIFICATION (8I5)

One card per beam must be input from top to bottom and from bay to bay in the structure (unless the data generate option is used).

1-5	Bay identification number for this beam.
6-10	Column line number at end I.
11-15	Column line number at end J.
16-20	Beam property set identification number for this beam.
21-25	Number of beams in the sequence below to be generated that have the same properties and vertical loading as this beam.
26-30	Vertical loading set identification number for vertical load Case 1.
31-35	Vertical loading set identification number for vertical load Case 2.
36-40	Vertical loading set identification number for vertical load Case 3.

XVIII. COLUMN IDENTIFICATION (4I5)

One card per column must be input from top to bottom and the column line is used to define the minor axis of the cross section (unless the data generation option is used).

1-5	Column line identification number for this column.
6-10	Column property set identification number.
11-15	Column line number defining direction of local weak axis (Y-direction) of this column.

Columns	Entry
16-20	Number of columns in sequence below to be generated that have the same properties as this column.

XIX. PANEL ELEMENT IDENTIFICATION (3I5, F15.0, F10.0, 2F5.0, 2F15.0/ 4F5.0, F15.0, F5.0, 4F10.0)

Omit this input if no panel element is in the structure.

Two cards per panel from top to bottom; no generation is allowed.

1-5	Level identification number at the top of this panel.
6-10	Column number at the P side of this panel.
11-15	Column number at the Q side of this panel.
16-30	EI-modulus of elasticity times moment of inertia.
31-40	EA-modulus of elasticity times cross sectional area.
41-45	Strain hardening ratio for inelastic flexure at node I. See explanation in input XIIIb.
46-50	Strain hardening ratio for inelastic flexure at node J.
51-65	Hinge stiffness at node I. See explanation in input XIIIb.
66-80	Hinge stiffness at node J.
1-5	Unloading stiffness parameter for end I. See explanation in input XIIIb.
6-10	Unloading stiffness parameter for end J.
11-15	Loading parameter for end I. See explanation in input XIIIb.
16-20	Loading parameter for end J.
21-35	GJ-shear modulus of elasticity times torsional moment of inertia.
36-40	Loading exponential parameter.
41-50	Positive yield moment at end I.

Columns	Entry
51-60	Negative yield moment at end I.
61-70	Positive yield moment at end J.
71-80	Negative yield moment at end J.

XX. BRACING ELEMENT IDENTIFICATION (3I5, 2F10.0)

Omit this input if no bracing element is in the structure.

One card per brace in order; no generation is allowed.

1-5	Floor level identification number at the top of this brace.
6-10	Column line number at the upper end of this brace.
11-15	Column line number at the lower end of this brace.
16-25	Modulus of elasticity.
26-35	Cross-sectional area.

XXI. INTEGRATION INFORMATION (I5, 6F10.0)

Omit this input if the type of analysis is coded 1 in input Code I.

1-5	Total number of time steps to be calculated by the integration method.
6-15	Time increment of the integration method.
16-25	α-damping factor.
26-35	β-damping factor.
36-45	Load factor for earthquake acceleration in X-direction.
46-55	Load factor for earthquake acceleration in Y-direction.
56-65	Load factor for earthquake acceleration in Z-direction.

XXII. ANGLE OF COLUMN AXIS (10F8.0)

The global ground displacements should be transferred to match the direction of the local shear forces at the base of each column line in order for one to calculate the input energy of the structure. Omit this card if type of analysis is coded 1 in input Code I.

Columns	Entry
1-8	Angle from the local weak axis of column number 1 to the X-direction of earthquake input (counterclockwise positive).
9-16	Angle from the local weak axis of column number 2 for the X-direction of earthquake input (counterclockwise positive).

Angle from the local weak axis of column number M to the X-direction of earthquake input (counterclockwise positive).

NOTE 1: One of the reference coordinates must be coincided with the weak axis of each column. Rotate the column in counterclockwise direction, if necessary, in order to make the weak axis parallel to the coordinate.

NOTE 2: The unit of the angle is in degrees.

XXIII. GENERAL CONTROL INFORMATION (I5, 6F10.0)

1-5	Method of analysis. Eq. 1; Step-by-step method. Eq. 2; Improved step-by-step method.
6-15	Constant a in Ramberg-Osgood stress-strain relationship.
16-25	Constant r in Ramberg-Osgood stress-strain relationship.
26-35	Yielding stress for a steel column.
36-45	Buckling stress for a bracing element.
46-55	Tolerance of percentage difference of the member stiffness to be used as a criterion of reformulating the tangential stiffness.
56-65	Angle from the X-axis of the mass center to the X-axis of the reference coordinates in degrees (counterclockwise positive).

XXIV. STATIC LOAD COMBINATION (I5/(6F10.0))

Last static load combination is used as the initial information for the dynamic analysis.

Columns	Entry
1-5	Total number of load combination (first card).
1-10	Multiplier for vertical load case 1 (second card).
11-20	Multiplier for vertical load case 2.
21-30	Multiplier for vertical load case 3.
31-40	Multiplier for lateral load case A.
41-50	Multiplier for lateral load case B.
51-60	Multiplier for vertical nodal load.

Total number of second card must equal to the total number of load combinations indicated in first card.

XXV. CONTROL OF PRINTING RESULTS (2I5)

Omit this input if the type of analysis is coded 1 in input Code I.

1-5	Number of time steps to have printouts for energies, forces, velocities, accelerations, and displacements.
6-10	Number of time steps to have printouts for ductilities and excursions.

XXVI. CONTROL OF PLOTTING RESULTS (16I5)

Omit this input if the type of analysis is coded 1 in input Code I.

1-5	Number of time steps to have the information plotting.
6-10	Floor level N1 for displacement plotting in X, Y and θ directions.
11-15	Floor level N2 for displacement plotting in X, Y and θ directions.
16-20	Floor level N3 for displacement plotting in X, Y and θ directions.

Columns	Entry
21-25	Column line number M1 for displacement plotting in Z direction at top level of the structure.
26-30	Column line number M2 for displacement plotting in Z direction at top level of the structure.
31-35	Column line number M3 for displacement plotting in Z direction at top level of the structure.
36-40	Column line number M4 for displacement plotting in Z direction at top level of the structure.
41-45	Column line number for M-θ plotting.
46-50	Floor level for M-θ plotting.
51-55	Column line number for M-θ plotting.
56-60	Floor level for M-θ plotting.
61-65	Column line number for M-θ plotting.
66-70	Floor level for M-θ plotting.
71-75	Column line number for M-θ plotting.
75-80	Floor level for M-θ plotting.

If no result is to be plotted, input the number of time steps in column 1-5 of this card higher than the total number of time steps in column 1-5 of input number XXI.

XXVII. CONTROL OF NUMBER OF PROBLEMS (I5)

1-5	Blank. No additional problem is to be executed. Otherwise repeat Codes I to XXVI for additional problems.

C. COMPUTER PROGRAM LISTING

```
C*****************************************************************************
C*    INRESB-3D INELASTIC ANALYSIS OF REINFORCED CONCRETE AND STEEL BUILDING   *
C*    SYSTEMS FOR THREE DIMENSIONAL GROUND MOTIONS                             *
C*    DEVELOPED BY F.Y.CHENG AND P. KITIPITAYANGKUL                            *
C*    CIVIL ENGINEERING DEPARTMENT,UNIVERSITY OF MISSOURI-ROLLA                *
C*    JULY,1979                                                                *
C*****************************************************************************
C
      IMPLICIT REAL*8(A-H,O-Z)                                          MAIN  10
      COMMON/DATA1/CLN(10,2),CP(16,40),BP(11,20),FEF(7,10),LB(10,13,3),LMAIN  20
     1DB(10,13,3),LCC(10,10,2),LP(3,20),IFEF(2),PP(16,20),LT(3,40),TP(2,MAIN  30
     240)                                                               MAIN  40
      COMMON/DATA2/COLUM1(10,10,10),BEAM1(5,13,10)                      MAIN  50
      COMMON/DATA3/COLUM2(8,10,10),BEAM2(3,13,10),PANEL2(4,20),DIAGO(4,4MAIN  60
     10)                                                                MAIN  70
      COMMON/DATA4/COLUM3(14,10,10),BEAM3(6,13,10),PANEL3(4,20),DISP(6, MAIN  80
     110)                                                               MAIN  90
      COMMON/DATA5/COCOL(9,10,10),COBM(5,13,10),COPAN(5,20),CODIA(2,40) MAIN 100
      COMMON/DATA6/PLOAD(100),A(10,14),AMA(200),IF,IFC,X1,Y1,ANG        MAIN 110
      COMMON/DATA7/PAA(4,900)                                           MAIN 120
      COMMON/DATA8/CDIS(6,10,10),BDIS(3,13,10),DDIS(1,40),PDIS(3,20)    MAIN 130
      COMMON/FORM1/S(210),C(20,20),SB(210),EF(66,26),PF(60,3),SPACE(937)MAIN 140
      COMMON/FORM2/KH(186),SD(20),E(20,146),EB(20,146),SPACE1(11304)    MAIN 150
      COMMON/FORM3/SL(10725),NC,NSNC,N,NFR,NF,NL,KLAT,LLAT,MLAT         MAIN 160
      COMMON/FORM4/SF4(210,10),CF4(20,20,10),EF4(20,143,10),KH4(183,10),MAIN 170
     1RF4(20,3,10)                                                      MAIN 180
      COMMON/STIF1/SS(130,130),SG(30,30)                                MAIN 190
      COMMON/TRAN1/D(10,1,2),AA(1,6),RF(130,6)                          MAIN 200
      COMMON/DYN1/ACCER(130),VELO(130),X1(130),X2(130)                  MAIN 210
      COMMON/GEN/ NST,NDF,NTF,NLD,NAT,NEQ,NSD,IDUM,BHED(10),NSS,        MAIN 220
     1          JDUM,T(6),RLAB(3),IS,I3                                 MAIN 230
      COMMON/JUNK/JK(3),MMJ,MNJ,JUK(331)                                MAIN 240
      COMMON/STIF/ STF(13396)                                           MAIN 250
      COMMON/DYNR/DELT,ALFA,BETA,CX,CY,CZ,XCOM,TT,NPC,KCSM,KCSMT,KSAME  MAIN 260
      COMMON/MAT/COEA,COER,COER1,COER2,EI,G,FYIELD,FCRITI,DCON           MAIN 270
      COMMON/ENG/ FPD(30),FPDD(30),DFO(130),DFDD(130),ED,EP              MAIN 280
      COMMON/DUCTI/ CRVES(4,10,10),BRVES(2,13,10),NELAS                 MAIN 290
      COMMON/DUCTJ/PRVES(2,20)                                          MAIN 300
      COMMON/ESTIF/SCOCOL(5,10,10),SCOBM(2,13,10),SCODIA(1,40)          MAIN 310
      COMMON/NEW/R(183,6),XM(6,10),FM(8)                                MAIN 320
      COMMON/SHER1/BMY(2,6,10,10),RY(2,6,10,10),BMA(2,2,10,10),BMB(2,2, MAIN 330
     110,10),RA(2,2,10,10),RB(2,2,10,10),PREC(2,2,10,10),EK1(2,10,10),  MAIN 340
     2RYI(2,2,10,10),KODY(2,10,10),KODYX(2,10,10),REVPT(2,10,10),EKEP(2,MAIN 350
     26,10,10),RTOT(2,10,10),INDI(2,10,10)                              MAIN 360
      COMMON/SHER2/BMMY(2,40)                                           MAIN 370
      COMMON/SHER3/EKH(2,10,10),EKHP(2,20)                              MAIN 380
      COMMON/SHER4/DDAD(3,10)                                           MAIN 390
      COMMON/SHERP1/BMYP(2,6,20),RYP(2,6,20),BMAP(2,2,20),BMBP(2,2,20),RMAIN 400
     1AP(2,2,20),RBP(2,2,20),RRECP(2,2,20),EK1P(2,20),RYIP(2,2,20),KODYPMAIN 410
     2(2,20),KODYXP(2,20),REVPTP(2,20),EKEPP(2,6,20),RTOTP(2,20),INDP(2,MAIN 420
     320)                                                               MAIN 430
      DIMENSION BCL(10)                                                 MAIN 440
      DATA R1/4H   X /,R2/4H   Y /,R3/4HROTN/                           MAIN 450
      RLAB(1)=R1                                                        MAIN 460
      RLAB(2)=R2                                                        MAIN 470
      RLAB(3)=R3                                                        MAIN 480
C
C     READ AND PRINT OF TYPE OF ANALYSIS
C
  100 READ(5,1004) IANALY                                               MAIN 490
      IF(IANALY.EQ.0) STOP                                              MAIN 500
      IF(IANALY.EQ.1) WRITE(6,2001)                                     MAIN 510
      IF(IANALY.EQ.2) WRITE(6,2002)                                     MAIN 520
C
C     READ AND PRINT OF STRUCTURAL INFORMATION
C
      READ  (5,1000) NST,NC,NB,NCP,NBP,NFEF,NPAN,NTRU,BHED             MAIN 530
      WRITE(6,2000) BHED,NST,NC,NB,NCP,NBP,NFEF,NPAN,NTRU               MAIN 540
      NS=NST                                                            MAIN 550
      NTF=1                                                             MAIN 560
      ISEC=1                                                            MAIN 570
      NAT=3                                                             MAIN 580
      NDF=NTF                                                           MAIN 590
      I3=3                                                              MAIN 600
      IS=0                                                              MAIN 610
      NCTS=NST*NC                                                       MAIN 620
      NCMS=NCTS                                                         MAIN 630
      NCM=NC                                                            MAIN 640
      NCTS2=2*NCTS                                                      MAIN 650
      NSS=NST*I3                                                        MAIN 660
      NFS=NST*3                                                         MAIN 670
      NCP=NCP+1                                                         MAIN 680
      NBP=NBP+1                                                         MAIN 690
      NSTC=3*NST+NCTS                                                   MAIN 700
      NSTM=3*NST+NCMS                                                   MAIN 710
C
C     READ AND PRINT OF INPUT DATA FROM INPUT CODES III TO XXVII
C
      CALL INFORM(NST,NCTS2,NTF,NCMS,NCTS,NC,NS,NB,NCP,NBP,NFEF,NPAN,NTRMAIN 720
     1U,JSHER,BCL,IANALY,NTT,NSTEP,NDPR,NFL1,NFL2,NFL3,NFL4,NFL5,       MAIN 730
     2NFL6,NCPRT1,NLPRT1,NCPRT2,NLPRT2,NCPRT3,NLPRT3,NCPRT4,NLPRT4,NREMIMAIN 740
     3N,NLD,ILAC,NFL7)                                                  MAIN 750
C
C     CLEAR ARRAYS AND INITIALIZE DATA
C
      CALL INITIL(NST,NC,NS,NPAN,NTRU,NB,JSHER)                         MAIN 760
      MM=2*NC                                                           MAIN 770
      MN=2*MM                                                           MAIN 780
      NN=MN+NC*NS+3*NS+3+NC                                             MAIN 790
      MN6=MM+MN+6                                                       MAIN 800
      LS=(MM*(MM+1))/2                                                  MAIN 810
      LC=MM*MM                                                          MAIN 820
      NE=NC*NS+3*NS+6+NC                                                MAIN 830
      LE=NE*MM                                                          MAIN 840
      NNM=NN-MN                                                         MAIN 850
      LSL=(NNM*(NNM+1))/2+NNM*3                                         MAIN 860
      NNL=NN+3                                                          MAIN 870
      NAD1=6+2*NC                                                       MAIN 880
      NAD2=MM+MN                                                        MAIN 890
C
C     FORM GEOMETRIC STIFFNESS
C
      ISTAT=0                                                           MAIN 900
      CALL FORM(LS,NN,NNM,NE,MN6,NAD1,NAD2,NNL,LSL,NST,NS,NC,NB,NPAN,   MAIN 910
     1NTRU,1,KCSM,NCP,NBP,ISTAT,ISEC)                                   MAIN 920
      CALL GLOCOR(NSS,NSTC,NCTS,1,1)                                    MAIN 930
      TT=0.                                                             MAIN 940
      ISTAT=1                                                           MAIN 950
      JDYN=1                                                            MAIN 960
      KCSM=0                                                            MAIN 970
      KCSMT=0                                                           MAIN 980
      KSAME=0                                                           MAIN 990
      ISTOP=NTT+1                                                       MAIN1000
      NNSTEP=NSTEP                                                      MAIN1010
      NNDPR=NDPR                                                        MAIN1020
      NNREMI=NREMIN                                                     MAIN1030
C
C     FORM SYSTEM STIFFNESS
C
   10 CALL FORM(LS,NN,NNM,NE,MN6,NAD1,NAD2,NNL,LSL,NST,NS,NC,NB,NPAN,   MAIN1040
     1NTRU,2,KCSM,NCP,NBP,ISTAT,ISEC)                                   MAIN1050
      CALL GLOCOR(NSS,NSTC,NCTS,2,ISTAT)                                MAIN1060
      IF(ISTAT.NE.1) GO TO 20                                           MAIN1070
C
C     CALCULATE STATIC DISPLACEMENTS AND FORCES
C
      CALL REFDSP(6,NFS,NST,NS,NC,NCTS,IS,I3)                           MAIN1080
      CALL FORCES(6,NC,NS,MM,MN,NN,ISTAT,LS,NNM,NST,NCP,NBP,NB,         MAIN1090
     1NPAN,NTRU,NLD,RLAB)                                               MAIN1100
      GO TO 30                                                          MAIN1110
C
C     CALCULATE DYNAMIC DISPLACEMENTS AND FORCES
C
   20 IF(ILAC.EQ.1) CALL LAC1(JDYN,NSS,NCTS,NST,NSTC,DISX,DISY,DISZ,VELXMAIN1120
     1,VELY,VELZ,NCHNG,KKBAL,NC)                                        MAIN1130
      IF(ILAC.EQ.2) CALL LAC2(JDYN,NSS,NCTS,NST,NSTC,DISX,DISY,DISZ,VELXMAIN1140
     1,VELY,VELZ,NCHNG,KKBAL,NC)                                        MAIN1150
      CALL REFDSP(1,NFS,NST,NS,NC,NCTS,IS,I3)                           MAIN1160
      CALL FORCES(1,NC,NS,MM,MN,NN,ISTAT,LS,NNM,NST,NCP,NBP,NB,         MAIN1170
     1NPAN,NTRU,NLD,RLAB)                                               MAIN1180
C
C     CHECK REFORMULATED STIFFNESS DUE TO SWITCH CURVE
C
   30 KCSMT=KCSMT+KCSM                                                  MAIN1190
      IF(KCSMT.LT.3) GO TO 60                                           MAIN1200
      GO TO 70                                                          MAIN1210
   60 IF(KCSM.NE.0) GO TO 80                                            MAIN1220
   70 KCSM=0                                                            MAIN1230
      KCSMT=0                                                           MAIN1240
      ISTOP=ISTOP-1                                                     MAIN1250
      TT=TT+DELT                                                        MAIN1260
      NNSTEP=NNSTEP-1                                                   MAIN1270
      NNDPR=NNDPR-1                                                     MAIN1280
      NNREMI=NNREMI-1                                                   MAIN1290
      IF(ISTAT.EQ.1) NNREMI=NREMIN                                      MAIN1300
      IF(ISTAT.EQ.1) NNSTEP=NSTEP                                       MAIN1310
      IF(ISTAT.EQ.1) NNDPR=NDPR                                         MAIN1320
C
C     FINAL RESULT AND PRINTOUT
C
      CALL RESULT(NS,NC,NB,NPAN,NTRU,NST,NNSTEP,NSTEP,NSTC,ISTAT,ISTOP, MAIN1330
     1NCHNG,DCON,NCTS,DISX,DISY,DISZ,VELX,VELY,VELZ,ISEC,NNDPR,NDPR,KONTMAIN1340
     2RL,NCHNSW,KKBAL,BCL,NNREMI,NREMIN,NFL1,NFL2,NFL3,NFL4,NFL5,NFL6,NCMAIN1350
     2PRT1,NLPRT1,NCPRT2,NLPRT2,NCPRT3,NLPRT3,NCPRT4,NLPRT4,NFL7,RR,TT,DMAIN1360
     3ELT)                                                              MAIN1370
      IF(IANALY.EQ.1) GO TO 100                                         MAIN1380
```

```
C
C     CHECK MAX.DUCTILITY
C
      IF(KONTRL.EQ.0) GO TO 72                                          MAIN1390
      WRITE(6,5001)                                                     MAIN1400
      GO TO 100                                                         MAIN1410
   72 KSAME=0                                                           MAIN1420
      GO TO 81                                                          MAIN1430
   80 KSAME=1                                                           MAIN1440
   81 JDYN=2                                                            MAIN1450
      IF(ISTAT.EQ.1) JDYN=1                                             MAIN1460
      ISTAT=2                                                           MAIN1470
      IF(ISTOP.EQ.0) GO TO 100                                          MAIN1480
C
C     CHECK REFORMULATED STIFFNESS DUE TO INELASTIC STIFFNESS CHANGE
C
      IF(KSAME.EQ.1.OR.NCHNG.EQ.1.OR.NCHNSW.EQ.1) GO TO 10              MAIN1490
      GO TO 20                                                          MAIN1500
C
 1000 FORMAT(8I5,10A4)                                                  MAIN1510
 1004 FORMAT(I5)                                                        MAIN1520
 2000 FORMAT (1X,10A4//                                                 MAIN1530
     127H NUMBER OF STORY LEVELS---- I4/                                MAIN1540
     127H NUMBER OF COLUMN LINES---- I4/                                MAIN1550
     127H NUMBER OF BAYS------------ I4/                                MAIN1560
     127H NUMBER OF DIFF. COL. PROP- I4/                                MAIN1570
     127H NUMBER OF DIFF. BEAM PROP- I4/                                MAIN1580
     127H NUMBER OF DIFF. REF------- I4/                                MAIN1590
     127H NUMBER OF PANEL ELEMENTS-- I4/                                MAIN1600
     127H NUMBER OF BRACING ELEMENTS I4/)                               MAIN1610
 2001 FORMAT(21H STATIC ANALYSIS ONLY///)                               MAIN1620
 2002 FORMAT(38H STATIC ANALYSIS PLUS DYNAMIC ANALYSIS///)              MAIN1630
 5001 FORMAT(10X,'DUCTILITY EXCEEDED LIMIT')                            MAIN1640
C
      END                                                               MAIN1650
```

```
      SUBROUTINE INFORM(NST,NCTS2,MTF,NCMS,NCTS,NC,NS,NB,NCP,NBP,NREF,NPINFO  10
     1AN,NTPU,JSHER,BCL,IANALY,NTT,NSTEP,NDPR,NFL1,NFL2,NFL3,NFL4,NFL5,NINFO  20
     2FL6,NCPRT1,NLPRT1,NCPRT2,NLPRT2,NCPRT3,NLPRT3,NCPRT4,NLPRT4,NREMININFO  30
     3,NLDD,ILAC,NFL7)                                                  INFO  40
C
C     INPUT DATA FROM INPUT CODES III TO XXVII
C
      IMPLICIT REAL*8(A-H,O-Z)                                          INFO  50
      COMMON/CATA1/CLN(10,2),CP(16,40),BP(11,20),FFF(7,10),LB(10,13,3),LINFO  60
     1DB(10,13,3),LC(10,10,2),LP(3,20),IFEF(2),PP(16,20),LT(3,40),TP(2,4INFO  70
     10)                                                                INFO  80
      COMMON/DATA6/PLOAD(100),SD(10,14),AMA(200),IF,IFC,X1,Y1,ANG       INFO  90
      COMMON/DATA7/PAA(4,900)                                           INFO 100
      COMMON/JUNK/ NLD,N,ND,MM,MN,LM(12),IDUM,P(12,3),TT(8)             INFO 110
      COMMON/DYNR/DELT,ALFA,BETA,CX,CY,CZ,XCOM,TKI,MPC,KCSM,KCSMT,KSAME INFO 120
      COMMON/MAT/SOEA,CCEP,COER1,COER2,E1,G,FYIELD,FCRITI,DCON           INFO 130
      COMMON/NEWAR/AR(183,6),XM(6,10),FM(8)                             INFO 140
      COMMON/SHER2/BMMY(2,40)                                           INFO 150
      DIMENSION PA(10,2),PB(10,2),BCL(10)                               INFO 160
C
C     READ AND PRINT OF STORY DATA AND STATIC LATERAL LOAD
C
      NLD=3                                                             INFO 170
      WRITE (6,5009)                                                    INFO 180
      DO 200 N=1,NST                                                    INFO 190
      LN=NST+1-N                                                        INFO 200
      READ (5,5000) (SD(N,I),I=1,10),PA(N,1),PA(N,2),SD(N,12),SD(N,13), INFO 210
     1PB(N,1),PB(N,2)                                                   INFO 220
  200 WRITE (6,5007) LN,(SD(N,I),I=1,8)                                 INFO 230
      WRITE (6,5010)                                                    INFO 240
      DO 310 N=1,NST                                                    INFO 250
      LN=NST+1-N                                                        INFO 260
      SD(N,11)= -SD(N,9)*(PA(N,2)-SD(N,6))+SD(N,10)*(PA(N,1)-SD(N,5))   INFO 270
      SD(N,14)=-SD(N,12)*(PB(N,2)-SD(N,6))+SD(N,13)*(PB(N,1)-SD(N,5))   INFO 280
  310 WRITE (6,5008) LN,(SD(N,I),I=9,14),PA(N,1),PA(N,2),PB(N,1),PB(N,2)INFO 290
      IF=1                                                              INFO 300
      IFC=0                                                             INFO 310
      X1=0.                                                             INFO 320
      Y1=0.                                                             INFO 330
C
C     READ AND PRINT OF STATIC VERTICAL LOAD AT NODAL POINTS
C
      READ(5,5003) (PLOAD(I),I=1,NCTS)                                  INFO 340
      WRITE(6,5030)                                                     INFO 350
      WRITE(6,5031) (I,I=1,NC)                                          INFO 360
      DO 311 I=1,NST                                                    INFO 370
      N=NST-I+1                                                         INFO 380
      KSP=NC*I                                                          INFO 390
      KBN=KSP-NC+1                                                      INFO 400
  311 WRITE(6,5032) N,(PLOAD(K),K=KBN,KSP)                              INFO 410
      IF(IANALY.EQ.1) GO TO 509                                         INFO 420
C
C     READ AND PRINT OF EARTHQUAKE ACCELERATION INPUT
C
      READ(5,5033) MPC,NEPR                                             INFO 430
C
C     READ OF EARTHQUAKE DIRECTION AND INTERVAL
C
      READ(5,5033) IXE,IYE,IZE                                          INFO 440
      READ(5,5001) DDELT                                                INFO 450
C
C     READ AND PRINT OF EARTHQUAKE ACCELERATIONS
C
      IF(IXE.EQ.1) READ(5,5005) (PAA(2,I),I=1,MPC)                      INFO 460
      IF(IYE.EQ.1) READ(5,5005) (PAA(3,I),I=1,MPC)                      INFO 470
      IF(IZE.EQ.1) READ(5,5005) (PAA(4,I),I=1,MPC)                      INFO 480
      TACC=0.                                                           INFO 490
      DO 500 I=1,MPC                                                    INFO 500
      PAA(1,I)=TACC                                                     INFO 510
  500 TACC=TACC+DDELT                                                   INFO 520
      IF(NEPR.EQ.0) GO TO 503                                           INFO 530
      IF(IXE.EQ.0) GO TO 501                                            INFO 540
      WRITE(6,5034) DDELT                                               INFO 550
      WRITE(6,5035) (PAA(2,I),I=1,MPC)                                  INFO 560
  501 IF(IYE.EQ.0) GO TO 502                                            INFO 570
      WRITE(6,5036) DDELT                                               INFO 580
      WRITE(6,5035) (PAA(3,I),I=1,MPC)                                  INFO 590
  502 IF(IZE.EQ.0) GO TO 503                                            INFO 600
      WRITE(6,5037) DDELT                                               INFO 610
      WRITE(6,5035) (PAA(4,I),I=1,MPC)                                  INFO 620
  503 IF(IXE.EQ.1) GO TO 505                                            INFO 630
      DO 504 I=1,MPC                                                    INFO 640
  504 PAA(2,I)=0.                                                       INFO 650
  505 IF(IYE.EQ.1) GO TO 507                                            INFO 660
      DO 506 I=1,MPC                                                    INFO 670
  506 PAA(3,I)=0.                                                       INFO 680
  507 IF(IZE.EQ.1) GO TO 509                                            INFO 690
      DO 508 I=1,MPC                                                    INFO 700
  508 PAA(4,I)=0.                                                       INFO 710
C
C     READ AND PRINT OF LUMP MASSES AT NODAL POINTS
C
  509 READ(5,5001) (AMA(I),I=1,NCTS2)                                   INFO 720
      WRITE(6,5038)                                                     INFO 730
      WRITE(6,5031) (I,I=1,NC)                                          INFO 740
      DO 510 I=1,NST                                                    INFO 750
      N=NST-I+1                                                         INFO 760
      KSP=NC*I                                                          INFO 770
      KBN=KSP-NC+1                                                      INFO 780
  510 WRITE(6,5039) N,(AMA(K),K=KBN,KSP)                                INFO 790
      IF(IANALY.EQ.1) GO TO 512                                         INFO 800
      WRITE(6,5040)                                                     INFO 810
      WRITE(6,5031) (I,I=1,NC)                                          INFO 820
      DO 511 I=1,NST                                                    INFO 830
      N=NST-I+1                                                         INFO 840
      KSP=NCTS+NC*I                                                     INFO 850
      KBN=KSP-NC+1                                                      INFO 860
  511 WRITE(6,5039) N,(AMA(K),K=KBN,KSP)                                INFO 870
C
C     READ AND PRINT OF COLUMN LINE COORDINATES
C
  512 WRITE(6,1000)                                                     INFO 880
      READ(5,2501) (M,(CLN(J,I),I=1,2),J=1,NC)                          INFO 890
      WRITE(6,2000)(J,(CLN(J,I),I=1,2),J=1,NC)                          INFO 900
C
C     READ AND PRINT OF COLUMN PROPERTIES
C
  100 L=NCP-1                                                           INFO 910
      IF(L.EQ.0) GO TO 105                                              INFO 920
      DO 101 I=1,L                                                      INFO 930
      READ(5,1001) M,(CP(J,M),J=1,16)                                   INFO 940
      IF(M.EQ.1) WRITE(6,2001)                                          INFO 950
      IF(M.EQ.21) WRITE(6,5041)                                         INFO 960
      IF(M.LE.20) WRITE(6,5042) M,CP(1,M),CP(2,M),(CP(J,M),J=5,16)      INFO 970
  101 IF(M.GT.20) WRITE(6,5043) M,(CP(K,M),K=1,16)                      INFO 980
      JSHER=0                                                           INFO 990
      IF(M.GT.20) JSHER=M                                              INFO1000
      IF(JSHER.EQ.0) GO TO 105                                         INFO1010
      M=JSHER-20                                                       INFO1020
C
C     READ AND PRINT OF YIELD MOMENTS OF CONCRETE ELEMENTS
C
      READ(5,5020) ((BMMY(1,I),BMMY(2,I),BMMY(1,I+20),BMMY(2,I+20)),I=1,INFO1030
     1M)                                                              INFO1040
      WRITE(6,5044)                                                    INFO1050
      DO 517 I=1,M                                                     INFO1060
      N=20+I                                                           INFO1070
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  517 WRITE(6,5045) N,BMMY(1,I),BMMY(2,I),BMMY(1,N),BMMY(2,N)                    INFO1080
  105 DO 110 I=1,16                                                              INFO1090
  110 CP(I,NCP)=0.                                                               INFO1100
C
C     READ AND PRINT OF BEAM PROPERTIES
C
      L=NBP-1                                                                    INFO1110
      IF(L.EQ.0) GO TO 115                                                       INFO1120
      READ  (5,1002) (M,(BP(J,I),J=1,11),I=1,L)                                  INFO1130
      WRITE(6,2002)                                                              INFO1140
      DO 513 I=1,L                                                               INFO1150
  513 WRITE(6,5070) I,BP(1,I),(BP(J,I),J=3,11)                                   INFO1160
  115 DO 120 I=1,11                                                              INFO1170
  120 BP(I,NBP)=0.                                                               INFO1180
C
C     READ AND PRINT OF FIXED END BEAM LOADS
C
      IF (NFEF.EQ.0) GO TO 208                                                   INFO1190
  205 READ  (5,1003) (M,IFEF(I),(FEF(J,I),J=1,7),I=1,NFEF)                       INFO1200
      WRITE (6,2003) (I,IFEF(I),(FEF(J,I),J=1,5),I=1,NFEF)                       INFO1210
C
C     READ (OR GENERATE) AND PRINT OF BEAM LOCATION CARDS - LB
C
  208 IF (NB.EQ.0) GO TO 300                                                     INFO1220
  210 WRITE (6,2004)                                                             INFO1230
      DO 260 M=1,NB                                                              INFO1240
      K=0                                                                        INFO1250
      DO 250 N=1,NS                                                              INFO1260
      IF (K.NE.0) GO TO 220                                                      INFO1270
      LN=NS+1-N                                                                  INFO1280
      READ(5,1004) (I,(LB(N,M,L),L=1,NLD),K,(LDB(N,M,L),L=1,NLD))               INFO1290
      WRITE(6,1004)(I,LN,(LB(N,M,L),L=1,NLD),K,(LDB(N,M,L),L=1,NLD))             INFO1300
      IF (LB(N,M,NLD).EQ.0) LB(N,M,NLD)=NBP                                      INFO1310
      GO TO 250                                                                  INFO1320
  220 K=K-1                                                                      INFO1330
      DO 230 L=1,NLD                                                             INFO1340
      LB(N,M,L)=LB(N-1,M,L)                                                      INFO1350
  230 LDB(N,M,L)=LDB(N-1,M,L)                                                    INFO1360
  250 CONTINUE                                                                   INFO1370
  260 WRITE (6,3000)                                                             INFO1380
      WRITE (6,3004)                                                             INFO1390
      CALL GENERA(LB,NS,NB,3,3,NBP,10,13,3)                                      INFO1400
      IF (NFEF.EQ.0) GO TO 300                                                   INFO1410
      DO 270 L=1,NLD                                                             INFO1420
      WRITE (6,4004) (HI,I=1,L)                                                  INFO1430
      CALL GENERA(LDB,NS,NB,3,L,100000,10,13,3)                                  INFO1440
  270 CONTINUE                                                                   INFO1450
C
C     READ (OR GENERATE) AND PRINT COLUMN LOCATIONS - LC
C
  300 WRITE (6,2005)                                                             INFO1460
      DO 360 M=1,NC                                                              INFO1470
      K=0                                                                        INFO1480
      DO 350 N=1,NS                                                              INFO1490
      IF (K.NE.0) GO TO 320                                                      INFO1500
      LN=NS+1-N                                                                  INFO1510
      READ(5,1005) KK,(LC(N,M,I),I=1,2),K                                        INFO1520
      WRITE(6,1005)KK,LN,(LC(N,M,I),I=1,2),K                                     INFO1530
      IF(LC(N,M,1).EQ.0)LC(N,M,1)=NCP                                            INFO1540
      GO TO 350                                                                  INFO1550
  320 K=K-1                                                                      INFO1560
      DO 330 I=1,2                                                               INFO1570
  330 LC(N,M,I)=LC(N-1,M,I)                                                      INFO1580
  350 CONTINUE                                                                   INFO1590
  360 WRITE (6,3000)                                                             INFO1600
      WRITE (6,3005)                                                             INFO1610
      CALL GENERA(LC,NS,NC,2,1,NCP,10,10,2)                                      INFO1620
C
C     READ AND PRINT OF PANEL CARDS - LP,PP
C
      IF(NPAN.EQ.0) GO TO 365                                                    INFO1630
      READ(5,1006) (LP(1,I),LP(2,I),LP(3,I),(PP(J,I),J=1,16),I=1,NPAN)           INFO1640
      WRITE (6,2006) (LP(1,I),LP(2,I),LP(3,I),(PP(J,I),J=1,12),I=1,NPAN)         INFO1650
      WRITE(6,5072)                                                              INFO1660
      WRITE(6,5071) (LP(1,I),LP(2,I),LP(3,I),(PP(J,I),J=13,16),I=1,NPAN)         INFO1670
C
C     READ AND PRINT OF BRACES
C
  365 IF (NTRU.EQ.0) GO TO 380                                                   INFO1680
      READ  (5,1007) (LT(1,I),LT(2,I),LT(3,I),TP(1,I),TP(2,I),I=1,NTRU)         INFO1690
      WRITE (6,2007) (LT(1,I),LT(2,I),LT(3,I),TP(1,I),TP(2,I),I=1,NTRU)         INFO1700
C
C     PRINT BEAM PROPERTIES AND LOADS
C
  380 IF(NB.EQ.0) GO TO 372                                                      INFO1710
      WRITE(6,2011)                                                              INFO1720
      DO 370 M=1,NB                                                              INFO1730
      WRITE (6,2012) M                                                           INFO1740
      DO 370 N=1,NS                                                              INFO1750
      LN=NS+1-N                                                                  INFO1760
      NN=LB(N,M,3)                                                               INFO1770
  370 WRITE(6,2010) LN,BP(1,NN),(BP(J,NN),J=3,11),(LDB(N,M,L),L=1,NLD)           INFO1780
C
C     PRINT COLUMN PROPERTIES
C
  372 WRITE (6,2013)                                                             INFO1790
      DO 375 M=1,NC                                                              INFO1800
      MWR=1                                                                      INFO1810
      DO 375 N=1,NS                                                              INFO1820
      LN=NS+1-N                                                                  INFO1830
      NN=LC(N,M,1)                                                               INFO1840
      IF(NN.LE.20.AND.MWR.EQ.1) WRITE(6,2014) M                                  INFO1850
      IF(NN.GT.20.AND.MWR.EQ.1) WRITE(6,5055) M                                  INFO1860
      MWR=2                                                                      INFO1870
      IF(NN.LE.20) WRITE(6,5056) LN,CP(1,NN),CP(2,NN),(CP(J,NN),J=5,16)          INFO1880
  375 IF(NN.GT.20) WRITE(6,5057) LN,(CP(K,NN),K=1,16)                            INFO1890
      IF(IANALY.EQ.1) GO TO 514                                                  INFO1900
C
C     READ AND PRINT OF NUMERICAL INTEGRATION INFORMATION
C
      READ(5,5058) NTT,DELT,ALFA,BETA,CX,CY,CZ                                  INFO1910
      WRITE(6,5059)                                                              INFO1920
      WRITE(6,5060) NTT,DELT,ALFA,BETA,CX,CY,CZ                                  INFO1930
C
C     READ AND PRINT OF ANGLE OF COLUMN AXIS
C
      READ(5,1008) (BCL(I),I=1,NC)                                               INFO1940
      WRITE(6,5061) (I,BCL(I),I=1,NC)                                            INFO1950
C
C     READ AND PRINT OF GENERAL CONTROL INFORMATION
C
  514 READ(5,5064) ILAC,COEA,COER,FYIELD,FCRITI,DCON,ANG                         INFO1960
      WRITE(6,5065) ILAC,COEA,COER,FYIELD,FCRITI,DCON,ANG                        INFO1970
      COER1=COER+1.                                                              INFO1980
      COER2=COER+2.                                                              INFO1990
C
C     READ AND PRINT OF STATIC LOAD COMBINATION MULTIPLIERS
C
      READ(5,6000) NLDD,((XM(I,J),I=1,6),J=1,NLDD)                               INFO2000
      WRITE(6,5062)                                                              INFO2010
      WRITE(6,5063) ((XM(I,J),I=1,6),J=1,NLDD)                                   INFO2020
      IF(IANALY.EQ.1) GO TO 516                                                  INFO2030
C
C     READ AND PRINT OF CONTROL PRINTING RESULTS
C
      READ(5,5066) NSTEP,NDPR                                                    INFO2040
      WRITE(6,5067) NSTEP,NDPR                                                   INFO2050
C
C     READ AND PRINT OF PLOTTING RESULTS
C
      READ(5,5068) NREMIN,NFL1,NFL2,NFL3,NFL4,NFL5,NFL6,NFL7,NCPRT1,NLPR         INFO2060
     1T1,NCPRT2,NLPRT2,NCPRT3,NLPRT3,NCPRT4,NLPRT4                               INFO2070
      NFT1=NST-NFL1+1                                                            INFO2080
      NFT2=NST-NFL2+1                                                            INFO2090
      NFT3=NST-NFL3+1                                                            INFO2100
      NLT1=NST-NLPRT1+1                                                          INFO2110
      NLT2=NST-NLPRT2+1                                                          INFO2120
      NLT3=NST-NLPRT3+1                                                          INFO2130
      NLT4=NST-NLPRT4+1                                                          INFO2140
      WRITE(6,5069) NREMIN,NFT1,NFT2,NFT3,NS,NFL4,NS,NFL5,NS,NFL6,NS,NFL         INFO2150
     17,NCPRT1,NLT1,NCPRT2,NLT2,NCPRT3,NLT3,NCPRT4,NLT4                          INFO2160
C
  516 RETURN                                                                     INFO2170
C
 1000 FORMAT(///24H COLUMN LINE COORDINATES /5H LINE,14X,1HX,14X,1HY)            INFO2180
 1001 FORMAT(I5,F15.0,2F10.0,5F5.0,F15.0/7F10.0)                                INFO2190
 1002 FORMAT(I5,F15.0,F5.0,2F10.0,7F5.0)                                        INFO2200
 1003 FORMAT (2I5,7F10.0)                                                       INFO2210
 1004 FORMAT (9I5)                                                              INFO2220
 1005 FORMAT(5I5)                                                               INFO2230
 1006 FORMAT (3I5,F15.0,F10.0,2F5.0,2F15.0/4F5.0,F15.0,F5.0,4F10.0)             INFO2240
 1007 FORMAT (3I5,2F10.0)                                                       INFO2250
 1008 FORMAT(10F8.0)                                                            INFO2260
 2000 FORMAT(I5,5X,F10.2,5X,F10.2)                                              INFO2270
 2001 FORMAT(///10H COLUMN ID,10X,1HE,7X,1HA,2X,6HTORS I,4X,5HMAJ I,3X,5        INFO2280
     1HMIN I,6X,2HDT,6X,2HDB,7X,1HD,6X,2HBF,6X,2HTF,6X,2HTW,6X,2HZX,6X,2        INFO2290
     1HZY,6X,2HTP)                                                              INFO2300
 2002 FORMAT(///10H    BEAM ID,11X,1HE,2X,6HTORS I,3X,6HFLEX I,5X,3HKII,5      INFO2310
     1X,3HKJJ,5X,3HKIJ,6X,2HDI,6X,2HDJ,7X,1HZ,6X,2HTP)                          INFO2320
 2003 FORMAT (///10H    FEF ID 6X,4HCODE 8X,2HML 10X,2HVL 10X,2HMR 10X,        INFO2330
     1 2HVR,11X,1HW  /(2I10,5F12.3))                                            INFO2340
 2004 FORMAT(///15H BEAM LOCATIONS/45H/ BAY  LEV   IC   JC  BID  GEN  VL        INFO2350
     11   VL2   VL3)                                                           INFO2360
 2005 FORMAT(///17H COLUMN LOCATIONS/ 26H  LINE   LEV  CID KCOL  GEN )         INFO2370
 2006 FORMAT(///12H PANEL CARDS/14H LEVEL  I    J,13X,3HEIX,9X,2HEA,5X,2        INFO2380
     1HPI,5X,2HPJ,5X,2HHI,5X,2HHJ,5X,2HAI,5X,2HAJ,5X,2HBI,5X,2HBJ,6X,2HG        INFO2390
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     2J,6X,1HN/(I4,2I5,F16.1,F11.1,8F7.2,F8.1,F7.1))                    INFO2400
2007 FORMAT (///22H BRACING ELEMENT CARDS/16H   LEV   UC    LC,14X,1HE  INFO2410
    1,14X,1HA/(1X,3I5,2F15.5))                                          INFO2420
2010 FORMAT(I4,2X,F12.2,F8.2,F9.2,7F8.2,3I8)                            INFO2430
2011 FORMAT(///26H BEAM PROPERTIES AND LOADS/)                          INFO2440
2012 FORMAT (11H BAY NUMBER,I3/6H LEVEL,11X,1HE,2X,6HTORS I,3X,6HFLEX I INFO2450
    1,5X,3HKII,5X,3HKJJ,5X,3HKIJ,6X,2HDI,6X,2HDJ,7X,1HZ,6X,2HTP,6X,2HV1INFO2460
    1,6X,2HV2,6X,2HV3)                                                  INFO2470
2013 FORMAT(///18H COLUMN PROPERTIES/)                                  INFO2480
2014 FORMAT(16H COLUMN LINE NO.,I3/6H LEVEL,14X,1HE,7X,1HA,2X,6HTORS I,INFO2490
    14X,5HMAJ I,3X,5HMIN I,6X,2HDT,6X,2HDB,7X,1HD,6X,2HBF,6X,2HTF,6X,2HINFO2500
    1TW,6X,2HZX,6X,2HZY,6X,2HTP)                                        INFO2510
2016 FORMAT (I4,2X,F12.2,8F10.2)                                        INFO2520
2500 FORMAT( I5,2F10.2)                                                 INFO2530
2501 FORMAT( I5,2F10.0)                                                 INFO2540
3000 FORMAT (1H )                                                       INFO2550
3004 FORMAT (//25H GENERATED BEAM LOCATIONS )                           INFO2560
3005 FORMAT (//27H GENERATED COLUMN LOCATIONS )                         INFO2570
4004 FORMAT(///34H GENERATED BEAM LOADS...LOAD CASE  3A1)               INFO2580
5000 FORMAT (A5,5X,7F10.0/8F10.0)                                       INFO2590
5001 FORMAT(8F10.0)                                                     INFO2600
5002 FORMAT(2I5,3F10.0)                                                 INFO2610
5003 FORMAT(8F10.0)                                                     INFO2620
5004 FORMAT(2I5)                                                        INFO2630
5005 FORMAT(8F9.0)                                                      INFO2640
5006 FORMAT(4(F9.0,9X))                                                 INFO2650
5007 FORMAT (I8,3X,A5,7F13.2)                                           INFO2660
5008 FORMAT (I8,6F13.2,3X,4F8.1)                                        INFO2670
5009 FORMAT  (///11H STORY DATA //  10H LEVEL NO. 3X,2HID 8X,6HHEIGHT   INFO2680
    1 6X,7HMASS(M) 8X,5HMR**2 9X,4HX(M) 9X,4HY(M) 10X,3HK-X 10X,3HK-Y)  INFO2690
5010 FORMAT (///37H STATIC LATERAL LOADS...CASES A AND B  //            INFO2700
    1 10H LEVEL NO. 7X,4HFX-A 9X,4HFY-A 8X,5HMOM-A 9X,4HFX-B 9X,4HFY-B  INFO2710
    2 8X,5HMOM-B 8X,2HXA 6X,2HYA 6X,2HXB 6X,2HYB )                      INFO2720
5020 FORMAT(4F10.0)                                                     INFO2730
5030 FORMAT(//27H STATIC VERTICAL NODAL LOAD)                           INFO2740
5031 FORMAT(/6H STORY 10I10)                                            INFO2750
5032 FORMAT(I4,4X,10F10.2)                                              INFO2760
5033 FORMAT(3I5)                                                        INFO2770
5034 FORMAT(///82H EARTHQUAKE ACCELERATION IN X DIRECTION LIST FROM LEFTINFO2780
    1T TO RIGHT WITH TIME INTERVAL F6.3/)                               INFO2790
5035 FORMAT(1X,10F12.6)                                                 INFO2800
5036 FORMAT(///82H EARTHQUAKE ACCELERATION IN Y DIRECTION LIST FROM LEFTINFO2810
    1T TO RIGHT WITH TIME INTERVAL F6.3/)                               INFO2820
5037 FORMAT(///82H EARTHQUAKE ACCELERATION IN Z DIRECTION LIST FROM LEFTINFO2830
    1T TO RIGHT WITH TIME INTERVAL F6.3/)                               INFO2840
5038 FORMAT(///34H LUMP MASS FOR GEOMETRIC STIFFNESS)                   INFO2850
5039 FORMAT(14,4X,10F10.4)                                              INFO2860
5040 FORMAT(///31H LUMP MASS FOR DYNAMIC ANALYSIS)                      INFO2870
5041 FORMAT  (/10H COLUMN ID,10X,3HEIX,9X,2HEA,5X,3HEIY,3X,3HKII,4X,3HK INFO2880
    1JJ,4X,3HKIJ,5X,2HPI,5X,2HPJ,5X,2HHI,5X,2HHJ,5X,2HAI,5X,2HAJ,5X,2HB INFO2890
    1I,5X,2HBJ,6X,2HGJ,5X,1HN)                                          INFO2900
5042 FORMAT(I10,F11.2,2F8.2,F9.2,10F8.2)                                INFO2910
5043 FORMAT(I10,F13.1,F11.1,F8.1,F6.2,10F7.2,F8.1,F6.1)                 INFO2920
5044 FORMAT  (/29H CONCRETE COLUMN YIELD MOMENT/10H COLUMN ID,5X,8HPOS  INFO2930
    1MY I,5X,8HNEG MY I,5X,8HPOS MY J,5X,8HNEG MY J)                   INFO2940
5045 FORMAT(I10,4F13.2)                                                 INFO2950
5055 FORMAT(16H COLUMN LINE NO.,I3/6H LEVEL,13X,3HEIX,9X,2HEA,5X,3HEIY, INFO2960
    13X,3HKII,4X,3HKJJ,4X,3HKIJ,5X,2HPI,5X,2HPJ,5X,2HHI,5X,2HHJ,5X,2HAI INFO2970
    1,5X,2HAJ,5X,2HBI,5X,2HBJ,6X,2HGJ,6X,1HN)                           INFO2980
5056 FORMAT(I4,F17.2,2F8.2,F9.2,10F8.2)                                 INFO2990
5057 FORMAT(I4,F18.1,F11.1,F8.1,F6.2,10F7.2,F8.1,F7.1)                  INFO3000
5058 FORMAT(I5,6F10.0)                                                  INFO3010
5059 FORMAT(///34H NUMERICAL INTEGRATION INFORMATION/)                  INFO3020
5060 FORMAT(29H TOTAL NUMBER OF TIME STEP---I10/                        INFO3030
    129H TIME INCREMENT--------------F10.4/                             INFO3040
    129H ALFA DAMPING FACTOR---------F10.4/                             INFO3050
    129H BETA DAMPING FACTOR---------F10.4/                             INFO3060
    129H LOAD FACTOR IN X DIRECTION--F10.4/                             INFO3070
    129H LOAD FACTOR IN Y DIRECTION--F10.4/                             INFO3080
    129H LOAD FACTOR IN Z DIRECTION--F10.4)                             INFO3090
5061 FORMAT(///32H ANGLE OF COLUMN AXIS IN DEGREES//(32H ANGLE FROM Y AINFO3100
    1XIS OF COLUMN NO.I3,1X,15HTO X GLOBAL----F8.2))                    INFO3110
5062 FORMAT(///37H STATIC LOAD COMBINATION (MULTIPLIER)//5H   V1,7X,3H  INFO3120
    1V2,7X,3H V3,7X,3H L1,7X,3H L2,7X,3H N1)                            INFO3130
5063 FORMAT(6(F5.1,5X))                                                 INFO3140
5064 FORMAT(I5,6F10.0)                                                  INFO3150
5065 FORMAT(///16H GENERAL CONTROL//                                    INFO3160
    143H NUMERICAL INTEGRATION CODE----------------I5/                  INFO3170
    143H RAMBERG OSGOOD CONSTSNT A-----------------F8.2/               INFO3180
    143H RAMBERG OSGOOD CONSTSNT R-----------------F8.2/               INFO3190
    143H YIELD STRESS FOR STEEL COLUMN-------------F8.2/               INFO3200
    143H BUCKLING STRESS FOR BRACING---------------F8.2/               INFO3210
    143H PERCENTAGE OF MEMBER STIFFNESS DIFFERENT--F8.2/               INFO3220
    143H ANGLE FROM X GLOBAL TO X REF.(DEGREES)----F8.2)               INFO3230
5066 FORMAT(2I5)                                                        INFO3240
5067 FORMAT(///24H CONTROL RESULT PRINTOUT//                            INFO3250
    162H NO. OF TIME STEPS TO HAVE ENG.,FORCE,ACC. AND DIS. PRINTOUT--I INFO3260
    137                                                                 INFO3270
    162H NO. OF TIME STEPS TO HAVE DUCT. AND EXCUR. PRINTOUT----------I INFO3280
    13)                                                                 INFO3290
 5068 FORMAT(16I5)                                                      INFO3300
 5069 FORMAT(///25H INFORMATION FOR PLOTTING//                          INFO3310
    141H NO. OF TIME STEPS TO HAVE INFO. PLOT----I4/                    INFO3320
    141H PLOT DIS. X,Y AND ROT. OF LEVEL NO.-----I4/                    INFO3330
    141H PLOT DIS. X,Y AND ROT. OF LEVEL NO.-----I4/                    INFO3340
    141H PLOT DIS. X,Y AND ROT. OF LEVEL NO.-----I4/                    INFO3350
    121H PLOT DIS. Z AT LEVEL I3,1X,16HOF COLUMN NO.---I4/              INFO3360
    121H PLOT DIS. Z AT LEVEL I3,1X,16HOF COLUMN NO.---I4/              INFO3370
    121H PLOT DIS. Z AT LEVEL I3,1X,16HOF COLUMN NO.---I4/              INFO3380
    121H PLOT DIS. Z AT LEVEL I3,1X,16HOF COLUMN NO.---I4/              INFO3390
    141H PLOT MOMENT-ROTATION OF COLUMN NUMBER---I4,13H LEVEL NO.---I4/INFO3400
    141H PLOT MOMENT-ROTATION OF COLUMN NUMBER---I4,13H LEVEL NO.---I4/INFO3410
    141H PLOT MOMENT-ROTATION OF COLUMN NUMBER---I4,13H LEVEL NO.---I4/INFO3420
    141H PLOT MOMENT-ROTATION OF COLUMN NUMBER---I4,13H LEVEL NO.---I4)INFO3430
 5070 FORMAT(I10,F12.2,F8.2,F9.2,7F8.2)                                 INFO3440
 5071 FORMAT(I4,2I5,4F13.2)                                             INFO3450
 5072 FORMAT(/19H PANEL YIELD MOMENT/14H LEVEL  I    J,5X,8HPOS MY I,5X, INFO3460
    18HNEG MY I,5X,8HPOS MY J,5X,8HNEG MY J)                            INFO3470
 6000 FORMAT(15/(6F10.0))                                               INFO3480
C
      END                                                               INFO3490



      SUBROUTINE GENERA (LBC,NS,NR,NL,L,NPROP,N1,N2,N3)                 GENE  10
C
C     PRINT MEMBER LOCATIONS AS GENERATED
C
      IMPLICIT REAL*8(A-H,O-Z)                                          GENE  20
      COMMON /JUNK/ NLD,LOC(60)                                         GENE  30
      DIMENSION LBC(N1,N2,N3),BB(1)                                     GENE  40
      DATA RM/'B'/                                                      GENE  50
      DATA PM/'C'/                                                      GENE  60
C
      IF(N3.EQ.3) BB(1)=RM                                              GENE  70
      IF(N3.EQ.2) BB(1)=PM                                              GENE  80
      DO 200 J=1,NR,30                                                  GENE  90
      JJ=J+29                                                           GENE 100
      IF (JJ.GT.NR) JJ=NR                                               GENE 110
      WRITE (6,2000) ((BB(1),I),I=J,JJ)                                 GENE 120
      WRITE (6,2002)                                                    GENE 130
      DO 200 I=1,NS                                                     GENE 140
      DO 100 K=J,JJ                                                     GENE 150
      LOC(K)=LBC(I,K,L)                                                 GENE 160
      IF (LOC(K).EQ.NPROP) LOC(K)=0                                     GENE 170
  100 CONTINUE                                                          GENE 180
      M=NS+1-I                                                          GENE 190
  200 WRITE (6,2001) M,(LOC(K),K=J,JJ)                                  GENE 200
C     RETURN                                                            GENE 210
C
 2000 FORMAT (6HOSTORY 20(2X,A1,I2))                                    GENE 220
 2001 FORMAT (I4,1X,2015)                                               GENE 230
 2002 FORMAT (1H )                                                      GENE 240
C
      END                                                               GENE 250



      SUBROUTINE INITIL(NST,NC,NS,NPAN,NTRU,NB,JSHER)                   INIT  10
C
C     CLEAR ARRAYS AND INITIALIZE DATA
C
      IMPLICIT REAL*8(A-H,O-Z)                                          INIT  20
      COMMON/DATA1/CLN(10,2),CP(16,40),BP(11,20),FEF(7,10),LB(10,13,3),LINIT  30
     1DB(10,13,3),LCC(10,10,2),LP(3,20),IFEF(2),PP(16,20),LT(3,40),TP(2,INIT  40
     240)                                                               INIT  50
      COMMON/DATA2/COLUM1(10,10,10),BEAM1(5,13,10)                      INIT  60
      COMMON/DATA3/COLUM2(8,10,10),BEAM2(3,13,10),PANEL2(4,20),DIAGO(4,4INIT  70
     10)                                                                INIT  80
      COMMON/DATA4/COLUM3(14,10,10),BEAM3(6,13,10),PANEL3(4,20),DISP(6, INIT  90
     110)                                                               INIT 100
      COMMON/DATA5/COCOL(9,10,10),COBM(5,13,10),COPAN(5,20),CODIA(2,40) INIT 110
      COMMON/DATA6/PLOAD(100),SD(10,14),AMA(200),IF,IFC,X1,Y1,ANG       INIT 120
      COMMON/DUCT1/ CRVES(4,10,10),BRVES(2,13,10),NELAS                 INIT 130
      COMMON/DUCT2/PRVES(2,20)                                          INIT 140
      COMMON/SHER1/BMY(2,6,10,10),RY(2,6,10,10),BMA(2,2,10,10),BMB(2,2, INIT 150
     110,10),RA(2,2,10,10),RB(2,2,10,10),RREC(2,2,10,10),EK(2,10,10),   INIT 160
     2RY(2,2,10,10),KODY(2,10,10),KODYX(2,10,10),REVPT(2,10,10),EKEP(2, INIT 170
     26,10,10),RTOT(2,10,10),IND(2,10,10)                               INIT 180
      COMMON/SHER2/BMMY(2,40)                                           INIT 190
      COMMON/SHER3/EKH(2,10,10),EKHP(2,20)                              INIT 200
      COMMON/SHERP1/BMYP(2,6,20),RYP(2,6,20),BMAP(2,2,20),BMBP(2,2,20),RINIT 210
     1AP(2,2,20),RBP(2,2,20),RRECP(2,2,20),EKIP(2,20),RYIP(2,2,20),KODYPINIT 220
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     2(2,20),KODYXP(2,20),REVPTP(2,20),EKEPP(2,6,20),RTOTP(2,20),INDP(2,INIT 230
     320)                                                              INIT 240
      DIMENSION IMT(40)                                                INIT 250
C
CC    CLEAR ARRAYS BEFORE STARTING EACH PROBLEM
C
      DO 8 I=1,4                                                       INIT 260
      DO 8 J=1,NC                                                      INIT 270
      DO 8 K=1,NS                                                      INIT 280
    8 CRVES(I,J,K)=0.                                                  INIT 290
      DO 9 I=1,2                                                       INIT 300
      DO 9 J=1,NB                                                      INIT 310
      DO 9 K=1,NS                                                      INIT 320
    9 BRVES(I,J,K)=0.                                                  INIT 330
      IF(NPAN.EQ.0) GO TO 11                                           INIT 340
      DO 7 I=1,2                                                       INIT 350
      DO 7 J=1,NPAN                                                    INIT 360
    7 PRVES(I,J)=0.                                                    INIT 370
   11 DO 30 I=1,NS                                                     INIT 380
      DO 30 J=1,NC                                                     INIT 390
      DO 10 K=1,10                                                     INIT 400
   10 COLUM1(K,J,I)=0.0                                                INIT 410
      DO 20 K=1,8                                                      INIT 420
   20 COLUM2(K,J,I)=0.0                                                INIT 430
      DO 30 K=1,14                                                     INIT 440
   30 COLUM3(K,J,I)=0.0                                                INIT 450
      DO 60 I=1,NS                                                     INIT 460
      DO 60 J=1,NB                                                     INIT 470
      DO 40 K=1,5                                                      INIT 480
   40 BEAM1(K,J,I)=0.0                                                 INIT 490
      DO 50 K=1,3                                                      INIT 500
   50 BEAM2(K,J,I)=0.0                                                 INIT 510
      DO 60 K=1,6                                                      INIT 520
   60 BEAM3(K,J,I)=0.0                                                 INIT 530
      IF(NPAN.EQ.0) GO TO 100                                          INIT 540
      DO 90 I=1,NPAN                                                   INIT 550
      DO 80 J=1,4                                                      INIT 560
   80 PANEL2(J,I)=0.0                                                  INIT 570
      DO 90 J=1,4                                                      INIT 580
   90 PANEL3(J,I)=0.0                                                  INIT 590
  100 IF(NTRU.EQ.0) GO TO 120                                          INIT 600
      DO 110 I=1,NTRU                                                  INIT 610
      DO 110 J=1,4                                                     INIT 620
  110 DIAGO(J,I)=0.0                                                   INIT 630
  120 DO 130 I=1,NS                                                    INIT 640
      DO 130 J=1,6                                                     INIT 650
  130 DISP(J,I)=0.0                                                    INIT 660
      DO 2 I=1,NS                                                      INIT 670
      DO 1 J=1,NC                                                      INIT 680
      DO 1 K=1,9                                                       INIT 690
    1 COCOL(K,J,I)=0.0                                                 INIT 700
      DO 2 J=1,NB                                                      INIT 710
      DO 2 K=1,5                                                       INIT 720
    2 COBM(K,J,I)=0.0                                                  INIT 730
      IF(NPAN.EQ.0) GO TO 4                                            INIT 740
C
CC    INITIALIZE DATA FOR CONCRETE SHEAR PANEL
C
      DO 3 I=1,NPAN                                                    INIT 750
      DO 3 J=1,5                                                       INIT 760
    3 COPAN(J,I)=0.0                                                   INIT 770
      DO 300 I=1,NS                                                    INIT 780
      DO 300 J=1,NPAN                                                  INIT 790
      NP=NS-LP(I,J)+1                                                  INIT 800
      IF(NP.NE.I) GO TO 300                                            INIT 810
      IMT(J)=0                                                         INIT 820
      IF(PP(5,J).NE.0.) GO TO 300                                      INIT 830
      IMT(J)=1                                                         INIT 840
      PP(5,J)=PP(1,J)*1.E8                                             INIT 850
      PP(6,J)=PP(5,J)                                                  INIT 860
  300 CONTINUE                                                         INIT 870
      DO 400 I=1,NS                                                    INIT 880
      DO 400 J=1,NPAN                                                  INIT 890
      NP=NS-LP(I,J)+1                                                  INIT 900
      IF(NP.NE.I) GO TO 400                                            INIT 910
      XL=SD(I,2)                                                       INIT 920
      FT7=PP(3,J)                                                      INIT 930
      FT8=PP(4,J)                                                      INIT 940
      IF(IMT(J).EQ.0) GO TO 310                                        INIT 950
      PSH=PP(3,J)                                                      INIT 960
      SKH=PP(5,J)                                                      INIT 970
      FT7=PSH/(SKH*(1.-PSH)/(3.*PP(1,J)/XL)+1.)                        INIT 980
      PSH=PP(4,J)                                                      INIT 990
      SKH=PP(6,J)                                                      INIT1000
      FT8=PSH/(SKH*(1.-PSH)/(3.*PP(1,J)/XL)+1.)                        INIT1010
  310 EKHP(1,J)=PP(5,J)                                                INIT1020
      EKEPP(1,1,J)=EKHP(1,J)                                           INIT1030
      EKEPP(1,2,J)=EKHP(1,J)*FT7                                       INIT1040
      EKHP(2,J)=PP(6,J)                                                INIT1050
      EKEPP(2,1,J)=EKHP(2,J)                                           INIT1060
      EKEPP(2,2,J)=EKHP(2,J)*FT8                                       INIT1070
C
      INDP(1,J)=1                                                      INIT1080
      INDP(2,J)=1                                                      INIT1090
      BMYP(1,1,J)=PP(13,J)                                             INIT1100
      RYP(1,1,J)=BMYP(1,1,J)/EKHP(1,J)                                 INIT1110
      BMYP(1,2,J)=PP(14,J)                                             INIT1120
      RYP(1,2,J)=BMYP(1,2,J)/EKHP(1,J)                                 INIT1130
      BMYP(2,1,J)=PP(15,J)                                             INIT1140
      RYP(2,1,J)=BMYP(2,1,J)/EKHP(2,J)                                 INIT1150
      BMYP(2,2,J)=PP(16,J)                                             INIT1160
      RYP(2,2,J)=BMYP(2,2,J)/EKHP(2,J)                                 INIT1170
      BMAP(1,1,J)=BMYP(1,1,J)                                          INIT1180
      BMBP(1,1,J)=BMYP(1,1,J)                                          INIT1190
      RAP(1,1,J)=RYP(1,1,J)                                            INIT1200
      RBP(1,1,J)=RYP(1,1,J)                                            INIT1210
      BMAP(1,2,J)=BMYP(1,2,J)                                          INIT1220
      BMBP(1,2,J)=BMYP(1,2,J)                                          INIT1230
      RAP(1,2,J)=RYP(1,2,J)                                            INIT1240
      RBP(1,2,J)=RYP(1,2,J)                                            INIT1250
      BMAP(2,1,J)=BMYP(2,1,J)                                          INIT1260
      BMBP(2,1,J)=BMYP(2,1,J)                                          INIT1270
      RAP(2,1,J)=RYP(2,1,J)                                            INIT1280
      RBP(2,1,J)=RYP(2,1,J)                                            INIT1290
      BMAP(2,2,J)=BMYP(2,2,J)                                          INIT1300
      BMBP(2,2,J)=BMYP(2,2,J)                                          INIT1310
      RAP(2,2,J)=RYP(2,2,J)                                            INIT1320
      RBP(2,2,J)=RYP(2,2,J)                                            INIT1330
      RRECP(1,1,J)=0.                                                  INIT1340
      RRECP(1,2,J)=0.                                                  INIT1350
      RRECP(2,1,J)=0.                                                  INIT1360
      RRECP(2,2,J)=0.                                                  INIT1370
      EK1P(1,J)=EKEPP(1,1,J)                                           INIT1380
      EK1P(2,J)=EKEPP(2,1,J)                                           INIT1390
      RY1P(1,1,J)=RYP(1,1,J)                                           INIT1400
      RY1P(1,2,J)=RYP(1,2,J)                                           INIT1410
      RY1P(2,1,J)=RYP(2,1,J)                                           INIT1420
      RY1P(2,2,J)=RYP(2,2,J)                                           INIT1430
      KODYXP(1,J)=0                                                    INIT1440
      KODYXP(2,J)=0                                                    INIT1450
      KODYP(1,J)=0                                                     INIT1460
      KODYP(2,J)=0                                                     INIT1470
  400 CONTINUE                                                         INIT1480
      DO 410 I=1,NPAN                                                  INIT1490
      DO 410 J=1,2                                                     INIT1500
  410 RTOTP(J,I)=0.                                                    INIT1510
    4 IF(NTRU.EQ.0) GO TO 6                                            INIT1520
      DO 5 I=1,NTRU                                                    INIT1530
      DO 5 J=1,2                                                       INIT1540
    5 CODIA(J,I)=0.0                                                   INIT1550
    6 IF(JSHER.EQ.0) RETURN                                            INIT1560
C
CC    INITIALIZE DATA FOR CONCRETE SHEAR WALL
C
      N=21                                                             INIT1570
      IMT(N)=0                                                         INIT1580
  200 IF(CP(9,N).NE.0.) GO TO 210                                      INIT1590
      IMT(N)=1                                                         INIT1600
      CP(9,N)=CP(1,N)*1.E8                                             INIT1610
      CP(10,N)=CP(9,N)                                                 INIT1620
  210 N=N+1                                                            INIT1630
      IF(N.LE.JSHER) GO TO 200                                         INIT1640
      DO 220 N=1,NS                                                    INIT1650
      DO 220 M=1,NC                                                    INIT1660
      MC=LCC(N,M+1)                                                    INIT1670
      IF(MC.LE.20) GO TO 220                                           INIT1680
      XL=SD(N,2)                                                       INIT1690
      FT7=CP(7,MC)                                                     INIT1700
      FT8=CP(8,MC)                                                     INIT1710
      IF(IMT(MC).EQ.0) GO TO 230                                       INIT1720
      PSH=CP(7,MC)                                                     INIT1730
      SKH=CP(9,MC)                                                     INIT1740
      FT7=PSH/(SKH*(1.-PSH)/(3.*CP(1,MC)/XL)+1.)                       INIT1750
      PSH=CP(8,MC)                                                     INIT1760
      SKH=CP(10,MC)                                                    INIT1770
      FT8=PSH/(SKH*(1.-PSH)/(3.*CP(1,MC)/XL)+1.)                       INIT1780
  230 EKH(1,M,N)=CP(9,MC)                                              INIT1790
      EKEP(1,1,M,N)=EKH(1,M,N)                                         INIT1800
      EKEP(1,2,M,N)=EKH(1,M,N)*FT7                                     INIT1810
      EKH(2,M,N)=CP(10,MC)                                             INIT1820
      EKEP(2,1,M,N)=EKH(2,M,N)                                         INIT1830
      EKEP(2,2,M,N)=EKH(2,M,N)*FT8                                     INIT1840
C
      IND(1,M,N)=1                                                     INIT1850
      IND(2,M,N)=1                                                     INIT1860
      BMY(1,1,M,N)=BMMY(1,MC-20)                                       INIT1870
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```
      RY(1,1,M,N)=BMY(1,1,M,N)/EKH(1,M,N)                               INIT1880
      BMY(1,2,M,N)=BMMY(2,MC-20)                                        INIT1890
      RY(1,2,M,N)=BMY(1,2,M,N)/EKH(1,M,N)                               INIT1900
      BMY(2,1,M,N)=BMMY(1,MC)                                           INIT1910
      RY(2,1,M,N)=BMY(2,1,M,N)/EKH(2,M,N)                               INIT1920
      BMY(2,2,M,N)=BMMY(2,MC)                                           INIT1930
      RY(2,2,M,N)=BMY(2,2,M,N)/EKH(2,M,N)                               INIT1940
      BMA(1,1,M,N)=BMY(1,1,M,N)                                         INIT1950
      BMB(1,1,M,N)=BMY(1,1,M,N)                                         INIT1960
      RA(1,1,M,N)=RY(1,1,M,N)                                           INIT1970
      RB(1,1,M,N)=RY(1,1,M,N)                                           INIT1980
      BMA(1,2,M,N)=BMY(1,2,M,N)                                         INIT1990
      BMB(1,2,M,N)=BMY(1,2,M,N)                                         INIT2000
      RA(1,2,M,N)=RY(1,2,M,N)                                           INIT2010
      RB(1,2,M,N)=RY(1,2,M,N)                                           INIT2020
      BMA(2,1,M,N)=BMY(2,1,M,N)                                         INIT2030
      BMB(2,1,M,N)=BMY(2,1,M,N)                                         INIT2040
      RA(2,1,M,N)=RY(2,1,M,N)                                           INIT2050
      RB(2,1,M,N)=RY(2,1,M,N)                                           INIT2060
      BMA(2,2,M,N)=BMY(2,2,M,N)                                         INIT2070
      BMB(2,2,M,N)=BMY(2,2,M,N)                                         INIT2080
      RA(2,2,M,N)=RY(2,2,M,N)                                           INIT2090
      RB(2,2,M,N)=RY(2,2,M,N)                                           INIT2100
      RREC(1,1,M,N)=0.                                                  INIT2110
      RREC(1,2,M,N)=0.                                                  INIT2120
      RREC(2,1,M,N)=0.                                                  INIT2130
      RREC(2,2,M,N)=0.                                                  INIT2140
      EK1(1,M,N)=EKEP(1,1,M,N)                                          INIT2150
      EK1(2,M,N)=EKEP(2,1,M,N)                                          INIT2160
      RY(1,1,M,N)=RY(1,1,M,N)                                           INIT2170
      RY(1,2,M,N)=RY(1,2,M,N)                                           INIT2180
      RY(2,1,M,N)=RY(2,1,M,N)                                           INIT2190
      RY(2,2,M,N)=RY(2,2,M,N)                                           INIT2200
      KODYX(1,M,N)=0                                                    INIT2210
      KODYX(2,M,N)=0                                                    INIT2220
      KODY(1,M,N)=0                                                     INIT2230
      KODY(2,M,N)=0                                                     INIT2240
  220 CONTINUE                                                          INIT2250
      DO 240 I=1,NS                                                     INIT2260
      DO 240 J=1,NC                                                     INIT2270
      DO 240 K=1,2                                                      INIT2280
  240 RTOT(K,J,I)=0.                                                    INIT2290
C
      RETURN                                                            INIT2300
      END                                                               INIT2310



      SUBROUTINE FORM(LS,NN,NNM,NE,MN6,NAD1,NAD2,NNL,LSL,NST,NS,NC,NB,  FORM  10
     1NPAN,NTRU,IFORM,KCSM,NCP,NBP,ISTAT,ISEC)                          FORM  20
C
C     FORM GEOMETRIC AND SYSTEM STIFFNESS
C     IFORM EQ. 1 FORM GEOMETRIC STIFFNESS
C     IFORM EQ. 2 FORM SYSTEM STIFFNESS
C
      IMPLICIT REAL*8(A-H,O-Z)                                          FORM  30
      COMMON/DATA1/CLN(10,2),CP(16,40),BP(11,20),FEF(7,10),LB(10,13,3),L FORM  40
     1DB(10,13,3),LC(10,10,2),LP(3,20),IFEF(2),PP(16,20),LT(3,40),TP(2,4FORM  50
     20)                                                                FORM  60
      COMMON/DATA2/COLUM1(10,10,10),BEAM1(5,13,10)                      FORM  70
      COMMON/DATA3/COLUM2(8,10,10),BEAM2(3,13,10),PANEL2(4,20),DIAGO(4,4FORM  80
     10)                                                                FORM  90
      COMMON/DATA5/COCOL(9,10,10),COBM(5,13,10),COPAN(5,20),CODIA(2,40) FORM 100
      COMMON/DATA6/PLOAD(100),SD(10,14),AMA(200),IF,IFC,X1,Y1,ANG       FORM 110
      COMMON/FORM1/S(210),C(20,20),SB(210),EF(66,26),PF(60,3)           FORM 120
      COMMON/FORM2/KH(186),SDD(20),EMM(20,146),EB(20,146)               FORM 130
      COMMON/FORM3/SL(10725),NCFO,NSNCFO,NI1,NFRFO,NFFO,NLFO,KLAT,LLAT, FORM 140
     1MLAT                                                              FORM 150
      COMMON/FORM4/SF4(210,10),CF4(20,20,10),EF4(20,143,10),KH4(183,10),FORM 160
     1RF4(20,3,10)                                                      FORM 170
      COMMON/JUNK/ NLD,N,ND,MM,MN,LM(12),IDUM,P(12,3),TT(8)             FORM 180
      COMMON/STIF/ ASA(12,12),SA(8,12),T(8,12),TAC(8,12,10,10),TAB(3,6, FORM 190
     113,10),TAD(1,8,40),TAP(4,10,20)                                   FORM 200
      COMMON/MAT/COEA,COER,COER1,COER2,E,G,FYIELD,FCRITI,DCON           FORM 210
      COMMON/ESTIF/SCOCOL(5,10,10),SCOBM(2,13,10),SCODIA(1,40)          FORM 220
      COMMON/SHER3/EKH(2,10,10),EKHP(2,20)                              FORM 230
      DATA HI /1HI /                                                    FORM 240
C
C     ZERO ARRAYS AND SHIFT STORAGE
C
      NLD=3                                                             FORM 250
      K=NST-NS                                                          FORM 260
      MM=2*NC                                                           FORM 270
      MN=4*NC                                                           FORM 280
      DO 1 I=1,LS                                                       FORM 290
    1 SB(I)=0.                                                          FORM 300
      DO 3 I=1,MM                                                       FORM 310
      SDD(I)=0.                                                         FORM 320
      DO 3 J=1,NE                                                       FORM 330
      EMM(I,J)=0.                                                       FORM 340
    3 EB(I,J)=0.                                                        FORM 350
      DO 6 I=1,NNL                                                      FORM 360
    6 KH(I)=0.                                                          FORM 370
      DO 7 I=1,LSL                                                      FORM 380
    7 SL(I)=0.                                                          FORM 390
      DO 700 N=1,NS                                                     FORM 400
      DO 8 I=1,LS                                                       FORM 410
      S(I)=SB(I)                                                        FORM 420
    8 SB(I)=0.                                                          FORM 430
      DO 9 I=1,MM                                                       FORM 440
      DO 9 J=1,MM                                                       FORM 450
    9 C(I,J)=0.                                                         FORM 460
      DO 10 I=1,MN6                                                     FORM 470
      DO 10 J=1,NAD1                                                    FORM 480
   10 EF(I,J)=0.                                                        FORM 490
      DO 11 I=1,NAD2                                                    FORM 500
      DO 11 J=1,3                                                       FORM 510
   11 PF(I,J)=0.                                                        FORM 520
C
C     FORM COLUMN MATRICES
C
      IF(ISTAT.NE.1) GO TO 12                                           FORM 530
      DO 390 I=1,12                                                     FORM 540
      DO 390 L=1,NLD                                                    FORM 550
  390 P(I,L)=0.0                                                        FORM 560
   12 NF=6                                                              FORM 570
      ND=12                                                             FORM 580
      DO 500 M=1,NC                                                     FORM 590
      MC=LC(N,M,1)                                                      FORM 600
      IF(MC.EQ.NCP) GO TO 500                                           FORM 610
      XL=SD(N,2)                                                        FORM 620
      E=CP(1,MC)                                                        FORM 630
      G=E/2.6                                                           FORM 640
      DT=CP(8,MC)                                                       FORM 650
      DB=CP(9,MC)                                                       FORM 660
      XLR=XL-DT-DB                                                      FORM 670
      IF(MC.LE.20) GO TO 389                                            FORM 680
      DT=0.                                                             FORM 690
      DB=0.                                                             FORM 700
      XLR=XL                                                            FORM 710
  389 IF((IFORM.EQ.1) GO TO 401                                         FORM 720
      IF(MC.GT.20) GO TO 810                                            FORM 730
C
C     FIND MP REDUCTION AND STIFFNESS COEFFICIENTS OF STEEL COLUMN ELEMENT
C
      CALL INTRCT(CP(10,MC),CP(11,MC),CP(12,MC),CP(13,MC),CP(2,MC),    FORM 740
     1CP(14,MC),CP(15,MC),FYIELD,COLUM2(4,M,N),COLUM2(2,M,N),COLUM2(5,M,FORM 750
     2N),COLUM2(1,M,N),CP(16,MC),COLXOI,COLYOI,ISEC)                    FORM 760
      CALL INTRCT(CP(10,MC),CP(11,MC),CP(12,MC),CP(13,MC),CP(2,MC),     FORM 770
     1CP(14,MC),CP(15,MC),FYIELD,COLUM2(4,M,N),COLUM2(3,M,N),COLUM2(6,M,FORM 780
     2N),COLUM2(1,M,N),CP(16,MC),COLXOJ,COLYOJ,ISEC)                    FORM 790
      IF(COLUM1(1,M,N).NE.0) GO TO 391                                  FORM 800
      CMPXI=COLXOI                                                      FORM 810
      GO TO 392                                                         FORM 820
  391 CMPXI=2.*COLXOI                                                   FORM 830
  392 CMXI=COLUM2(2,M,N)-COLUM1(1,M,N)                                  FORM 840
      CMXJ=COLUM2(3,M,N)-COLUM1(2,M,N)                                  FORM 850
C
      CALL INECOF(1,XLR,CP(6,MC),CP(5,MC),CP(2,MC),CMXI,CMXJ,CMPXI,     FORM 860
     1CMPXJ,P1,PP1,SC1Z,SC2X,SC3X,SC4X,SC8Z)                            FORM 870
      IF(COLUM1(6,M,N).NE.0) GO TO 393                                  FORM 880
      CMPXJ=COLXOJ                                                      FORM 890
      GO TO 394                                                         FORM 900
  393 CMPXJ=2.*COLXOJ                                                   FORM 910
  394 CMXI=COLUM2(2,M,N)-COLUM1(5,M,N)                                  FORM 920
      CMXJ=COLUM2(3,M,N)-COLUM1(6,M,N)                                  FORM 930
C
      CALL INECOF(2,XLR,CP(6,MC),CP(5,MC),CP(2,MC),CMXI,CMXJ,CMPXI,     FORM 940
     1CMPXJ,P1,PP1,SC1Z,SC2X,SC3X,SC4X,SC8Z)                            FORM 950
      IF(COLUM1(9,M,N).NE.0) GO TO 395                                  FORM 960
      PP1=FYIELD*CP(2,MC)                                               FORM 970
      GO TO 396                                                         FORM 980
  395 PP1=2.*FYIELD*CP(2,MC)                                            FORM 990
  396 P1=COLUM2(4,M,N)-COLUM1(9,M,N)                                    FORM1000
C
      CALL INECOF(3,XLR,CP(6,MC),CP(5,MC),CP(2,MC),CMXI,CMXJ,CMPXI,     FORM1010
     1CMPXJ,P1,PP1,SC1Z,SC2X,SC3X,SC4X,SC8Z)                            FORM1020
      IF(COLUM1(10,M,N).NE.0.) GO TO 381                                FORM1030
      TT1=CP(16,MC)                                                     FORM1040
      GO TO 382                                                         FORM1050
  381 TT1=2.*CP(16,MC)                                                  FORM1060
  382 T1=COLUM2(1,M,N)-COLUM1(10,M,N)                                   FORM1070
C
      CALL INECOF(4,XLR,CP(6,MC),CP(5,MC),CP(2,MC),CMXI,CMXJ,CMPXI,     FORM1080
     1CMPXJ,T1,TT1,SC1Z,SC2X,SC3X,SC4X,SC8Z)                            FORM1090
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      IF(COLUM1(3,M,N).NE.0) GO TO 397                                  FORM1100
      CMPYI=COLYOI                                                      FORM1110
      GO TO 398                                                         FORM1120
  397 CMPYI=2.*COLYOI                                                   FORM1130
  398 CMYI=COLUM2(5,M,N)-COLUM1(3,M,N)                                  FORM1140
      CMYJ=COLUM2(6,M,N)-COLUM1(4,M,N)                                  FORM1150
C
      CALL INECOF(1,XLR,CP(7,MC),CP(5,MC),CP(2,MC),CMYI,CMYJ,CMPYI,     FORM1160
     1CMPYJ,P1,PP1,SCM1Z,SCM2Y,SCM3Y,SCM4Y,SCM8Z)                       FORM1170
      IF(COLUM1(8,M,N).NE.0) GO TO 399                                  FORM1180
      CMPYJ=COLYOJ                                                      FORM1190
      GO TO 400                                                         FORM1200
  399 CMPYJ=2.*COLYOJ                                                   FORM1210
  400 CMYI=COLUM2(5,M,N)-COLUM1(7,M,N)                                  FORM1220
      CMYJ=COLUM2(6,M,N)-COLUM1(8,M,N)                                  FORM1230
C
      CALL INECOF(2,XLR,CP(7,MC),CP(5,MC),CP(2,MC),CMYI,CMYJ,CMPYI,     FORM1240
     1CMPYJ,P1,PP1,SCM1Z,SCM2Y,SCM3Y,SCM4Y,SCM8Z)                       FORM1250
      GO TO 820                                                         FORM1260
C
C     FIND STIFFNESS COEFFICIENT OF SHEAR WALL ELEMENT
C
  810 DET=(CP(4,MC)*CP(5,MC)-CP(6,MC)**2)*CP(1,MC)/XL                  FORM1270
      BFII=CP(5,MC)/DET                                                 FORM1280
      BFJJ=CP(4,MC)/DET                                                 FORM1290
      BFIJ=-CP(6,MC)/DET                                                FORM1300
C
      CALLSHRWL1(EKH(1,M,N),EKH(2,M,N),BFII,BFJJ,BFIJ,SCM2X,SCM4X,SCM3X)FORM1310
      SCM8Z=CP(15,MC)/XL                                                FORM1320
      SCM1Z=CP(2,MC)/XL                                                 FORM1330
      SCM2Y=4.*CP(3,MC)/XL                                              FORM1340
      SCM4Y=SCM2Y/2.0                                                   FORM1350
      SCM3Y=SCM2Y                                                       FORM1360
C
C     TO PREVENT UNDERFLOW IN ELIMINATION PROCESS
C
  820 IF(SCM8Z.LE.0.01) SCM8Z=0.                                        FORM1370
      IF(SCM2X.LE.0.01) SCM2X=0.                                        FORM1380
      IF(SCM4X.LE.0.01) SCM4X=0.                                        FORM1390
      IF(SCM3X.LE.0.01) SCM3X=0.                                        FORM1400
      IF(SCM1Z.LE.0.01) SCM1Z=0.                                        FORM1410
      IF(SCM2Y.LE.0.01) SCM2Y=0.                                        FORM1420
      IF(SCM4Y.LE.0.01) SCM4Y=0.                                        FORM1430
      IF(SCM3Y.LE.0.01) SCM3Y=0.                                        FORM1440
      COCOL(1,M,N)=SCM8Z                                                FORM1450
      COCOL(2,M,N)=SCM2X                                                FORM1460
      COCOL(3,M,N)=SCM4X                                                FORM1470
      COCOL(4,M,N)=SCM3X                                                FORM1480
      COCOL(5,M,N)=SCM1Z                                                FORM1490
      COCOL(6,M,N)=SCM2Y                                                FORM1500
      COCOL(7,M,N)=SCM4Y                                                FORM1510
      COCOL(8,M,N)=SCM3Y                                                FORM1520
C
      IF(IFORM.EQ.2) GO TO 402                                          FORM1530
C
  401 MASC=M+NC*(N-1)                                                   FORM1540
      GI=AMA(MASC)                                                      FORM1550
  402 KK=LC(N,M,2)                                                      FORM1560
      B1=CLN(KK,1)-CLN(M,1)                                             FORM1570
      B2=CLN(KK,2)-CLN(M,2)                                             FORM1580
      B3=B1*B1+B2*B2                                                    FORM1590
      B3=DSQRT(B3)                                                      FORM1600
      IF(B3.LE.0.) STOP1                                                FORM1610
      CSA=B1/B3                                                         FORM1620
      SNA=B2/B3                                                         FORM1630
      XL1=CLN(M,1)                                                      FORM1640
      YL1=CLN(M,2)                                                      FORM1650
      CALL COLUMN(1,DT,XLR,SNA,CSA,XL1,YL1,DB,GI,IFORM,SCM8Z,SCM2X,     FORM1660
     1SCM4X,SCM3X,SCM1Z,SCM2Y,SCM4Y,SCM3Y,M)                            FORM1670
C
C     ADD ELEMENT STIFFNESS TO FLOOR STIFFNESS
C
      LM(6)=4*NC+M+3*(N-1)                                              FORM1680
      LM(5)=2*M                                                         FORM1690
      LM(4)=LM(5)-1                                                     FORM1700
      LM(11)=LM(5)+2*NC                                                 FORM1710
      LM(10)=LM(4)+2*NC                                                 FORM1720
      LM(12)=LM(6)+NC                                                   FORM1730
      LM(3)=6*NC+3*N                                                    FORM1740
      LM(2)=LM(3)-1                                                     FORM1750
      LM(1)=LM(2)-1                                                     FORM1760
      LM(9)=LM(3)+3                                                     FORM1770
      LM(8)=LM(9)-1                                                     FORM1780
      LM(7)=LM(8)-1                                                     FORM1790
      CALL FLOSTF(MM,MN,ISTAT)                                          FORM1800
  500 CONTINUE                                                          FORM1810
C
      IF(IFORM.EQ.1) GO TO 601                                          FORM1820
C
C     FORM BEAM MATRICES
C
      IF (NB.EQ.0) GO TO 610                                            FORM1830
      NF=3                                                              FORM1840
      ND=6                                                              FORM1850
      DO 600 M=1,NB                                                     FORM1860
      MB=LB(N,M,3)                                                      FORM1870
      IF(MB.EQ.NBP) GO TO 600                                           FORM1880
      KI=LB(N,M,1)                                                      FORM1890
      KJ=LB(N,M,2)                                                      FORM1900
      B1=CLN(KJ,1)-CLN(KI,1)                                            FORM1910
      B2=CLN(KJ,2)-CLN(KI,2)                                            FORM1920
      B3=B1*B1+B2*B2                                                    FORM1930
      B3=DSQRT(B3)                                                      FORM1940
      CSA=B1/B3                                                         FORM1950
      SNA=B2/B3                                                         FORM1960
      XL=B3                                                             FORM1970
      WI=BP(8,MB)                                                       FORM1980
      WJ=BP(9,MB)                                                       FORM1990
      E=BP(1,MB)                                                        FORM2000
      G=E/2.5                                                           FORM2010
      XLR=XL-WI-WJ                                                      FORM2020
      IF(IFORM.EQ.1) GO TO 510                                          FORM2030
C
C     FIND MP REDUCTION AND STIFFNESS COEFFICIENTS OF STEEL BEAM ELEMENT
C
  403 CALL INTRCT(SPACE,SPACE,SPACE,SPACE,0.0,BP(10,MB),0.0,FYIELD,0.0, FORM2040
     1SPACE,0.0,BEAM2(1,M,N),BP(11,MB),BMO,0.0,ISEC)                    FORM2050
      IF(BEAM1(1,M,N).NE.0) GO TO 501                                   FORM2060
      CMPI=BMO                                                          FORM2070
      GO TO 502                                                         FORM2080
  501 CMPI=2.*BMO                                                       FORM2090
  502 CMI=BEAM2(2,M,N)-BEAM1(1,M,N)                                     FORM2100
      CMJ=BEAM2(3,M,N)-BEAM1(2,M,N)                                     FORM2110
      CALL INECOF(1,XLR,BP(4,MB),BP(3,MB),0.0,CMI,CMJ,CMPI,CMPJ,0.0,0.0,FORM2120
     10.0,SCM2,SCM3,SCM4,SCM8)                                          FORM2130
      IF(BEAM1(4,M,N).NE.0) GO TO 503                                   FORM2140
      CMPJ=BMO                                                          FORM2150
      GO TO 504                                                         FORM2160
  503 CMPJ=2.*BMO                                                       FORM2170
  504 CMI=BEAM2(2,M,N)-BEAM1(3,M,N)                                     FORM2180
      CMJ=BEAM2(3,M,N)-BEAM1(4,M,N)                                     FORM2190
C
      CALL INECOF(2,XLR,BP(4,MB),BP(3,MB),0.0,CMI,CMJ,CMPI,CMPJ,0.0,0.0,FORM2200
     10.0,SCM2,SCM3,SCM4,SCM8)                                          FORM2210
      IF(BEAM1(5,M,N).NE.0.) GO TO 505                                  FORM2220
      TT1=BP(11,MB)                                                     FORM2230
      GO TO 506                                                         FORM2240
  505 TT1=2.*BP(11,MB)                                                  FORM2250
  506 T1=BEAM2(1,M,N)-BEAM1(5,M,N)                                      FORM2260
      CALL INECOF(4,XLR,BP(4,MB),BP(3,MB),0.0,CMI,CMJ,CMPI,CMPJ,T1,TT1, FORM2270
     10.0,SCM2,SCM3,SCM4,SCM8)                                          FORM2280
C
C     TO PREVENT UNDERFLOW IN ELIMINATION PROCESS
C
      IF(SCM8.LE.0.01) SCM8=0.                                          FORM2290
      IF(SCM2.LE.0.01) SCM2=0.                                          FORM2300
      IF(SCM4.LE.0.01) SCM4=0.                                          FORM2310
      IF(SCM3.LE.0.01) SCM3=0.                                          FORM2320
      COBM(1,M,N)=SCM8                                                  FORM2330
      COBM(2,M,N)=SCM2                                                  FORM2340
      COBM(3,M,N)=SCM4                                                  FORM2350
      COBM(4,M,N)=SCM3                                                  FORM2360
C
  510 IF(ISTAT.NE.1) GO TO 560                                          FORM2370
C
      DO 550 L=1,NLD                                                    FORM2380
      DO 520 I=1,6                                                      FORM2390
  520 P(I,L)=0.                                                         FORM2400
      J=LOB(N,M,L)                                                      FORM2410
      IF (J) 550,550,530                                                FORM2420
  530 V=FEF(5,J)*XL/2.                                                  FORM2430
      YM=V*XL/6.                                                        FORM2440
      P(1,L)=-FEF(1,J)-YM                                               FORM2450
      P(2,L)=-FEF(2,J)-V                                                FORM2460
      P(3,L)= FEF(3,J)+YM                                               FORM2470
      P(4,L)=-FEF(4,J)-V                                                FORM2480
      IF(IFEF(J)) 550,540,550                                           FORM2490
  540 P(1,L)=P(1,L)+P(2,L)*BP(8,MB)                                     FORM2500
      P(3,L)=P(3,L)-P(4,L)*BP(9,MB)                                     FORM2510
  550 CONTINUE                                                          FORM2520
  560 CALL BEAM(1,WI,XLR,SNA,CSA,WJ,SCM8,SCM2,SCM4,SCM3,M,ISTAT)        FORM2530
C
C     ADD ELEMENT STIFFNESS TO FLOOR STIFFNESS
C
      LM(3)=4*NC+KI+3*(N-1)                                             FORM2540
      LM(2)=2*KI                                                        FORM2550
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      LM(1)=LM(2)-1                                                     FORM2560
      LM(6)=4*NC+KJ+3*(N-1)                                             FORM2570
      LM(5)=2*KJ                                                        FORM2580
      LM(4)=LM(5)-1                                                     FORM2590
      CALL FLOSTF(MM,MN,ISTAT)                                          FORM2600
  600 CONTINUE                                                          FORM2610
C
C     FORM PANEL STIFFNESS
C
  601 IF(NPAN.EQ.0) GO TO 610                                           FORM2620
      DO 720 I=1,10                                                     FORM2630
      DO 720 J=1,3                                                      FORM2640
  720 P(I,J)=0.                                                         FORM2650
      NF=3                                                              FORM2660
      ND=10                                                             FORM2670
      DO 800 L=1,NPAN                                                   FORM2680
      NP=NS-LP(1,L)+1                                                   FORM2690
      IF(NP.NE.N) GO TO 800                                             FORM2700
      XL=SD(N,2)                                                        FORM2710
      KI=LP(2,L)                                                        FORM2720
      KJ=LP(3,L)                                                        FORM2730
      IF(IFORM.EQ.2) GO TO 722                                          FORM2740
      LOAD1=NC*(NP-1)+KI                                                FORM2750
      LOAD2=NC*(NP-1)+KJ                                                FORM2760
      GI=AMA(LOAD1)+AMA(LOAD2)                                          FORM2770
  722 B1=CLN(KJ,1)-CLN(KI,1)                                            FORM2780
      B2=CLN(KJ,2)-CLN(KI,2)                                            FORM2790
      B3=B1*B1+B2*B2                                                    FORM2800
      B3=DSQRT(B3)                                                      FORM2810
      CSA=B1/B3                                                         FORM2820
      SNA=B2/B3                                                         FORM2830
      D=B3                                                              FORM2840
      AR=CLN(KI,1)*CLN(KJ,2)-CLN(KJ,1)*CLN(KI,2)                        FORM2850
      DF=AR/B3                                                          FORM2860
      IF(IFORM.EQ.1) GO TO 721                                          FORM2870
C
C     FIND STIFFNESS COEFFICIENTS OF CONCRETE SHEAR PANEL ELEMENT
C
      DET=12.*PP(1,L)/XL                                                FORM2880
      BFII=4./DET                                                       FORM2890
      BFJJ=4./DET                                                       FORM2900
      BFIJ=-2./DET                                                      FORM2910
      CALL SHRWL1(EKHP(1,L),EKHP(2,L),BFII,BFJJ,BFIJ,SCM2X,SCM4X,SCM3X) FORM2920
      SCM1Z=PP(2,L)/XL                                                  FORM2930
C
C     TO PREVENT UNDERFLOW IN ELEMINATION PROCESS
C
      IF(SCM1Z.LE.0.01) SCM1Z=0.                                        FORM2940
      IF(SCM2X.LE.0.01) SCM2X=0.                                        FORM2950
      IF(SCM4X.LE.0.01) SCM4X=0.                                        FORM2960
      IF(SCM3X.LE.0.01) SCM3X=0.                                        FORM2970
      COPAN(1,L)=SCM2X                                                  FORM2980
      COPAN(2,L)=SCM4X                                                  FORM2990
      COPAN(3,L)=SCM3X                                                  FORM3000
      COPAN(4,L)=SCM1Z                                                  FORM3010
  721 CALL PANEL(I,L,XL,D,DF,SNA,CSA,NPAN,GI,IFORM,SCM2X,SCM4X,SCM3X,SCMFORM3020
     1IZ)                                                               FORM3030
C
C     ADD ELEMENT STIFFNESS TO FLOOR STIFFNESS
C
      LM(3)=6*NC+3*N                                                    FORM3040
      LM(2)=LM(3)-1                                                     FORM3050
      LM(1)=LM(2)-1                                                     FORM3060
      LM(4)=4*NC+KI+3*(N-1)                                             FORM3070
      LM(5)=4*NC+KJ+3*(N-1)                                             FORM3080
      LM(8)=6*NC+3*N+3                                                  FORM3090
      LM(7)=LM(8)-1                                                     FORM3100
      LM(6)=LM(7)-1                                                     FORM3110
      LM(9)=LM(4)+NC                                                    FORM3120
      LM(10)=LM(5)+NC                                                   FORM3130
      CALL FLOSTF(MM,MN,ISTAT)                                          FORM3140
  800 CONTINUE                                                          FORM3150
  610 IF(IFORM.EQ.1) GO TO 710                                          FORM3160
C
C     FORM BRACE STIFFNESS
C
      IF (NTRU.EQ.0) GO TO 710                                          FORM3170
      DO 620 I=1,8                                                      FORM3180
      DO 620 J=1,NLD                                                    FORM3190
  620 P(I,J)=0.                                                         FORM3200
      NF=1                                                              FORM3210
      ND=8                                                              FORM3220
      DO 690 L=1,NTRU                                                   FORM3230
      NP=NS-LT(1,L)+1                                                   FORM3240
      IF (NP.NE.N) GO TO 690                                            FORM3250
      YL=SD(N*K,2)                                                      FORM3260
      KJ=LT(2,L)                                                        FORM3270
      KI=LT(3,L)                                                        FORM3280
      B1=CLN(KJ,1)-CLN(KI,1)                                            FORM3290
      B2=CLN(KJ,2)-CLN(KI,2)                                            FORM3300
      B3=B1*B1+B2*B2                                                    FORM3310
      B3=DSQRT(B3)                                                      FORM3320
      CSA=B1/B3                                                         FORM3330
      SNA=B2/B3                                                         FORM3340
      VANG=DATAN(YL/B3)                                                 FORM3350
      DL=DSQRT(B3*B3+YL*YL)                                             FORM3360
      AR=CLN(KI,1)*CLN(KJ,2)-CLN(KJ,1)*CLN(KI,2)                        FORM3370
      D1=AR/B3                                                          FORM3380
      E=TP(1,L)                                                         FORM3390
C
C     FIND STIFFNESS COEFFICIENTS OF STEEL BRACING ELEMENT
C
  623 IF(DIAGO(1,L).NE.0.0) GO TO 621                                   FORM3400
      PP1=FYIELD*TP(2,L)                                                FORM3410
      IF(DIAGO(2,L).LT.0.) PP1=FCRITI*TP(2,L)                           FORM3420
      GO TO 622                                                         FORM3430
  621 PP1=TP(2,L)*(FYIELD+FCRITI)                                       FORM3440
  622 P1=DIAGO(2,L)-DIAGO(1,L)                                          FORM3450
      CALL INECOF(3,DL,SPACE,SPACE,TP(2,L),SPACE,SPACE,SPACE,SPACE,P1,  FORM3460
     1PP1,SCM1Z,SCM22,SCM33,SCM44,SCM88)                                FORM3470
C
C     TO PREVENT UNDERFLOW IN ELIMINATION PROCESS
C
      IF(SCM1Z.LE.0.01) SCM1Z=0.                                        FORM3480
      CODIA(1,L)=SCM1Z                                                  FORM3490
  680 CALL BRAC(1,VANG,DL,SNA,CSA,D1,SCM1Z,L)                           FORM3500
C
C     ADD ELEMENT STIFFNESS TO FLOOR STIFFNESS
C
      LM(3)=6*NC+3*N                                                    FORM3510
      LM(2)=LM(3)-1                                                     FORM3520
      LM(1)=LM(2)-1                                                     FORM3530
      LM(4)=4*NC+KJ+3*(N-1)                                             FORM3540
      LM(7)=6*NC+3*N+3                                                  FORM3550
      LM(6)=LM(7)-1                                                     FORM3560
      LM(5)=LM(6)-1                                                     FORM3570
      LM(8)=5*NC+KI+3*(N-1)                                             FORM3580
      CALL FLOSTF(MM,MN,ISTAT)                                          FORM3590
  690 CONTINUE                                                          FORM3600
  710 CONTINUE                                                          FORM3610
C
C      REDUCE STIFFNESS MATRIX FOR LEVEL N
C
      CALL ELIMIN(MM,NS,NC,NNL,NE,IFORM,LS,NAD2,ISTAT)                  FORM3620
  700 CONTINUE                                                          FORM3630
C
C     COMPACT STIFFNESS STORAGE (NO DEGREE OF FREEDOM AT BASE)
C
      N=NST-NS+1                                                        FORM3640
      N11=N                                                             FORM3650
      NFRFO=NN-MN-3-NC                                                  FORM3660
      NFFO=1                                                            FORM3670
      NLFO=(NFRFO*(NFRFO+1))/2                                          FORM3680
      MLAT=LSL-NNM                                                      FORM3690
      LLAT=MLAT-NNM                                                     FORM3700
      KLAT=LLAT-NNM                                                     FORM3710
      NS3=3*NS                                                          FORM3720
      NSNC=NS*NC                                                        FORM3730
      NSNC1=(NS+1)*NC                                                   FORM3740
      K1=(NSNC*(NSNC+1))/2                                              FORM3750
      K2=(NSNC1*(NSNC1+1))/2                                            FORM3760
      K3=LSL-NNM*NLD+NSNC                                               FORM3770
      K4=K3+NC                                                          FORM3780
      DO 408 J=1,NS3                                                    FORM3790
      DO 406 I=1,NSNC                                                   FORM3800
  406 SL(K1+I)=SL(K2+I)                                                 FORM3810
      DO 407 I=1,J                                                      FORM3820
  407 SL(K1+NSNC+I)=SL(K2+NSNC1+I)                                      FORM3830
      K1=K1+NSNC+J                                                      FORM3840
  408 K2=K2+NSNC1+J                                                     FORM3850
      DO 405 J=1,3                                                      FORM3860
      DO 404 I=1,NS3                                                    FORM3870
  404 SL(K3+I)=SL(K4+I)                                                 FORM3880
      K3=K3+NNM                                                         FORM3890
  405 K4=K4+NNM                                                         FORM3900
      NCFO=NC                                                           FORM3910
      NSNCFO=NSNC                                                       FORM3920
      IF(ISTAT.NE.1) RETURN                                             FORM3930
C
C     STORE ELASTIC STIFFNESS COEFFICIENTS
C
      DO 411 I=1,NS                                                     FORM3940
      DO 410 J=1,NC                                                     FORM3950
      SCOCOL(1,J,I)=COCOL(2,J,I)                                        FORM3960
      SCOCOL(2,J,I)=COCOL(5,J,I)                                        FORM3970
      SCOCOL(3,J,I)=COCOL(6,J,I)                                        FORM3980
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      SCOCOL(4,J,I)=COCOL(3,J,I)                                        FORM3990
  410 SCOCOL(5,J,I)=COCOL(7,J,I)                                        FORM4000
      DO 411 J=1,NB                                                     FORM4010
      SCOBM(1,J,I)=COBM(2,J,I)                                          FORM4020
  411 SCOBM(2,J,I)=COBM(3,J,I)                                          FORM4030
      DO 412 I=1,NTRU                                                   FORM4040
  412 SCODIA(1,I)=CODIA(1,I)                                            FORM4050
C
      RETURN                                                            FORM4060
      END                                                               FORM4070



      SUBROUTINE COLUMN(IO,DT,XLR,SNA,CSA,XL1,YL1,DB,GI,IFORM,S1,S2,S3, COLU  10
     1S4,S5,S6,S7,S8,M)                                                 COLU  20
C
CC    FORM GEOMETRIC AND SYSTEM MEMBER STIFFNESS
C
      IMPLICIT REAL*8(A-H,O-Z)                                          COLU  30
      COMMON/STIF/ ASA(12,12),SA(8,12),T(8,12),TAC(8,12,10,10)          COLU  40
      COMMON/JUNK/ NLD,N,ND,MM,MN,LM(12),IDUM,P(12,3),TT(8)             COLU  50
C
      IF(IFORM.EQ.1) GO TO 200                                          COLU  60
C
CC    TRANSFORMATION MATRICES
C
      CALL REFCOR(1,XLR,DT,DB,SNA,CSA,XL1,YL1,0.,0.,M)                  COLU  70
C
CC    FORCE-FRAME DISPLACEMENT MATRIX
C
      DO 10 I=1,12                                                      COLU  80
      SA(1,I)=S1*TAC(1,I,M,N)                                           COLU  90
      SA(2,I)=S2*TAC(2,I,M,N)+S3*TAC(3,I,M,N)                           COLU 100
      SA(3,I)=S3*TAC(2,I,M,N)+S4*TAC(3,I,M,N)                           COLU 110
      SA(4,I)=S5*TAC(4,I,M,N)                                           COLU 120
      SA(5,I)=S6*TAC(5,I,M,N)+S7*TAC(6,I,M,N)                           COLU 130
   10 SA(6,I)=S7*TAC(5,I,M,N)+S8*TAC(6,I,M,N)                           COLU 140
C
CC    SYSTEM MEMBER STIFFNESS
C
      DO 120 I=1,12                                                     COLU 150
      DO 120 J=I,12                                                     COLU 160
      ASA(I,J)=0.                                                       COLU 170
      DO 110 K=1,6                                                      COLU 180
  110 ASA(I,J)=ASA(I,J)+TAC(K,I,M,N)*SA(K,J)                            COLU 190
  120 ASA(J,I)=ASA(I,J)                                                 COLU 200
C
      RETURN                                                            COLU 210
C
CC    GEOMETRIC MEMBER STIFFNESS
C
  200 SG1=GI/XLR                                                        COLU 220
      DO 210 I=1,12                                                     COLU 230
      DO 210 J=1,12                                                     COLU 240
  210 ASA(I,J)=0.                                                       COLU 250
      A=-YL1*SNA-XL1*CSA                                                COLU 260
      B=-YL1*CSA+XL1*SNA                                                COLU 270
      ASA(1,1)=-SG1                                                     COLU 280
      ASA(1,7)=SG1                                                      COLU 290
      ASA(2,2)=-SG1                                                     COLU 300
      ASA(2,8)=SG1                                                      COLU 310
      ASA(7,1)=SG1                                                      COLU 320
      ASA(7,7)=-SG1                                                     COLU 330
      ASA(8,2)=SG1                                                      COLU 340
      ASA(8,8)=-SG1                                                     COLU 350
      ASA(7,3)=SG1*(A*SNA+B*CSA)                                        COLU 360
      ASA(3,7)=ASA(7,3)                                                 COLU 370
      ASA(1,9)=ASA(7,3)                                                 COLU 380
      ASA(9,1)=ASA(7,3)                                                 COLU 390
      ASA(1,3)=-ASA(7,3)                                                COLU 400
      ASA(3,1)=-ASA(7,3)                                                COLU 410
      ASA(7,9)=-ASA(7,3)                                                COLU 420
      ASA(9,7)=-ASA(7,3)                                                COLU 430
      ASA(2,3)=SG1*(A*CSA-B*SNA)                                        COLU 440
      ASA(3,2)=ASA(2,3)                                                 COLU 450
      ASA(8,9)=ASA(2,3)                                                 COLU 460
      ASA(9,8)=ASA(2,3)                                                 COLU 470
      ASA(8,3)=-ASA(2,3)                                                COLU 480
      ASA(3,8)=-ASA(2,3)                                                COLU 490
      ASA(9,2)=-ASA(2,3)                                                COLU 500
      ASA(2,9)=-ASA(2,3)                                                COLU 510
      ASA(3,9)=SG1*(A**2+B**2)                                          COLU 520
      ASA(9,3)=ASA(3,9)                                                 COLU 530
      ASA(3,3)=-ASA(3,9)                                                COLU 540
      ASA(9,9)=-ASA(3,9)                                                COLU 550
C
      RETURN                                                            COLU 560
      END                                                               COLU 570



      SUBROUTINE BEAM(IO,WI,XLR,SNA,CSA,WJ,S1,S2,S3,S4,M,ISTAT)         BEAM  10
C
CC    FORM SYSTEM MEMBER STIFFNESS
C
      IMPLICIT REAL*8(A-H,O-Z)                                          BEAM  20
      COMMON/STIF/ ASA(12,12),SA(8,12),T(8,12),TAC(8,12,10,10),TAB(3,6, BEAM  30
     113,10)                                                            BEAM  40
      COMMON/JUNK/ NLD,N,ND,MM,MN,LM(12),IDUM,P(12,3),TX(8)             BEAM  50
C
CC    TRANSFORMATION MATRIX
C
      CALL REFCOR(2,XLR,WI,WJ,SNA,CSA,0.,0.,0.,0.,M)                    BEAM  60
C
CC    FORCE-FRAME DISPLACEMENT MATRIX
C
      DO 10 I=1,6                                                       BEAM  70
      SA(1,I)=S1*TAB(1,I,M,N)                                           BEAM  80
      SA(2,I)=S2*TAB(2,I,M,N)+S3*TAB(3,I,M,N)                           BEAM  90
   10 SA(3,I)=S3*TAB(2,I,M,N)+S4*TAB(3,I,M,N)                           BEAM 100
C
CC    SYSTEM MEMBER STIFFNESS
C
      DO 120 I=1,6                                                      BEAM 110
      DO 120 J=I,6                                                      BEAM 120
      ASA(I,J)=0.                                                       BEAM 130
      DO 110 K=1,3                                                      BEAM 140
  110 ASA(I,J)=ASA(I,J)+TAB(K,I,M,N)*SA(K,J)                            BEAM 150
  120 ASA(J,I)=ASA(I,J)                                                 BEAM 160
C
CC    FIXED END FORCES
C
      IF(ISTAT.NE.1) RETURN                                             BEAM 170
      DO 160 L=1,NLD                                                    BEAM 180
      TX(3)= P(3,L)                                                     BEAM 190
      TX(1)= SNA*P(1,L)                                                 BEAM 200
      TX(2)=-CSA*P(1,L)                                                 BEAM 210
      TX(6)= P(4,L)                                                     BEAM 220
      TX(4)= SNA*P(3,L)                                                 BEAM 230
      TX(5)=-CSA*P(3,L)                                                 BEAM 240
      DO 150 I=1,6                                                      BEAM 250
  150 P(I,L)=TX(I)                                                      BEAM 260
  160 CONTINUE                                                          BEAM 270
C
      RETURN                                                            BEAM 280
      END                                                               BEAM 290



      SUBROUTINE PANEL (IO,L,XL,D,DF,SNA,CSA,NPAN,G,IFORM,S1,S2,S3,S4)  PANE  10
C
CC    FORM GEOMETRIC AND SYSTEM MEMBER STIFFNESS
C
      IMPLICIT REAL*8(A-H,O-Z)                                          PANE  20
      COMMON/STIF/ ASA(12,12),SA(8,12),T(8,12),TAC(8,12,10,10),TAB(3,6,1PANE  30
     13,10),TAP(4,10,20)                                                PANE  40
      COMMON/JUNK/ NLD,N,ND,MM,MN,LM(12),IDUM,P(12,3),TT(8)             PANE  50
C
      IF(IFORM.EQ.1) GO TO 200                                          PANE  60
C
CC    TRANSFORMATION MATRIX
C
      CALL REFCOR(3,XL,D,DF,SNA,CSA,0.,0.,0.,0.,L)                      PANE  70
C
CC    FORCE-FRAME DISPLACEMENT MATRIX
C
      DO 10 I=1,10                                                      PANE  80
      SA(1,I)=S1*TAP(1,I,L)+S2*TAP(2,I,L)                               PANE  90
      SA(2,I)=S2*TAP(1,I,L)+S3*TAP(2,I,L)                               PANE 100
   10 SA(3,I)=S4*TAP(3,I,L)                                             PANE 110
C
CC    SYSTEM MEMBER STIFFNESS
C
   30 DO 120 I=1,10                                                     PANE 120
      DO 120 J=I,10                                                     PANE 130
      ASA(I,J)=0.                                                       PANE 140
      DO 110 K=1,3                                                      PANE 150
  110 ASA(I,J)=ASA(I,J)+TAP(K,I,L)*SA(K,J)                              PANE 160
  120 ASA(J,I)=ASA(I,J)                                                 PANE 170
C
      RETURN                                                            PANE 180
C
CC    GEOMETRIC MEMBER STIFFNESS
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C
  200 SG1=G/XL                                                          PANE 190
      DO 210 I=1,10                                                     PANE 200
      DO 210 J=1,10                                                     PANE 210
  210 ASA(I,J)=0.                                                       PANE 220
      ASA(1,1)=-SG1*CSA*CSA                                             PANE 230
      ASA(1,2)=-SG1*CSA*SNA                                             PANE 240
      ASA(1,3)=SG1*CSA*DF                                               PANE 250
      ASA(1,6)=-ASA(1,1)                                                PANE 260
      ASA(1,7)=-ASA(1,2)                                                PANE 270
      ASA(1,8)=-ASA(1,3)                                                PANE 280
      ASA(2,1)=ASA(1,2)                                                 PANE 290
      ASA(2,2)=-SG1*SNA*SNA                                             PANE 300
      ASA(2,3)=SG1*SNA*DF                                               PANE 310
      ASA(2,6)=ASA(1,7)                                                 PANE 320
      ASA(2,7)=-ASA(2,2)                                                PANE 330
      ASA(2,8)=-ASA(2,3)                                                PANE 340
      ASA(3,1)=ASA(1,3)                                                 PANE 350
      ASA(3,2)=ASA(2,3)                                                 PANE 360
      ASA(3,3)=-SG1*DF*DF                                               PANE 370
      ASA(3,6)=ASA(1,8)                                                 PANE 380
      ASA(3,7)=ASA(2,8)                                                 PANE 390
      ASA(3,8)=-ASA(3,3)                                                PANE 400
      ASA(6,1)=ASA(1,6)                                                 PANE 410
      ASA(6,2)=ASA(2,6)                                                 PANE 420
      ASA(6,3)=ASA(3,6)                                                 PANE 430
      ASA(6,6)=ASA(1,1)                                                 PANE 440
      ASA(6,7)=ASA(1,2)                                                 PANE 450
      ASA(6,8)=ASA(1,3)                                                 PANE 460
      ASA(7,1)=ASA(1,7)                                                 PANE 470
      ASA(7,2)=ASA(2,7)                                                 PANE 480
      ASA(7,3)=ASA(3,7)                                                 PANE 490
      ASA(7,6)=ASA(6,7)                                                 PANE 500
      ASA(7,7)=ASA(2,2)                                                 PANE 510
      ASA(7,8)=ASA(2,3)                                                 PANE 520
      ASA(8,1)=ASA(1,8)                                                 PANE 530
      ASA(8,2)=ASA(2,8)                                                 PANE 540
      ASA(8,3)=ASA(3,8)                                                 PANE 550
      ASA(8,6)=ASA(6,8)                                                 PANE 560
      ASA(8,7)=ASA(7,8)                                                 PANE 570
      ASA(8,8)=ASA(3,3)                                                 PANE 580
C
      RETURN                                                            PANE 590
      END                                                               PANE 600



      SUBROUTINE BRAC(IO,VANG,DL,SNA,CSA,XL1,S1,L)                      BRAC  10
C
C     FORM SYSTEM MEMBER STIFFNESS
C
      IMPLICIT REAL*8(A-H,O-Z)                                          BRAC  20
      COMMON/STIF/ ASA(12,12),SA(8,12),T(8,12),TAC(8,12,10,10),TAB(3,6, BRAC  30
     113,10),TAD(1,8,40)                                               BRAC  40
C
C     TRANSFORMATION MATRIX
C
      CALL REFCOR(4,VANG,0.,DL,SNA,CSA,XL1,0.,0.,0.,L)                  BRAC  50
C
C     FORCE-FRAME DISPLACEMENT MATRIX
C
      DO 10 I=1,8                                                       BRAC  60
   10 SA(1,I)=S1*TAD(1,I,L)                                             BRAC  70
C
C     SYSTEM MEMBER STIFFNESS
C
      DO 120 I=1,8                                                      BRAC  80
      DO 120 J=1,8                                                      BRAC  90
      ASA(I,J)=TAD(1,I,L)*SA(1,J)                                       BRAC 100
  120 ASA(J,I)=ASA(I,J)                                                 BRAC 110
C
      RETURN                                                            BRAC 120
      END                                                               BRAC 130



      SUBROUTINE REFCOR(KK,XLR,A,B,SNA,CSA,XL1,YL1,XL2,YL2,M)           REFC  10
C
C     FORM TRANSFORMATION MATRICES
C
      IMPLICIT REAL*8(A-H,O-Z)                                          REFC  20
      COMMON/STIF/ ASA(12,12),SA(8,12),T(8,12),TAC(8,12,10,10),TAB(3,6, REFC  30
     113,10),TAD(1,8,40),TAP(4,10,20)                                  REFC  40
      COMMON/JUNK/ NLD,N,ND,MM,MN,LM(12),IDUM,P(12,3),TF(6,12),TT(12,12)REFC  50
C
      GO TO (100,200,300,400,300),KK                                    REFC  60

C
C     COLUMN TRANSFORMATION
C
  100 DO 10 I=1,4,3                                                     REFC  70
      DO 10 J=1,12                                                      REFC  80
   10 TAC(I,J,M,N)=0.                                                   REFC  90
      TAC(1,3,M,N)=1.0                                                  REFC 100
      TAC(1,9,M,N)=-1.0                                                 REFC 110
      TAC(4,6,M,N)=1.0                                                  REFC 120
      TAC(4,12,M,N)=-1.0                                                REFC 130
      TAC(2,6,M,N)=0.                                                   REFC 140
      TAC(2,12,M,N)=0.                                                  REFC 150
      TAC(3,6,M,N)=0.                                                   REFC 160
      TAC(3,12,M,N)=0.                                                  REFC 170
      TAC(5,6,M,N)=0.                                                   REFC 180
      TAC(5,12,M,N)=0.                                                  REFC 190
      TAC(6,6,M,N)=0.                                                   REFC 200
      TAC(6,12,M,N)=0.                                                  REFC 210
      TAC(2,1,M,N)=CSA/XLR                                              REFC 220
      TAC(2,7,M,N)=-TAC(2,1,M,N)                                        REFC 230
      TAC(3,1,M,N)=TAC(2,1,M,N)                                         REFC 240
      TAC(3,7,M,N)=-TAC(2,1,M,N)                                        REFC 250
      TAC(5,2,M,N)=TAC(2,1,M,N)                                         REFC 260
      TAC(5,8,M,N)=-TAC(2,1,M,N)                                        REFC 270
      TAC(6,2,M,N)=TAC(2,1,M,N)                                         REFC 280
      TAC(6,8,M,N)=-TAC(2,1,M,N)                                        REFC 290
      TAC(2,2,M,N)=SNA/XLR                                              REFC 300
      TAC(2,8,M,N)=-TAC(2,2,M,N)                                        REFC 310
      TAC(3,2,M,N)=TAC(2,2,M,N)                                         REFC 320
      TAC(3,8,M,N)=-TAC(2,2,M,N)                                        REFC 330
      TAC(5,1,M,N)=-TAC(2,2,M,N)                                        REFC 340
      TAC(5,7,M,N)=TAC(2,2,M,N)                                         REFC 350
      TAC(6,1,M,N)=-TAC(2,2,M,N)                                        REFC 360
      TAC(6,7,M,N)=TAC(2,2,M,N)                                         REFC 370
      TAC(2,3,M,N)=(-YL1*CSA+XL1*SNA)/XLR                               REFC 380
      TAC(2,9,M,N)=-TAC(2,3,M,N)                                        REFC 390
      TAC(3,3,M,N)=TAC(2,3,M,N)                                         REFC 400
      TAC(3,9,M,N)=-TAC(2,3,M,N)                                        REFC 410
      TAC(5,3,M,N)=(YL1*SNA+XL1*CSA)/XLR                                REFC 420
      TAC(5,9,M,N)=-TAC(5,3,M,N)                                        REFC 430
      TAC(6,3,M,N)=TAC(5,3,M,N)                                         REFC 440
      TAC(6,9,M,N)=-TAC(5,3,M,N)                                        REFC 450
      TAC(2,4,M,N)=SNA*(1.+A/XLR)                                       REFC 460
      TAC(5,5,M,N)=TAC(2,4,M,N)                                         REFC 470
      TAC(3,4,M,N)=SNA*A/XLR                                            REFC 480
      TAC(6,5,M,N)=TAC(3,4,M,N)                                         REFC 490
      TAC(5,4,M,N)=CSA*(1.+A/XLR)                                       REFC 500
      TAC(2,5,M,N)=-TAC(5,4,M,N)                                        REFC 510
      TAC(6,4,M,N)=CSA*A/XLR                                            REFC 520
      TAC(3,5,M,N)=-TAC(6,4,M,N)                                        REFC 530
      TAC(2,10,M,N)=SNA*B/XLR                                           REFC 540
      TAC(5,11,M,N)=TAC(2,10,M,N)                                       REFC 550
      TAC(3,10,M,N)=SNA*(1.+B/XLR)                                      REFC 560
      TAC(5,11,M,N)=TAC(3,10,M,N)                                       REFC 570
      TAC(5,10,M,N)=CSA*B/XLR                                           REFC 580
      TAC(2,11,M,N)=-TAC(5,10,M,N)                                      REFC 590
      TAC(6,10,M,N)=CSA*(1.+B/XLR)                                      REFC 600
      TAC(3,11,M,N)=-TAC(6,10,M,N)                                      REFC 610
C
      RETURN                                                            REFC 620
C
C     BEAM TRANSFORMATION
C
  200 TAB(1,4,M,N)=CSA                                                  REFC 630
      TAB(1,1,M,N)=-TAB(1,4,M,N)                                        REFC 640
      TAB(1,5,M,N)=SNA                                                  REFC 650
      TAB(1,2,M,N)=-TAB(1,5,M,N)                                        REFC 660
      TAB(1,3,M,N)=0.                                                   REFC 670
      TAB(1,6,M,N)=0.                                                   REFC 680
      TAB(2,1,M,N)=SNA*(1.+A/XLR)                                       REFC 690
      TAB(2,2,M,N)=-CSA*(1.+A/XLR)                                      REFC 700
      TAB(2,3,M,N)=1./XLR                                               REFC 710
      TAB(2,6,M,N)=-TAB(2,3,M,N)                                        REFC 720
      TAB(3,3,M,N)=TAB(2,3,M,N)                                         REFC 730
      TAB(3,6,M,N)=-TAB(2,3,M,N)                                        REFC 740
      TAB(2,4,M,N)=SNA*B/XLR                                            REFC 750
      TAB(2,5,M,N)=-CSA*B/XLR                                           REFC 760
      TAB(3,1,M,N)=SNA*A/XLR                                            REFC 770
      TAB(3,2,M,N)=-CSA*A/XLR                                           REFC 780
      TAB(3,4,M,N)=SNA*(1.+B/XLR)                                       REFC 790
      TAB(3,5,M,N)=-CSA*(1.+B/XLR)                                      REFC 800
C
      RETURN                                                            REFC 810
C
C     PANEL TRANSFORMATION
C
  300 DO 310 I=1,3                                                      REFC 820
      DO 310 J=1,10                                                     REFC 830
```

```
  310 TAP(I,J,M)=0.                                                    REFC 840
      TAP(1,1,M)=CSA/XLR                                               REFC 850
      TAP(1,2,M)=SNA/XLR                                               REFC 860
      TAP(1,3,M)=B/XLR                                                 REFC 870
      TAP(1,4,M)=-1.0/A                                                REFC 880
      TAP(1,5,M)=-TAP(1,4,M)                                           REFC 890
      TAP(1,6,M)=-TAP(1,1,M)                                           REFC 900
      TAP(1,7,M)=-TAP(1,2,M)                                           REFC 910
      TAP(1,8,M)=-TAP(1,3,M)                                           REFC 920
      TAP(2,1,M)=TAP(1,1,M)                                            REFC 930
      TAP(2,2,M)=TAP(1,2,M)                                            REFC 940
      TAP(2,3,M)=TAP(1,3,M)                                            REFC 950
      TAP(2,6,M)=TAP(1,6,M)                                            REFC 960
      TAP(2,7,M)=TAP(1,7,M)                                            REFC 970
      TAP(2,8,M)=TAP(1,8,M)                                            REFC 980
      TAP(2,9,M)=TAP(1,9,M)                                            REFC 990
      TAP(2,10,M)=TAP(1,5,M)                                           REFC1000
      TAP(3,4,M)=0.5                                                   REFC1010
      TAP(3,5,M)=0.5                                                   REFC1020
      TAP(3,9,M)=-0.5                                                  REFC1030
      TAP(3,10,M)=-0.5                                                 REFC1040
C
      RETURN                                                           REFC1050
C
C     BRACE TRANSFORMATION
C
  400 TAD(1,1,M)=DCOS(XLR)*CSA                                         REFC1060
      TAD(1,2,M)=DCOS(XLR)*SNA                                         REFC1070
      TAD(1,3,M)=DCOS(XLR)*XL1                                         REFC1080
      TAD(1,4,M)=DSIN(XLR)                                             REFC1090
      TAD(1,5,M)=-TAD(1,1,M)                                           REFC1100
      TAD(1,6,M)=-TAD(1,2,M)                                           REFC1110
      TAD(1,7,M)=-TAD(1,3,M)                                           REFC1120
      TAD(1,8,M)=-TAD(1,4,M)                                           REFC1130
C
      RETURN                                                           REFC1140
      END                                                              REFC1150



      SUBROUTINE FLOSTF(MM,MN,ISTAT)                                   FLOS  10
C
C     ADD ELEMENT STIFFNESS TO FLOOR STIFFNESS
C
      IMPLICIT REAL*8(A-H,O-Z)                                         FLOS  20
      COMMON/FORM1/S(210),C(20,20),SB(210),EF(66,26),PF(60,3)          FLOS  30
      COMMON/STIF/ ES(12,12)                                           FLOS  40
      COMMON/JUNK/ NLD,N,ND,MD,ID,LM(12),IDUM,P(12,3),TT(8)            FLOS  50
      DIMENSION KM(12)                                                 FLOS  60
C
      DO 100 I=1,ND                                                    FLOS  70
      II=LM(I)                                                         FLOS  80
      DO 50 J=1,3                                                      FLOS  90
      II=II-MM                                                         FLOS 100
      IF (II) 20,20,50                                                 FLOS 110
   20 KM(I)=J                                                          FLOS 120
      GO TO 100                                                        FLOS 130
   50 KM(I)=3                                                          FLOS 140
  100 CONTINUE                                                         FLOS 150
C
      MJ=MN+3*(N-1)                                                    FLOS 160
      DO 320 I=1,ND                                                    FLOS 170
      II=LM(I)                                                         FLOS 180
      IF (II) 320,320,110                                              FLOS 190
  110 KI=KM(I)                                                         FLOS 200
      DO 290 J=1,ND                                                    FLOS 210
      JJ=LM(J)                                                         FLOS 220
      IF (JJ.LT.II) GO TO 290                                          FLOS 230
      KJ=KM(J)                                                         FLOS 240
      MI=3*(N-1)                                                       FLOS 250
      GO TO (120,150,210) ,KI                                          FLOS 260
  120 GO TO (130,140,200) ,KJ                                          FLOS 270
  130 L=(JJ*(JJ-1))/2+II                                               FLOS 280
      S(L)=S(L)+ES(I,J)                                                FLOS 290
      GO TO 290                                                        FLOS 300
  140 C(II,JJ-MM)=C(II,JJ-MM)+ES(I,J)                                  FLOS 310
      GO TO 290                                                        FLOS 320
  150 GO TO (290,180,200) ,KJ                                          FLOS 330
  180 JM=JJ-MM                                                         FLOS 340
      L=(JM*(JM-1))/2+II-MM                                            FLOS 350
      SB(L)=SB(L)+ES(I,J)                                              FLOS 360
      GO TO 290                                                        FLOS 370
C
  200 MI=0                                                             FLOS 380
  210 EF(II-MI,JJ-MJ)=EF(II-MI,JJ-MJ)+ES(I,J)                          FLOS 390
  290 CONTINUE                                                         FLOS 400
      IF(NC.NE.6) GO TO 320                                            FLOS 410
      IF(ISTAT.NE.1) GO TO 320                                         FLOS 420
      GO TO (300,300,291) ,KI                                          FLOS 430
  291 MII=3*(N-1)                                                      FLOS 440
      GO TO 301                                                        FLOS 450
  300 MII=0                                                            FLOS 460
  301 DO 310 L=1,3                                                     FLOS 470
  310 PF(II-MII,L)=PF(II-MII,L)+P(I,L)                                 FLOS 480
  320 CONTINUE                                                         FLOS 490
C
      RETURN                                                           FLOS 500
      END                                                              FLOS 510



      SUBROUTINE ELIMIN (MM,NS,NC,NNL,NE,IFORM,LS,NAD2,ISTAT)          ELIM  10
C
C     ADD FLOOR STIFFNESS TO FRAME STIFFNESS AND ELIMINATE ROTATIONAL
C     DEGREES OF FREEDOM AT JOINTS OF LEVEL N
C
      IMPLICIT REAL*8(A-H,O-Z)                                         ELIM  20
      COMMON/FORM1/S(210),C(20,20),SB(210),EF(66,26),PF(60,3)          ELIM  30
      COMMON/FORM2/KH(186),SD(20),E(20,146),EB(20,146)                 ELIM  40
      COMMON/FORM3/SL(10725),NCC,NSNC,N11,NFR,NF,NL,KLAT,LLAT,MLAT     ELIM  50
      COMMON/FORM4/SF4(210,10),CF4(20,20,10),EF4(20,143,10),KH4(183,10),ELIM  60
     1EF4(20,3,10)                                                     ELIM  70
      COMMON/JUNK/ NLD,N,ND,MD,ID,LM(12),IDUM,P(12,3),TT(8)            ELIM  80
C
      NBKS=3                                                           ELIM  90
      NLD=3                                                            ELIM 100
      MN=2*MM                                                          ELIM 110
      MMP=MM+1                                                         ELIM 120
      MNP=MN+1                                                         ELIM 130
      NNN=MN+(NS+1)*NC+3*N+3                                           ELIM 140
      NN=NNL-NLD                                                       ELIM 150
      NNM=NN-MN                                                        ELIM 160
C
      IF(IFORM.EQ.1) GO TO 571                                         ELIM 170
C
      IF(ISTAT.EQ.1) GO TO 30                                          ELIM 180
      DO 20 J=1,3                                                      ELIM 190
      DO 20 I=1,NAD2                                                   ELIM 200
   20 PF(I,J)=0.                                                       ELIM 210
C
C     DETERMINE PROFILE OF (S,C,SB)
C
   30 JB=0                                                             ELIM 220
      DO 50 J=1,MM                                                     ELIM 230
      KH(JJ)=1                                                         ELIM 240
      DO 40 I=1,J                                                      ELIM 250
      IF (S(JB+I)) 50,40,50                                            ELIM 260
   40 KH(J)=I+1                                                        ELIM 270
   50 JB=JB+J                                                          ELIM 280
      DO 70 J=1,MM                                                     ELIM 290
      KH(J+MM)=1                                                       ELIM 300
      DO 60 I=1,MM                                                     ELIM 310
      IF (C(I,J)) 70,60,70                                             ELIM 320
   60 KH(J+MM)=I+1                                                     ELIM 330
   70 CONTINUE                                                         ELIM 340
C
C     REDUCTION OF S
C
      SD(1)=S(1)                                                       ELIM 350
      JB=1                                                             ELIM 360
      DO 300 J=2,MM                                                    ELIM 370
      SD(J)=0.0                                                        ELIM 380
      JM=J-1                                                           ELIM 390
      IF (J.EQ.2) GO TO 260                                            ELIM 400
      IB=1                                                             ELIM 410
      DO 250 I=2,JM                                                    ELIM 420
      IM=I-1                                                           ELIM 430
      SS=0.0                                                           ELIM 440
      KF=MINO(KH(I),KH(J))                                             ELIM 450
      IF (KF.GT.IM) GO TO 250                                          ELIM 460
C
C     REDUCTION OF S BY S,S
C
      DO 200 K=KF,IM                                                   ELIM 470
  200 SS=SS+S(IB+K)*S(JB+K)                                            ELIM 480
      S(JB+I)=S(JB+I)-SS                                               ELIM 490
  250 IB=IB+I                                                          ELIM 500
C
C     REDUCTION OF COL BY SELF
C
  260 SS=0.0                                                           ELIM 510
      KF=KH(J)                                                         ELIM 520
      IF (KF.GT.JM) GO TO 290                                          ELIM 530
      KD=(KF*(KF+1))/2                                                 ELIM 540
```

```
      DO 280 K=KF,JM                                                    ELIM 550
      IF (S(KD)) 270,280,270                                            ELIM 560
  270 T=S(JB+K)/S(KD)                                                   ELIM 570
      SS=SS+T*S(JB+K)                                                   ELIM 580
      S(JB+K)=T                                                         ELIM 590
  280 KD=KD+K+1                                                         ELIM 600
      S(JB+J)=S(JB+J)-SS                                                ELIM 610
  290 SD(J)=S(JB+J)                                                     ELIM 620
  300 JB=JB+J                                                           ELIM 630
C
C     REDUCTION OF C,SB
C
      JB=0                                                              ELIM 640
      DO 500 J=MMP,MN                                                   ELIM 650
      JJ=J-MM                                                           ELIM 660
      JM=J-1                                                            ELIM 670
      IB=1                                                              ELIM 680
      DO 450 I=2,JM                                                     ELIM 690
      II=I-MM                                                           ELIM 700
      IM=I-1                                                            ELIM 710
      KL=MINO(IM,MM)                                                    ELIM 720
      KF=MINO (KH(I),KH(J))                                             ELIM 730
      IF (KF.GT.KL) GO TO 450                                           ELIM 740
      SS=0.0                                                            ELIM 750
      IF (I.GT.MM) GO TO 430                                            ELIM 760
C
C     REDUCTION OF C BY S,C
C
      DO 420 K=KF,KL                                                    ELIM 770
  420 SS=SS+S(IB+K)*C(K,JJ)                                             ELIM 780
      C(I,JJ)=C(I,JJ)-SS                                                ELIM 790
      GO TO 450                                                         ELIM 800
C
C     REDUCTION OF SB BY C,C
C
  430 DO 440 K=KF,KL                                                    ELIM 810
  440 SS=SS+C(K,II)*C(K,JJ)                                             ELIM 820
      SB(JB+II)=SB(JB+II)-SS                                            ELIM 830
  450 IB=IB+I                                                           ELIM 840
C
C     REDUCTION OF COL BY SELF
C
      SS=0.0                                                            ELIM 850
      KF=KH(J)                                                          ELIM 860
      IF (KF.GT.MM) GO TO 500                                           ELIM 870
      DO 460 K=KF,MM                                                    ELIM 880
      IF (SD(K)) 455,460,455                                            ELIM 890
  455 T=C(K,JJ)/SD(K)                                                   ELIM 900
      SS=SS+T*C(K,JJ)                                                   ELIM 910
      C(K,JJ)=T                                                         ELIM 920
  460 CONTINUE                                                          ELIM 930
      SB(JB+JJ)=SB(JB+JJ)-SS                                            ELIM 940
  500 JB=JB+JJ                                                          ELIM 950
      DO 502 I=1,LS                                                     ELIM 960
  502 SF4(I,N)=S(I)                                                     ELIM 970
      DO 503 I=1,MM                                                     ELIM 980
      DO 503 J=1,MM                                                     ELIM 990
  503 CF4(I,J,N)=C(I,J)                                                 ELIM1000
C
C     REPLACE E BY EB
C
      DO 501 I=1,MM                                                     ELIM1010
      DO 501 J=1,NE                                                     ELIM1020
  501 E(I,J)=EB(I,J)                                                    ELIM1030
      L1=NC*(N-1)                                                       ELIM1040
      L2=3*(N-1)+NC*(NS+1)                                              ELIM1050
      NC2=2*NC                                                          ELIM1060
      DO 810 I=1,MM                                                     ELIM1070
      DO 800 J=1,NC2                                                    ELIM1080
  800 E(I,J+L1)=E(I,J+L1)+EF(I,J)                                       ELIM1090
      DO 801 J=1,6                                                      ELIM1100
      JJ=2*NC+J                                                         ELIM1110
  801 E(I,J+L2)=E(I,J+L2)+EF(I,JJ)                                      ELIM1120
  810 CONTINUE                                                          ELIM1130
      DO 820 I=1,MM                                                     ELIM1140
      DO 820 J=1,3                                                      ELIM1150
  820 E(I,J+NNM)=E(I,J+NNM)+PF(I,J)                                     ELIM1160
C
C     DETIRMINE PROFILE OF (E,EB)
C
      DO 90 J=MNP,NNL                                                   ELIM1170
      JJ=J-MN                                                           ELIM1180
      KH(J)=1                                                           ELIM1190
      DO 80 I=1,MM                                                      ELIM1200
      IF (E(I,JJ)) 90,80,90                                             ELIM1210
   80 KH(J)=I+1                                                         ELIM1220
   90 CONTINUE                                                          ELIM1230
C
C     REDUCTION OF E BY S,E
C
      JB=0                                                              ELIM1240
      DO 540 J=MNP,NNL                                                  ELIM1250
      JJ=J-MN                                                           ELIM1260
      IB=1                                                              ELIM1270
      DO 530 I=2,MM                                                     ELIM1280
      IM=I-1                                                            ELIM1290
      KF=MINO (KH(I),KH(J))                                             ELIM1300
      SS=0.0                                                            ELIM1310
      IF (KF.GT.IM) GO TO 530                                           ELIM1320
      DO 520 K=KF,IM                                                    ELIM1330
  520 SS=SS+S(IB+K)*E(K,JJ)                                             ELIM1340
      E(I,JJ)=E(I,JJ)-SS                                                ELIM1350
  530 IB=IB+I                                                           ELIM1360
  540 CONTINUE                                                          ELIM1370
      DO 830 I=1,MM                                                     ELIM1380
      DO 830 J=1,NE                                                     ELIM1390
  830 EB(I,J)=0.0                                                       ELIM1400
      DO 840 I=1,MM                                                     ELIM1410
      DO 841 J=1,NC2                                                    ELIM1420
  841 EB(I,J+L1)=EB(I,J+L1)+EF(I+MM,J)                                  ELIM1430
      DO 842 J=1,6                                                      ELIM1440
      JJ=2*NC+J                                                         ELIM1450
  842 EB(I,J+L2)=EB(I,J+L2)+EF(I+MM,JJ)                                 ELIM1460
  840 CONTINUE                                                          ELIM1470
      DO 845 I=1,MM                                                     ELIM1480
      DO 845 J=1,3                                                      ELIM1490
  845 EB(I,J+NNM)=EB(I,J+NNM)+PF(I+MM,J)                                ELIM1500
C
C     REDUCTION OF EB BY C,E
C
      DO 570 J=MNP,NNL                                                  ELIM1510
      JJ=J-MN                                                           ELIM1520
      DO 560 I=MMP,MN                                                   ELIM1530
      II=I-MM                                                           ELIM1540
      KF=MINO(KH(I),KH(J))                                              ELIM1550
      SS=0.0                                                            ELIM1560
      IF (KF.GT.MM) GO TO 560                                           ELIM1570
      DO 550 K=KF,MM                                                    ELIM1580
  550 SS=SS+C(K,II)*E(K,JJ)                                             ELIM1590
  560 EB(II,JJ)=EB(II,JJ)-SS                                            ELIM1600
  570 CONTINUE                                                          ELIM1610
C
  571 L1=NC*(N-1)                                                       ELIM1620
      L2=3*(N-1)+NC*(NS+1)                                              ELIM1630
      NC2=2*NC                                                          ELIM1640
      NC4=4*NC                                                          ELIM1650
      NC6=6*NC                                                          ELIM1660
      NCN1=NC*(N-1)                                                     ELIM1670
      K1=(L1*(L1+1))/2                                                  ELIM1680
      DO 860 J=1,NC2                                                    ELIM1690
      DO 850 I=1,J                                                      ELIM1700
  850 SL(K1+L1+I)=SL(K1+L1+I)+EF(I+MN,J)                                ELIM1710
  860 K1=K1+L1+J                                                        ELIM1720
      K2=(L2*(L2+1))/2                                                  ELIM1730
      DO 863 J=1,6                                                      ELIM1740
      DO 861 I=1,NC2                                                    ELIM1750
      JJ=2*NC+J                                                         ELIM1760
  861 SL(K2+NCN1+I)=SL(K2+NCN1+I)+EF(I+MN,JJ)                           ELIM1770
      DO 862 I=1,J                                                      ELIM1780
  862 SL(K2+L2+I)=SL(K2+L2+I)+EF(I+NC6,JJ)                              ELIM1790
  863 K2=K2+L2+J                                                        ELIM1800
      IF(IFORM.EQ.1) GO TO 701                                          ELIM1810
      NNM1=(NNM*(NNM+1))/2+(N-1)*NC                                     ELIM1820
      DO 865 J=1,3                                                      ELIM1830
      DO 864 I=1,NC2                                                    ELIM1840
  864 SL(NNM1+I)=SL(NNM1+I)+PF(NC4+I,J)                                 ELIM1850
  865 NNM1=NNM1+NNM                                                     ELIM1860
C
C     REDUCTION OF SL BY E,E
C
      JB=0                                                              ELIM1870
      DO 700 J=MNP,NNL                                                  ELIM1880
      JJ=J-MN                                                           ELIM1890
      JM=J-1                                                            ELIM1900
      JM=MINO(JM,NNN)                                                   ELIM1910
      IF (MNP.GT.JM) GO TO 610                                          ELIM1920
      DO 600 I=MNP,JM                                                   ELIM1930
      KF=MINO(KH(I),KH(J))                                              ELIM1940
      II=I-MN                                                           ELIM1950
      SS=0.0                                                            ELIM1960
      IF (KF.GT.MM) GO TO 600                                           ELIM1970
      DO 580 K=KF,MM                                                    ELIM1980
  580 SS=SS+E(K,II)*E(K,JJ)                                             ELIM1990
  600 SL(JB+II)=SL(JB+II)-SS                                            ELIM2000
C
C     REDUCTION OF COL BY SELF
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C
  610 SS=0.0                                                          ELIM2010
      KF=KH(J)                                                        ELIM2020
      IF (KF.GT.MM) GO TO 660                                         ELIM2030
      DO 650 K=KF,MM                                                  ELIM2040
      IF (SD(K)) 640,650,640                                          ELIM2050
  640 T=E(K,JJ)/SD(K)                                                 ELIM2060
      SS=SS+T*E(K,JJ)                                                 ELIM2070
      E(K,JJ)=T                                                       ELIM2080
  650 CONTINUE                                                        ELIM2090
  660 JA=MINO(JJ,NNM)                                                 ELIM2100
      IF (J.GT.NNN) GO TO 700                                         ELIM2110
      SL(JB+JA)=SL(JB+JA)-SS                                          ELIM2120
  700 JB=JB+JA                                                        ELIM2130
      DO 703 I=1,MM                                                   ELIM2140
      DO 702 J=1,NNM                                                  ELIM2150
  702 EF4(I,J,N)=E(I,J)                                               ELIM2160
      IF(ISTAT.NE.1) GO TO 703                                        ELIM2170
      DO 703 J=1,3                                                    ELIM2180
      RF4(I,J,N)=E(I,J+NNM)                                           ELIM2190
  703 CONTINUE                                                        ELIM2200
      DO 704 I=1,NNL                                                  ELIM2210
  704 KH4(I,N)=KH(I)                                                  ELIM2220
C
  701 RETURN                                                          ELIM2230
      END                                                             ELIM2240


      SUBROUTINE GLOCOR(MSS,MSTC,MCTS,IFORM,ISTAT)                    GLOC  10
C
C     TRANSFER STIFFNESS REF. FROM FRAME TO MASS CENTER               GLOC  20
C     SOLVE STATIC DISPLACEMENTS                                      GLOC  30
C
      IMPLICIT REAL*8(A-H,O-Z)                                        GLOC  40
      COMMON/DATA6/PLOAD(100),A(10,14),AMA(200),IF,IFC,X1,Y1,AANG     GLOC  50
      COMMON/FORM2/S(130,130),R(130,3),S1(10,3),S2(3,10)              GLOC  60
      COMMON/FORM3/SL(10725),NC,NSNC,NT,NFR,NF,NL,KLAT,LLAT,MLAT      GLOC  70
      COMMON/STIF1/SS(130,130),SG(30,30)                              GLOC  80
      COMMON/TRAN1/DI(10,1,2),AA(1,6),RR(130,6)                       GLOC  90
      COMMON/GEN/ NST,NDF,NTF,NLD,NAT,NEQ,NSD,IDUM,BHED(10),NSS,      GLOC 100
     1           JDUM,T(6),RLAB(3),IS,I3                              GLOC 110
      COMMON /JUNK/ AI(3,3),AJ(3,3),AR(3,3),AS(3,3)                   GLOC 120
C
      IF(IFORM.NE.1) GO TO 35                                         GLOC 130
C
C     ZERO STIFFNESS AND LOAD ARRAYS                                  GLOC 140
C     ADD EXTERNAL STIFFNESS TO SYSTEM STIFFNESS                      GLOC 150
C
      DO 30 I=1,MSS                                                   GLOC 160
      DO 30 J=1,MSS                                                   GLOC 170
   30 SG(I,J)=0.                                                      GLOC 180
   35 DO 50 I=1,MSTC                                                  GLOC 190
      DO 40 J=1,6                                                     GLOC 200
   40 RR(I,J)=0.                                                      GLOC 210
      DO 50 J=1,MSTC                                                  GLOC 220
   50 SS(I,J)=0.                                                      GLOC 230
      DO 100 I=1,NST                                                  GLOC 240
      II=I3*(I-1)+MCTS                                                GLOC 250
      SS(II+1,II+1)=A(I,7+IS)                                         GLOC 260
      IF(NSD.EQ.0) SS(II+2,II+2)=A(I,8)                               GLOC 270
      DO 100 J=1,I3                                                   GLOC 280
      DO 100 L=1,2                                                    GLOC 290
      LL=5+3*L+J+IS                                                   GLOC 300
  100 RR(II+J,L+3)=A(I,LL)                                            GLOC 310
C
C     SET TRANSFORMATION PARAMETERS                                   GLOC 320
C                                                                     GLOC 330
      ICNT=0                                                          GLOC 340
      IFP=0                                                           GLOC 350
      KCHNG=KLAT                                                      GLOC 360
      DO 110 J=1,NFR                                                  GLOC 370
      DO 110 I=1,J                                                    GLOC 380
      ICNT=ICNT+1                                                     GLOC 390
  110 S(I,J)=SL(ICNT)                                                 GLOC 400
      IF(ISTAT.NE.1) GO TO 140                                        GLOC 410
      DO 130 L=1,3                                                    GLOC 420
      DO 120 I=1,NFR                                                  GLOC 430
  120 R(I,L)=SL(KCHNG+I)                                              GLOC 440
      IF(L.EQ.1) KCHNG=LLAT                                           GLOC 450
  130 IF(L.EQ.2) KCHNG=MLAT                                           GLOC 460
  140 DO 145 I=1,NFR                                                  GLOC 470
      DO 145 J=I,NFR                                                  GLOC 480
  145 S(J,I)=S(I,J)                                                   GLOC 490
      IFP=IF                                                          GLOC 500
      ANG=AANG*ATAN(1.0)/45.                                          GLOC 510
      DO 190 I=1,3                                                    GLOC 520
      DO 190 J=1,3                                                    GLOC 530
  190 AI(I,J)=0.                                                      GLOC 540
C                                                                     GLOC 550
      AI(1,1)=DCOS(ANG)                                               GLOC 560
      AI(1,2)=DSIN(ANG)                                               GLOC 570
      AI(2,1)=-AI(1,2)                                                GLOC 580
      AI(2,2)=AI(1,1)                                                 GLOC 590
      AI(3,3)=1.                                                      GLOC 600
      DO 195 I=1,3                                                    GLOC 610
      DO 195 J=1,3                                                    GLOC 620
  195 AJ(J,I)=AI(I,J)                                                 GLOC 630
C                                                                     GLOC 640
C     TRANSFER REF. FLOOR BY FLOOR                                    GLOC 650
C                                                                     GLOC 660
      DO 200 N=NT,NST                                                 GLOC 670
      XM=X1-A(N,5)                                                    GLOC 680
      YM=Y1-A(N,6)                                                    GLOC 690
      D(N,1,1)=-YM*DCOS(ANG)+XM*DSIN(ANG)                             GLOC 700
  200 D(N,1,2)= YM*DSIN(ANG)+XM*DCOS(ANG)                             GLOC 710
C                                                                     GLOC 720
      DO 400 N=NT,NST                                                 GLOC 730
      J2=3*(N-NT)+NSNC                                                GLOC 740
      J22=NC*(N-NT)                                                   GLOC 750
      AI(1,3)=D( N,1,1)                                               GLOC 760
      AI(2,3)=D( N,1,2)                                               GLOC 770
C                                                                     GLOC 780
      DO 400 M=NT,NST                                                 GLOC 790
      I2=3*(M-NT)+NSNC                                                GLOC 800
      I22=NC*(M-NT)                                                   GLOC 810
      II2=3*(M-NT)+MCTS                                               GLOC 820
      AJ(3,1)=D(M,1,1)                                                GLOC 830
      AJ(3,2)=D(M,1,2)                                                GLOC 840
C                                                                     GLOC 850
      DO 225 II=1,3                                                   GLOC 860
      DO 225 J1=1,I3                                                  GLOC 870
      JJ=J1+IS                                                        GLOC 880
      AR(II,JJ)=0.                                                    GLOC 890
      DO 225 KK=1,3                                                   GLOC 900
  225 AR(II,JJ)=AR(II,JJ)+S(I2+II,J2+KK)*AI(KK,JJ)                    GLOC 910
C                                                                     GLOC 920
      IF(IFORM.EQ.1) GO TO 227                                        GLOC 930
C                                                                     GLOC 940
      DO 226 II=1,NC                                                  GLOC 950
      DO 226 J1=1,I3                                                  GLOC 960
      JJ=J1+IS                                                        GLOC 970
      SI(II,JJ)=0.                                                    GLOC 980
      DO 226 KK=1,3                                                   GLOC 990
  226 SI(II,JJ)=SI(II,JJ)+S(I22+II,J2+KK)*AI(KK,JJ)                   GLOC1000
C                                                                     GLOC1010
  227 DO 275 I1=1,I3                                                  GLOC1020
      II=I1+IS                                                        GLOC1030
C                                                                     GLOC1040
      IF(IFORM.EQ.1.OR.ISTAT.NE.1) GO TO 260                          GLOC1050
C                                                                     GLOC1060
      IF(N.NE.NT) GO TO 260                                           GLOC1070
      DO 250 L=1,3                                                    GLOC1080
      DO 250 KK=1,3                                                   GLOC1090
  250 RR(II+II2,L)=RR(II+II2,L)+AJ(II,KK)*R(I2+KK,L)                  GLOC1100
C                                                                     GLOC1110
  260 DO 275 J1=1,I3                                                  GLOC1120
      JJ=J1+IS                                                        GLOC1130
      AS(II,JJ)=0.                                                    GLOC1140
      DO 275 KK=1,3                                                   GLOC1150
  275 AS(II,JJ)=AS(II,JJ)+AJ(II,KK)*AR(KK,JJ)                         GLOC1160
C                                                                     GLOC1170
      IF(IFORM.EQ.1) GO TO 256                                        GLOC1180
C                                                                     GLOC1190
      DO 255 I1=1,I3                                                  GLOC1200
      II=I1+IS                                                        GLOC1210
      DO 255 J1=1,NC                                                  GLOC1220
      JJ=J1+IS                                                        GLOC1230
      S2(II,JJ)=0.                                                    GLOC1240
      DO 255 KK=1,3                                                   GLOC1250
  255 S2(II,JJ)=S2(II,JJ)+AJ(II,KK)*S(I2+KK,J22+JJ)                   GLOC1260
  256 NN=I3*(NT-1)                                                    GLOC1270
C                                                                     GLOC1280
      DO 300 I=1,I3                                                   GLOC1290
      IIN=I3*(M-NT)+I                                                 GLOC1300
      II=I3*(M-NT)+I+MCTS                                             GLOC1310
      DO 300 J=1,I3                                                   GLOC1320
      JJN=I3*(N-NT)+J                                                 GLOC1330
      JJ=I3*(N-NT)+J+MCTS                                             GLOC1340
      IF(IFORM.EQ.1) SG(NN+IIN,NN+JJN)=SG(NN+IIN,NN+JJN)+AS(I+IS,J+IS)GLOC1350
  300 IF(IFORM.EQ.2) SS(NN+II,NN+JJ)=SS(NN+II,NN+JJ)+AS(I+IS,J+IS)   GLOC1360
      IF(IFORM.EQ.1) GO TO 400                                        GLOC1370
      DO 310 I=1,NC                                                   GLOC1380
      II=NC*(M-NT)+I                                                  GLOC1390
      DO 310 J=1,I3                                                   GLOC1400
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      JJ=I3*(N-NT)+J+MCTS                                               GLOC1190
  310 SS(NN+II,NN+JJ)=SS(NN+II,NN+JJ)+S1(I+IS,J+IS)                     GLOC1200
C
      DO 320 I=1,I3                                                     GLOC1210
      II=I3*(M-NT)+I+MCTS                                               GLOC1220
      DO 320 J=1,NC                                                     GLOC1230
      JJ=NC*(N-NT)+J                                                    GLOC1240
  320 SS(NN+II,NN+JJ)=SS(NN+II,NN+JJ)+S2(I+IS,J+IS)                     GLOC1250
  400 CONTINUE                                                          GLOC1260
C
      IF(IFORM.EQ.1) RETURN                                             GLOC1270
C
      DO 410 I=1,NSNC                                                   GLOC1280
      DO 410 J=1,NSNC                                                   GLOC1290
  410 SS(I,J)=S(I,J)                                                    GLOC1300
      IF(ISTAT.NE.1) GO TO 450                                          GLOC1310
      DO 420 I=1,NSNC                                                   GLOC1320
      DO 420 J=1,3                                                      GLOC1330
  420 RR(I,J)=RR(I,J)+R(I,J)                                            GLOC1340
      DO 440 I=1,NSNC                                                   GLOC1350
  440 RR(I,6)=RR(I,6)+PLOAD(I)                                          GLOC1360
C
  450 AA(1,1)=IF                                                        GLOC1370
      AA(1,2)=IFC                                                       GLOC1380
      AA(1,3)=AI(1,1)                                                   GLOC1390
      AA(1,4)=AI(1,2)                                                   GLOC1400
      AA(1,5)=NT                                                        GLOC1410
      AA(1,6)=NC                                                        GLOC1420
      IF(ISTAT.NE.1) RETURN                                             GLOC1430
C
C     SOLVE STATIC DISPLACEMENTS
C
      DO 460 I=1,MSTC                                                   GLOC1440
      DO 460 J=1,MSTC                                                   GLOC1450
  460 SI(I,J)=SS(I,J)                                                   GLOC1460
      DO 470 I=1,MSS                                                    GLOC1470
      DO 470 J=1,MSS                                                    GLOC1480
  470 SI(I+MCTS,J+MCTS)=S(I+MCTS,J+MCTS)+386.4*SG(I,J)                  GLOC1490
      CALL GAUSS(S,MSTC,RR,6)                                           GLOC1500
C
      RETURN                                                            GLOC1510
      END                                                               GLOC1520
```

```
      SUBROUTINE GAUSS(A,M,B,NL)                                        GAUS  10
C
C     SOLVE STATIC DISPLACEMENTS
C
      IMPLICIT REAL*8(A-H,O-Z)                                          GAUS  20
      DIMENSION A(130,130),B(130,6)                                     GAUS  30
C
      M=0                                                               GAUS  40
C
C     REDUCTION OF M TH EQUATION
C
   50 M=M+1                                                             GAUS  50
      MM=M+1                                                            GAUS  60
      DO 60 L=1,NL                                                      GAUS  70
   60 B(M,L)=B(M,L)/A(M,M)                                              GAUS  80
      IF (M-N) 70,130,70                                                GAUS  90
   70 DO 80 J=MM,N                                                      GAUS 100
   80 A(M,J)=A(M,J)/A(M,M)                                              GAUS 110
C
C     SUBSTITUTION INTO REMAINING EQUATIONS
C
      DO 120 I=MM,N                                                     GAUS 120
      IF (A(I,M)) 90,120,90                                             GAUS 130
   90 DO 100 J=1,N                                                      GAUS 140
      A(I,J)=A(I,J)-A(I,M)*A(M,J)                                       GAUS 150
  100 A(J,I)=A(I,J)                                                     GAUS 160
      DO 110 L=1,NL                                                     GAUS 170
  110 B(I,L)=B(I,L)-A(I,M)*B(M,L)                                       GAUS 180
  120 CONTINUE                                                          GAUS 190
      GO TO 50                                                          GAUS 200
C
C     BACK SUBSTITUTION
C
  130 M=M-1                                                             GAUS 210
      IF (M.EQ.0) GO TO 150                                             GAUS 220
      MM=M+1                                                            GAUS 230
      DO 140 L=1,NL                                                     GAUS 240
      DO 140 J=MM,N                                                     GAUS 250
  140 B(M,L)=B(M,L)-A(M,J)*B(J,L)                                       GAUS 260
      GO TO 130                                                         GAUS 270
C
  150 RETURN                                                            GAUS 280
      END                                                               GAUS 290
```

```
      SUBROUTINE LAC1(JDYN,MSS,MCTS,MST,MSTC,DISX,DISY,DISZ,VELX,VELY,  LAC1  10
     1VELZ,NCHNG,KKBAL,NC)                                              LAC1  20
C
C     STEP-BY-STEP INTEGRATION METHOD
C     FIND DAMPING AND P-DELT EFFECT ENERGIES
C
      IMPLICIT REAL*8(A-H,O-Z)                                          LAC1  30
      COMMON/DATA6/PLOAD(100),A(10,14),AMA(200),IF,IFC,X11,Y1,ANG       LAC1  40
      COMMON/DATA7/PA(4,900)                                            LAC1  50
      COMMON/STIF1/SU(130,130),SG(30,30)                                LAC1  60
      COMMON/TRAN1/DKIT(10,1,2),AAKIT(1,6),XQ(130,6)                    LAC1  70
      COMMON/DYN1/ACCER(130),VELO(130),X1(130),X2(130)                  LAC1  80
      COMMON/DYNR/DELT,ALFA,BETA,CX,CY,CZ,XCOM,TT,NPC,KCSM,KCSMT,KSAME  LAC1  90
      COMMON/ENG/ FPD(30),FPDD(30),DFO(130),DFDO(130),ED,EP             LAC1 100
      COMMON/SHER4/DD(3,10)                                             LAC1 110
      DIMENSION AA(130),BB(130),B(130),S(130,130),SC(130,130)           LAC1 120
C
      DO 11 I=1,MSTC                                                    LAC1 130
      DO 11 J=1,MSTC                                                    LAC1 140
   11 SI(I,J)=SU(I,J)                                                   LAC1 150
      IF(JDYN.NE.1) GO TO 19                                            LAC1 160
C
C     CALCULATE DAMPING CONSTANTS
C
      C0=3.*ALFA/DELT+6./DELT**2                                        LAC1 170
      C1=1.+3.*BETA/DELT                                                LAC1 180
      C1=1./C1                                                          LAC1 190
      C2=C0*C1                                                          LAC1 200
      C3=ALFA-C2*BETA                                                   LAC1 210
C
C     CALCULATE INITIAL ACCELERATIONS
C
      K=1                                                               LAC1 220
      DO 12 I=1,MSS                                                     LAC1 230
   12 FPDD(I)=0.                                                        LAC1 240
      DO 13 I=1,MSTC                                                    LAC1 250
      VELO(I)=0.                                                        LAC1 260
   13 DFDO(I)=0.                                                        LAC1 270
      ED=0.                                                             LAC1 280
      EP=0.                                                             LAC1 290
      VELX=0.                                                           LAC1 300
      VELY=0.                                                           LAC1 310
      VELZ=0.                                                           LAC1 320
      ACCX=PA(2,1)*CX                                                   LAC1 330
      ACCY=PA(3,1)*CY                                                   LAC1 340
      ACCZ=PA(4,1)*CZ                                                   LAC1 350
      DO 150 I=1,MCTS                                                   LAC1 360
  150 ACCER(I)=-PA(4,1)*CZ                                              LAC1 370
      DO 160 J=1,MST                                                    LAC1 380
      J1=3*(J-1)                                                        LAC1 390
      ACCER(MCTS+J1+1)=-PA(2,1)*CX                                      LAC1 400
      ACCER(MCTS+J1+2)=-PA(3,1)*CY                                      LAC1 410
  160 ACCER(MCTS+J1+3)=0.                                               LAC1 420
      XCOM1=-ACCER(1)                                                   LAC1 430
      FXO=PA(2,1)                                                       LAC1 440
      FYO=PA(3,1)                                                       LAC1 450
      FZO=PA(4,1)                                                       LAC1 460
C
C     FORM EFFECTIVE STIFFNESS MATRIX
C
   19 IF(KSAME.EQ.1) GO TO 20                                           LAC1 470
      XCOM=XCOM1                                                        LAC1 480
      VELX1=VELX                                                        LAC1 490
      VELY1=VELY                                                        LAC1 500
      VELZ1=VELZ                                                        LAC1 510
   20 DO 40 I=1,MSS                                                     LAC1 520
      DO 40 J=1,MSS                                                     LAC1 530
   40 S(I+MCTS,J+MCTS)=S(I+MCTS,J+MCTS)+386.4*SG(I,J)+XCOM*SG(I,J)      LAC1 540
      DO 50 I=1,MCTS                                                    LAC1 550
   50 S(I,I)=S(I,I)+C2*AMA(I+MCTS)                                      LAC1 560
      DO 100 J=1,MST                                                    LAC1 570
      J1=3*(J-1)                                                        LAC1 580
      S(MCTS+3+J1,MCTS+3+J1)=S(MCTS+3+J1,MCTS+3+J1)+C2*A(J,4)           LAC1 590
      DO 100 KK=1,2                                                     LAC1 600
  100 S(MCTS+J1+KK,MCTS+J1+KK)=S(MCTS+J1+KK,MCTS+J1+KK)+C2*A(J,3)       LAC1 610
C
C     TRIANGULARIZE EFFECTIVE STIFFNESS MATRIX
C
      N1=MSTC-1                                                         LAC1 620
      DO 170 I=1,N1                                                     LAC1 630
      L=I+1                                                             LAC1 640
      DO 170 J=L,MSTC                                                   LAC1 650
      S(I,J)=S(I,J)/S(I,I)                                              LAC1 660
```

```
      C=S(I,J)                                                          LAC1 670
      DO 170 KK=L,MSTC                                                  LAC1 680
  170 S(KK,J)=S(KK,J)-S(KK,I)*C                                         LAC1 690
C
C     FORM EFFECTIVE ACCELERATION VECTOR
C     FIND GROUND DISPLACEMENTS
C
      IF(KSAME.EQ.1) GO TO 191                                          LAC1 700
      DO 110 I=1,MSTC                                                   LAC1 710
      AA(I)=6.*VELO(I)/DELT+3.*ACCER(I)                                 LAC1 720
  110 BB(I)=3.*VELO(I)+DELT*ACCER(I)/2.                                 LAC1 730
      TAU=TT                                                            LAC1 740
  180 IF(TAU.GE.PA(1,K).AND.TAU.LT.PA(1,K+1)) GO TO 190                 LAC1 750
      K=K+1                                                             LAC1 760
      GO TO 180                                                         LAC1 770
  190 D=PA(1,K+1)-PA(1,K)                                               LAC1 780
      DX=PA(2,K+1)-PA(2,K)                                              LAC1 790
      DY=PA(3,K+1)-PA(3,K)                                              LAC1 800
      DZ=PA(4,K+1)-PA(4,K)                                              LAC1 810
      DDT=TAU-PA(1,K)                                                   LAC1 820
      FX=PA(2,K)+DDT*DX/D                                               LAC1 830
      FY=PA(3,K)+DDT*DY/D                                               LAC1 840
      FZ=PA(4,K)+DDT*DZ/D                                               LAC1 850
      FXD=FX-FX0                                                        LAC1 860
      FYD=FY-FY0                                                        LAC1 870
      FZD=FZ-FZ0                                                        LAC1 880
      FX0=FX                                                            LAC1 890
      FY0=FY                                                            LAC1 900
      FZ0=FZ                                                            LAC1 910
      XCOM1=FZ*CZ                                                       LAC1 920
C
      DISX=VELX*DELT+(DELT**2)*(2.*ACCX+FX*CX)/6.                       LAC1 930
      DISY=VELY*DELT+(DELT**2)*(2.*ACCY+FY*CY)/6.                       LAC1 940
      DISZ=VELZ*DELT+(DELT**2)*(2.*ACCZ+FZ*CZ)/6.                       LAC1 950
      VELX=VELX+DELT*(ACCX+FX*CX)/2.                                    LAC1 960
      VELY=VELY+DELT*(ACCY+FY*CY)/2.                                    LAC1 970
      VELZ=VELZ+DELT*(ACCZ+FZ*CZ)/2.                                    LAC1 980
      ACCX=FX*CX                                                        LAC1 990
      ACCY=FY*CY                                                        LAC11000
      ACCZ=FZ*CZ                                                        LAC11010
C
  191 DO 200 I=1,MCTS                                                   LAC11020
  200 B(I)=AMA(I+MCTS)*(-CZ*FZD+AA(I)+C3*BB(I))                         LAC11030
      DO 210 J=1,MST                                                    LAC11040
      J1=3*(J-1)                                                        LAC11050
      B(MCTS+J1+1)=A(J,3)*(-CX*FXD+AA(MCTS+J1+1)+C3*BB(MCTS+J1+1))      LAC11060
      B(MCTS+J1+2)=A(J,3)*(-CY*FYD+AA(MCTS+J1+2)+C3*BB(MCTS+J1+2))      LAC11070
  210 B(MCTS+J1+3)=A(J,4)*(AA(MCTS+J1+3)+C3*BB(MCTS+J1+3))              LAC11080
C
C     ADD UNBALANCE FORCES TO DYNAMIC LOAD
C
      IF(KKBAL.EQ.0) GO TO 213                                          LAC11090
      DO 211 I=1,MST                                                    LAC11100
      I1=3*(I-1)                                                        LAC11110
      B(MCTS+I1+1)=B(MCTS+I1+1)+DD(1,I)                                 LAC11120
      B(MCTS+I1+2)=B(MCTS+I1+2)+DD(2,I)                                 LAC11130
      B(MCTS+I1+3)=B(MCTS+I1+3)+DD(3,I)                                 LAC11140
      IF(I.EQ.MST) GO TO 211                                            LAC11150
      B(MCTS+I1+4)=B(MCTS+I1+4)-DD(1,I)                                 LAC11160
      B(MCTS+I1+5)=B(MCTS+I1+5)-DD(2,I)                                 LAC11170
      B(MCTS+I1+6)=B(MCTS+I1+6)+DD(3,I)                                 LAC11180
  211 CONTINUE                                                          LAC11190
C
C     CALCULATE DISPLACEMENTS,VELOCITIES AND ACCELERATIONS
C
  213 DO 220 I=1,N1                                                     LAC11200
      B(I)=B(I)/S(I,I)                                                  LAC11210
      L=I+1                                                             LAC11220
      DO 220 J=L,MSTC                                                   LAC11230
  220 B(J)=B(J)-S(J,I)*B(I)                                             LAC11240
      B(MSTC)=B(MSTC)/S(MSTC,MSTC)                                      LAC11250
      NN=MSTC                                                           LAC11260
  230 NN=NN-1                                                           LAC11270
      IF(NN) 240,270,240                                                LAC11280
  240 DO 260 KK=2,MSTC                                                  LAC11290
      L=NN+KK-1                                                         LAC11300
      IF(MSTC-L) 260,250,250                                            LAC11310
  250 B(NN)=B(NN)-S(NN,L)*B(L)                                          LAC11320
  260 CONTINUE                                                          LAC11330
      GO TO 230                                                         LAC11340
  270 CONTINUE                                                          LAC11350
      DO 120 I=1,MSTC                                                   LAC11360
      X0(I,1)=C1*B(I)+C1*BETA*BB(I)                                     LAC11370
      X1(I)=3.*X0(I,1)/DELT-BB(I)                                       LAC11380
  120 X2(I)=6.*X0(I,1)/DELT**2-AA(I)                                    LAC11390
C
C     DAMPING ENERGIES
C
      IF(ALFA.EQ.0.AND.BETA.EQ.0) GO TO 130                             LAC11400
      IF(JDYN.EQ.1) GO TO 271                                           LAC11410
      IF(KSAME.EQ.0.OR.NCHNG.EQ.0) GO TO 124                            LAC11420
  271 DO 121 I=1,MSTC                                                   LAC11430
      DO 121 J=1,MSTC                                                   LAC11440
  121 SC(I,J)=SU(I,J)                                                   LAC11450
      DO 135 I=1,MSS                                                    LAC11460
      DO 135 J=1,MSS                                                    LAC11470
  135 SC(I+MCTS,J+MCTS)=SC(I+MCTS,J+MCTS)+386.4*SG(I,J)+XCOM*SG(I,J)    LAC11480
      DO 136 I=1,MSTC                                                   LAC11490
      DO 136 J=1,MSTC                                                   LAC11500
  136 SC(I,J)=SC(I,J)*BETA                                              LAC11510
      DO 122 I=1,MCTS                                                   LAC11520
  122 SC(I,I)=SC(I,I)+ALFA*AMA(I+MCTS)                                  LAC11530
      DO 123 J=1,MST                                                    LAC11540
      J1=3*(J-1)                                                        LAC11550
      SC(MCTS+J1+3,MCTS+J1+3)=SC(MCTS+J1+3,MCTS+J1+3)+ALFA*A(J,4)       LAC11560
      DO 123 KK=1,2                                                     LAC11570
  123 SC(MCTS+J1+KK,MCTS+J1+KK)=SC(MCTS+J1+KK,MCTS+J1+KK)+ALFA*A(J,3)   LAC11580
  124 DO 126 I=1,MSTC                                                   LAC11590
  126 DFO(I)=0.                                                         LAC11600
      DO 125 I=1,MSTC                                                   LAC11610
      DO 125 J=1,MSTC                                                   LAC11620
  125 DFO(I)=DFO(I)+SC(I,J)*X1(J)                                       LAC11630
      ED=0.                                                             LAC11640
      DO 127 I=1,MCTS                                                   LAC11650
  127 ED=ED+0.25*(2.*DFOO(I)+DFO(I))*(2.*VELO(I)+VELZ1+X1(I)+VELZ)*DELT LAC11660
      DO 128 I=1,MST                                                    LAC11670
      J1=3*(I-1)                                                        LAC11680
      ED=ED+0.25*(2.*DFOO(MCTS+J1+3)+DFO(MCTS+J1+3))*(2.*VELO(MCTS+J1+3)LAC11690
     1+X1(MCTS+J1+3))*DELT                                              LAC11700
      ED=ED+0.25*(2.*DFOO(MCTS+J1+1)+DFO(MCTS+J1+1))*(2.*VELO(MCTS+J1+1)LAC11710
     1+VELX1+X1(MCTS+J1+1)+VELX)*DELT                                   LAC11720
  128 ED=ED+0.25*(2.*DFOO(MCTS+J1+2)+DFO(MCTS+J1+2))*(2.*VELO(MCTS+J1+2)LAC11730
     1+VELY1+X1(MCTS+J1+2)+VELY)*DELT                                   LAC11740
C
C     P-DELT EFFECT ENERGIES
C
  130 IF(AMA(1).EQ.0) RETURN                                            LAC11750
      DO 131 I=1,MSS                                                    LAC11760
  131 FPD(I)=0.                                                         LAC11770
      DO 132 I=1,MSS                                                    LAC11780
      DO 132 J=1,MSS                                                    LAC11790
  132 S(I,J)=SG(I,J)*386.4+XCOM*SG(I,J)                                 LAC11800
      DO 133 I=1,MSS                                                    LAC11810
      DO 133 J=1,MSS                                                    LAC11820
  133 FPD(I)=FPD(I)-S(I,J)*XO(J+MCTS,1)                                 LAC11830
      EP=0.                                                             LAC11840
      DO 134 I=1,MST                                                    LAC11850
      J1=3*(I-1)                                                        LAC11860
  134 EP=EP+0.5*((2.*FPDD(J1+3)+FPD(J1+3))*(XO(MCTS+J1+3,1)             LAC11870
     1+(2.*FPDD(J1+1)+FPD(J1+1))*(XO(MCTS+J1+1,1)+DISX)                 LAC11880
     2+(2.*FPDD(J1+2)+FPD(J1+2))*(XO(MCTS+J1+2,1)+DISY))                LAC11890
C
      RETURN                                                            LAC11900
      END                                                               LAC11910
C
C
C
      SUBROUTINE LAC2(JDYN,MSS,MCTS,MST,MSTC,DISX,DISY,DISZ,VELX,VELY,  LAC2  10
     1VELZ,NCHNG,KKBAL,NC)                                              LAC2  20
C
C     IMPROVED STEP-BY-STEP INTEGRATION METHOD
C
      IMPLICIT REAL*8(A-H,O-Z)                                          LAC2  30
      COMMON/DATA6/PLOAD(100),A(10,14),AMA(200),IF,IFC,X11,Y1,ANG       LAC2  40
      COMMON/DATA7/PA(4,900)                                            LAC2  50
      COMMON/STIF1/SU(130,130),SG(30,30)                                LAC2  60
      COMMON/TRAN1/DKIT(10,1,2),AAKIT(1,6),X0(130,5)                    LAC2  70
      COMMON/DYN1/ACCER(130),VELO(130),X1(130),X2(130)                  LAC2  80
      COMMON/DYNR/DELT,ALFA,BETA,CX,CY,CZ,XCOM,TT,NPC,KCSM,KCSMT,KSAME  LAC2  90
      COMMON/ENG/ FPD(30),FPDD(30),DFO(130),DFOO(130),ED,EP             LAC2 100
      COMMON/SHER4/DD(3,10)                                             LAC2 110
      DIMENSION AA(130),BB(130),B(130),S(130,130),SC(130,130)           LAC2 120
C
      DO 11 I=1,MSTC                                                    LAC2 130
      DO 11 J=1,MSTC                                                    LAC2 140
   11 S(I,J)=SU(I,J)                                                    LAC2 150
      IF(JDYN.NE.1) GO TO 19                                            LAC2 160
C
C     CALCULATE DAMPING CONSTANTS
C
      C0=1.5*ALFA/DELT+1.5/DELT**2                                      LAC2 170
      C1=1.+1.5*BETA/DELT                                               LAC2 180
      C1=1./C1                                                          LAC2 190
      C2=C0*C1                                                          LAC2 200
      C3=ALFA-C2*BETA                                                   LAC2 210
```

```
C
C     CALCULATE INITIAL ACCELERATIONS
C
      K=1                                                              LAC2 220
      DO 12 I=1,MSS                                                    LAC2 230
   12 FPDD(I)=0.                                                       LAC2 240
      DO 13 I=1,MSTC                                                   LAC2 250
      VELO(I)=0.                                                       LAC2 260
   13 DFDD(I)=0.                                                       LAC2 270
      ED=0.                                                            LAC2 280
      EP=0.                                                            LAC2 290
      VELX=0.                                                          LAC2 300
      VELY=0.                                                          LAC2 310
      VELZ=0.                                                          LAC2 320
      ACCX=PA(2,1)*CX                                                  LAC2 330
      ACCY=PA(3,1)*CY                                                  LAC2 340
      ACCZ=PA(4,1)*CZ                                                  LAC2 350
      DO 150 I=1,MCTS                                                  LAC2 360
  150 ACCER(I)=-PA(4,1)*CZ                                             LAC2 370
      DO 160 J=1,MST                                                   LAC2 380
      J1=3*(J-1)                                                       LAC2 390
      ACCER(MCTS+J1+1)=-PA(2,1)*CX                                     LAC2 400
      ACCER(MCTS+J1+2)=-PA(3,1)*CY                                     LAC2 410
  160 ACCER(MCTS+J1+3)=0.                                              LAC2 420
      XCOM1=-ACCER(1)                                                  LAC2 430
      FXO=PA(2,1)                                                      LAC2 440
      FYO=PA(3,1)                                                      LAC2 450
      FZO=PA(4,1)                                                      LAC2 460
C
C     FORM EFFECTIVE STIFFNESS MATRIX
C
   19 IF(KSAME.EQ.1) GO TO 20                                          LAC2 470
      XCOM=XCOM1                                                       LAC2 480
      VELX1=VELX                                                       LAC2 490
      VELY1=VELY                                                       LAC2 500
      VELZ1=VELZ                                                       LAC2 510
   20 DO 40 I=1,MSS                                                    LAC2 520
      DO 40 J=1,MSS                                                    LAC2 530
   40 S(I+MCTS,J+MCTS)=S(I+MCTS,J+MCTS)+386.4*SG(I,J)+XCOM*SG(I,J)     LAC2 540
      DO 50 I=1,MCTS                                                   LAC2 550
   50 S(I,I)=S(I,I)+C2*AMA(I+MCTS)                                     LAC2 560
      DO 100 J=1,MST                                                   LAC2 570
      J1=3*(J-1)                                                       LAC2 580
      S(MCTS+3+J1,MCTS+3+J1)=S(MCTS+3+J1,MCTS+3+J1)+C2*A(J,4)          LAC2 590
      DO 100 KK=1,2                                                    LAC2 600
  100 S(MCTS+J1+KK,MCTS+J1+KK)=S(MCTS+J1+KK,MCTS+J1+KK)+C2*A(J,3)      LAC2 610
C
C     TRIANGULARIZE EFFECTIVE STIFFNESS MATRIX
C
      N1=MSTC-1                                                        LAC2 620
      DO 170 I=1,N1                                                    LAC2 630
      L=I+1                                                            LAC2 640
      DO 170 J=L,MSTC                                                  LAC2 650
      S(I,J)=S(I,J)/S(I,I)                                             LAC2 660
      C=S(I,J)                                                         LAC2 670
      DO 170 KK=L,MSTC                                                 LAC2 680
  170 S(KK,J)=S(KK,J)-S(KK,I)*C                                        LAC2 690
C
C     FORM EFFECTIVE ACCELERATION VECTOR
C     FIND GROUND DISPLACEMENTS
C
      IF(KSAME.EQ.1) GO TO 191                                         LAC2 700
      DO 110 I=1,MSTC                                                  LAC2 710
      AA(I)=3.*VELO(I)/DELT+3.*ACCER(I)                                LAC2 720
  110 BB(I)=3.*VELO(I)+DELT*ACCER(I)                                   LAC2 730
      TAU=TT+DELT                                                      LAC2 740
  180 IF(TAU.GE.PA(1,K).AND.TAU.LT.PA(1,K+1)) GO TO 190                LAC2 750
      K=K+1                                                            LAC2 760
      GO TO 180                                                        LAC2 770
  190 D=PA(1,K+1)-PA(1,K)                                              LAC2 780
      DX=PA(2,K+1)-PA(2,K)                                             LAC2 790
      DY=PA(3,K+1)-PA(3,K)                                             LAC2 800
      DZ=PA(4,K+1)-PA(4,K)                                             LAC2 810
      DDT=TAU-PA(1,K)                                                  LAC2 820
      FX=PA(2,K)+DDT*DX/D                                              LAC2 830
      FY=PA(3,K)+DDT*DY/D                                              LAC2 840
      FZ=PA(4,K)+DDT*DZ/D                                              LAC2 850
      FXD=FX-FXO                                                       LAC2 860
      FYD=FY-FYO                                                       LAC2 870
      FZD=FZ-FZO                                                       LAC2 880
      FXO=FX-FXD/2.                                                    LAC2 890
      FYO=FY-FYD/2.                                                    LAC2 900
      FZO=FZ-FZD/2.                                                    LAC2 910
      XCOM1=FZO*CZ                                                     LAC2 920
C
      DISX=VELX*DELT+(DELT**2)*(5.*ACCX+FX*CX)/12.                     LAC2 930
      DISY=VELY*DELT+(DELT**2)*(5.*ACCY+FY*CY)/12.                     LAC2 940
      DISZ=VELZ*DELT+(DELT**2)*(5.*ACCZ+FZ*CZ)/12.                     LAC2 950
      VELX=VELX+DELT*(3.*ACCX+FX*CX)/4.                                LAC2 960
      VELY=VELY+DELT*(3.*ACCY+FY*CY)/4.                                LAC2 970
      VELZ=VELZ+DELT*(3.*ACCZ+FZ*CZ)/4.                                LAC2 980
      ACCX=FXO*CX                                                      LAC2 990
      ACCY=FYO*CY                                                      LAC21000
      ACCZ=FZO*CZ                                                      LAC21010
C
  191 DO 200 I=1,MCTS                                                  LAC21020
  200 B(I)=AMA(I+MCTS)*(-CZ*FZO+AA(I)+C3*BB(I))                        LAC21030
      DO 210 J=1,MST                                                   LAC21040
      J1=3*(J-1)                                                       LAC21050
      B(MCTS+J1+1)=A(J,3)*(-CX*FXD+AA(MCTS+J1+1)+C3*BB(MCTS+J1+1))     LAC21060
      B(MCTS+J1+2)=A(J,3)*(-CY*FYD+AA(MCTS+J1+2)+C3*BB(MCTS+J1+2))     LAC21070
  210 B(MCTS+J1+3)=A(J,4)*(AA(MCTS+J1+3)+C3*BB(MCTS+J1+3))             LAC21080
C
C     ADD UNBALANCE FORCES TO DYNAMIC LOAD
C
      IF(KKBAL.EQ.0) GO TO 213                                         LAC21090
      DO 211 I=1,MST                                                   LAC21100
      I1=3*(I-1)                                                       LAC21110
      B(MCTS+I1+1)=B(MCTS+I1+1)+DD(1,I)                                LAC21120
      B(MCTS+I1+2)=B(MCTS+I1+2)+DD(2,I)                                LAC21130
      B(MCTS+I1+3)=B(MCTS+I1+3)+DD(3,I)                                LAC21140
      IF(I.EQ.MST) GO TO 211                                           LAC21150
      B(MCTS+I1+4)=B(MCTS+I1+4)-DD(1,I)                                LAC21160
      B(MCTS+I1+5)=B(MCTS+I1+5)-DD(2,I)                                LAC21170
      B(MCTS+I1+6)=B(MCTS+I1+6)+DD(3,I)                                LAC21180
  211 CONTINUE                                                         LAC21190
C
C     CALCULATE DISPLACEMENTS,VELOCITIES AND ACCELERATIONS
C
  213 DO 220 I=1,N1                                                    LAC21200
      B(I)=B(I)/S(I,I)                                                 LAC21210
      L=I+1                                                            LAC21220
      DO 220 J=L,MSTC                                                  LAC21230
  220 B(J)=B(J)-S(J,I)*B(I)                                            LAC21240
      B(MSTC)=B(MSTC)/S(MSTC,MSTC)                                     LAC21250
      NN=MSTC                                                          LAC21260
  230 NN=NN-1                                                          LAC21270
      IF(NN) 240,270,240                                               LAC21280
  240 DO 260 KK=2,MSTC                                                 LAC21290
      L=NN+KK-1                                                        LAC21300
      IF(MSTC-L) 260,250,250                                           LAC21310
  250 B(NN)=B(NN)-S(NN,L)*B(L)                                         LAC21320
  260 CONTINUE                                                         LAC21330
      GO TO 230                                                        LAC21340
  270 CONTINUE                                                         LAC21350
      DO 120 I=1,MSTC                                                  LAC21360
      B(I)=C1*B(I)+C1*BETA*BB(I)                                       LAC21370
      ACTEMP=1.5*B(I)/DELT**2-AA(I)                                    LAC21380
      XQ(I,1)=(ACTEMP*6.*ACCER(I))*DELT**2/12.+VELO(I)*DELT            LAC21390
      X1(I)=(ACTEMP+4.*ACCER(I))*DELT/4.                               LAC21400
  120 X2(I)=0.5*ACTEMP                                                 LAC21410
C
      RETURN                                                           LAC21420
      END                                                              LAC21430


      SUBROUTINE REFDSP(MLD,NFS,MST,NS,NC,MCTS,IS,I3)                  REFD  10
C
C     TRANSFER DISPLACEMENTS FROM MASS CENTER TO FRAME REF.
C
      IMPLICIT REAL*8(A-H,O-Z)                                         REFD  20
      COMMON/TRAN1/D(10,1,2),A(1,6),R(130,6)                           REFD  30
      COMMON/JUNK/ AI(3,3),AJ(3,5)                                     REFD  40
      DIMENSION RF(30,6)                                               REFD  50
C
C     SET TRANSFORMATION PARAMETERS
C
      I=1                                                              REFD  60
      DO 25 L=1,3                                                      REFD  70
      DO 25 J=1,3                                                      REFD  80
   25 AI(L,J)=0.                                                       REFD  90
C
      IF=A(I,1)                                                        REFD 100
      IFC=A(I,2)                                                       REFD 110
      AI(1,1)=A(I,3)                                                   REFD 120
      AI(1,2)=A(I,4)                                                   REFD 130
      AI(2,2)=A(I,1)                                                   REFD 140
      AI(2,1)=-AI(1,2)                                                 REFD 150
      NT=A(I,5)                                                        REFD 160
      NC=A(I,6)                                                        REFD 170
      AI(3,3)=1.                                                       REFD 180
C
C     TRANSFER REF. FLOOR BY FLOOR
C
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      NS=MST+1-NT                                                       REFD 190
      NSNC=NS*NC                                                        REFD 200
      NFR=NS*3                                                          REFD 210
      DO 300 N=NT,MST                                                   REFD 220
      NN=(N-NT)*13+MCTS                                                 REFD 230
      N1=(N- 1)*3                                                       REFD 240
      AI( 1,3)=D(N,I,1)                                                 REFD 250
      AI( 2,3)=D(N,I,2)                                                 REFD 260
      DO 225 II=1,3                                                     REFD 270
      DO 225 L=1,MLD                                                    REFD 280
      RF(N1+II,L)=0.                                                    REFD 290
      DO 225 KK=1,13                                                    REFD 300
      K1=KK+1S                                                          REFD 310
  225 RF(N1+II,L)=RF(N1+II,L)+AI(II,K1)*R(NN+KK,L)                      REFD 320
  300 CONTINUE                                                          REFD 330
C
      DO 310 J=1,MLD                                                    REFD 340
      DO 310 K=1,NFS                                                    REFD 350
  310 R(MCTS+K,J)=RF(K,J)                                               REFD 360
C
      RETURN                                                            REFD 370
      END                                                               REFD 380


      SUBROUTINE FORCES(MLD,NC,NS,MM,MN,NN,ISTAT,LS,NNM,NST,NCP,        FORC  10
     1NBP,NB,NPAN,NTRU,NLD,RLAB)                                        FORC  20
C
CCC   COMPUTE STATIC AND DYNAMIC MEMBER FORCES
CCC   CHECK SWITCH CURVE OF STEEL MEMBER
C
      IMPLICIT REAL*8(A-H,O-Z)                                          FORC  30
      COMMON/DATA1/CLN(10,2),CP(16,40),BP(11,20),FEF(7,10),LB(10,13,3),LFORC  40
     10B(10,13,3),LC(10,10,2),LP(3,20),IFEF(2),PP(16,20),LT(3,40),TP(2,4FORC  50
     20)                                                                FORC  60
      COMMON/DATA2/COLUM1(10,10,10),BEAM1(5,13,10)                      FORC  70
      COMMON/DATA3/COLUM2(8,10,10),BEAM2(3,13,10),PANEL2(4,20),DIAGO(4,4FORC  80
     10)                                                                FORC  90
      COMMON/DATA4/COLUM3(14,10,10),BEAM3(6,13,10),PANEL3(4,20),DISP(6, FORC 100
     110)                                                               FORC 110
      COMMON/DATA5/COCOL(9,10,10),COBM(5,13,10),COPAN(5,20),CODIA(2,40) FORC 120
      COMMON/DATA6/PLOAD(100),SD(10,14),AMA(200),IFFO,IFCFO,X1FO,Y1FO,ANFORC 130
     1GFO                                                               FORC 140
      COMMON/DATA8/CDIS(6,10,10),BDIS(3,13,10),DDIS(1,40),PDIS(3,20)    FORC 150
      COMMON/FORM4/S(210,10),C(20,20,10),E(20,143,10),KH(183,10),RF4(20,FORC 160
     13,10)                                                             FORC 170
      COMMON/TRAN1/DKIT(10,1,2),AAKIT(1,6),U(130,6)                     FORC 180
      COMMON/NEW/R(183,6),XM(6,10),FM(8)                                FORC 190
      COMMON/JUNK/FHED(4),IF,IFC,ND,NF,LM(12),F(8,8),Q(3,3),P(8),PMIN(8)FORC 200
      COMMON/STIF/ ASA(12,12),SA(8,12),T(8,12),TAC(8,12,10,10),TAB(3,6, FORC 210
     113,10),TAD(1,8,40),TAP(4,10,20)                                  FORC 220
      COMMON/DYNR/DELT,ALFA,BETA,CX,CY,CZ,XCOM,TT,NPC,KCSM,KCSMT,KSAME  FORC 230
      COMMON/DUCT1/ CRVES(4,10,10),BRVES(2,13,10),NELAS                 FORC 240
      DIMENSION RLAB(3)                                                 FORC 250
C
CCC   SET FOUNDATION DISPLACEMENTS AND FRAME DISPLACEMENTS
C
      KCSM=0                                                            FORC 260
      NBKS=3                                                            FORC 270
      NSNC=NS*NC                                                        FORC 280
      NS3=3*NS                                                          FORC 290
      KL=MM+1                                                           FORC 300
      DO 475 L=1,MLD                                                    FORC 310
      DO 425 K=1,MN                                                     FORC 320
  425 R(K,L)=0.0                                                        FORC 330
      DO 450 N=1,NSNC                                                   FORC 340
      KK=MN+N                                                           FORC 350
  450 R(KK,L)=U(N,L)                                                    FORC 360
      DO 460 N=1,NC                                                     FORC 370
      KKK=KK+N                                                          FORC 380
  460 R(KKK,L)=0.                                                       FORC 390
      DO 470 N=1,NS3                                                    FORC 400
      KM=KKK+N                                                          FORC 410
  470 R(KM,L)=U(NSNC+N,L)                                               FORC 420
      DO 471 N=1,3                                                      FORC 430
  471 R(KM+N,L)=0.                                                      FORC 440
  475 CONTINUE                                                          FORC 450
C
CCC   STORY BY STORY  CALCULATION OF MEMBER FORCES
C
      N=NS                                                              FORC 460
C
CCC   CALCULATE ROTATIONAL DISPLACEMENTS AT LEVEL N
C
  300 IF(ISTAT.NE.1) GO TO 303                                          FORC 470
      DO 301 I=1,MM                                                     FORC 480
      DO 301 J=1,3                                                      FORC 490
  301 R(I,J)=RF4(I,J,N)                                                 FORC 500
  303 MMP=MM+1                                                          FORC 510
      DO 400 L=1,MLD                                                    FORC 520
      DO 401 J=MMP,NN                                                   FORC 530
      KF=KH(J,N)                                                        FORC 540
      IF (KF.GT.MM) GO TO 401                                           FORC 550
      IF (J.GT.MN) GO TO 402                                            FORC 560
      DO 403 K=KF,MM                                                    FORC 570
  403 R(K,L)=R(K,L)-C(K,J-MM,N)*R(J,L)                                  FORC 580
      GO TO 401                                                         FORC 590
  402 DO 404 K=KF,MM                                                    FORC 600
  404 R(K,L)=R(K,L)-E(K,J-MN,N)*R(J,L)                                  FORC 610
  401 CONTINUE                                                          FORC 620
      IB=LS                                                             FORC 630
      DO 400 II=1,MM                                                    FORC 640
      I=MM+1-II                                                         FORC 650
      KK=I-1                                                            FORC 660
      KF=KH(I,N)                                                        FORC 670
      IB=IB-1                                                           FORC 680
      IF (KF.GT.KK) GO TO 400                                           FORC 690
      DO 405 K=KF,KK                                                    FORC 700
  405 R(K,L)=R(K,L)-S(IB+K,N)*R(I,L)                                    FORC 710
  400 CONTINUE                                                          FORC 720
C
CCC   CALCULATE COLUMN FORCES
C
      LV=NS -N+1                                                        FORC 730
      K=NST-NS                                                          FORC 740
      NF=8                                                              FORC 750
      ND=12                                                             FORC 760
      IF(ISTAT.EQ.1) WRITE(6,2009) LV                                   FORC 770
      IF(ISTAT.EQ.1) WRITE(6,2007)                                      FORC 780
      IF(ISTAT.EQ.1) WRITE(6,2001)                                      FORC 790
      DO 500 M=1,NC                                                     FORC 800
      MASC=M+NC*(N-1)                                                   FORC 810
      MC=LC(N,M,1)                                                      FORC 820
      IF(MC.EQ.NCP) GO TO 500                                           FORC 830
      XL =SD(N+K,2)                                                     FORC 840
      KK=LC(N,M,2)                                                      FORC 850
      B1=CLN(KK,1)-CLN(M ,1)                                            FORC 860
      B2=CLN(KK,2)-CLN(M ,2)                                            FORC 870
      B3=B1*B1+B2*B2                                                    FORC 880
      B3=DSQRT(B3)                                                      FORC 890
      IF(B3.LE.0.) STOP1                                                FORC 900
      CSA=B1/B3                                                         FORC 910
      SNA=B2/B3                                                         FORC 920
      XL1=CLN(M ,1)                                                     FORC 930
      YL1=CLN(M ,2)                                                     FORC 940
      DT=CP(8,MC)                                                       FORC 950
      DB=CP(9,MC)                                                       FORC 960
      XLR=XL-DT-DB                                                      FORC 970
      IF(MC.GT.20) XLR=XL                                               FORC 980
      GI=XCOM*AMA(MASC)+386.4*AMA(MASC)                                 FORC 990
      IF(ISTAT.EQ.1) GI=386.4*AMA(MASC)                                 FORC1000
      SG1=GI/XLR                                                        FORC1010
      A=-YL1*SNA-XL1*CSA                                                FORC1020
      B=-YL1*CSA+XL1*SNA                                                FORC1030
      TAC(7,1,M,N)=-SG1*CSA                                             FORC1040
      TAC(7,2,M,N)=-SG1*SNA                                             FORC1050
      TAC(7,3,M,N)=-SG1*B                                               FORC1060
      TAC(7,4,M,N)=0.                                                   FORC1070
      TAC(7,5,M,N)=0.                                                   FORC1080
      TAC(7,6,M,N)=0.                                                   FORC1090
      TAC(7,7,M,N)=SG1*CSA                                              FORC1100
      TAC(7,8,M,N)=SG1*SNA                                              FORC1110
      TAC(7,9,M,N)=SG1*B                                                FORC1120
      TAC(7,10,M,N)=0.                                                  FORC1130
      TAC(7,11,M,N)=0.                                                  FORC1140
      TAC(7,12,M,N)=0.                                                  FORC1150
      TAC(8,1,M,N)=-SG1*SNA                                             FORC1160
      TAC(8,2,M,N)=SG1*CSA                                              FORC1170
      TAC(8,3,M,N)=-SG1*A                                               FORC1180
      TAC(8,4,M,N)=0.                                                   FORC1190
      TAC(8,5,M,N)=0.                                                   FORC1200
      TAC(8,6,M,N)=0.                                                   FORC1210
      TAC(8,7,M,N)=SG1*SNA                                              FORC1220
      TAC(8,8,M,N)=-SG1*CSA                                             FORC1230
      TAC(8,9,M,N)=SG1*A                                                FORC1240
      TAC(8,10,M,N)=0.                                                  FORC1250
      TAC(8,11,M,N)=0.                                                  FORC1260
      TAC(8,12,M,N)=0.                                                  FORC1270
C
  312 LM(6)=4*NC+M+NC*(N-1)                                             FORC1280
      LM(5)=2*M                                                         FORC1290
      LM(4)=LM(5)-1                                                     FORC1300
      LM(11)=LM(5)+2*NC                                                 FORC1310
      LM(10)=LM(4)+2*NC                                                 FORC1320
      LM(12)=LM(6)+NC                                                   FORC1330
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      LM(3)=5*NC+NS*NC+3*N                                              FORC1340
      LM(2)=LM(3)-1                                                     FORC1350
      LM(1)=LM(2)-1                                                     FORC1360
      LM( 9)=LM(3)+3                                                    FORC1370
      LM(8)=LM( 9)-1                                                    FORC1380
      LM(7)=LM(8)-1                                                     FORC1390
      CALL REFROT(1,NN,NLD,MLD,M,N,ISTAT,B1,B2,XLR,SNA,CSA)             FORC1400
C
      IF(B1.GE.0.AND.B2.GE.0) GO TO 313                                 FORC1410
      FM(2)=-FM(2)                                                      FORC1420
      FM(3)=-FM(3)                                                      FORC1430
      FM(5)=-FM(5)                                                      FORC1440
      FM(6)=-FM(6)                                                      FORC1450
      FM(7)=-FM(7)                                                      FORC1460
      FM(8)=-FM(8)                                                      FORC1470
  313 CDIS(1,M,N)=FM(1)                                                 FORC1480
      CDIS(2,M,N)=FM(2)                                                 FORC1490
      CDIS(3,M,N)=FM(3)                                                 FORC1500
      CDIS(4,M,N)=FM(4)                                                 FORC1510
      CDIS(5,M,N)=FM(5)                                                 FORC1520
      CDIS(6,M,N)=FM(6)                                                 FORC1530
      FM(1)=COCOL(1,M,N)*CDIS(1,M,N)                                    FORC1540
      FM(2)=COCOL(2,M,N)*CDIS(2,M,N)+COCOL(3,M,N)*CDIS(3,M,N)           FORC1550
      FM(3)=COCOL(3,M,N)*CDIS(2,M,N)+COCOL(4,M,N)*CDIS(3,M,N)           FORC1560
      FM(4)=COCOL(5,M,N)*CDIS(4,M,N)                                    FORC1570
      FM(5)=COCOL(6,M,N)*CDIS(5,M,N)+COCOL(7,M,N)*CDIS(6,M,N)           FORC1580
      FM(6)=COCOL(7,M,N)*CDIS(5,M,N)+COCOL(8,M,N)*CDIS(6,M,N)           FORC1590
      FM(7)=(FM(2)+FM(3))/XLR+FM(7)                                     FORC1600
      FM(8)=(FM(5)+FM(6))/XLR-FM(8)                                     FORC1610
      IF(MC.GT.20) GO TO 337                                            FORC1620
C
CC    CHECK SWITCH CURVE OF STEEL COLUMN ELEMENT
C
      IF(COLUM3(11,M,N)*FM(1).GE.0.) GO TO 314                          FORC1630
      COLUM1(10,M,N)=COLUM2(1,M,N)                                      FORC1640
      IF(DABS(COLUM2(1,M,N)).GT.COLUM3(14,M,N))                         FORC1650
     1COLUM3(14,M,N)=DABS(COLUM2(1,M,N))                                FORC1660
      KCSM=1                                                            FORC1670
  314 IF(COLUM3(1,M,N)*FM(2).GE.0.0) GO TO 321                          FORC1680
      CRVES(1,M,N)=1.0                                                  FORC1690
      COLUM1(3,M,N)=COLUM2(2,M,N)                                       FORC1700
      COLUM1(2,M,N)=COLUM2(3,M,N)                                       FORC1710
      IF(DABS(COLUM2(2,M,N)).GT.COLUM3(2,M,N))                          FORC1720
     1COLUM3(2,M,N)=DABS(COLUM2(2,M,N))                                 FORC1730
      KCSM=1                                                            FORC1740
  321 IF(COLUM3(3,M,N)*FM(5).GE.0.0) GO TO 322                          FORC1750
      CRVES(3,M,N)=1.0                                                  FORC1760
      COLUM1(3,M,N)=COLUM2(5,M,N)                                       FORC1770
      COLUM1(4,M,N)=COLUM2(6,M,N)                                       FORC1780
      IF(DABS(COLUM2(5,M,N)).GT.COLUM3(4,M,N))                          FORC1790
     1COLUM3(4,M,N)=DABS(COLUM2(5,M,N))                                 FORC1800
      KCSM=1                                                            FORC1810
  322 IF(COLUM3(5,M,N)*FM(3).GE.0.0) GO TO 323                          FORC1820
      CRVES(2,M,N)=1.0                                                  FORC1830
      COLUM1(5,M,N)=COLUM2(2,M,N)                                       FORC1840
      COLUM1(6,M,N)=COLUM2(3,M,N)                                       FORC1850
      IF(DABS(COLUM2(3,M,N)).GT.COLUM3(6,M,N))                          FORC1860
     1COLUM3(6,M,N)=DABS(COLUM2(3,M,N))                                 FORC1870
      KCSM=1                                                            FORC1880
  323 IF(COLUM3(7,M,N)*FM(6).GE.0.0) GO TO 324                          FORC1890
      CRVES(4,M,N)=1.0                                                  FORC1900
      COLUM1(7,M,N)=COLUM2(5,M,N)                                       FORC1910
      COLUM1(8,M,N)=COLUM2(6,M,N)                                       FORC1920
      IF(DABS(COLUM2(6,M,N)).GT.COLUM3(8,M,N))                          FORC1930
     1COLUM3(8,M,N)=DABS(COLUM2(6,M,N))                                 FORC1940
      KCSM=1                                                            FORC1950
  324 IF(COLUM3(9,M,N)*FM(4).GE.0.0) GO TO 325                          FORC1960
      COLUM1(9,M,N)=COLUM2(4,M,N)                                       FORC1970
      IF(DABS(COLUM2(4,M,N)).GT.COLUM3(10,M,N))                         FORC1980
     1COLUM3(10,M,N)=DABS(COLUM2(4,M,N))                                FORC1990
      KCSM=1                                                            FORC2000
  325 CONTINUE                                                          FORC2010
      IF(COLUM1(1,M,N).EQ.0.0) GO TO 327                                FORC2020
      IF(DABS(COLUM2(2,M,N)+FM(2)).LT.COLUM3(2,M,N)) GO TO 327          FORC2030
      IF(DABS(COLUM2(2,M,N)+0.5*FM(2)).LT.COLUM3(2,M,N)) GO TO 326      FORC2040
      KCSM=2                                                            FORC2050
  326 COLUM1(1,M,N)=0.0                                                 FORC2060
      COLUM1(2,M,N)=0.0                                                 FORC2070
  327 IF(COLUM1(3,M,N).EQ.0.0) GO TO 329                                FORC2080
      IF(DABS(COLUM2(5,M,N)+FM(5)).LT.COLUM3(4,M,N)) GO TO 329          FORC2090
      IF(DABS(COLUM2(5,M,N)+.5*FM(5)).LT.COLUM3(4,M,N)) GO TO 328       FORC2100
      KCSM=2                                                            FORC2110
  328 COLUM1(3,M,N)=0.0                                                 FORC2120
      COLUM1(4,M,N)=0.0                                                 FORC2130
  329 IF(COLUM1(6,M,N).EQ.0.0) GO TO 331                                FORC2140
      IF(DABS(COLUM2(3,M,N)+FM(3)).LT.COLUM3(6,M,N)) GO TO 331          FORC2150
      IF(DABS(COLUM2(3,M,N)+.5*FM(3)).LT.COLUM3(6,M,N)) GO TO 330       FORC2160
      KCSM=2                                                            FORC2170
  330 COLUM1(5,M,N)=0.0                                                 FORC2180
      COLUM1(6,M,N)=0.0                                                 FORC2190
  331 IF(COLUM1(8,M,N).EQ.0.0) GO TO 333                                FORC2200
      IF(DABS(COLUM2(6,M,N)+FM(6)).LT.COLUM3(8,M,N)) GO TO 333          FORC2210
      IF(DABS(COLUM2(6,M,N)+.5*FM(6)).LT.COLUM3(8,M,N)) GO TO 332       FORC2220
      KCSM=2                                                            FORC2230
  332 COLUM1(7,M,N)=0.0                                                 FORC2240
      COLUM1(8,M,N)=0.0                                                 FORC2250
  333 IF(COLUM1(9,M,N).EQ.0.0) GO TO 335                                FORC2260
      IF(DABS(COLUM2(4,M,N)+FM(4)).LT.COLUM3(10,M,N)) GO TO 335         FORC2270
      IF(DABS(COLUM2(4,M,N)+.5*FM(4)).LT.COLUM3(10,M,N)) GO TO 334      FORC2280
      KCSM=2                                                            FORC2290
  334 COLUM1(9,M,N)=0.0                                                 FORC2300
  335 IF(COLUM1(10,M,N).EQ.0.) GO TO 337                                FORC2310
      IF(DABS(COLUM2(1,M,N)+FM(1)).LT.COLUM3(14,M,N)) GO TO 337         FORC2320
      IF(DABS(COLUM2(1,M,N)+.5*FM(1)).LT.COLUM3(14,M,N)) GO TO 336      FORC2330
      KCSM=2                                                            FORC2340
  336 COLUM1(10,M,N)=0.0                                                FORC2350
  337 COCOL(9,M,N)=CHECK                                                FORC2360
      COLUM3(1,M,N)=FM(2)                                               FORC2370
      COLUM3(3,M,N)=FM(5)                                               FORC2380
      COLUM3(9,M,N)=FM(4)                                               FORC2390
      COLUM3(5,M,N)=FM(3)                                               FORC2400
      COLUM3(7,M,N)=FM(6)                                               FORC2410
      COLUM3(11,M,N)=FM(1)                                              FORC2420
      COLUM3(12,M,N)=FM(7)                                              FORC2430
      COLUM3(13,M,N)=FM(8)                                              FORC2440
      IF(ISTAT.EQ.1) WRITE(6,2005)                                      FORC2450
  500 CONTINUE                                                          FORC2460
C
CC    CALCULATE BEAM FORCES
C
      IF(NB.EQ.0) GO TO 565                                             FORC2470
      IF(ISTAT.EQ.1) WRITE(6,2008)                                      FORC2480
      IF(ISTAT.EQ.1) WRITE(6,2002)                                      FORC2490
      NF=3                                                              FORC2500
      NO=6                                                              FORC2510
      DO 600 M=1,NB                                                     FORC2520
      MB=LB(N,M,3)                                                      FORC2530
      IF(MB.EQ.NBP) GO TO 600                                           FORC2540
      K1=LB(N,M,1)                                                      FORC2550
      KJ=LB(N,M,2)                                                      FORC2560
      B1=CLN(KJ,1)-CLN(K1,1)                                            FORC2570
      B2=CLN(KJ,2)-CLN(K1,2)                                            FORC2580
      B3=B1*B1+B2*B2                                                    FORC2590
      B3=DSQRT(B3)                                                      FORC2600
      XL=B3                                                             FORC2610
C
      LM(3)=4*NC+KI+NC*(N-1)                                            FORC2620
      LM(2)=2*KI                                                        FORC2630
      LM(1)=LM(2)-1                                                     FORC2640
      LM( 6)=4*NC+KJ+NC*(N-1)                                           FORC2650
      LM( 5)=2*KJ                                                       FORC2660
      LM(4)=LM( 5)-1                                                    FORC2670
      IF(ISTAT.NE.1) GO TO 547                                          FORC2680
      DO 540 L=1,3                                                      FORC2690
      DO 528 I=1,2                                                      FORC2700
  528 Q(I,L)=0.                                                         FORC2710
      J=LOB(N,M,L)                                                      FORC2720
      IF (J) 540,540,530                                                FORC2730
  530 V=FEF(5,J)*XL/2.                                                  FORC2740
      YM=V*XL/6.                                                        FORC2750
      Q(1,L)= FEF(1,J)+YM                                               FORC2760
      Q(2,L)=-FEF(3,J)-YM                                               FORC2770
  540 Q(3,L)=0.0                                                        FORC2780
  547 CALL REFROT(2,NN,NLD,MLD,M,N,ISTAT,B1,B2,XLR,SNA,CSA)             FORC2790
      BDIS(1,M,N)=FM(1)                                                 FORC2800
      BDIS(2,M,N)=FM(2)                                                 FORC2810
      BDIS(3,M,N)=FM(3)                                                 FORC2820
      FM(1)=COBM(1,M,N)*BDIS(1,M,N)                                     FORC2830
      FM(2)=COBM(2,M,N)*BDIS(2,M,N)+COBM(3,M,N)*BDIS(3,M,N)             FORC2840
      FM(3)=COBM(3,M,N)*BDIS(2,M,N)+COBM(4,M,N)*BDIS(3,M,N)             FORC2850
C
CC    CHECK SWITCH CURVE OF STEEL BEAM ELEMENT
C
      IF(BEAM3(5,M,N)*FM(1).GE.0.) GO TO 549                            FORC2860
      BEAM1(5,M,N)=BEAM2(1,M,N)                                         FORC2870
      IF(DABS(BEAM2(1,M,N)).GT.BEAM3(6,M,N))                            FORC2880
     1BEAM3(6,M,N)=DABS(BEAM2(1,M,N))                                   FORC2890
      KCSM=1                                                            FORC2900
  549 IF(BEAM3(1,M,N)*FM(2).GE.0.0) GO TO 541                           FORC2910
      BRVES(1,M,N)=1.0                                                  FORC2920
      BEAM1(1,M,N)=BEAM2(2,M,N)                                         FORC2930
      BEAM1(2,M,N)=BEAM2(3,M,N)                                         FORC2940
      IF(DABS(BEAM2(2,M,N)).GT.BEAM3(2,M,N)) BEAM3(2,M,N)=DABS(BEAM2(2,MFORC2950
     1,N))                                                              FORC2960
      KCSM=1                                                            FORC2970
  541 IF(BEAM3(3,M,N)*FM(3).GE.0.0) GO TO 542                           FORC2980
```

```
      BRVES(2,M,N)=1.0                                                  FORC2990
      BEAM1(3,M,N)=BEAM2(2,M,N)                                         FORC3000
      BEAM1(4,M,N)=BEAM2(3,M,N)                                         FORC3010
      IF(DABS(BEAM2(3,M,N)).GT.BEAM3(4,M,N)) BEAM3(4,M,N)=DABS(BEAM2(3,M FORC3020
     1,N))                                                              FORC3030
      KCSM=1                                                            FORC3040
  542 CONTINUE                                                          FORC3050
      IF(BEAM1(1,M,N).EQ.0.0) GO TO 544                                 FORC3060
      IF(DABS(BEAM2(2,M,N)+FM(2)).LT.BEAM3(2,M,N)) GO TO 544            FORC3070
      IF(DABS(BEAM2(2,M,N)+.5*FM(2)).LT.BEAM3(2,M,N)) GO TO 543         FORC3080
      KCSM=2                                                            FORC3090
  543 BEAM1(1,M,N)=0.0                                                  FORC3100
      BEAM1(2,M,N)=0.0                                                  FORC3110
  544 IF(BEAM1(4,M,N).EQ.0.0) GO TO 546                                 FORC3120
      IF(DABS(BEAM2(3,M,N)+FM(3)).LT.BEAM3(4,M,N)) GO TO 546            FORC3130
      IF(DABS(BEAM2(3,M,N)+.5*FM(3)).LT.BEAM3(4,M,N)) GO TO 545         FORC3140
      KCSM=2                                                            FORC3150
  545 BEAM1(3,M,N)=0.0                                                  FORC3160
      BEAM1(4,M,N)=0.0                                                  FORC3170
  546 IF(BEAM1(5,M,N).EQ.0.) GO TO 602                                  FORC3180
      IF(DABS(BEAM2(1,M,N)+FM(1)).LT.BEAM3(6,M,N)) GO TO 602            FORC3190
      IF(DABS(BEAM2(1,M,N)+.5*FM(1)).LT.BEAM3(6,M,N)) GO TO 601         FORC3200
      KCSM=2                                                            FORC3210
  601 BEAM1(5,M,N)=0.0                                                  FORC3220
  602 COBM(5,M,N)=CHECK                                                 FORC3230
      BEAM3(1,M,N)=FM(2)                                                FORC3240
      BEAM3(3,M,N)=FM(3)                                                FORC3250
      BEAM3(5,M,N)=FM(1)                                                FORC3260
      IF(ISTAT.EQ.1) WRITE(6,2005)                                      FORC3270
  600 CONTINUE                                                          FORC3280
C
C     CALCULATE PANEL FORCES
C
      IF(NPAN.EQ.0) GO TO 565                                           FORC3290
      DO 770 L=1,NPAN                                                   FORC3300
      NP=NS-LP(1,L)+1                                                   FORC3310
      IF (NP.NE.N) GO TO 770                                            FORC3320
      GO TO 772                                                         FORC3330
  770 CONTINUE                                                          FORC3340
      GO TO 565                                                         FORC3350
  772 IF(ISTAT.EQ.1) WRITE(6,2004)                                      FORC3360
      IF(ISTAT.EQ.1) WRITE(6,2003)                                      FORC3370
      LNF=0                                                             FORC3380
      ND=10                                                             FORC3390
      DO 800 L=1,NPAN                                                   FORC3400
      NF=4                                                              FORC3410
      NP=NS-LP(1,L)+1                                                   FORC3420
      IF(NP.NE.N) GO TO 800                                             FORC3430
  780 IF(LNF.EQ.NF) GO TO 790                                           FORC3440
      LNF=NF                                                            FORC3450
  790 XL=SD(N,2)                                                        FORC3460
      KI=LP(2,L)                                                        FORC3470
      M=KI                                                              FORC3480
      KJ=LP(3,L)                                                        FORC3490
      LOAD1=NC*(NP-1)+KI                                                FORC3500
      LOAD2=NC*(NP-1)+KJ                                                FORC3510
      B1=CLN(KJ,1)-CLN(KI,1)                                            FORC3520
      B2=CLN(KJ,2)-CLN(KI,2)                                            FORC3530
      B3=B1*B1+B2*B2                                                    FORC3540
      B3=DSQRT(B3)                                                      FORC3550
      CSA=B1/B3                                                         FORC3560
      SNA=B2/B3                                                         FORC3570
      AR=CLN(KI,1)*CLN(KJ,2)-CLN(KJ,1)*CLN(KI,2)                       FORC3580
      DF=AR/B3                                                          FORC3590
      D=B3                                                              FORC3600
      G1=(XCOM*386.4)*(AMA(LOAD1)+AMA(LOAD2))                           FORC3610
      IF(ISTAT.EQ.1) G1=386.4*(AMA(LOAD1)+AMA(LOAD2))                   FORC3620
      SG1=G1/XL                                                         FORC3630
      TAP(4,1,L)=-SG1*CSA                                               FORC3640
      TAP(4,2,L)=-SG1*SNA                                               FORC3650
      TAP(4,3,L)=SG1*DF                                                 FORC3660
      TAP(4,4,L)=0.                                                     FORC3670
      TAP(4,5,L)=0.                                                     FORC3680
      TAP(4,6,L)=-TAP(4,1,L)                                            FORC3690
      TAP(4,7,L)=-TAP(4,2,L)                                            FORC3700
      TAP(4,8,L)=-TAP(4,3,L)                                            FORC3710
      TAP(4,9,L)=0.                                                     FORC3720
      TAP(4,10,L)=0.                                                    FORC3730
C
      LM(3)=5*NC+NS*NC+3*N                                              FORC3740
      LM(2)=LM(3)-1                                                     FORC3750
      LM(1)=LM(2)-1                                                     FORC3760
      LM(4)=4*NC+KI+NC*(N-1)                                            FORC3770
      LM(5)=4*NC+KJ+NC*(N-1)                                            FORC3780
      LM(8)=LM(3)+3                                                     FORC3790
      LM(7)=LM(8)-1                                                     FORC3800
      LM(6)=LM(7)-1                                                     FORC3810
      LM(9)=LM(4)+NC                                                    FORC3820
      LM(10)=LM(5)+NC                                                   FORC3830
      CALL REFROT(3,NN,NLD,MLD,L,N,ISTAT,B1,B2,XL,SNA,CSA)              FORC3840
      IF(SNA.GE.CSA) GO TO 100                                          FORC3850
      FM(4)=-FM(4)                                                      FORC3860
  100 PDIS(1,L)=FM(1)                                                   FORC3870
      PDIS(2,L)=FM(2)                                                   FORC3880
      PDIS(3,L)=FM(3)                                                   FORC3890
      FM(1)=COPAN(1,L)*PDIS(1,L)+COPAN(2,L)*PDIS(2,L)                   FORC3900
      FM(2)=COPAN(2,L)*PDIS(1,L)+COPAN(3,L)*PDIS(2,L)                   FORC3910
      FM(3)=COPAN(4,L)*PDIS(3,L)                                        FORC3920
      FM(4)=(FM(1)+FM(2))/XL*FM(4)                                      FORC3930
      PANEL3(1,L)=FM(1)                                                 FORC3940
      PANEL3(2,L)=FM(2)                                                 FORC3950
      PANEL3(3,L)=FM(3)                                                 FORC3960
      PANEL3(4,L)=FM(4)                                                 FORC3970
      IF(ISTAT.EQ.1) WRITE(6,2005)                                      FORC3980
  800 CONTINUE                                                          FORC3990
C
C     CALCULATE BRACE FORCES
C
  565 IF (NTRU.EQ.0) GO TO 690                                          FORC4000
      DO 650 L=1,NTRU                                                   FORC4010
      NP=NS-LT(1,L)+1                                                   FORC4020
      IF(NP.NE.N) GO TO 650                                             FORC4030
      IF(ISTAT.EQ.1) WRITE(6,2006)                                      FORC4040
      GO TO 660                                                         FORC4050
  650 CONTINUE                                                          FORC4060
      GO TO 690                                                         FORC4070
  660 NF=1                                                              FORC4080
      ND=8                                                              FORC4090
      DO 680 L=1,NTRU                                                   FORC4100
      NP=NS-LT(1,L)+1                                                   FORC4110
      IF (NP.NE.N) GO TO 680                                            FORC4120
      KJ=LT(2,L)                                                        FORC4130
      KI=LT(3,L)                                                        FORC4140
C
      LM(3)=5*NC+NS*NC+3*N                                              FORC4150
      LM(2)=LM(3)-1                                                     FORC4160
      LM(1)=LM(2)-1                                                     FORC4170
      LM(4)=4*NC+KJ+NC*(N-1)                                            FORC4180
      LM(7)=LM(3)+3                                                     FORC4190
      LM(6)=LM(7)-1                                                     FORC4200
      LM(5)=LM(6)-1                                                     FORC4210
      LM(8)=5*NC+KI+NC*(N-1)                                            FORC4220
      CALL REFROT(4,NN,NLD,MLD,L,N,ISTAT,B1,B2,XL,SNA,CSA)              FORC4230
      DDIS(1,L)=FM(1)                                                   FORC4240
      FM(1)=CODIA(1,L)*DDIS(1,L)                                        FORC4250
C
C     CHECK SWITCH CURVE OF STEEL BRACE ELEMENT
C
      IF(DIAGO(3,L)*FM(1).GE.0.0) GO TO 661                             FORC4260
      DIAGO(1,L)=DIAGO(2,L)                                             FORC4270
      IF(DABS(DIAGO(2,L)).GT.DIAGO(4,L)) DIAGO(4,L)=DABS(DIAGO(2,L))    FORC4280
      KCSM=1                                                            FORC4290
  661 CONTINUE                                                          FORC4300
      IF(DIAGO(1,L).EQ.0.0) GO TO 663                                   FORC4310
      IF(DABS(DIAGO(2,L)+FM(1)).LT.DIAGO(4,L)) GO TO 663                FORC4320
      IF(DABS(DIAGO(2,L)+.5*FM(1)).LT.DIAGO(4,L)) GO TO 662             FORC4330
      KCSM=2                                                            FORC4340
  662 DIAGO(1,L)=0.0                                                    FORC4350
  663 CODIA(2,L)=CHECK                                                  FORC4360
      DIAGO(3,L)=FM(1)                                                  FORC4370
      IF(ISTAT.EQ.1) WRITE(6,2005)                                      FORC4380
  680 CONTINUE                                                          FORC4390
C
C     SHIFT DISPLACEMENTS
C
  690 DO 570 K=1,MM                                                     FORC4400
      KK=MM+K                                                           FORC4410
      DO 570 L=1,MLD                                                    FORC4420
      R(KK,L)=R(K,L)                                                    FORC4430
  570 R(K,L)=0.0                                                        FORC4440
C
  610 N=N-1                                                             FORC4450
      IF (N.NE.0) GO TO 300                                             FORC4460
C
C     CALCULATE AND PRINT OF LAST STATIC LOAD COMBINATION
C
      IF(ISTAT.NE.1) GO TO 613                                          FORC4470
      NLD1=NLD-1                                                        FORC4480
      WRITE(6,3000)                                                     FORC4490
      WRITE(6,3010) (N,N=1,NLD1)                                        FORC4500
      DO 612 N=1,NS                                                     FORC4510
      NL=NS+1-N                                                         FORC4520
      DO 612 II=1,3                                                     FORC4530
      NV=(N-1)*3+II+NSNC                                                FORC4540
      DO 611 L=1,NLD                                                    FORC4550
      F(L,II)=0.                                                        FORC4560
```

```
      DO 611 J=1,6                                                      FORC4570
  611 F(L,II)=F(L,II)+U(NV,J)*XM(J,L)                                   FORC4580
      WRITE(6,2000) NL,RLAB(II),(F(KD,II),KD=1,NLD1)                    FORC4590
      IF(II.EQ.3) WRITE(6,2005)                                         FORC4600
  612 DISP(3+II,N)=F(NLD,II)                                            FORC4610
      GO TO 615                                                         FORC4620
  613 DO 614 N=1,NS                                                     FORC4630
      DO 614 II=1,3                                                     FORC4640
      NL=(N-1)*3+NSNC+II                                                FORC4650
  614 DISP(3+II,N)=U(NL,MLD)                                            FORC4660
C                                                                       FORC4670
  615 RETURN
C                                                                       FORC4680
 2000 FORMAT(I6,5X,A3,5X,8F14.7)                                        FORC4690
 2001 FORMAT (128H0  LINE LOAD          TORSIONAL          MAJOR AXIS   FORC4700
     1          AXIAL          MINOR AXIS          MAJOR               FORC4710
     1    MINOR /129H                    MOMENT    TOP MOMENT    BOT  FORC4720
     1 MOMENT          FORCE    TOP MOMENT    BOT MOMENT          SHEAR FORC4730
     1    SHEAR  )                                                     FORC4740
 2002 FORMAT    ( 59H   BAY  LOAD        TORS MOMENT     I  MOMENT     FORC4750
     1J   MOMENT )                                                     FORC4760
 2003 FORMAT(12H PANEL  LOAD 6X,13H   TOP-MOMENT 4X,10HBOT-MOMENT 3X,11HF FORC4770
     1AXIAL-FORCE 3X,11HSHEAR-FORCE )                                  FORC4780
 2004 FORMAT(/13H PANEL FORCES /)                                       FORC4790
 2005 FORMAT (1H )                                                      FORC4800
 2006 FORMAT(/17H BRACING ELEMENTS//12H BRACE  LOAD,11X,11HAXIAL-FORCE ) FORC4810
 2007 FORMAT(///14H COLUMN FORCES)                                      FORC4820
 2008 FORMAT(/12H BEAM FORCES /)                                        FORC4830
 2009 FORMAT(56H1STATIC LOAD COMBINATION-----MEMBER FORCES-----LEVEL NO. FORC4840
     1I3)                                                               FORC4850
 3000 FORMAT(56H1STATIC LOAD COMBINATION-----LATERAL FRAME DISPLACEMENTS FORC4860
     1)                                                                 FORC4870
 3010 FORMAT(//6H LEVEL,3X,9HDIRECTION,8X,I2,7(12X,I2))                 FORC4880
C
      END


      SUBROUTINE REFRCT(IO,NN,NLD,MLD,M,N,ISTAT,B1,B2,XLR,SNA,CSA)      REFR  10
C
C     COMPUTE STATIC LOAD CASE COMBINATION AND PRINTOUT MEMBER FORCES
C     COMPUTE DYNAMIC LOCAL DISPLACEMENTS
C
      IMPLICIT REAL*8(A-H,O-Z)                                          REFR  20
      COMMON/DATA5/COCOL(9,10,10),COBM(5,13,10),COPAN(5,20),CODIA(2,40) REFR  30
      COMMON/NEW/R(183,6),XM(6,10),FM(8)                                REFR  40
      COMMON/JUNK/FMED(4),IF,IFC,ND,NF,LM(12),F(8,8),Q(3,3),P(8),PMIN(8)REFR  50
      COMMON/STIF/ ASA(12,12),SA(8,12),T(8,12),TAC(8,12,10,10),TAB(3,6, REFR  60
     1 13,10),TAD(1,8,40),TAP(4,10,20)                                  REFR  70
      DIMENSION FM1(8,6),FM2(8,6),FM3(8)                                REFR  80
C
      NLD1=NLD-1                                                        REFR  90
      IF(ISTAT.NE.1) GO TO 220                                          REFR 100
C
C     STATIC CASE
C
      DO 100 I=1,NF                                                     REFR 110
      DO 100 J=1,8                                                      REFR 120
  100 F(I,J)=0.0                                                        REFR 130
C
  150 DO 200 K=1,ND                                                     REFR 140
      KK=LM(K)                                                          REFR 150
      DO 200 I=1,NF                                                     REFR 160
      DO 200 J=1,6                                                      REFR 170
      IF(IO.EQ.1) F(I,J)=F(I,J)+TAC(I,K,M,N)*R(KK,J)                    REFR 180
      IF(IO.EQ.2) F(I,J)=F(I,J)+TAB(I,K,M,N)*R(KK,J)                    REFR 190
      IF(IO.EQ.3) F(I,J)=F(I,J)+TAP(I,K,M)*R(KK,J)                      REFR 200
  200 IF(IO.EQ.4) F(I,J)=F(I,J)+TAD(I,K,M)*R(KK,J)                      REFR 210
      DO 210 I=1,NF                                                     REFR 220
      FM(I)=0.                                                          REFR 230
      DO 210 J=1,6                                                      REFR 240
  210 FM(I)=FM(I)+F(I,J)*XM(J,NLD)                                      REFR 250
      DO 211 I=1,NF                                                     REFR 260
      DO 211 J=1,6                                                      REFR 270
  211 FM1(I,J)=F(I,J)                                                   REFR 280
C
      IF(IO.EQ.2.OR.IO.EQ.3.OR.IO.EQ.4) GO TO 430                       REFR 290
C
C     STATIC COLUMN FORCES
C
      IF(B1.GE.0.AND.B2.GE.0) GO TO 400                                 REFR 300
      DO 300 I=1,6                                                      REFR 310
      FM1(2,I)=-FM1(2,I)                                                REFR 320
      FM1(3,I)=-FM1(3,I)                                                REFR 330
      FM1(5,I)=-FM1(5,I)                                                REFR 340
      FM1(6,I)=-FM1(6,I)                                                REFR 350
      FM1(7,I)=-FM1(7,I)                                                REFR 360
  300 FM1(8,I)=-FM1(8,I)                                                REFR 370
  400 DO 410 I=1,6                                                      REFR 380
      FM2(1,I)=COCOL(1,M,N)*FM1(1,I)                                    REFR 390
      FM2(2,I)=COCOL(2,M,N)*FM1(2,I)+COCOL(3,M,N)*FM1(3,I)              REFR 400
      FM2(3,I)=COCOL(3,M,N)*FM1(2,I)+COCOL(4,M,N)*FM1(3,I)              REFR 410
      FM2(4,I)=COCOL(5,M,N)*FM1(4,I)                                    REFR 420
      FM2(5,I)=COCOL(6,M,N)*FM1(5,I)+COCOL(7,M,N)*FM1(6,I)              REFR 430
      FM2(6,I)=COCOL(7,M,N)*FM1(5,I)+COCOL(8,M,N)*FM1(6,I)              REFR 440
      FM2(7,I)=(FM2(2,I)+FM2(3,I))/XLR+FM1(7,I)                         REFR 450
  410 FM2(8,I)=(FM2(5,I)+FM2(6,I))/XLR-FM1(8,I)                         REFR 460
      GO TO 212                                                         REFR 470
C
  430 IF(IO.EQ.1.OR.IO.EQ.3.OR.IO.EQ.4) GO TO 460                       REFR 480
C
C     STATIC BEAM FORCES
C
      DO 440 I=1,6                                                      REFR 490
      FM2(1,I)=COBM(1,M,N)*FM1(1,I)                                     REFR 500
      FM2(2,I)=COBM(2,M,N)*FM1(2,I)+COBM(3,M,N)*FM1(3,I)                REFR 510
  440 FM2(3,I)=COBM(3,M,N)*FM1(2,I)+COBM(4,M,N)*FM1(3,I)                REFR 520
      DO 441 I=1,3                                                      REFR 530
      FM2(2,I)=FM2(2,I)+Q(1,I)                                          REFR 540
  441 FM2(3,I)=FM2(3,I)+Q(2,I)                                          REFR 550
      GO TO 212                                                         REFR 560
C
  460 IF(IO.EQ.1.OR.IO.EQ.2.OR.IO.EQ.4) GO TO 464                       REFR 570
C
C     STATIC PANEL FORCES
C
      IF(SNA.GE.CSA) GO TO 462                                          REFR 580
      DO 461 I=1,6                                                      REFR 590
  461 FM1(4,I)=-FM1(4,I)                                                REFR 600
  462 DO 463 I=1,6                                                      REFR 610
      FM2(1,I)=COPAN(1,M)*FM1(1,I)+COPAN(2,M)*FM1(2,I)                  REFR 620
      FM2(2,I)=COPAN(2,M)*FM1(1,I)+COPAN(3,M)*FM1(2,I)                  REFR 630
      FM2(3,I)=COPAN(4,M)*FM1(3,I)                                      PEFR 640
  463 FM2(4,I)=(FM2(1,I)+FM2(2,I))/XLR+FM1(4,I)                         REFR 650
      GO TO 212                                                         REFR 660
C
  464 IF(IO.EQ.1.OR.IO.EQ.2.OR.IO.EQ.3) RETURN                          REFR 670
C
C     STATIC BRACE FORCES
C
      DO 470 I=1,6                                                      REFR 680
  470 FM2(1,I)=CODIA(1,M)*FM1(1,I)                                      REFR 690
C
C     COMBINATION OF STATIC LOAD CASE
C
  212 DO 214 I=1,NLD1                                                   REFR 700
      DO 213 J=1,NF                                                     REFR 710
      FM3(J)=0.                                                         REFR 720
      DO 213 K=1,6                                                      REFR 730
  213 FM3(J)=FM3(J)+FM2(J,K)*XM(K,I)                                    REFR 740
  214 WRITE(6,2000) M,I,(FM3(II),II=1,NF)                               REFR 750
C
      RETURN                                                            REFR 760
C
C     DYNAMIC CASE
C
  220 DO 240 I=1,NF                                                     REFR 770
      DO 240 J=1,MLD                                                    REFR 780
      X=0.0                                                             REFR 790
      DO 230 K=1,ND                                                     REFR 800
      KK=LM(K)                                                          REFR 810
      IF(IO.EQ.1) X=X+TAC(I,K,M,N)*R(KK,J)                              REFR 820
      IF(IO.EQ.2) X=X+TAB(I,K,M,N)*R(KK,J)                              REFR 830
      IF(IO.EQ.3) X=X+TAP(I,K,M)*R(KK,J)                                REFR 840
  230 IF(IO.EQ.4) X=X+TAD(I,K,M)*R(KK,J)                                REFR 850
  240 FM(I)=X                                                           REFR 860
C
      RETURN                                                            REFR 870
 2000 FORMAT(2I6,5X,8F14.4)                                             REFR 880
C
      END                                                               REFR 890


      SUBROUTINE RESULT (NS,NC,NB,NPAN,NTRU,NST,NNSTEP,NSTEP,NSTC,ISTAT,RESU   5
     1ISTOP,NCHNG,DCON,MCTS,DISX,DISY,DISZ,VELX,VELY,VELZ,ISEC,NNDPR,   RESU  10
     2NDPR,KONTRL,KST,KK8AL,BCL,NNREMI,NREMIN,NFL1,NFL2,NFL3,NFL4,NFL5, RESU  15
     3NFL6,NCPRT1,NLPRT1,NCPRT2,NLPRT2,NCPRT3,NLPRT3,NCPRT4,NLPRT4,NFL7,RESU  20
     4RR,TT,DELT)                                                       RESU  25
C
C     FIND TOTAL FORCES,ENERGIES,DUCTILITIES,EXCURSIONS,INELASTIC STIFFNESS
C     OF CONCRETE ELEMENT,PERCENT TOLERANCE,MAX.COLUMN FORCES AND DISPLACEMENTS
C     PRINTOUT RESULT AND WRITE DATA ON DISC FOR PLOTTING
C
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      IMPLICIT REAL*8(A-H,O-Z)                                          RESU  30
      COMMON/DATA1/CLN(10,2),CP(16,40),BP(11,20),FEF(7,10),LB(10,13,3),LRESU  35
     1DB(10,13,3),LC(10,10,2),LP(3,20),IFEF(2),PP(16,20),LT(3,40),TP(2,4RESU  40
     20)                                                                RESU  45
      COMMON/DATA2/COLUM1(10,10,10),BEAM1(5,13,10)                      RESU  50
      COMMON/DATA3/COLUM2(8,10,10),BEAM2(3,13,10),PANEL2(4,20),DIAGO(4,4RESU  55
     10)                                                                RESU  60
      COMMON/DATA4/COLUM3(14,10,10),BEAM3(6,13,10),PANEL3(4,20),DISP(6,RESU  65
     110)                                                               RESU  70
      COMMON/DATA5/COCOL(9,10,10),COBM(5,13,10),COPAN(5,20),CODIA(2,40) RESU  75
      COMMON/DATA6/PLOAD(100),SD(10,14),AMA(200),IFFO,IFCFO,XIFO,YIFO,ANRESU  80
      COMMON/DATA8/CDIS(6,10,10),BDIS(3,13,10),DDIS(1,40),PDIS(3,20)    RESU  85
      COMMCN/DYN1/ACCER(130),VELO(130),X1(130),X2(130)                  RESU  90
      COMMCN/MAT/COEA,COER,COER1,COER2,E,G,FYIELD,FCRITI,DCON1          RESU  95
      COMMON/ENG/ FPD(30),FPDD(30),DF0(130),DF00(130),ED,EP             RESU 100
      COMMON/DUCTI/  CRVES(4,10,10),BRVES(2,13,10),NELAS                RESU 105
      COMMON/DUCTJ/PRVES(2,20)                                          RESU 110
      COMMON/ESTIF/SCOCOL(5,10,10),SCOBM(2,13,10),SCODIA(1,40)          RESU 115
      COMMCN/SHER1/BMY(2,6,10,10),RY(2,6,10,10),BMA(2,2,10,10),BMB(2,2,RESU 120
     110,10),RA(2,2,10,10),RB(2,2,10,10),RREC(2,2,10,10),EK1(2,10,10),RESU 125
     2RY1(2,2,10,10),KODY(2,10,10),KODYX(2,10,10),REVPT(2,10,10),EKEP(2,RESU 130
     26,10,10),RTOT(2,10,10),IND(2,10,10)                               RESU 135
      COMMON/SHER2/BMMY(2,40)                                           RESU 140
      COMMON/SHER3/EKHH(2,10,10),EKHP(2,20)                             RESU 145
      COMMCN/SHER4/DDAD(3,10)                                           RESU 150
      COMMON/SHERP1/BMYP(2,6,20),RYP(2,6,20),BMAP(2,2,20),BMBP(2,2,20),RRESU 155
     1AP(2,2,20),RBP(2,2,20),RRECP(2,2,20),EK1P(2,20),RY1P(2,2,20),KODYPRESU 160
     2(2,20),KODYXP(2,20),REVPTP(2,20),EKEPP(2,6,20),RTOTP(2,20),INDP(2,RESU 165
     320)                                                               RESU 170
      DIMENSION TCDIS(4,10,10),DROT(4,10,10),EROT(4,10,10),CMAX(8,10,10)RESU 175
     1,DENG(4,10,10),EENG(4,10,10),DETSE(4,10,10),DEDE(4,10,10),TBDIS(2,RESU 180
     213,10),DROTB(2,13,10),EROTB(2,13,10),DMAX(3,10),DEDB(2,13,10)    RESU 185
     3,DENGB(2,13,10),EENGB(2,13,10),DETSB(2,13,10),DEDE1(4,10,10),DEDB1RESU 190
     4(2,13,10),MIND(2),DENGC(4,10,10),EENGC(4,10,10),DENGBC(2,13,10),EERESU 195
     5NGBC(2,13,10),TPDIS(2,20),DROTP(2,20),EROTP(2,20),DD(3,10,10),DDP(RESU 200
     63,20)                                                             RESU 205
      DIMENSION BCL(10),RP(130,6)                                       RESU 210
C
C     EIE=TOTAL INPUT ENERGY(EARTHQUAKE AT BASE+P-DELTA EFFECT)
C     ETSE=TOTAL STRAIN ENERGY(STORE+DISSIPATED)
C     EKE=KINETIC ENERGY
C     EDD=DAMPING DISSIPATED ENERGY
C     EDE=DISSIPATED STRAIN ENERGY
C     ETD=TOTAL DISSIPATED ENERGY
C
C     ZERO ARRAYS AND VARIABLES
C
      INPRT=0                                                           RESU 215
      NELAS=0                                                           RESU 220
      KST=0                                                             RESU 225
      NCHNG=0                                                           RESU 230
      KKST=0                                                            RESU 235
      KKBAL=0                                                           RESU 240
      DO 5 I=1,NS                                                       RESU 245
      DO 5 J=1,NC                                                       RESU 250
      DO 5 K=1,3                                                        RESU 255
    5 DD(K,J,I)=0.                                                      RESU 260
      IF(NPAN.EQ.0) GO TO 2                                             RESU 265
      DO 1 I=1,3                                                        RESU 270
      DO 1 J=1,NPAN                                                     RESU 275
    1 DDP(I,J)=0.                                                       RESU 280
    2 IF(ISTAT.NE.1) GO TO 15                                           RESU 285
      T01=0.                                                            RESU 290
      T02=0.                                                            RESU 295
      T03=0.                                                            RESU 300
      T04=0.                                                            RESU 305
      T05=0.                                                            RESU 310
      T06=0.                                                            RESU 315
      T07=0.                                                            RESU 320
      T08=0.                                                            RESU 325
      T09=0.                                                            RESU 330
      T10=0.                                                            RESU 335
      T11=0.                                                            RESU 340
      T12=0.                                                            RESU 345
      T13=0.                                                            RESU 350
      T14=0.                                                            RESU 355
      T15=0.                                                            RESU 360
      T16=0.                                                            RESU 365
      T17=0.                                                            RESU 370
      T18=0.                                                            RESU 375
      T19=0.                                                            RESU 380
      T20=0.                                                            RESU 385
      EIE=0.                                                            RESU 390
      ETSE=0.                                                           RESU 395
      EKE=0.                                                            RESU 400
      EDD=0.                                                            RESU 405
      EDE=0.                                                            RESU 410
      KONTRL=0                                                          RESU 415
C
      DO 8 I=1,4                                                        RESU 420
      DO 8 J=1,NC                                                       RESU 425
      DO 8 K=1,NS                                                       RESU 430
      TCDIS(I,J,K)=0.                                                   RESU 435
      DROT(I,J,K)=1.0                                                   RESU 440
      EROT(I,J,K)=0.                                                    RESU 445
      DENG(I,J,K)=1.0                                                   RESU 450
      EENG(I,J,K)=0.                                                    RESU 455
      DENGC(I,J,K)=1.0                                                  RESU 460
      EENGC(I,J,K)=0.                                                   RESU 465
      DETSE(I,J,K)=0.                                                   RESU 470
      DEDE(I,J,K)=0.                                                    RESU 475
    8 DEDE1(I,J,K)=0.                                                   RESU 480
      DO 9 I=1,2                                                        RESU 485
      DO 9 J=1,NB                                                       RESU 490
      DO 9 K=1,NS                                                       RESU 495
      TBDIS(I,J,K)=0.                                                   RESU 500
      DROTB(I,J,K)=1.0                                                  RESU 505
      EROTB(I,J,K)=0.                                                   RESU 510
      DENGB(I,J,K)=1.0                                                  RESU 515
      EENGB(I,J,K)=0.                                                   RESU 520
      DENGBC(I,J,K)=1.0                                                 RESU 525
      EENGBC(I,J,K)=0.                                                  RESU 530
      DETSB(I,J,K)=0.                                                   RESU 535
      DEDB(I,J,K)=0.                                                    RESU 540
    9 DEDB1(I,J,K)=0.                                                   RESU 545
      IF(NPAN.EQ.0) GO TO 25                                            RESU 550
      DO 3 I=1,2                                                        RESU 555
      DO 3 J=1,NPAN                                                     RESU 560
      TPDIS(I,J)=0.                                                     RESU 565
      DROTP(I,J)=1.0                                                    RESU 570
    3 EROTP(I,J)=0.                                                     RESU 575
      GO TO 25                                                          RESU 580
C
C     TOTAL ACCELERATIONS AND VELOCITIES
C
   15 DO 20 I=1,NSTC                                                    RESU 585
      ACCER(I)=ACCER(I)+X2(I)                                           RESU 590
   20 VELO(I)=VELO(I)+X1(I)                                             RESU 595
      IF(ISTOP.GT.0) GO TO 25                                           RESU 600
      DO 22 I=1,NS                                                      RESU 605
      DO 21 J=1,NC                                                      RESU 610
      DO 21 K=1,4                                                       RESU 615
   21 CRVES(K,J,I)=1.0                                                  RESU 620
      DO 22 J=1,NB                                                      RESU 625
      DO 22 K=1,2                                                       RESU 630
   22 BRVES(K,J,I)=1.0                                                  RESU 635
      IF(NPAN.EQ.0) GO TO 25                                            RESU 640
      DO 958 I=1,2                                                      RESU 645
      DO 958 L=1,NPAN                                                   RESU 650
  958 PRVES(I,L)=1.                                                     RESU 655
C
C     CALCULATE TOTAL FORCES,ENERGIES,DUCTILITIES,EXCURSIONS AND PERCENT
C     TOLERANCE,STORY BY STORY
C
   25 DO 40 II=1,NS                                                     RESU 660
      I=NS-II+1                                                         RESU 665
C
C     COLUMN ELEMENT
C
      DO 30 J=1,NC                                                      RESU 670
      MC=LC(I,J,1)                                                      RESU 675
      XL=SD(I,2)                                                        RESU 680
      E=CP(1,MC)                                                        RESU 685
      G=E/2.5                                                           RESU 690
      DT=CP(8,MC)                                                       RESU 695
      DB=CP(9,MC)                                                       RESU 700
      XLR=XL-DT-DB                                                      RESU 705
      IF(MC.GT.20) INPRT=1                                              RESU 710
      IF(MC.GT.20) XLR=XL                                               RESU 715
      IF(I.NE.NS) GO TO 16                                              RESU 720
C
C     INPUT ENERGIES
C
      BCL1=BCL(J)*ATAN(1.)/45.                                          RESU 725
      TEMPDX=DISX*DCOS(BCL1)-DISY*DSIN(BCL1)                            RESU 730
      TEMPDY=DISX*DSIN(BCL1)+DISY*DCOS(BCL1)                            RESU 735
     4 EIE=EIE-0.5*((2.*(COLUM2(2,J,I)*COLUM2(3,J,I))+COLUM3(1,J,I))+   RESU 740
     1COLUM3(5,J,I))/XLR)*TEMPDX+((2.*(COLUM2(5,J,I)+COLUM2(6,J,I))+COLURESU 745
     2M3(3,J,I)+COLUM3(7,J,I))/XLR)*TEMPDY+(2.*(COLUM2(4,J,I))+COLUM3(9,RESU 750
     3J,I))*DISZ)                                                       RESU 755
C
C     STRAIN ENERGIES
C
   16 E1=0.5*(2.*COLUM2(1,J,I)+COLUM3(11,J,I))*CDIS(1,J,I)              RESU 760
      E2=0.5*(2.*COLUM2(2,J,I)+COLUM3(1,J,I))*CDIS(2,J,I)               RESU 765
      E3=0.5*(2.*COLUM2(3,J,I)+COLUM3(5,J,I))*CDIS(3,J,I)               RESU 770
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      E4=0.5*(2.*COLUM2(4,J,I)+COLUM3(9,J,I))*CDIS(4,J,I)                RESU 775
      E5=0.5*(2.*COLUM2(5,J,I)+COLUM3(3,J,I))*CDIS(5,J,I)                RESU 780
      E6=0.5*(2.*COLUM2(6,J,I)+COLUM3(7,J,I))*CDIS(6,J,I)                RESU 785
      ETSE=ETSE+E1+E2+E3+E4+E5+E6                                        RESU 790
C
C     DISSIPATED STRAIN ENERGIES
C
      E7=E2*(1.-COCOL(2,J,I)/SCOCOL(1,J,I))                              RESU 795
      E8=E3*(1.-COCOL(4,J,I)/SCOCOL(1,J,I))                              RESU 800
      E9=E4*(1.-COCOL(5,J,I)/SCOCOL(2,J,I))                              RESU 805
      E10=E5*(1.-COCOL(6,J,I)/SCOCOL(3,J,I))                             RESU 810
      E11=E6*(1.-COCOL(8,J,I)/SCOCOL(3,J,I))                             RESU 815
      EDE=EDE+E7+E8+E9+E10+E11                                           RESU 820
      IF(MC.GT.20) GO TO 480                                             RESU 825
      RYIEL1=CP(14,MC)*FYIELD*XLR/(6.*E*CP(6,MC))                        RESU 830
      RYIEL2=CP(15,MC)*FYIELD*XLR/(6.*E*CP(7,MC))                        RESU 835
C
C     TOTAL COLUMN FORCES
C
      COLUM2(1,J,I)=COLUM2(1,J,I)+COLUM3(11,J,I)                         RESU 840
      COLUM2(2,J,I)=COLUM2(2,J,I)+COLUM3(1,J,I)                          RESU 845
      COLUM2(3,J,I)=COLUM2(3,J,I)+COLUM3(5,J,I)                          RESU 850
      COLUM2(4,J,I)=COLUM2(4,J,I)+COLUM3(9,J,I)                          RESU 855
      COLUM2(5,J,I)=COLUM2(5,J,I)+COLUM3(3,J,I)                          RESU 860
      COLUM2(6,J,I)=COLUM2(6,J,I)+COLUM3(7,J,I)                          RESU 865
      COLUM2(7,J,I)=COLUM2(7,J,I)+COLUM3(12,J,I)                         RESU 870
      COLUM2(8,J,I)=COLUM2(8,J,I)+COLUM3(13,J,I)                         RESU 875
      GO TO 950                                                          RESU 880
C
C     MODIFIED OR EXTENDED TAKEDA RULE FOR SHEAR WALL
C
  480 RYIEL=BMMY(1,MC)*XL/(6.*CP(1,MC))                                  RESU 885
      RYIEL2=BMMY(1,MC)*XL/(6.*CP(3,MC))                                 RESU 890
      KODYX(1,J,I)=KODY(1,J,I)                                           RESU 895
      KODYX(2,J,I)=KODY(2,J,I)                                           RESU 900
      FACAC=0                                                            RESU 905
      KBAL=0                                                             RESU 910
      COLUM3(1,J,I)=-COLUM3(1,J,I)                                       RESU 915
      COLUM2(2,J,I)=-COLUM2(2,J,I)                                       RESU 920
      BMLI=COLUM2(2,J,I)+COLUM3(1,J,I)                                   RESU 925
      BMLJ=COLUM2(3,J,I)+COLUM3(5,J,I)                                   RESU 930
  490 FACTOR=1.0-FACAC                                                   RESU 935
      KFAC=0                                                             RESU 940
      DO 900 IEND=1,2                                                    RESU 945
      IINCR=IEND+(IEND-1)*3                                              RESU 950
      IF(COLUM3(IINCR,J,I).EQ.0.) GO TO 900                              RESU 955
      REMIND=1                                                           RESU 960
      IF(IND(IEND,J,I).EQ.2) REMIND=-1.                                  RESU 965
C
C     RULE 1
C
      IF(KODY(IEND,J,I).NE.0) GO TO 520                                  RESU 970
      IF(COLUM3(IINCR,J,I).GT.0.) GO TO 510                              RESU 975
      FAC=(BMY(IEND,2,J,I)-COLUM2(IEND+1,J,I))/COLUM3(IINCR,J,I)         RESU 980
      IF(FAC.GE.FACTOR) GO TO 900                                        RESU 985
      FACTOR=FAC                                                         RESU 990
      BM=BMY(IEND,2,J,I)                                                 RESU 995
      ROT=RY(IEND,2,J,I)                                                 RESU1000
      KFAC=IEND                                                          RESU1005
      KODE=2                                                             RESU1010
      EK=EKEP(IEND,2,J,I)                                                RESU1015
      IDK=2                                                              RESU1020
      GO TO 900                                                          RESU1025
  510 FAC=(BMY(IEND,1,J,I)-COLUM2(IEND+1,J,I))/COLUM3(IINCR,J,I)         RESU1030
      IF(FAC.GE.FACTOR) GO TO 900                                        RESU1035
      FACTOR=FAC                                                         RESU1040
      BM=BMY(IEND,1,J,I)                                                 RESU1045
      ROT=RY(IEND,1,J,I)                                                 RESU1050
      KFAC=IEND                                                          RESU1055
      KODE=1                                                             RESU1060
      EK=EKEP(IEND,2,J,I)                                                RESU1065
      IDK=1                                                              RESU1070
      GO TO 900                                                          RESU1075
  520 KOD=KODY(IEND,J,I)                                                 RESU1080
C
      GO TO (530,530,570,620,640,690,710,730,750,770,790),KOD            RESU1085
C
C     RULE 2
C
  530 IF(REMIND*COLUM3(IINCR,J,I).LT.0.) GO TO 540                       RESU1090
      MIND(IEND)=IND(IEND,J,I)                                           RESU1095
      GO TO 900                                                          RESU1100
  540 KODY(IEND,J,I)=3                                                   RESU1105
      CRVES(IEND,J,I)=1.0                                                RESU1110
      IDD=IND(IEND,J,I)                                                  RESU1115
      BMT=COLUM2(IEND+1,J,I)                                             RESU1120
      BMTEST=(BMB(IEND,IDD,J,I)-BMT)*REMIND                              RESU1125
      IF(BMTEST.GE.0.) GO TO 560                                         RESU1130
      EKU=BMT/(CP(IEND+10,MC)*RTOT(IEND,J,I)+(1.-CP(IEND+10,MC))*BMT/EK RESU1135
     1(IEND,J,I))                                                        RESU1140
      IDM=3-IDD                                                          RESU1145
      EKUMIN=(BMT-BMA(IEND,IDM,J,I))/(RTOT(IEND,J,I)-RA(IEND,IDM,J,I))   RESU1150
      IF(EKU.LT.EKUMIN) EKU=EKUMIN                                       RESU1155
      IF(EKEP(IEND,1,J,I).LE.EKU) EKU=EKEP(IEND,1,J,I)                   RESU1160
      IF(CP(IEND+10,MC).LE.0.) EKU=EK1(IEND,J,I)                         RESU1165
      EKEP(IEND,1,J,I)=EKU                                               RESU1170
      BMB(IEND,IDD,J,I)=BMT                                              RESU1175
      RB(IEND,IDD,J,I)=RTOT(IEND,J,I)                                    RESU1180
      RA(IEND,IDD,J,I)=(1.-CP(IEND+12,MC))*RTOT(IEND,J,I)+CP(IEND+12,MC) RESU1185
     1*RY1(IEND,IDD,J,I)                                                 RESU1190
      BMA(IEND,IDD,J,I)=BMT-(RTOT(IEND,J,I)-RA(IEND,IDD,J,I))*EKEP(IEND, RESU1195
     12,J,I)                                                             RESU1200
      IF(CP(IEND+12,MC).GT.0.) GO TO 550                                 RESU1205
      RA(IEND,IDD,J,I)=RTOT(IEND,J,I)                                    RESU1210
      BMA(IEND,IDD,J,I)=BMT                                              RESU1215
  550 RREC(IEND,IDD,J,I)=RTOT(IEND,J,I)-BMB(IEND,IDD,J,I)/EKEP(IEND,1,J RESU1220
     1,I)                                                                RESU1225
      IDB=3-IDD                                                          RESU1230
      RREC(IEND,IDB,J,I)=RB(IEND,IDB,J,I)-BMB(IEND,IDB,J,I)/EKEP(IEND,1, RESU1235
     1J,I)                                                               RESU1240
      RCTEST=RREC(IEND,IDB,J,I)*REMIND                                   RESU1245
      IF(RCTEST.GT.0.) RREC(IEND,IDB,J,I)=0.                             RESU1250
  560 EKH(IEND,J,I)=EKEP(IEND,1,J,I)                                     RESU1255
      REVPT(IEND,J,I)=RTOT(IEND,J,I)-BMT/EKH(IEND,J,I)                   RESU1260
      FACTOR=0.                                                          RESU1265
      KFAC=0                                                             RESU1270
      GO TO 900                                                          RESU1275
C
C     RULE 3
C
  570 IF(REMIND*COLUM3(IINCR,J,I).LT.0.) GO TO 580                       RESU1280
      IDD=IND(IEND,J,I)                                                  RESU1285
      FAC=(BMY(IEND,IDD,J,I)-COLUM2(IEND+1,J,I))/COLUM3(IINCR,J,I)       RESU1290
      IF(FAC.GE.FACTOR) GO TO 900                                        RESU1295
      FACTOR=FAC                                                         RESU1300
      BM=BMY(IEND,IDD,J,I)                                               RESU1305
      ROT=RY(IEND,IDD,J,I)                                               RESU1310
      KFAC=IEND                                                          RESU1315
      KODE=IDD                                                           RESU1320
      IDK=IDD                                                            RESU1325
      EK=EKEP(IEND,2,J,I)                                                RESU1330
      GO TO 900                                                          RESU1335
  580 FAC=-COLUM2(IEND+1,J,I)/COLUM3(IINCR,J,I)                          RESU1340
      IF(FAC.GE.FACTOR) GO TO 900                                        RESU1345
      FACTOR=FAC                                                         RESU1350
      BM=0.                                                              RESU1355
      ROT=REVPT(IEND,J,I)                                                RESU1360
      KFAC=IEND                                                          RESU1365
      KODE=4                                                             RESU1370
      IDK=3-IND(IEND,J,I)                                                RESU1375
      IDD=3-IDK                                                          RESU1380
      RTEST=(RREC(IEND,IDD,J,I)-ROT)*REMIND                              RESU1385
      IF(RTEST.GT.0.) GO TO 590                                          RESU1390
      BMY(IEND,IDK,J,I)=BMA(IEND,IDK,J,I)                                RESU1395
      RY(IEND,IDK,J,I)=RA(IEND,IDK,J,I)                                  RESU1400
      GO TO 600                                                          RESU1405
  590 RBA=RB(IEND,IDK,J,I)-RA(IEND,IDK,J,I)                              RESU1410
      RPR=ROT-RREC(IEND,IDD,J,I)                                         RESU1415
      RRR=RREC(IEND,IDK,J,I)-RREC(IEND,IDD,J,I)                          RESU1420
      RXA=RBA*(RPR/RRR)**CP(16,MC)                                       RESU1425
      RA(IEND,IDK,J,I)=RA(IEND,IDK,J,I)+RXA                              RESU1430
      BMY(IEND,IDK,J,I)=BMA(IEND,IDK,J,I)+RXA*EKEP(IEND,2,J,I)           RESU1435
  600 EKL=BMY(IEND,IDK,J,I)/(RY(IEND,IDK,J,I)-ROT)                       RESU1440
      IF(EKL.LT.EKEP(IEND,1,J,I)) GO TO 610                              RESU1445
      EKL=0.999*EKEP(IEND,1,J,I)                                         RESU1450
      RY(IEND,IDK,J,I)=(ROT*EKL+BMA(IEND,IDK,J,I)-RA(IEND,IDK,J,I)*EKEP  RESU1455
     1(IEND,2,J,I))/(EKL-EKEP(IEND,2,J,I))                               RESU1460
      BMY(IEND,IDK,J,I)=EKL*(RY(IEND,IDK,J,I)-ROT)                       RESU1465
  610 EKEP(IEND,3,J,I)=EKL                                               RESU1470
      EKH=EKEP(IEND,3,J,I)                                               RESU1475
      GO TO 900                                                          RESU1480
C
C     RULE 4
C
  620 IF(REMIND*COLUM3(IINCR,J,I).LT.0.) GO TO 630                       RESU1485
      IDD=IND(IEND,J,I)                                                  RESU1490
      MIND(IEND)=3                                                       RESU1495
      FAC=(BMY(IEND,IDD,J,I)-COLUM2(IEND+1,J,I))/COLUM3(IINCR,J,I)       RESU1500
      IF(FAC.GE.FACTOR) GO TO 900                                        RESU1505
      FACTOR=FAC                                                         RESU1510
      BM=BMY(IEND,IDD,J,I)                                               RESU1515
      ROT=RY(IEND,IDD,J,I)                                               RESU1520
      KFAC=IEND                                                          RESU1525
      KODE=IDD                                                           RESU1530
      IDK=IDD                                                            RESU1535
      EK=EKEP(IEND,2,J,I)                                                RESU1540
```

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      GO TO 900                                                         RESU1545
  630 KODY(IEND,J,I)=5                                                  RESU1550
      CRVES(IEND,J,I)=1.0                                               RESU1555
      EKH(IEND,J,I)=EKEP(IEND,1,J,I)                                    RESU1560
      REVPT(IEND,J,I)=RY(IEND,3,J,I)-BMY(IEND,3,J,I)/EKH(IEND,J,I)      RESU1565
      FACTOR=0.                                                         RESU1570
      KFAC=0                                                            RESU1575
      GO TO 900                                                         RESU1580
C
C     RULE 5
C
  640 IF(REMIND*COLUM3(IINCR,J,I).LT.0.) GO TO 650                      RESU1585
      FAC=(BMY(IEND,3,J,I)-COLUM2(IEND+1,J,I))/COLUM3(IINCR,J,I)        RESU1590
      IF(FAC.GE.FACTOR) GO TO 900                                       RESU1595
      FACTOR=FAC                                                        RESU1600
      BM=BMY(IEND,3,J,I)                                                RESU1605
      ROT=RY(IEND,3,J,I)                                                RESU1610
      KFAC=IEND                                                         RESU1615
      KODE=4                                                            RESU1620
      IDK=IND(IEND,J,I)                                                 RESU1625
      EK=EKEP(IEND,3,J,I)                                               RESU1630
      GO TO 900                                                         RESU1635
  650 FAC=-COLUM2(IEND+1,J,I)/COLUM3(IINCR,J,I)                         RESU1640
      IF(FAC.GE.FACTOR) GO TO 900                                       RESU1645
      FACTOR=FAC                                                        RESU1650
      BM=0.                                                             RESU1655
      ROT=REVPT(IEND,J,I)                                               RESU1660
      KFAC=IEND                                                         RESU1665
      KODE=6                                                            RESU1670
      IDK=3-IND(IEND,J,I)                                               RESU1675
      IDD=3-IDK                                                         RESU1680
      RTEST=(RREC(IEND,IDD,J,I)-ROT)*REMIND                             RESU1685
      IF(RTEST.GT.0.) GO TO 660                                         RESU1690
      BMY(IEND,IDK,J,I)=BMA(IEND,IDK,J,I)                               RESU1695
      RY(IEND,IDK,J,I)=RA(IEND,IDK,J,I)                                 RESU1700
      GO TO 670                                                         RESU1705
  660 RBA=RB(IEND,IDK,J,I)-RA(IEND,IDK,J,I)                             RESU1710
      RPR=ROT-RREC(IEND,IDD,J,I)                                        RESU1715
      RRR=RREC(IEND,IDK,J,I)-RREC(IEND,IDD,J,I)                         RESU1720
      RXA=RBA*(RPR/RRR)**CP(16,MC)                                      RESU1725
      RY(IEND,IDK,J,I)=RA(IEND,IDK,J,I)+RXA                             RESU1730
      BMY(IEND,IDK,J,I)=BMA(IEND,IDK,J,I)+RXA*EKEP(IEND,2,J,I)          RESU1735
  670 EKL=BMY(IEND,IDK,J,I)/(RY(IEND,IDK,J,I)-ROT)                      RESU1740
      IF(EKL.LT.EKEP(IEND,1,J,I)) GO TO 680                             RESU1745
      EKL=0.999*EKEP(IEND,1,J,I)                                        RESU1750
      RY(IEND,IDK,J,I)=(ROT*EKL+BMA(IEND,IDK,J,I)-RA(IEND,IDK,J,I)*EKEP RESU1755
     1(IEND,2,J,I))/(EKL-EKEP(IEND,2,J,I))                              RESU1760
      BMY(IEND,IDK,J,I)=EKL*(RY(IEND,IDK,J,I)-ROT)                      RESU1765
  680 EKEP(IEND,4,J,I)=EKL                                              RESU1770
      EK=EKEP(IEND,4,J,I)                                               RESU1775
      GO TO 900                                                         RESU1780
C
C     RULE 6
C
  690 IF(REMIND*COLUM3(IINCR,J,I).LT.0.) GO TO 700                      RESU1785
      IDD=IND(IEND,J,I)                                                 RESU1790
      MIND(IEND)=4                                                      RESU1795
      FAC=(BMY(IEND,IDD,J,I)-COLUM2(IEND+1,J,I))/COLUM3(IINCR,J,I)      RESU1800
      IF(FAC.GE.FACTOR) GO TO 900                                       RESU1805
      FACTOR=FAC                                                        RESU1810
      BM=BMY(IEND,IDD,J,I)                                              RESU1815
      ROT=RY(IEND,IDD,J,I)                                              RESU1820
      KFAC=IEND                                                         RESU1825
      KODE=IDD                                                          RESU1830
      IDK=IDD                                                           RESU1835
      EK=EKEP(IEND,2,J,I)                                               RESU1840
      GO TO 900                                                         RESU1845
  700 KODY(IEND,J,I)=7                                                  RESU1850
      CRVES(IEND,J,I)=1.0                                               RESU1855
      EKH(IEND,J,I)=EKEP(IEND,1,J,I)                                    RESU1860
      REVPT(IEND,J,I)=RY(IEND,4,J,I)-BMY(IEND,4,J,I)/EKH(IEND,J,I)      RESU1865
      FACTOR=0.                                                         RESU1870
      KFAC=0                                                            RESU1875
      GO TO 900                                                         RESU1880
C
C     RULE 7
C
  710 IF(REMIND*COLUM3(IINCR,J,I).LT.0.) GO TO 720                      RESU1885
      FAC=(BMY(IEND,4,J,I)-COLUM2(IEND+1,J,I))/COLUM3(IINCR,J,I)        RESU1890
      IF(FAC.GE.FACTOR) GO TO 900                                       RESU1895
      FACTOR=FAC                                                        RESU1900
      BM=BMY(IEND,4,J,I)                                                RESU1905
      ROT=RY(IEND,4,J,I)                                                RESU1910
      KFAC=IEND                                                         RESU1915
      KODE=6                                                            RESU1920
      IDK=IND(IEND,J,I)                                                 RESU1925
      EK=EKEP(IEND,4,J,I)                                               RESU1930
      GO TO 900                                                         RESU1935
  720 FAC=-COLUM2(IEND+1,J,I)/COLUM3(IINCR,J,I)                         RESU1940
      IF(FAC.GE.FACTOR) GO TO 900                                       RESU1945
      FACTOR=FAC                                                        RESU1950
      BM=0.                                                             RESU1955
      ROT=REVPT(IEND,J,I)                                               RESU1960
      KFAC=IEND                                                         RESU1965
      KODE=8                                                            RESU1970
      IDK=3-IND(IEND,J,I)                                               RESU1975
      EKEP(IEND,5,J,I)=BMY(IEND,3,J,I)/(RY(IEND,3,J,I)-REVPT(IEND,J,I)) RESU1980
      EK=EKEP(IEND,5,J,I)                                               RESU1985
      GO TO 900                                                         RESU1990
C
C     RULE 8
C
  730 IF(REMIND*COLUM3(IINCR,J,I).LT.0.) GO TO 740                      RESU1995
      MIND(IEND)=5                                                      RESU2000
      FAC=(BMY(IEND,3,J,I)-COLUM2(IEND+1,J,I))/COLUM3(IINCR,J,I)        RESU2005
      IF(FAC.GE.FACTOR) GO TO 900                                       RESU2010
      FACTOR=FAC                                                        RESU2015
      BM=BMY(IEND,3,J,I)                                                RESU2020
      ROT=RY(IEND,3,J,I)                                                RESU2025
      KFAC=IEND                                                         RESU2030
      KODE=4                                                            RESU2035
      IDK=IND(IEND,J,I)                                                 RESU2040
      EK=EKEP(IEND,3,J,I)                                               RESU2045
      GO TO 900                                                         RESU2050
  740 KODY(IEND,J,I)=9                                                  RESU2055
      CRVES(IEND,J,I)=1.0                                               RESU2060
      EKH(IEND,J,I)=EKEP(IEND,1,J,I)                                    RESU2065
      REVPT(IEND,J,I)=RY(IEND,5,J,I)-BMY(IEND,5,J,I)/EKH(IEND,J,I)      RESU2070
      FACTOR=0.                                                         RESU2075
      KFAC=0                                                            RESU2080
      GO TO 900                                                         RESU2085
C
C     RULE 9
C
  750 IF(REMIND*COLUM3(IINCR,J,I).LT.0.) GO TO 760                      RESU2090
      FAC=(BMY(IEND,5,J,I)-COLUM2(IEND+1,J,I))/COLUM3(IINCR,J,I)        RESU2095
      IF(FAC.GE.FACTOR) GO TO 900                                       RESU2100
      FACTOR=FAC                                                        RESU2105
      BM=BMY(IEND,5,J,I)                                                RESU2110
      ROT=RY(IEND,5,J,I)                                                RESU2115
      KFAC=IEND                                                         RESU2120
      KODE=8                                                            RESU2125
      IDK=IND(IEND,J,I)                                                 RESU2130
      EK=EKEP(IEND,5,J,I)                                               RESU2135
      GO TO 900                                                         RESU2140
  760 FAC=-COLUM2(IEND+1,J,I)/COLUM3(IINCR,J,I)                         RESU2145
      IF(FAC.GE.FACTOR) GO TO 900                                       RESU2150
      FACTOR=FAC                                                        RESU2155
      BM=0.                                                             RESU2160
      ROT=REVPT(IEND,J,I)                                               RESU2165
      KFAC=IEND                                                         RESU2170
      KODE=10                                                           RESU2175
      IDK=3-IND(IEND,J,I)                                               RESU2180
      EKEP(IEND,6,J,I)=BMY(IEND,4,J,I)/(RY(IEND,4,J,I)-REVPT(IEND,J,I)) RESU2185
      EK=EKEP(IEND,6,J,I)                                               RESU2190
      GO TO 900                                                         RESU2195
C
C     RULE 10
C
  770 IF(REMIND*COLUM3(IINCR,J,I).LT.0.) GO TO 780                      RESU2200
      MIND(IEND)=6                                                      RESU2205
      FAC=(BMY(IEND,4,J,I)-COLUM2(IEND+1,J,I))/COLUM3(IINCR,J,I)        RESU2210
      IF(FAC.GE.FACTOR) GO TO 900                                       RESU2215
      FACTOR=FAC                                                        RESU2220
      BM=BMY(IEND,4,J,I)                                                RESU2225
      ROT=RY(IEND,4,J,I)                                                RESU2230
      KFAC=IEND                                                         RESU2235
      KODE=6                                                            RESU2240
      IDK=IND(IEND,J,I)                                                 RESU2245
      EK=EKEP(IEND,4,J,I)                                               RESU2250
      GO TO 900                                                         RESU2255
  780 KODY(IEND,J,I)=11                                                 RESU2260
      CRVES(IEND,J,I)=1.0                                               RESU2265
      EKH(IEND,J,I)=EKEP(IEND,1,J,I)                                    RESU2270
      REVPT(IEND,J,I)=RY(IEND,6,J,I)-BMY(IEND,6,J,I)/EKH(IEND,J,I)      RESU2275
      FACTOR=0.                                                         RESU2280
      KFAC=0                                                            RESU2285
      GO TO 900                                                         RESU2290
C
C     RULE 11
C
  790 IF(REMIND*COLUM3(IINCR,J,I).LT.0.) GO TO 800                      RESU2295
      FAC=(BMY(IEND,6,J,I)-COLUM2(IEND+1,J,I))/COLUM3(IINCR,J,I)        RESU2300
      IF(FAC.GE.FACTOR) GO TO 900                                       RESU2305
      FACTOR=FAC                                                        RESU2310
      BM=BMY(IEND,6,J,I)                                                RESU2315
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      ROT=RY(IEND,6,J,I)                                                RESU2320
      KFAC=IEND                                                         RESU2325
      KCODE=10                                                          RESU2330
      IDK=IND(IEND,J,I)                                                 RESU2335
      EK=EKEP(IEND,6,J,I)                                               RESU2340
      GO TO 900                                                         RESU2345
  800 FAC=-COLUM2(IEND+1,J,I)/COLUM3(IINCR,J,I)                         RESU2350
      IF(FAC.GE.FACTOR) GO TO 900                                       RESU2355
      FACTOR=FAC                                                        RESU2360
      BM=0.                                                             RESU2365
      ROT=REVPT(IEND,J,I)                                               RESU2370
      KFAC=IEND                                                         RESU2375
      KCODE=8                                                           RESU2380
      IDK=3-IND(IEND,J,I)                                               RESU2385
      EKEP(IEND,5,J,I)=BMY(IEND,3,J,I)/(RY(IEND,3,J,I)-PEVPT(IEND,J,I)) RESU2390
      EK=EKEP(IEND,5,J,I)                                               RESU2395
  900 CONTINUE                                                          RESU2400
C
C     TOTAL SHEAR WALL FORCES
C
      DO 930 IEND=1,2                                                   RESU2405
      IINCR=IEND*(IEND-1)*3                                             RESU2410
      IF(IEND.EQ.KFAC) GO TO 920                                        RESU2415
      COLUM2(IEND*1,J,I)=COLUM2(IEND+1,J,I)+FACTOR*COLUM3(IINCR,J,I)    RESU2420
      RTOT(IEND,J,I)=RTOT(IEND,J,I)+FACTOR*COLUM3(IINCR,J,I)/EKH(IEND,J,RESU2425
     1I)                                                                RESU2430
      IF(KODY(IEND,J,I).EQ.0) GO TO 930                                 RESU2435
      KOD=KODY(IEND,J,I)                                                RESU2440
      GO TO (910,910,930,910,930,910,930,910,930,910,930),KOD           RESU2445
  910 IDD=MIND(IEND)                                                    RESU2450
      BMY(IEND,IDD,J,I)=COLUM2(IEND+1,J,I)                              RESU2455
      RY(IEND,IDD,J,I)=RTOT(IEND,J,I)                                   RESU2460
      GO TO 930                                                         RESU2465
  920 COLUM2(IEND+1,J,I)=BM                                             RESU2470
      RTOT(IEND,J,I)=ROT                                                RESU2475
      KODY(IEND,J,I)=KODE                                               RESU2480
      EKH(IEND,J,I)=EK                                                  RESU2485
      IND(IEND,J,I)=IDK                                                 RESU2490
  930 CONTINUE                                                          RESU2495
      FACAC=FACAC+FACTOR                                                RESU2500
      IF(FACAC.GT.0.99999) GO TO 940                                    RESU2505
      DET=(CP(4,MC)*CP(5,MC)-CP(6,MC)**2)*CP(1,MC)/XL                   RESU2510
      BFII=CP(5,MC)/DET                                                 RESU2515
      BFJJ=CP(4,MC)/DET                                                 RESU2520
      BFIJ=-CP(6,MC)/DET                                                RESU2525
      CALLSHRWL1(EKH(1,J,I),EKH(2,J,I),BFII,BFJJ,BFIJ,SCM2X,SCM4X,SCM3X)RESU2530
      COLUM3(1,J,I)=-SCM2X*CDIS(2,J,I)-SCM4X*CDIS(3,J,I)               RESU2535
      COLUM3(5,J,I)=SCM4X*CDIS(2,J,I)+SCM3X*CDIS(3,J,I)                RESU2540
      CCCOL(2,J,I)=SCM2X                                                RESU2545
      CCCOL(3,J,I)=SCM4X                                                RESU2550
      CCCOL(4,J,I)=SCM3X                                                RESU2555
      KBAL=1                                                            RESU2560
      GO TO 490                                                         RESU2565
  940 COLUM2(1,J,I)=COLUM2(1,J,I)+COLUM3(11,J,I)                        RESU2570
      COLUM2(4,J,I)=COLUM2(4,J,I)+COLUM3(9,J,I)                         RESU2575
      COLUM2(5,J,I)=COLUM2(5,J,I)+COLUM3(13,J,I)                        RESU2580
      COLUM2(6,J,I)=COLUM2(6,J,I)+COLUM3(7,J,I)                         RESU2585
      COLUM2(7,J,I)=COLUM2(7,J,I)+COLUM3(12,J,I)                        RESU2590
      COLUM2(8,J,I)=COLUM2(8,J,I)+COLUM3(13,J,I)                        RESU2595
      IF(KBAL.EQ.0) GO TO 941                                           RESU2600
C
C     UNBALANCE FORCES DUE TO OVERSHOOTING
C
      BMIUB=-BMLI+COLUM2(2,J,I)                                         RESU2605
      BMJUB=BMLJ-COLUM2(3,J,I)                                          RESU2610
      SFUB=(BMIUB+BMJUB)/XL                                             RESU2615
      DD(1,J,I)=SFUB*DCOS(BCL(J))                                       RESU2620
      DD(2,J,I)=SFUB*DSIN(BCL(J))                                       RESU2625
      XMUL=CLN(J,1)-SD(I,5)                                             RESU2630
      YMUL=-CLN(J,2)+SD(I,6)                                            RESU2635
      DD(3,J,I)=DD(1,J,I)*YMUL+DD(2,J,I)*XMUL                           RESU2640
      KKBAL=1                                                           RESU2645
  941 KKST=0                                                            RESU2650
      IF(KODYX(1,J,I).NE.KODY(1,J,I).OR.KODYX(2,J,I).NE.KODY(2,J,I))KKSTRESU2655
     1=1                                                                RESU2660
      IF(KKST.EQ.1) KST=1                                               RESU2665
      COLUM3(1,J,I)=-COLUM3(1,J,I)                                      RESU2670
      COLUM2(2,J,I)=-COLUM2(2,J,I)                                      RESU2675
  950 IF(ISTAT.EQ.1.AND.ETSE.EQ.0.) GO TO 6                             RESU2680
C
C     DUCTILITY AND EXCURSION (COLUMN)
C
      DETSE(1,J,I)=DETSE(1,J,I)+E2                                      RESU2685
      DETSE(2,J,I)=DETSE(2,J,I)+E3                                      RESU2690
      DETSE(3,J,I)=DETSE(3,J,I)+E5                                      RESU2695
      DETSE(4,J,I)=DETSE(4,J,I)+E6                                      RESU2700
      IF(ISTOP.GT.0) GO TO 199                                          RESU2705
      E2=0.                                                             RESU2710
      E3=0.                                                             RESU2715
      E5=0.                                                             RESU2720
      E6=0.                                                             RESU2725
  199 IF(E7.EQ.0.) GO TO 200                                            RESU2730
      TCDIS(1,J,I)=TCDIS(1,J,I)+DABS(CDIS(2,J,I))                       RESU2735
      DEDE(1,J,I)=DEDE(1,J,I)+E7                                        RESU2740
      DEDE1(1,J,I)=DEDE1(1,J,I)+DABS(E7)                                RESU2745
  200 IF(E8.EQ.0.) GO TO 201                                            RESU2750
      TCDIS(2,J,I)=TCDIS(2,J,I)+DABS(CDIS(3,J,I))                       RESU2755
      DEDE(2,J,I)=DEDE(2,J,I)+E8                                        RESU2760
      DEDE1(2,J,I)=DEDE1(2,J,I)+DABS(E8)                                RESU2765
  201 IF(E10.EQ.0.) GO TO 202                                           RESU2770
      TCDIS(3,J,I)=TCDIS(3,J,I)+DABS(CDIS(5,J,I))                       RESU2775
      DEDE(3,J,I)=DEDE(3,J,I)+E10                                       RESU2780
      DEDE1(3,J,I)=DEDE1(3,J,I)+DABS(E10)                               RESU2785
  202 IF(E11.EQ.0.) GO TO 203                                           RESU2790
      TCDIS(4,J,I)=TCDIS(4,J,I)+DABS(CDIS(6,J,I))                       RESU2795
      DEDE(4,J,I)=DEDE(4,J,I)+E11                                       RESU2800
      DEDE1(4,J,I)=DEDE1(4,J,I)+DABS(E11)                               RESU2805
C
  203 IF(CRVES(1,J,I).EQ.0.) GO TO 204                                  RESU2810
      IDU=1                                                             RESU2815
      RYIELD=RYIEL1                                                     RESU2820
      GO TO 207                                                         RESU2825
  204 IF(CRVES(2,J,I).EQ.0.) GO TO 205                                  RESU2830
      IDU=2                                                             RESU2835
      RYIELD=RYIEL1                                                     RESU2840
      GO TO 207                                                         RESU2845
  205 IF(CRVES(3,J,I).EQ.0.) GO TO 206                                  RESU2850
      IDU=3                                                             RESU2855
      RYIELD=RYIEL2                                                     RESU2860
      GO TO 207                                                         RESU2865
  206 IF(CRVES(4,J,I).EQ.0.) GO TO 6                                    RESU2870
      IDU=4                                                             RESU2875
      RYIELD=RYIEL2                                                     RESU2880
C
  207 DUCT=1.0+TCDIS(IDU,J,I)/RYIELD                                    RESU2885
      IF(DUCT.GE.1000000.) KONTRL=1                                     RESU2890
      IF(DROT(IDU,J,I).LT.DUCT) DROT(IDU,J,I)=DUCT                      RESU2895
      EROT(IDU,J,I)=EROT(IDU,J,I)+DUCT-1.0                              RESU2900
      IF(IDU.GT.2) GO TO 208                                            RESU2905
      EMEMC=RYIELD*CP(14,MC)*FYIELD                                     RESU2910
      IF(MC.GT.20) EMEMC=RYIELD*BMMY(1,MC)                              RESU2915
      EMEM=DETSE(1,J,I)+DETSE(2,J,I)-E2-E3-DEDE(1,J,I)-DEDE(2,J,I)      RESU2920
      GO TO 209                                                         RESU2925
  208 EMEMC=RYIELD*CP(15,MC)*FYIELD                                     RESU2930
      IF(MC.GT.20) EMEMC=RYIELD*BMMY(1,MC)                              RESU2935
      EMEM=DETSE(3,J,I)+DETSE(4,J,I)-E5-E6-DEDE(3,J,I)-DEDE(4,J,I)      RESU2940
  209 DUCT=1.0+DEDE1(IDU,J,I)/DABS(EMEM)                                RESU2945
      IF(DUCT.GE.1000000.) KONTRL=1                                     RESU2950
      IF(DENG(IDU,J,I).LT.DUCT) DENG(IDU,J,I)=DUCT                      RESU2955
      EENG(IDU,J,I)=EENG(IDU,J,I)+DUCT-1.0                              RESU2960
      DUCT=1.+DEDE1(IDU,J,I)/EMEMC                                      RESU2965
      IF(DUCT.GE.1000000.) KONTRL=1                                     RESU2970
      IF(DENGC(IDU,J,I).LT.DUCT) DENGC(IDU,J,I)=DUCT                    RESU2975
      EENGC(IDU,J,I)=EENGC(IDU,J,I)+DUCT-1.                             RESU2980
      TCDIS(IDU,J,I)=0.                                                 RESU2985
      DEDE1(IDU,J,I)=0.                                                 RESU2990
      CRVES(IDU,J,I)=0.                                                 RESU2995
      GO TO 203                                                         RESU3000
    6 IF(MC.GT.20) GO TO 30                                             RESU3005
      IF(NCHNG.EQ.1.OR.KST.EQ.1) GO TO 30                               RESU3010
C
C     PERCENT TOLERANCE
C
      CALL INTRCT(CP(10,MC),CP(11,MC),CP(12,MC),CP(13,MC),CP(2,MC),     RESU3015
     1CP(14,MC),CP(15,MC),FYIELD,COLUM2(4,J,I),COLUM2(2,J,I),COLUM2(5,J,RESU3020
     2I),COLUM2(1,J,I),CP(16,MC),COLXOI,COLYOI,ISEC)                    RESU3025
      CALL INTRCT(CP(10,MC),CP(11,MC),CP(12,MC),CP(13,MC),CP(2,MC),     RESU3030
     1CP(14,MC),CP(15,MC),FYIELD,COLUM2(4,J,I),COLUM2(3,J,I),COLUM2(6,J,RESU3035
     2I),COLUM2(1,J,I),CP(16,MC),COLXOJ,COLYOJ,ISEC)                    RESU3040
      IF(COLUM1(1,J,I).NE.0) GO TO 26                                   RESU3045
      CMPXI=COLXOI                                                      RESU3050
      GO TO 27                                                          RESU3055
   26 CMPXI=2.*COLXOI                                                   RESU3060
   27 CMXI=COLUM2(2,J,I)-COLUM1(1,J,I)                                  RESU3065
      CMXJ=COLUM2(3,J,I)-COLUM1(2,J,I)                                  RESU3070
C
      CALL INECOF(1,XLR,CP(6,MC),CP(5,MC),CP(2,MC),CMXI,CMXJ,CMPXI,     RESU3075
     1CMPXJ,P1,PP1,SCM1Z,SCM2X,SCM3X,SCM4X,SCM8Z)                       RESU3080
      IF(COLUM1(6,J,I).NE.0) GO TO 28                                   RESU3085
      CMPXJ=COLXOJ                                                      RESU3090
      GO TO 29                                                          RESU3095
   28 CMPXJ=2.*COLXOJ                                                   RESU3100
   29 CMXI=COLUM2(2,J,I)-COLUM1(5,J,I)                                  RESU3105
      CMXJ=COLUM2(3,J,I)-COLUM1(6,J,I)                                  RESU3110
C
      CALL INECOF(2,XLR,CP(6,MC),CP(5,MC),CP(2,MC),CMXI,CMXJ,CMPXI,     RESU3115
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     1CMPXJ,P1,PP1,SCM1Z,SCM2X,SCM3X,SCM4X,SCM8Z)                        RESU3120
      IF(COLUM1(9,J,I).NE.0) GO TO 31                                    RESU3125
      PP1=FYIELD*CP(2,MC)                                                RESU3130
      GO TO 32                                                           RESU3135
   31 PP1=2.*FYIELD*CP(2,MC)                                             RESU3140
   32 P1=COLUM2(4,J,I)-COLUM1(9,J,I)                                     RESU3145
C
      CALL INECOF(3,XLR,CP(6,MC),CP(5,MC),CP(2,MC),CMXI,CMXJ,CMPXI,      RESU3150
     1CMPXJ,P1,PP1,SCM1Z,SCM2X,SCM3X,SCM4X,SCM8Z)                        RESU3155
      IF(COLUM1(10,J,I).NE.0.) GO TO 400                                 RESU3160
      TT1=CP(16,MC)                                                      RESU3165
      GO TO 401                                                          RESU3170
  400 TT1=2.*CP(16,MC)                                                   RESU3175
  401 T1=COLUM2(1,J,I)-COLUM1(10,J,I)                                    RESU3180
C
      CALL INECOF(4,XLR,CP(6,MC),CP(5,MC),CP(2,MC),CMXI,CMXJ,CMPXI,      RESU3185
     1CMPXJ,T1,TT1,SCM1Z,SCM2X,SCM3X,SCM4X,SCM8Z)                        RESU3190
      IF(CCLUM1(3,J,I).NE.0) GO TO 33                                    RESU3195
      CMPYI=COLYOI                                                       RESU3200
      GO TO 34                                                           RESU3205
   33 CMPYI=2.*CCLYOI                                                    RESU3210
   34 CMYI=COLUM2(5,J,I)-COLUM1(3,J,I)                                   RESU3215
      CMYJ=COLUM2(6,J,I)-COLUM1(4,J,I)                                   RESU3220
C
      CALL INECOF(1,XLR,CP(7,MC),CP(5,MC),CP(2,MC),CMYI,CMYJ,CMPYI,      RESU3225
     1CMPYJ,P1,PP1,SCM1Z,SCM2Y,SCM3Y,SCM4Y,SCM8Z)                        RESU3230
      IF(COLUM1(8,J,I).NE.0) GO TO 35                                    RESU3235
      CMPYJ=COLYOJ                                                       RESU3240
      GO TO 36                                                           RESU3245
   35 CMPYJ=2.*COLYOJ                                                    RESU3250
   36 CMYI=COLUM2(5,J,I)-COLUM1(7,J,I)                                   RESU3255
      CMYJ=COLUM2(6,J,I)-COLUM1(8,J,I)                                   RESU3260
C
      CALL INECOF(2,XLR,CP(7,MC),CP(5,MC),CP(2,MC),CMYI,CMYJ,CMPYI,      RESU3265
     1CMPYJ,P1,PP1,SCM1Z,SCM2Y,SCM3Y,SCM4Y,SCM8Z)                        RESU3270
C
      A1=DABS(COCOL(2,J,I)-SCM2X)                                        RESU3275
      IF(SCOCOL(1,J,I).NE.SCM2X) NELAS=1                                 RESU3280
      IF(A1.LT.0.001) GO TO 42                                           RESU3285
      B1=DABS(COCOL(2,J,I))                                              RESU3290
      IF(DABS(SCM2X).LT.DABS(COCOL(2,J,I))) B1=DABS(SCM2X)               RESU3295
      IF(B1.EQ.0) B1=1.                                                  RESU3300
      IF(A1*100./B1.LT.DCON) GO TO 42                                    RESU3305
      NCHNG=1                                                            RESU3310
      GO TO 30                                                           RESU3315
C
   42 A2=DABS(COCOL(3,J,I)-SCM4X)                                        RESU3320
      IF(SCCCOL(4,J,I).NE.SCM4X) NELAS=1                                 RESU3325
      IF(A2.LT.0.001) GO TO 37                                           RESU3330
      B2=DABS(COCOL(3,J,I))                                              RESU3335
      IF(DABS(SCM4X).LT.DABS(COCOL(3,J,I))) B2=DABS(SCM4X)               RESU3340
      IF(B2.EQ.0) B2=1.                                                  RESU3345
      IF(A2*100./B2.LT.DCON) GO TO 37                                    RESU3350
      NCHNG=1                                                            RESU3355
      GO TO 30                                                           RESU3360
C
   37 A3=DABS(COCOL(4,J,I)-SCM3X)                                        RESU3365
      IF(SCOCOL(1,J,I).NE.SCM3X) NELAS=1                                 RESU3370
      IF(A3.LT.0.001) GO TO 38                                           RESU3375
      B3=DABS(COCOL(4,J,I))                                              RESU3380
      IF(DABS(SCM3X).LT.DABS(COCOL(4,J,I))) B3=DABS(SCM3X)               RESU3385
      IF(B3.EQ.0) B3=1.                                                  RESU3390
      IF(A3*100./B3.LT.DCON) GO TO 38                                    RESU3395
      NCHNG=1                                                            RESU3400
      GO TO 30                                                           RESU3405
C
   38 A4=DABS(COCOL(6,J,I)-SCM2Y)                                        RESU3410
      IF(SCOCOL(3,J,I).NE.SCM2Y) NELAS=1                                 RESU3415
      IF(A4.LT.0.001) GO TO 39                                           RESU3420
      B4=DABS(COCOL(6,J,I))                                              RESU3425
      IF(DABS(SCM2Y).LT.DABS(COCOL(6,J,I))) B4=DABS(SCM2Y)               RESU3430
      IF(B4.EQ.0) B4=1.                                                  RESU3435
      IF(A4*100./B4.LT.DCON) GO TO 39                                    RESU3440
      NCHNG=1                                                            RESU3445
      GO TO 30                                                           RESU3450
C
   39 A5=DABS(COCOL(7,J,I)-SCM4Y)                                        RESU3455
      IF(SCOCOL(5,J,I).NE.SCM4Y) NELAS=1                                 RESU3460
      IF(A5.LT.0.001) GO TO 41                                           RESU3465
      B5=DABS(COCOL(7,J,I))                                              RESU3470
      IF(DABS(SCM4Y).LT.DABS(COCOL(7,J,I))) B5=DABS(SCM4Y)               RESU3475
      IF(B5.EQ.0) B5=1.                                                  RESU3480
      IF(A5*100./B5.LT.DCON) GO TO 41                                    RESU3485
      NCHNG=1                                                            RESU3490
      GO TO 30                                                           RESU3495
C
   41 A6=DABS(COCOL(8,J,I)-SCM3Y)                                        RESU3500
      IF(SCOCOL(3,J,I).NE.SCM3Y) NELAS=1                                 RESU3505
      IF(A6.LT.0.001) GO TO 51                                           RESU3510
      B6=DABS(COCOL(8,J,I))                                              RESU3515
      IF(DABS(SCM3Y).LT.DABS(COCOL(8,J,I))) B6=DABS(SCM3Y)               RESU3520
      IF(B6.EQ.0) B6=1.                                                  RESU3525
      IF(A6*100./B6.LT.DCON) GO TO 51                                    RESU3530
      NCHNG=1                                                            RESU3535
      GO TO 30                                                           RESU3540
C
   51 A7=DABS(COCOL(5,J,I)-SCM1Z)                                        RESU3545
      IF(SCOCOL(2,J,I).NE.SCM1Z) NELAS=1                                 RESU3550
      IF(A7.LT.0.001) GO TO 52                                           RESU3555
      B7=DABS(COCOL(5,J,I))                                              RESU3560
      IF(DABS(SCM1Z).LT.DABS(COCOL(5,J,I))) B7=DABS(SCM1Z)               RESU3565
      IF(B7.EQ.0) B7=1.                                                  RESU3570
      IF(A7*100./B7.LT.DCON) GO TO 52                                    RESU3575
      NCHNG=1                                                            RESU3580
      GO TO 30                                                           RESU3585
C
   52 A8=DABS(COCOL(1,J,I)-SCM8Z)                                        RESU3590
      IF(A8.LT.0.001) GO TO 30                                           RESU3595
      B8=DABS(COCOL(1,J,I))                                              RESU3600
      IF(DABS(SCM8Z).LT.DABS(COCOL(1,J,I))) B8=DABS(SCM8Z)               RESU3605
      IF(B8.EQ.0) B8=1.                                                  RESU3610
      IF(A8*100./B8.LT.DCON) GO TO 30                                    RESU3615
      NCHNG=1                                                            RESU3620
   30 CONTINUE                                                           RESU3625
C
C     BEAM ELEMENT
C
      DO 60 J=1,NB                                                       RESU3630
      MB=LB(I,J,3)                                                       RESU3635
      KI=LB(I,J,1)                                                       RESU3640
      KJ=LB(I,J,2)                                                       RESU3645
      B1=CLN(KJ,1)-CLN(KI,1)                                             RESU3650
      B2=CLN(KJ,2)-CLN(KI,2)                                             RESU3655
      B3=B1*B1+B2*B2                                                     RESU3660
      B3=DSQRT(B3)                                                       RESU3665
      CSA=B1/B3                                                          RESU3670
      SNA=B2/B3                                                          RESU3675
      XL=B3                                                              RESU3680
      WI=BP(8,MB)                                                        RESU3685
      WJ=BP(9,MB)                                                        RESU3690
      E=BP(1,MB)                                                         RESU3695
      G=E/2.5                                                            RESU3700
      XLR=XL-WI-WJ                                                       RESU3705
      RYIELD=BP(10,MB)*FYIELD*XLR/(6.*E*BP(4,MB))                        RESU3710
C
C     STRAIN ENERGIES
C
      E1=0.5*(2.*BEAM2(1,J,I)+BEAM3(5,J,I))*BDIS(1,J,I)                  RESU3715
      E2=0.5*(2.*BEAM2(2,J,I)+BEAM3(1,J,I))*BDIS(2,J,I)                  RESU3720
      E3=0.5*(2.*BEAM2(3,J,I)+BEAM3(3,J,I))*BDIS(3,J,I)                  RESU3725
      ETSE=ETSE+E1+E2+E3                                                 RESU3730
C
C     DISSIPATED STRAIN ENERGIES
C
      E4=E2*(1.-COBM(2,J,I)/SCOBM(1,J,I))                                RESU3735
      E5=E3*(1.-COBM(4,J,I)/SCOBM(1,J,I))                                RESU3740
      EDE=EDE+E4+E5                                                      RESU3745
C
C     TOTAL BEAM FORCES
C
      BEAM2(1,J,I)=BEAM2(1,J,I)+BEAM3(5,J,I)                             RESU3750
      BEAM2(2,J,I)=BEAM2(2,J,I)+BEAM3(1,J,I)                             RESU3755
      BEAM2(3,J,I)=BEAM2(3,J,I)+BEAM3(3,J,I)                             RESU3760
      IF(ISTAT.EQ.1.AND.ETSE.EQ.0.) GO TO 7                              RESU3765
C
C     DUCTILITY AND EXCURSION (BEAM)
C
      DETSB(1,J,I)=DETSB(1,J,I)+E2                                       RESU3770
      DETSB(2,J,I)=DETSB(2,J,I)+E3                                       RESU3775
      IF(ISTOP.GT.0) GO TO 299                                           RESU3780
      E2=0.                                                              RESU3785
      E3=0.                                                              RESU3790
  299 IF(E4.EQ.0.) GO TO 300                                             RESU3795
      TBDIS(1,J,I)=TBDIS(1,J,I)+DABS(BDIS(2,J,I))                        RESU3800
      DEDB(1,J,I)=DEDB(1,J,I)+E4                                         RESU3805
      DEDB1(1,J,I)=DEDB1(1,J,I)+DABS(E4)                                 RESU3810
  300 IF(E5.EQ.0.) GO TO 301                                             RESU3815
      TBDIS(2,J,I)=TBDIS(2,J,I)+DABS(BDIS(3,J,I))                        RESU3820
      DEDB(2,J,I)=DEDB(2,J,I)+E5                                         RESU3825
      DEDB1(2,J,I)=DEDB1(2,J,I)+DABS(E5)                                 RESU3830
C
  301 IF(BRVES(1,J,I).EQ.0.) GO TO 302                                   RESU3835
      IDU=1                                                              RESU3840
      GO TO 303                                                          RESU3845
  302 IF(BRVES(2,J,I).EQ.0.) GO TO 7                                     RESU3850
      IDU=2                                                              RESU3855
```

```
C
  303 DUCT=1.0+TBDIS(IDU,J,I)/RYIELD                                    RESU3860
      IF(DUCT.GE.1000000.) KONTRL=1                                     RESU3865
      IF(DROTB(IDU,J,I).LT.DUCT) DROTB(IDU,J,I)=DUCT                    RESU3870
      EROTB(IDU,J,I)=ERCTB(IDU,J,I)+DUCT-1.0                            RESU3875
      EMEMC=RYIELD*BP(10,MB)*FYIELD                                     RESU3880
      EMEM=DETSB(1,J,I)+DETSB(2,J,I)-E2-E3-DEDB(1,J,I)-DEDB(2,J,I)      RESU3885
      DUCT=1.0+DEDB(IDU,J,I)/DABS(EMEM)                                 RESU3890
      IF(DUCT.GE.1000000.) KONTRL=1                                     RESU3895
      IF(DENGB(IDU,J,I).LT.DUCT) DENGB(IDU,J,I)=DUCT                    RESU3900
      EENGB(IDU,J,I)=EENGB(IDU,J,I)+DUCT-1.0                            RESU3905
      DUCT=1.+DEDB(IDU,J,I)/EMEMC                                       RESU3910
      IF(DUCT.GE.1000000.) KONTRL=1                                     RESU3915
      IF(DENGBC(IDU,J,I).LT.DUCT) DENGBC(IDU,J,I)=DUCT                  RESU3920
      EENGBC(IDU,J,I)=EENGBC(IDU,J,I)+DUCT-1.                           RESU3925
      TBDIS(IDU,J,I)=0.                                                 RESU3930
      DEDB(IDU,J,I)=0.                                                  RESU3935
      BRVES(IDU,J,I)=0.                                                 RESU3940
      GO TO 301                                                         RESU3945
    7 IF(NCHNG.EQ.1.OR.KST.EQ.1) GO TO 60                               RESU3950
C
C     PERCENT TOLERANCE
C
      CALL INTRCT(SPACE,SPACE,SPACE,SPACE,0.0,BP(10,MB),0.0,FYIELD,0.0, RESU3955
     1SPACE,0.0,BEAM2(1,J,I),BP(11,MB),BMO,0.0,ISEC)                    RESU3960
      IF(BEAM1(1,J,I).NE.0) GO TO 43                                    RESU3965
      CMPI=BMO                                                          RESU3970
      GO TO 44                                                          RESU3975
   43 CMPI=2.*BMO                                                       RESU3980
   44 CMI=BEAM2(2,J,I)-BEAM1(1,J,I)                                     RESU3985
      CMJ=BEAM2(3,J,I)-BEAM1(2,J,I)                                     RESU3990
C
      CALL INECOF(1,XLR,BP(4,MB),BP(3,MB),0.0,CMI,CMJ,CMPI,CMPJ,0.0,0.0,RESU3995
     10.0,SCM2,SCM3,SCM4,SCM8)                                          RESU4000
      IF(BEAM1(4,J,I).NE.0) GO TO 45                                    RESU4005
      CMPJ=BMO                                                          RESU4010
      GO TO 46                                                          RESU4015
   45 CMPJ=2.*BMO                                                       RESU4020
   46 CMI=BEAM2(2,J,I)-BEAM1(3,J,I)                                     RESU4025
      CMJ=BEAM2(3,J,I)-BEAM1(4,J,I)                                     RESU4030
C
      CALL INECOF(2,XLR,BP(4,MB),BP(3,MB),0.0,CMI,CMJ,CMPI,CMPJ,0.0,0.0,RESU4035
     10.0,SCM2,SCM3,SCM4,SCM8)                                          RESU4040
      IF(BEAM1(5,J,I).NE.0) GO TO 49                                    RESU4045
      TT1=BP(11,MB)                                                     RESU4050
      GO TO 53                                                          RESU4055
   49 TT1=2.*BP(11,MB)                                                  RESU4060
   53 T1=BEAM2(1,J,I)-BEAM1(5,J,I)                                      RESU4065
C
      CALL INECOF(4,XLR,BP(4,MB),BP(3,MB),0.0,CMI,CMJ,CMPI,CMPJ,T1,TT1, RESU4070
     10.0,SCM2,SCM3,SCM4,SCM8)                                          RESU4075
C
      A1=DABS(COBM(2,J,I)-SCM2)                                         RESU4080
      IF(SCOBM(1,J,I).NE.SCM2) NELAS=1                                  RESU4085
      IF(A1.LT.0.001) GO TO 47                                          RESU4090
      B1=DABS(COBM(2,J,I))                                              RESU4095
      IF(DABS(SCM2).LT.DABS(COBM(2,J,I))) B1=DABS(SCM2)                 RESU4100
      IF(B1.EQ.0) B1=1.                                                 RESU4105
      IF(A1*100./B1.LT.DCON) GO TO 47                                   RESU4110
      NCHNG=1                                                           RESU4115
      GO TO 60                                                          RESU4120
C
   47 A2=DABS(COBM(3,J,I)-SCM4)                                         RESU4125
      IF(SCOBM(2,J,I).NE.SCM4) NELAS=1                                  RESU4130
      IF(A2.LT.0.001) GO TO 48                                          RESU4135
      B2=DABS(COBM(3,J,I))                                              RESU4140
      IF(DABS(SCM4).LT.DABS(COBM(3,J,I))) B2=DABS(SCM4)                 RESU4145
      IF(B2.EQ.0) B2=1.                                                 RESU4150
      IF(A2*100./B2.LT.DCON) GO TO 48                                   RESU4155
      NCHNG=1                                                           RESU4160
      GO TO 60                                                          RESU4165
C
   48 A3=DABS(COBM(4,J,I)-SCM3)                                         RESU4170
      IF(SCOBM(1,J,I).NE.SCM3) NELAS=1                                  RESU4175
      IF(A3.LT.0.001) GO TO 66                                          RESU4180
      B3=DABS(COBM(4,J,I))                                              RESU4185
      IF(DABS(SCM3).LT.DABS(COBM(4,J,I))) B3=DABS(SCM3)                 RESU4190
      IF(B3.EQ.0) B3=1.                                                 RESU4195
      IF(A3*100./B3.LT.DCON) GO TO 66                                   RESU4200
      NCHNG=1                                                           RESU4205
      GO TO 60                                                          RESU4210
C
   66 A4=DABS(COBM(1,J,I)-SCM8)                                         RESU4215
      IF(A4.LT.0.001) GO TO 60                                          RESU4220
      B4=DABS(COBM(1,J,I))                                              RESU4225
      IF(DABS(SCM8).LT.DABS(COBM(1,J,I))) B4=DABS(SCM8)                 RESU4230
      IF(B4.EQ.0) B4=1.                                                 RESU4235
      IF(A4*100./B4.LT.DCON) GO TO 60                                   RESU4240
      NCHNG=1                                                           RESU4245
   60 CONTINUE                                                          RESU4250
C
C     BRACE ELEMENT
C
      IF(NTRU.EQ.0) GO TO 40                                            RESU4255
      DO 61 J=1,NTRU                                                    RESU4260
      NP=NS-LT(1,J)+1                                                   RESU4265
      IF(NP.NE.1) GO TO 61                                              RESU4270
      YL=SD(1,2)                                                        RESU4275
      KJ=LT(2,J)                                                        RESU4280
      KI=LT(3,J)                                                        RESU4285
      B1=CLN(KJ,1)-CLN(KI,1)                                            RESU4290
      B2=CLN(KJ,2)-CLN(KI,2)                                            RESU4295
      B3=B1*B1+B2*B2                                                    RESU4300
      B3=DSQRT(B3)                                                      RESU4305
      DL=DSQRT(B3*B3+YL*YL)                                             RESU4310
      E=TP(1,J)                                                         RESU4315
C
C     INPUT ENERGIES
C
      IF(NP.NE.NS) GO TO 63                                             RESU4320
      CSA=B3/DL                                                         RESU4325
      SNA=YL/DL                                                         RESU4330
      E1=DIAGO(2,J)*CSA                                                 RESU4335
      E2=DIAGO(3,J)*CSA                                                 RESU4340
      E3=DIAGO(2,J)*SNA                                                 RESU4345
      E4=DIAGO(3,J)*SNA                                                 RESU4350
      BCL1=BCL(KI)*ATAN(1.)/45.                                         RESU4355
      TEMPDX=DISX*DCOS(BCL1)-DISY*DSIN(BCL1)                            RESU4360
      TEMPDY=DISX*DSIN(BCL1)+DISY*DCOS(BCL1)                            RESU4365
      IF(KJ.NE.LC(I,KI,2)) GO TO 62                                     RESU4370
      EIE=EIE-0.5*((2.*E1+E2)*TEMPDX+(2.*E3+E4)*DISZ)                   RESU4375
      GO TO 63                                                          RESU4380
   62 EIE=EIE-0.5*((2.*E1+E2)*TEMPDY+(2.*E3+E4)*DISZ)                   RESU4385
C
C     STRAIN ENERGIES
C
   63 E1=0.5*(2.*DIAGO(2,J)+DIAGO(3,J))*DDIS(1,J)                       RESU4390
      ETSE=ETSE+E1                                                      RESU4395
C
C     DISSIPATED STRAIN ENERGIES
C
      E2=E1*(1.-CODIA(1,J)/SCODIA(1,J))                                 RESU4400
      EDE=EDE+E2                                                        RESU4405
C
C     TOTAL BRACE FORCES
C
      DIAGO(2,J)=DIAGO(2,J)+DIAGO(3,J)                                  RESU4410
      IF(NCHNG.EQ.1) GO TO 61                                           RESU4415
      IF(DIAGO(1,J).NE.0.) GO TO 64                                     RESU4420
C
C     PERCENT TOLERANCE
C
      PP1=FYIELD*TP(2,J)                                                RESU4425
      IF(DIAGO(2,J).LT.0.) PP1=FCRITI*TP(2,J)                           RESU4430
      GO TO 65                                                          RESU4435
   64 PP1=TP(2,J)*(FYIELD+FCRITI)                                       RESU4440
   65 P1=DIAGO(2,J)-DIAGO(1,J)                                          RESU4445
      CALL INECOF(3,DL,SPACE,SPACE,TP(2,J),SPACE,SPACE,SPACE,SPACE,P1,  RESU4450
     1PP1,SCM12,SCM22,SCM33,SCM44,SCM88)                                RESU4455
      A1=DABS(CODIA(1,J)-SCM12)                                         RESU4460
      IF(SCODIA(1,J).NE.SCM12) NELAS=1                                  RESU4465
      IF(A1.LT.0.001) GO TO 61                                          RESU4470
      A2=DABS(CODIA(1,J))                                               RESU4475
      IF(DABS(SCM12).LT.DABS(CODIA(1,J))) A2=DABS(SCM12)                RESU4480
      IF(A2.EQ.0.) A2=1.0                                               RESU4485
      IF(A1*100./A2.LT.DCON) GO TO 61                                   RESU4490
      NCHNG=1                                                           RESU4495
   61 CONTINUE                                                          RESU4500
   40 CONTINUE                                                          RESU4505
C
C     SHEAR PANEL ELEMENT
C
      IF(NPAN.EQ.0) GO TO 80                                            RESU4510
      DO 50 I=1,NS                                                      RESU4515
      DO 50 L=1,NPAN                                                    RESU4520
      NP=NS-LP(1,L)+1                                                   RESU4525
      IF(NP.NE.1) GO TO 50                                              RESU4530
      KI=LP(2,L)                                                        RESU4535
      KJ=LP(3,L)                                                        RESU4540
      XL=SD(1,2)                                                        RESU4545
C
C     MODIFIED OR EXTENDED TAKEDA RULE FOR SHEAR PANEL
C
      KODYXP(1,L)=KODYP(1,L)                                            RESU4550
      KODYXP(2,L)=KODYP(2,L)                                            RESU4555
      FACAC=0                                                           RESU4560
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      KBAL=0                                                                    RESU4565
      PANEL3(1,L)=-PANEL3(1,L)                                                  RESU4570
      PANEL2(1,L)=-PANEL2(1,L)                                                  RESU4575
      BMLI=PANEL2(1,L)+PANEL3(1,L)                                              RESU4580
      BMLJ=PANEL2(2,L)+PANEL3(2,L)                                              RESU4585
  491 FACTOR=1.0-FACAC                                                          RESU4590
      KFAC=0                                                                    RESU4595
      DO 901 IEND=1,2                                                           RESU4600
      IF(PANEL3(IEND,L).EQ.0) GO TO 901                                         RESU4605
      REMIND=1.                                                                 RESU4610
      IF(INDP(IEND,L).EQ.2) REMIND=-1.                                          RESU4615
C
C     RULE 1
C
      IF(KODYP(IEND,L).NE.0) GO TO 521                                          RESU4620
      IF(PANEL3(IEND,L).GT.0.) GO TO 511                                        RESU4625
      FAC=(BMYP(IEND,2,L)-PANEL2(1,L))/PANEL3(IEND,L)                           RESU4630
      IF(FAC.GE.FACTOR) GO TO 901                                               RESU4635
      FACTOR=FAC                                                                RESU4640
      BM=BMYP(IEND,2,L)                                                         RESU4645
      ROT=RYP(IEND,2,L)                                                         RESU4650
      KFAC=IEND                                                                 RESU4655
      KODE=2                                                                    RESU4660
      EK=EKEPP(IEND,2,L)                                                        RESU4665
      IDK=2                                                                     RESU4670
      GO TO 901                                                                 RESU4675
  511 FAC=(BMYP(IEND,1,L)-PANEL2(IEND,L))/PANEL3(IEND,L)                        RESU4680
      IF(FAC.GE.FACTOR) GO TO 901                                               RESU4685
      FACTOR=FAC                                                                RESU4690
      BM=BMYP(IEND,1,L)                                                         RESU4695
      ROT=RYP(IEND,1,L)                                                         RESU4700
      KFAC=IEND                                                                 RESU4705
      KODE=1                                                                    RESU4710
      EK=EKEPP(IEND,2,L)                                                        RESU4715
      IDK=1                                                                     RESU4720
      GO TO 901                                                                 RESU4725
  521 KOD=KODYP(IEND,L)                                                         RESU4730
C
      GO TO (531,531,571,621,641,691,711,731,751,771,791),KOD                   RESU4735
C
C     RULE 2
C
  531 IF(REMIND*PANEL3(IEND,L).LT.0.) GO TO 541                                 RESU4740
      MIND(IEND)=INDP(IEND,L)                                                   RESU4745
      GO TO 901                                                                 RESU4750
  541 KODYP(IEND,L)=3                                                           RESU4755
      PRVES(IEND,L)=1.0                                                         RESU4760
      IDD=INDP(IEND,L)                                                          RESU4765
      BMT=PANEL2(IEND,L)                                                        RESU4770
      BMTEST=(BMBP(IEND,IDD,L)-BMT)*REMIND                                      RESU4775
      IF(BMTEST.GE.0.) GO TO 561                                                RESU4780
      EKU=BMT/(PP(IEND+6,L)*RTOTP(IEND,L)+(1.-PP(IEND+6,L))*BMT/EK1P(IENRESU4785
     1D,L))                                                                     RESU4790
      IDM=3-IDD                                                                 RESU4795
      EKUMIN=(BMT-BMAP(IEND,IDM,L))/(RTOTP(IEND,L)-RAP(IEND,IDM,L))             RESU4800
      IF(EKU.LT.EKUMIN) EKU=EKUMIN                                              RESU4805
      IF(EKEPP(IEND,1,L).LE.EKU) EKU=EKEPP(IEND,1,L)                            RESU4810
      IF(PP(IEND+6,L).LE.0.) EKU=EK1P(IEND,L)                                   RESU4815
      EKEPP(IEND,1,L)=EKU                                                       RESU4820
      BMBP(IEND,IDD,L)=BMT                                                      RESU4825
      RBP(IEND,IDD,L)=RTOTP(IEND,L)                                             RESU4830
      RAP(IEND,IDD,L)=(1.-PP(IEND+8,L))*RTOTP(IEND,L)+PP(IEND+8,L)*RY1P(RESU4835
     1IEND,IDD,L)                                                               RESU4840
      BMAP(IEND,IDD,L)=BMT-(RTOTP(IEND,L)-RAP(IEND,IDD,L))*EKEPP(IEND,2,RESU4845
     1L)                                                                        RESU4850
      IF(PP(IEND+8,L).GT.0.) GO TO 551                                          RESU4855
      RAP(IEND,IDD,L)=RTOTP(IEND,L)                                             RESU4860
      BMAP(IEND,IDD,L)=BMT                                                      RESU4865
  551 RRECP(IEND,IDD,L)=RTOTP(IEND,L)-BMBP(IEND,IDD,L)/EKEPP(IEND,1,L)          RESU4870
      IDB=3-IDD                                                                 RESU4875
      RRECP(IEND,IDB,L)=RBP(IEND,IDB,L)-BMBP(IEND,IDB,L)/EKEPP(IEND,1,L)RESU4880
      RCTEST=RRECP(IEND,IDB,L)*REMIND                                           RESU4885
      IF(RCTEST.GT.0.) RRECP(IEND,IDB,L)=0.                                     RESU4890
  561 EKHP(IEND,L)=EKEPP(IEND,1,L)                                              RESU4895
      REVPTP(IEND,L)=RTOTP(IEND,L)-BMT/EKHP(IEND,L)                             RESU4900
      FACTOR=0.                                                                 RESU4905
      KFAC=0                                                                    RESU4910
      GO TO 901                                                                 RESU4915
C
C     RULE 3
C
  571 IF(REMIND*PANEL3(IEND,L).LT.0.) GO TO 581                                 RESU4920
      IDD=INDP(IEND,L)                                                          RESU4925
      FAC=(BMYP(IEND,IDD,L)-PANEL2(IEND,L))/PANEL3(IEND,L)                      RESU4930
      IF(FAC.GE.FACTOR) GO TO 901                                               RESU4935
      FACTOR=FAC                                                                RESU4940
      BM=BMYP(IEND,IDD,L)                                                       RESU4945
      ROT=RYP(IEND,IDD,L)                                                       RESU4950
      KFAC=IEND                                                                 RESU4955
      KODE=IDD                                                                  RESU4960
      IDK=IDD                                                                   RESU4965
      EK=EKEPP(IEND,2,L)                                                        RESU4970
      GO TO 901                                                                 RESU4975
  581 FAC=-PANEL2(IEND,L)/PANEL3(IEND,L)                                        RESU4980
      IF(FAC.GE.FACTOR) GO TO 901                                               RESU4985
      FACTOR=FAC                                                                RESU4990
      BM=0.                                                                     RESU4995
      ROT=REVPTP(IEND,L)                                                        RESU5000
      KFAC=IEND                                                                 RESU5005
      KODE=4                                                                    RESU5010
      IDK=3-INDP(IEND,L)                                                        RESU5015
      IDD=3-IDK                                                                 RESU5020
      RTEST=(RRECP(IEND,IDD,L)-RCT)*REMIND                                      RESU5025
      IF(RTEST.GT.0.) GO TO 591                                                 RESU5030
      BMYP(IEND,IDK,L)=BMAP(IEND,IDK,L)                                         RESU5035
      RYP(IEND,IDK,L)=RAP(IEND,IDK,L)                                           RESU5040
      GO TO 601                                                                 RESU5045
  591 RBA=RBP(IEND,IDK,L)-RAP(IEND,IDK,L)                                       RESU5050
      RPR=ROT-RRECP(IEND,IDD,L)                                                 RESU5055
      RRR=RRECP(IEND,IDK,L)-RRECP(IEND,IDD,L)                                   RESU5060
      RXA=RBA*(RPR/RRR)**PP(12,L)                                               RESU5065
      RYP(IEND,IDK,L)=RAP(IEND,IDK,L)+RXA                                       RESU5070
      BMYP(IEND,IDK,L)=BMAP(IEND,IDK,L)+RXA*EKEPP(IEND,2,L)                     RESU5075
  601 EKL=BMYP(IEND,IDK,L)/(RYP(IEND,IDK,L)-ROT)                                RESU5080
      IF(EKL.LT.EKEPP(IEND,1,L)) GO TO 611                                      RESU5085
      EKL=0.999*EKEPP(IEND,1,L)                                                 RESU5090
      RYP(IEND,IDK,L)=(ROT*EKL+BMAP(IEND,IDK,L)-RAP(IEND,IDK,L)*EKEPP(IERESU5095
     1ND,2,L))/(EKL-EKEPP(IEND,2,L))                                            RESU5100
      BMYP(IEND,IDK,L)=EKL*(RYP(IEND,IDK,L)-ROT)                                RESU5105
  611 EKEPP(IEND,3,L)=EKL                                                       RESU5110
      EK=EKEPP(IEND,3,L)                                                        RESU5115
      GO TO 901                                                                 RESU5120
C
C     RULE 4
C
  621 IF(REMIND*PANEL3(IEND,L).LT.0.) GO TO 631                                 RESU5125
      IDD=INDP(IEND,L)                                                          RESU5130
      MIND(IEND)=3                                                              RESU5135
      FAC=(BMYP(IEND,IDD,L)-PANEL2(IEND,L))/PANEL3(IEND,L)                      RESU5140
      IF(FAC.GE.FACTOR) GO TO 901                                               RESU5145
      FACTOR=FAC                                                                RESU5150
      BM=BMYP(IEND,IDD,L)                                                       RESU5155
      ROT=RYP(IEND,IDD,L)                                                       RESU5160
      KFAC=IEND                                                                 RESU5165
      KODE=IDD                                                                  RESU5170
      IDK=IDD                                                                   RESU5175
      EK=EKEPP(IEND,2,L)                                                        RESU5180
      GO TO 901                                                                 RESU5185
  631 KODYP(IEND,L)=5                                                           RESU5190
      PRVES(IEND,L)=1.0                                                         RESU5195
      EKHP(IEND,L)=EKEPP(IEND,1,L)                                              RESU5200
      REVPTP(IEND,L)=RYP(IEND,3,L)-BMYP(IEND,3,L)/EKHP(IEND,L)                  RESU5205
      FACTOR=0.                                                                 RESU5210
      KFAC=0                                                                    RESU5215
      GO TO 901                                                                 RESU5220
C
C     RULE 5
C
  641 IF(REMIND*PANEL3(IEND,L).LT.0.) GO TO 651                                 RESU5225
      FAC=(BMYP(IEND,3,L)-PANEL2(IEND,L))/PANEL3(IEND,L)                        RESU5230
      IF(FAC.GE.FACTOR) GO TO 901                                               RESU5235
      FACTOR=FAC                                                                RESU5240
      BM=BMYP(IEND,3,L)                                                         RESU5245
      ROT=RYP(IEND,3,L)                                                         RESU5250
      KFAC=IEND                                                                 RESU5255
      KODE=4                                                                    RESU5260
      IDK=INDP(IEND,L)                                                          RESU5265
      EK=EKEPP(IEND,3,L)                                                        RESU5270
      GO TO 901                                                                 RESU5275
  651 FAC=-PANEL2(IEND,L)/PANEL3(IEND,L)                                        RESU5280
      IF(FAC.GE.FACTOR) GO TO 901                                               RESU5285
      FACTOR=FAC                                                                RESU5290
      BM=0.                                                                     RESU5295
      ROT=REVPTP(IEND,L)                                                        RESU5300
      KFAC=IEND                                                                 RESU5305
      KODE=6                                                                    RESU5310
      IDK=3-INDP(IEND,L)                                                        RESU5315
      IDD=3-IDK                                                                 RESU5320
      RTEST=(RRECP(IEND,IDD,L)-ROT)*REMIND                                      RESU5325
      IF(RTEST.GT.0.) GO TO 661                                                 RESU5330
      BMYP(IEND,IDK,L)=BMAP(IEND,IDK,L)                                         RESU5335
      RYP(IEND,IDK,L)=RAP(IEND,IDK,L)                                           RESU5340
      GO TO 671                                                                 RESU5345
  661 RBA=RBP(IEND,IDK,L)-RAP(IEND,IDK,L)                                       RESU5350
      RPR=ROT-RRECP(IEND,IDD,L)                                                 RESU5355
      RRR=RRECP(IEND,IDK,L)-RRECP(IEND,IDD,L)                                   RESU5360
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      RXA=RBA*(RPR/RRR)**PP(12,L)                                       RESU5365
      RYP(IEND,IDK,L)=RAP(IEND,IDK,L)+RXA                               RESU5370
      BMYP(IEND,IDK,L)=BMAP(IEND,IDK,L)+RXA*EKEPP(IEND,2,L)             RESU5375
  671 EKL=BMYP(IEND,IDK,L)/(RYP(IEND,IDK,L)-ROT)                        RESU5380
      IF(EKL.LT.EKEPP(IEND,1,L)) GO TO 681                              RESU5385
      EKL=0.999*EKEPP(IEND,1,L)                                         RESU5390
      RYP(IEND,IDK,L)=(ROT*EKL+BMAP(IEND,IDK,L)-RAP(IEND,IDK,L)*EKEPP(IERESU5395
     1ND,2,L))/(EKL-EKEPP(IEND,2,L))                                    RESU5400
      BMYP(IEND,IDK,L)=EKL*(RYP(IEND,IDK,L)-ROT)                        RESU5405
  681 EKEPP(IEND,4,L)=EKL                                               RESU5410
      EK=EKEPP(IEND,4,L)                                                RESU5415
      GO TO 901                                                         RESU5420
C
C     RULE 6
C
  691 IF(REMIND*PANEL3(IEND,L).LT.0.) GO TO 701                         RESU5425
      IDD=INDP(IEND,L)                                                  RESU5430
      MIND(IEND)=4                                                      RESU5435
      FAC=(BMYP(IEND,IDD,L)-PANEL2(IEND,L))/PANEL3(IEND,L)              RESU5440
      IF(FAC.GE.FACTOR) GO TO 901                                       RESU5445
      FACTOR=FAC                                                        RESU5450
      BM=BMYP(IEND,IDD,L)                                               RESU5455
      ROT=RYP(IEND,IDD,L)                                               RESU5460
      KFAC=IEND                                                         RESU5465
      KODE=IDD                                                          RESU5470
      IDK=IDD                                                           RESU5475
      EK=EKEPP(IEND,2,L)                                                RESU5480
      GO TO 901                                                         RESU5485
  701 KODYP(IEND,L)=7                                                   RESU5490
      PRVES(IEND,L)=1.0                                                 RESU5495
      EKHP(IEND,L)=EKEPP(IEND,1,L)                                      RESU5500
      REVPTP(IEND,L)=RYP(IEND,4,L)-BMYP(IEND,4,L)/EKHP(IEND,L)          RESU5505
      FACTOR=0.                                                         RESU5510
      KFAC=0                                                            RESU5515
      GO TO 901                                                         RESU5520
C
C     RULE 7
C
  711 IF(REMIND*PANEL3(IEND,L).LT.0.) GO TO 721                         RESU5525
      FAC=(BMYP(IEND,4,L)-PANEL2(IEND,L))/PANEL3(IEND,L)                RESU5530
      IF(FAC.GE.FACTOR) GO TO 901                                       RESU5535
      FACTOR=FAC                                                        RESU5540
      BM=BMYP(IEND,4,L)                                                 RESU5545
      ROT=RYP(IEND,4,L)                                                 RESU5550
      KFAC=IEND                                                         RESU5555
      KODE=6                                                            RESU5560
      IDK=INDP(IEND,L)                                                  RESU5565
      EK=EKEPP(IEND,4,L)                                                RESU5570
      GO TO 901                                                         RESU5575
  721 FAC=-PANEL2(IEND,L)/PANEL3(IEND,L)                                RESU5580
      IF(FAC.GE.FACTOR) GO TO 901                                       RESU5585
      FACTOR=FAC                                                        RESU5590
      BM=0.                                                             RESU5595
      ROT=REVPTP(IEND,L)                                                RESU5600
      KFAC=IEND                                                         RESU5605
      KODE=8                                                            RESU5610
      IDK=3-INDP(IEND,L)                                                RESU5615
      EKEPP(IEND,5,L)=BMYP(IEND,3,L)/(RYP(IEND,3,L)-REVPTP(IEND,L))     RESU5620
      EK=EKEPP(IEND,5,L)                                                RESU5625
      GO TO 901                                                         RESU5630
C
C     RULE 8
C
  731 IF(REMIND*PANEL3(IEND,L).LT.0.) GO TO 741                         RESU5635
      MIND(IEND)=5                                                      RESU5640
      FAC=(BMYP(IEND,3,L)-PANEL2(IEND,L))/PANEL3(IEND,L)                RESU5645
      IF(FAC.GE.FACTOR) GO TO 901                                       RESU5650
      FACTOR=FAC                                                        RESU5655
      BM=BMYP(IEND,3,L)                                                 RESU5660
      KFAC=IEND                                                         RESU5665
      ROT=RYP(IEND,3,L)                                                 RESU5670
      KODE=6                                                            RESU5675
      IDK=INDP(IEND,L)                                                  RESU5680
      EK=EKEPP(IEND,3,L)                                                RESU5685
      GO TO 901                                                         RESU5690
  741 KODYP(IEND,L)=9                                                   RESU5695
      PRVES(IEND,L)=1.0                                                 RESU5700
      EKHP(IEND,L)=EKEPP(IEND,1,L)                                      RESU5705
      REVPTP(IEND,L)=RYP(IEND,5,L)-BMYP(IEND,5,L)/EKHP(IEND,L)          RESU5710
      FACTOR=0.                                                         RESU5715
      KFAC=0                                                            RESU5720
      GO TO 901                                                         RESU5725
C
C     RULE 9
C
  751 IF(REMIND*PANEL3(IEND,L).LT.0.) GO TO 761                         RESU5730
      FAC=(BMYP(IEND,5,L)-PANEL2(IEND,L))/PANEL3(IEND,L)                RESU5735
      IF(FAC.GE.FACTOR) GO TO 901                                       RESU5740
      FACTOR=FAC                                                        RESU5745
      BM=BMYP(IEND,5,L)                                                 RESU5750
      ROT=RYP(IEND,5,L)                                                 RESU5755
      KFAC=IEND                                                         RESU5760
      KODE=8                                                            RESU5765
      IDK=INDP(IEND,L)                                                  RESU5770
      EK=EKEPP(IEND,5,L)                                                RESU5775
      GO TO 901                                                         RESU5780
  761 FAC=-PANEL2(IEND,L)/PANEL3(IEND,L)                                RESU5785
      IF(FAC.GE.FACTOR) GO TO 901                                       RESU5790
      FACTOR=FAC                                                        RESU5795
      BM=0.                                                             RESU5800
      ROT=REVPTP(IEND,L)                                                RESU5805
      KFAC=IEND                                                         RESU5810
      KODE=10                                                           RESU5815
      IDK=3-INDP(IEND,L)                                                RESU5820
      EKEPP(IEND,6,L)=BMYP(IEND,4,L)/(RYP(IEND,4,L)-REVPTP(IEND,L))     RESU5825
      EK=EKEPP(IEND,6,L)                                                RESU5830
      GO TO 901                                                         RESU5835
C
C     RULE 10
C
  771 IF(REMIND*PANEL3(IEND,L).LT.0.) GO TO 781                         RESU5840
      MIND(IEND)=6                                                      RESU5845
      FAC=(BMYP(IEND,4,L)-PANEL2(IEND,L))/PANEL3(IEND,L)                RESU5850
      IF(FAC.GE.FACTOR) GO TO 901                                       RESU5855
      FACTOR=FAC                                                        RESU5860
      BM=BMYP(IEND,4,L)                                                 RESU5865
      ROT=RYP(IEND,4,L)                                                 RESU5870
      KFAC=IEND                                                         RESU5875
      KODE=6                                                            RESU5880
      IDK=INDP(IEND,L)                                                  RESU5885
      EK=EKEPP(IEND,4,L)                                                RESU5890
      GO TO 901                                                         RESU5895
  781 KODYP(IEND,L)=11                                                  RESU5900
      PRVES(IEND,L)=1.0                                                 RESU5905
      EKHP(IEND,L)=EKEPP(IEND,1,L)                                      RESU5910
      REVPTP(IEND,L)=RYP(IEND,6,L)-BMYP(IEND,6,L)/EKHP(IEND,L)          RESU5915
      FACTOR=0.                                                         RESU5920
      KFAC=0                                                            RESU5925
      GO TO 901                                                         RESU5930
C
C     RULE 11
C
  791 IF(REMIND*PANEL3(IEND,L).LT.0.) GO TO 801                         RESU5935
      FAC=(BMYP(IEND,6,L)-PANEL2(IEND,L))/PANEL3(IEND,L)                RESU5940
      IF(FAC.GE.FACTOR) GO TO 901                                       RESU5945
      FACTOR=FAC                                                        RESU5950
      BM=BMYP(IEND,6,L)                                                 RESU5955
      ROT=RYP(IEND,6,L)                                                 RESU5960
      KFAC=IEND                                                         RESU5965
      KODE=10                                                           RESU5970
      IDK=INDP(IEND,L)                                                  RESU5975
      EK=EKEPP(IEND,6,L)                                                RESU5980
      GO TO 901                                                         RESU5985
  801 FAC=-PANEL2(IEND,L)/PANEL3(IEND,L)                                RESU5990
      IF(FAC.GE.FACTOR) GO TO 901                                       RESU5995
      FACTOR=FAC                                                        RESU6000
      BM=0.                                                             RESU6005
      ROT=REVPTP(IEND,L)                                                RESU6010
      KFAC=IEND                                                         RESU6015
      KODE=8                                                            RESU6020
      IDK=3-INDP(IEND,L)                                                RESU6025
      EKEPP(IEND,5,L)=BMYP(IEND,3,L)/(RYP(IEND,3,L)-REVPTP(IEND,L))     RESU6030
      EK=EKEPP(IEND,5,L)                                                RESU6035
  901 CONTINUE                                                          RESU6040
C
C     TOTAL SHEAR PANEL FORCES
C
      DO 931 IEND=1,2                                                   RESU6045
      IF(IEND.EQ.KFAC) GO TO 921                                        RESU6050
      PANEL2(IEND,L)=PANEL2(IEND,L)+FACTOR*PANEL3(IEND,L)               RESU6055
      RTOTP(IEND,L)=RTOTP(IEND,L)+FACTOR*PANEL3(IEND,L)/EKHP(IEND,L)    RESU6060
      IF(KODYP(IEND,L).EQ.0) GO TO 931                                  RESU6065
      KOD=KODYP(IEND,L)                                                 RESU6070
      GO TO (911,911,931,911,931,911,931,911,931,911,931),KOD           RESU6075
  911 IDD=MIND(IEND)                                                    RESU6080
      BMYP(IEND,IDD,L)=PANEL2(IEND,L)                                   RESU6085
      RYP(IEND,IDD,L)=RTOTP(IEND,L)                                     RESU6090
      GO TO 931                                                         RESU6095
  921 PANEL2(IEND,L)=BM                                                 RESU6100
      RTOTP(IEND,L)=ROT                                                 RESU6105
      KODYP(IEND,L)=KODE                                                RESU6110
      EKHP(IEND,L)=EK                                                   RESU6115
      INDP(IEND,L)=IDK                                                  RESU6120
  931 CONTINUE                                                          RESU6125
      FACAC=FACAC+FACTOR                                                RESU6130
      IF(FACAC.GT.0.99999) GO TO 942                                    RESU6135
```

```
      DET=12.*PP(1,L)/XL                                                    RESU6140
      RFII=4./DET                                                           RESU6145
      BFJJ=4./DET                                                           RESU6150
      BFIJ=-2./DET                                                          RESU6155
      CALL SHRWLI(EKHP(1,L),EKHP(2,L),BFII,BFJJ,BFIJ,SCM2X,SCM4X,SCM3X)    RESU6160
      PANEL3(1,L)=-SCM2X*PDIS(1,L)-SCM4X*PDIS(2,L)                          RESU6165
      PANEL3(2,L)=SCM4X*PDIS(1,L)+SCM3X*PDIS(2,L)                           RESU6170
      COPAN(1,L)=SCM2X                                                      RESU6175
      COPAN(2,L)=SCM4X                                                      RESU6180
      COPAN(3,L)=SCM3X                                                      RESU6185
      KBAL=1                                                                RESU6190
      GO TO 491                                                             RESU6195
  942 PANEL2(3,L)=PANEL2(3,L)+PANEL3(3,L)                                   RESU6200
      PANEL2(4,L)=PANEL2(4,L)+PANEL3(4,L)                                   RESU6205
C
CC    UNBALANCE FORCES DUE TO OVERSHOOTING
C
      IF(KBAL.EQ.0) GO TO 943                                               RESU6210
      BMIUB=-RMLI+PANEL2(1,L)                                               RESU6215
      BMJUB=BMLJ-PANEL2(2,L)                                                RESU6220
      SFUB=(BMIUB+BMJUB)/XL                                                 RESU6225
      DDP(1,L)=SFUB*DCOS(BCL(KI))                                           RESU6230
      DDP(2,L)=SFUB*DSIN(BCL(KI))                                           RESU6235
      XMUL=(CLN(KI,1)-SD(I,5)+CLN(KJ,1)-SD(I,5))*0.5                        RESU6240
      YMUL=(-CLN(KI,2)+SD(I,6)-CLN(KJ,2)+SD(I,6))*0.5                       RESU6245
      DDP(3,L)=DDP(1,L)*YMUL+DDP(2,L)*XMUL                                  RESU6250
      KKBAL=1                                                               RESU6255
  943 KKST=0                                                                RESU6260
      IF(KODYXP(1,L).NE.KODYP(1,L).OR.KODYXP(2,L).NE.KODYP(2,L)) KKST=1     RESU6265
      IF(KKST.EQ.1) KST=1                                                   RESU6270
      PANEL3(1,L)=-PANEL3(1,L)                                              RESU6275
      PANEL2(1,L)=-PANEL2(1,L)                                              RESU6280
C
CC    DUCTILITY AND EXCURSION(PANEL)
C
      IF(DABS(PANEL2(1,L)).GT.PP(13,L)) TPDIS(1,L)=TPDIS(1,L)+DABS(PDIS(RESU6285
     11,L))                                                                 RESU6290
      IF(DABS(PANEL2(2,L)).GT.PP(13,L)) TPDIS(2,L)=TPDIS(2,L)+DABS(PDIS(RESU6295
     12,L))                                                                 RESU6300
  952 IF(PRVES(1,L).EQ.0.) GO TO 953                                        RESU6305
      IDU=1                                                                 RESU6310
      RYIELD=PP(13,L)*XL/(6.*PP(1,L))                                       RESU6315
      GO TO 954                                                             RESU6320
  953 IF(PRVES(2,L).EQ.0) GO TO 955                                         RESU6325
      IDU=2                                                                 RESU6330
      RYIELD=PP(13,L)*XL/(6.*PP(1,L))                                       RESU6335
  954 DUCT=1.0+TPDIS(IDU,L)/RYIELD                                          RESU6340
      IF(DUCT.GE.1000000.) KONTRL=1                                         RESU6345
      IF(DROTP(IDU,L).LT.DUCT) DROTP(IDU,L)=DUCT                            RESU6350
      EROTP(IDU,L)=EROTP(IDU,L)+DUCT-1.                                     RESU6355
      TPDIS(IDU,L)=0.                                                       RESU6360
      PRVES(IDU,L)=0.                                                       RESU6365
      GO TO 952                                                             RESU6370
  955 CONTINUE                                                              RESU6375
   50 CONTINUE                                                              RESU6380
C
CC    TOTAL DISPLACEMENTS
C
   80 DO 90 I=1,NS                                                          RESU6385
      DO 90 J=1,3                                                           RESU6390
   90 DISP(J,I)=DISP(J,I)+DISP(3+J,I)                                       RESU6395
C
CC    TOTAL P-DELT EFFECT FORCES
C
      MSS=3*NST                                                             RESU6400
      DO 91 I=1,MSS                                                         RESU6405
   91 FPDD(I)=FPDD(I)+FPD(I)                                                RESU6410
C
CC    TOTAL DAMPING FORCES
C
      DO 92 I=1,NSTC                                                        RESU6415
   92 DFOO(I)=DFCO(I)+DFO(I)                                                RESU6420
      IF(KKBAL.EQ.0.) GO TO 101                                             RESU6425
C
CC    TOTAL UNBALANCE FORCES (SHEAR WALL AND SHEAR PANEL)
C
      DO 97 I=1,NS                                                          RESU6430
      DDAD(1,I)=0.                                                          RESU6435
      DDAD(2,I)=0.                                                          RESU6440
      DDAD(3,I)=0.                                                          RESU6445
      DO 98 J=1,NC                                                          RESU6450
      IF(LC(I,J,1).LE.20) GO TO 98                                          RESU6455
      DDAD(1,I)=DDAD(1,I)+DD(1,J,I)                                         RESU6460
      DDAD(2,I)=DDAD(2,I)+DD(2,J,I)                                         RESU6465
      DDAD(3,I)=DDAD(3,I)+DD(3,J,I)                                         RESU6470
   98 CONTINUE                                                              RESU6475
C
      IF(NPAN.EQ.0) GO TO 97                                                RESU6480
      DO 99 K=1,NPAN                                                        RESU6485
      NP=NS-LP(1,K)+1                                                       RESU6490
      IF(NP.NE.1) GO TO 99                                                  RESU6495
      DDAD(1,I)=DDAD(1,I)+DDP(1,K)                                          RESU6500
      DDAD(2,I)=DDAD(2,I)+DDP(2,K)                                          RESU6505
      DDAD(3,I)=DDAD(3,I)+DDP(3,K)                                          RESU6510
   99 CONTINUE                                                              RESU6515
   97 CONTINUE                                                              RESU6520
C
CC    TOTAL DAMPING,DISSIPATED AND INPUT ENERGIES
C
  101 EDD=EDD+ED                                                            RESU6525
      ETD=EDD+EDE                                                           RESU6530
      EIE=EIE+EP                                                            RESU6535
      IF(ISTAT.EQ.1) GO TO 100                                              RESU6540
C
CC    ROTATION FOR M-ROT PLOT
C
      TO1=TO1+CDIS(2,NCPRT1,NLPRT1)                                         RESU6545
      TO2=TO2+CDIS(3,NCPRT1,NLPRT1)                                         RESU6550
      TO3=TO3+CDIS(5,NCPRT1,NLPRT1)                                         RESU6555
      TO4=TO4+CDIS(6,NCPRT1,NLPRT1)                                         RESU6560
      TO5=TO5+CDIS(2,NCPRT2,NLPRT2)                                         RESU6565
      TO6=TO6+CDIS(3,NCPRT2,NLPRT2)                                         RESU6570
      TO7=TO7+CDIS(5,NCPRT2,NLPRT2)                                         RESU6575
      TO8=TO8+CDIS(6,NCPRT2,NLPRT2)                                         RESU6580
      TO9=TO9+CDIS(2,NCPRT3,NLPRT3)                                         RESU6585
      T10=T10+CDIS(3,NCPRT3,NLPRT3)                                         RESU6590
      T11=T11+CDIS(5,NCPRT3,NLPRT3)                                         RESU6595
      T12=T12+CDIS(6,NCPRT3,NLPRT3)                                         RESU6600
      T13=T13+CDIS(2,NCPRT4,NLPRT4)                                         RESU6605
      T14=T14+CDIS(3,NCPRT4,NLPRT4)                                         RESU6610
      T15=T15+CDIS(5,NCPRT4,NLPRT4)                                         RESU6615
      T16=T16+CDIS(6,NCPRT4,NLPRT4)                                         RESU6620
      T17=T17+RR(NFL4,1)                                                    RESU6625
      T18=T18+RR(NFL5,1)                                                    RESU6630
      T19=T19+RR(NFL6,1)                                                    RESU6635
      T20=T20+RR(NFL7,1)                                                    RESU6640
C
CC    WRITE DATA FOR PLOTTING ON DISC
C
      IF(NNREMI.NE.0) GO TO 9002                                            RESU6645
      NNREMI=NREMIN                                                         RESU6650
      WRITE(15,9000) TO1,TO2,TO3,TO4,TO5,TO6,TO7,TO8                        RESU6655
      WRITE(15,9000) TO9,T10,T11,T12,T13,T14,T15,T16                        RESU6660
      WRITE(15,9001)COLUM2(2,NCPRT1,NLPRT1),COLUM2(3,NCPRT1,NLPRT1),COLURESU6665
     1M2(5,NCPRT1,NLPRT1),COLUM2(6,NCPRT1,NLPRT1),COLUM2(2,NCPRT2,NLPRT2RESU6670
     2),COLUM2(3,NCPRT2,NLPRT2),COLUM2(5,NCPRT2,NLPRT2),COLUM2(6,NCPRT2,RESU6675
     3NLPRT2)                                                               RESU6680
      WRITE(15,9001)COLUM2(2,NCPRT3,NLPRT3),COLUM2(3,NCPRT3,NLPRT3),COLURESU6685
     1M2(5,NCPRT3,NLPRT3),COLUM2(6,NCPRT3,NLPRT3),COLUM2(2,NCPRT4,NLPRT4RESU6690
     2),COLUM2(3,NCPRT4,NLPRT4),COLUM2(5,NCPRT4,NLPRT4),COLUM2(6,NCPRT4,RESU6695
     3NLPRT4)                                                               RESU6700
      WRITE(15,6000) DISP(1,NFL1),DISP(2,NFL1),DISP(1,NFL2),DISP(2,NFL2)RESU6705
     1,DISP(1,NFL3),DISP(2,NFL3)                                            RESU6710
      WRITE(15,6010) DISP(3,NFL1),DISP(3,NFL2),DISP(3,NFL3)                 RESU6715
      WRITE(15,6020) T17,T18,T19,T20                                        RESU6720
      WRITE(15,5000) EIE,ETD,EDD,EDE                                        RESU6725
 9002 IF(NNSTEP.NE.0) GO TO 95                                              RESU6730
      NNSTEP=NSTEP                                                          RESU6735
C
CC    KINETIC ENERGIES
C
      EKE=0.                                                                RESU6740
      DO 17 I=1,MCTS                                                        RESU6745
   17 EKE=EKE+0.5*AMA(I+MCTS)*(VELO(I)+VELZ)**2                             RESU6750
      DO 18 I=1,NST                                                         RESU6755
      J1=3*(I-1)                                                            RESU6760
      EKE=EKE+0.5*SD(I,3)*(VELO(MCTS+J1+1)+VELX)**2                         RESU6765
      EKE=EKE+0.5*SD(I,3)*(VELO(MCTS+J1+2)+VELY)**2                         RESU6770
   18 EKE=EKE+0.5*SD(I,4)*(VELO(MCTS+J1+3))**2                              RESU6775
C
CC    PERCENT ERROR
C
      EEP=(EIE-ETSE-EKE-EDD)*100/EIE                                        RESU6780
      TTPT=TT-DELT                                                          RESU6785
      WRITE(6,7070) TTPT                                                    RESU6790
      IF(NPAN.NE.0.OR.INPRT.EQ.1) GO TO 100                                 RESU6795
C
CC    PRINT OF ENERGIES RESULT
C
      WRITE(6,3003)                                                         RESU6800
      WRITE(6,3004) EIE,ETSE,EKE,EDD,EDE,ETD,EEP                            RESU6805
  100 IF(ISTAT.EQ.1) WRITE(6,7000)                                          RESU6810
C
CC    PRINT OF MEMBER FORCES
C
      WRITE(6,2000)                                                         RESU6815
```

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      WRITE(6,7020)                                                     RESU6820
      DO 182 K=1,NS                                                     RESU6825
      LV=NS-K+1                                                         RESU6830
      DO 181 J=1,NC                                                     RESU6835
  181 WRITE(6,2001) LV,J,(COLUM2(I,J,K),I=1,8)                          RESU6840
  182 WRITE(6,7030)                                                     RESU6845
C
      IF(ISTAT.NE.1) GO TO 104                                          RESU6850
      DO 103 I=1,NS                                                     RESU6855
      DO 103 J=1,NC                                                     RESU6860
      DO 103 K=1,8                                                      RESU6865
  103 CMAX(K,J,I)=DABS(COLUM2(K,J,I))                                   RESU6870
      DO 107 I=1,NS                                                     RESU6875
      DO 107 J=1,3                                                      RESU6880
  107 DMAX(J,I)=DISP(J,I)                                               RESU6885
      GO TO 106                                                         RESU6890
C
C     SEARCH MAX.COLUMN FORCES
C
  104 DO 105 I=1,NS                                                     RESU6895
      DO 105 J=1,NC                                                     RESU6900
      DO 105 K=1,8                                                      RESU6905
  105 IF(DABS(COLUM2(K,J,I)).GT.CMAX(K,J,I)) CMAX(K,J,I)=DABS(COLUM2(K,JRESU6910
     1,I))                                                              RESU6915
C
  106 WRITE(6,2002)                                                     RESU6920
      WRITE(6,7040)                                                     RESU6925
      DO 184 K=1,NS                                                     RESU6930
      LV=NS-K+1                                                         RESU6935
      DO 183 J=1,NB                                                     RESU6940
  183 WRITE(6,2001) LV,J,(BEAM2(I,J,K),I=1,3)                           RESU6945
  184 WRITE(6,7030)                                                     RESU6950
C
      IF(NPAN.EQ.0) GO TO 110                                           RESU6955
      WRITE(6,2004)                                                     RESU6960
      WRITE(6,7050)                                                     RESU6965
      DO 186 K=1,NS                                                     RESU6970
      LV=NS-K+1                                                         RESU6975
      DO 185 J=1,NPAN                                                   RESU6980
      NP=NS-LP(1,J)+1                                                   RESU6985
      IF(NP.NE.K) GO TO 185                                             RESU6990
      WRITE(6,2001) LV,J,(PANEL2(I,J),I=1,4)                            RESU6995
  185 CONTINUE                                                          RESU7000
  186 WRITE(6,7030)                                                     RESU7005
C
  110 IF(NTRU.EQ.0) GO TO 120                                           RESU7010
      WRITE(6,2006)                                                     RESU7015
      WRITE(6,7060)                                                     RESU7020
      DO 188 K=1,NS                                                     RESU7025
      LV=NS-K+1                                                         RESU7030
      DO 187 J=1,NTRU                                                   RESU7035
      NP=NS-LT(1,J)+1                                                   RESU7040
      IF(NP.NE.K) GO TO 187                                             RESU7045
      WRITE(6,2001) LV,J,DIAGO(2,J)                                     RESU7050
  187 CONTINUE                                                          RESU7055
  188 WRITE(6,7030)                                                     RESU7060
  120 WRITE(6,2008)                                                     RESU7065
C
C     PRINT OF DISPLACEMENTS
C
      DO 189 K=1,NS                                                     RESU7070
      LV=NS-K+1                                                         RESU7075
  189 WRITE(6,2009) LV,(DISP(I,K),I=1,3)                                RESU7080
      IF(ISTAT.EQ.1) GO TO 109                                          RESU7085
C
C     SEARCH MAX.DISPLACEMENTS
C
      DO 108 I=1,NS                                                     RESU7090
      DO 108 J=1,3                                                      RESU7095
  108 IF(DABS(DISP(J,I)).GT.DABS(DMAX(J,I))) DMAX(J,I)=DISP(J,I)        RESU7100
C
C     PRINT OF VELOCITIES
C
  109 WRITE(6,3000)                                                     RESU7105
      DO 190 K=1,NS                                                     RESU7110
      LV=NS-K+1                                                         RESU7115
      I1=(K-1)*3+MCTS                                                   RESU7120
  190 WRITE(6,2009) LV,(VELO(I1+I),I=1,3)                               RESU7125
C
C     PRINT OF ACCELERATIONS
C
      WRITE(6,3002)                                                     RESU7130
      DO 191 K=1,NS                                                     RESU7135
      LV=NS-K+1                                                         RESU7140
      I1=(K-1)*3+MCTS                                                   RESU7145
  191 WRITE(6,2009) LV,(ACCER(I1+I),I=1,3)                              RESU7150
   95 IF(KONTRL.EQ.1) GO TO 96                                          RESU7155
      IF(NNDPR.NE.0) RETURN                                             RESU7160
C
C     PRINT OF DUCTILITIES AND EXCURSIONS
C
      NNDPR=NDPR                                                        RESU7165
      TTPT=TT-DELT                                                      RESU7170
   96 WRITE(6,4002) TTPT                                                RESU7175
      IF(INPRT.EQ.0) WRITE(6,7080)                                      RESU7180
      IF(INPRT.EQ.1) WRITE(6,7090)                                      RESU7185
      DO 93 I=1,NS                                                      RESU7190
      II=NS-I+1                                                         RESU7195
      DO 93 J=1,NC                                                      RESU7200
      DO 93 IDU=1,4                                                     RESU7205
      IF(INPRT.EQ.1) WRITE(6,4003) II,J,IDU,DROT(IDU,J,I),EROT(IDU,J,I) RESU7210
   93 IF(INPRT.EQ.0)WRITE(6,4003) II,J,IDU,DROT(IDU,J,I),EROT(IDU,J,I),DRESU7215
     1ENG(IDU,J,I),EENG(IDU,J,I),DENGC(IDU,J,I),EENGC(IDU,J,I)          RESU7220
      IF(INPRT.EQ.0)WRITE(6,4004)                                       RESU7225
      IF(INPRT.EQ.1) WRITE(6,7100)                                      RESU7230
C
      DO 94 I=1,NS                                                      RESU7235
      II=NS-I+1                                                         RESU7240
      DO 94 J=1,NB                                                      RESU7245
      DO 94 IDU=1,2                                                     RESU7250
      IF(INPRT.EQ.1) WRITE(6,4003)II,J,IDU,DROTB(IDU,J,I),EROTB(IDU,J,I)RESU7255
   94 IF(INPRT.EQ.0) WRITE(6,4003)II,J,IDU,DROTB(IDU,J,I),EROTB(IDU,J,I)RESU7260
     1,DENGB(IDU,J,I),EENGB(IDU,J,I),DENGBC(IDU,J,I),EENGBC(IDU,J,I)    RESU7265
C
      IF(NPAN.EQ.0) GO TO 959                                           RESU7270
      WRITE(6,4005)                                                     RESU7275
      DO 956 I=1,NS                                                     RESU7280
      II=NS-I+1                                                         RESU7285
      DO 956 L=1,NPAN                                                   RESU7290
      NP=NS-LP(1,L)+1                                                   RESU7295
      IF(NP.NE.I) GO TO 956                                             RESU7300
      DO 957 IDU=1,2                                                    RESU7305
  957 WRITE(6,4003) II,L,IDU,DROTP(IDU,L),EROTP(IDU,L)                  RESU7310
  956 CONTINUE                                                          RESU7315
C 959 IF(ISTOP.GT.0) RETURN                                             RESU7320
C
C     PRINT OF MAX.COLUMN FORCES AND DISPLACEMENTS
C
      TTPT=TT-DELT                                                      RESU7325
      WRITE(6,3005) TTPT                                                RESU7330
      WRITE(6,2000)                                                     RESU7335
      WRITE(6,7020)                                                     RESU7340
      DO 193 K=1,NS                                                     RESU7345
      LV=NS-K+1                                                         RESU7350
      DO 192 J=1,NC                                                     RESU7355
  192 WRITE(6,2001) LV,J,(CMAX(I,J,K),I=1,8)                            RESU7360
  193 WRITE(6,7030)                                                     RESU7365
      WRITE(6,7030)                                                     RESU7370
      WRITE(6,2008)                                                     RESU7375
      DO 194 K=1,NS                                                     RESU7380
      LV=NS-K+1                                                         RESU7385
  194 WRITE(6,2009) LV,(DMAX(I,K),I=1,3)                                RESU7390
C
      RETURN                                                            RESU7395
C
 2000 FORMAT(//14H COLUMN FORCES)                                       RESU7400
 2001 FORMAT(216,5X,8F14.4)                                             RESU7405
 2002 FORMAT(/12H BEAM FORCES)                                          RESU7410
 2004 FORMAT(/13H PANEL FORCES)                                         RESU7415
 2006 FORMAT(/15H BRACING FORCES)                                       RESU7420
 2008 FORMAT(//14H DISPLACEMENTS//6H LEVEL,5X,1HX,17X,1HY,17X,3HROT)    RESU7425
 2009 FORMAT(I3,1P3E18.5)                                               RESU7430
 3000 FORMAT(//11H VELOCITIES//6H LEVEL,5X,1HX,17X,1HY,17X,3HROT)       RESU7435
 3002 FORMAT(//14H ACCELERATIONS//6H LEVEL,5X,1HX,17X,1HY,17X,3HROT)    RESU7440
 3003 FORMAT(///9H ENERGIES//6X,10HINPUT ENG.,7X,11HSTRAIN ENG.,6X,12HKIRESU7445
     1NETIC ENG.,5X,12HDAMPING ENG.,5X,12HDIS STR ENG.,5X,11HDISSP. ENG.RESU7450
     2,5X,13HPERCENT ERROR//)                                           RESU7455
 3004 FORMAT(7E17.5)                                                    RESU7460
 3005 FORMAT(40H1MAX. DYNAMIC ANALYSIS RESULT AT TIME---F7.4,1X,6HSECONDRESU7465
     1)                                                                 RESU7470
 4002 FORMAT(38H1DUCTILITIES AND EXCURSIONS AT TIME---F7.4,1X,6HSECOND//RESU7475
     1/37H DUCTILITIES AND EXCURSIONS OF COLUMN//                       RESU7480
     122H CODE 1 EQ. TOP X-DIR./                                        RESU7485
     122H CODE 2 EQ. BOT X-DIR./                                        RESU7490
     122H CODE 3 EQ. TOP Y-DIR./                                        RESU7495
     122H CODE 4 EQ. BOT Y-DIR.)                                        RESU7500
 4003 FORMAT(3I7,6E17.5)                                                RESU7505
 4004 FORMAT(///35H DUCTILITIES AND EXCURSIONS OF BEAM//                RESU7510
     120H CODE 1 EQ. I X-DIR./                                          RESU7515
     120H CODE 2 EQ. J X-DIR.//                                         RESU7520
     17H  LEVEL,4X,3HBAY,3X,4HCODE,7X,4HDROT,13X,4HEROT,13X,4HDENG,13X,RESU7525
     14HEENG,12X,5HDENGC,12X,5HEENGC)                                   RESU7530
 4005 FORMAT(///36H DUCTILITIES AND EXCURSIONS OF PANEL//               RESU7535
     122H CODE 1 EQ. TOP X-DIR./                                        RESU7540
     122H CODE 2 EQ. BOT X-DIR.//                                       RESU7545
```

```
     17H   LEVEL,2X,5HPANEL,3X,4HCODE,7X,4HDROT,13X,4HEROT)                 RESU7550
 5000 FORMAT(4F20.6)                                                        RESU7555
 6000 FORMAT(6F13.8)                                                        RESU7560
 6010 FORMAT(3F25.20)                                                       RESU7565
 6020 FORMAT(4F20.15)                                                       RESU7570
 7000 FORMAT(84H1LAST STATIC LOAD COMBINATION IS USED AS AN INITIAL INFO    RESU7575
     1RMATION FOR DYNAMIC ANALYSIS)                                         RESU7580
 7070 FORMAT(35H1DYNAMIC ANALYSIS RESULT AT TIME---F7.4,1X,6HSECOND)        RESU7585
 7080 FORMAT (//7H  LEVEL,4X,3HCOL,3X,4HCODE,7X,4HDROT,13X,4HEROT,13X,4HRESU7590
     1DENG,13X,4HEENG,12X,5HDENGC,12X,5HEENGC)                              RESU7595
 7090 FORMAT (//7H  LEVEL,4X,3HCOL,3X,4HCODE,7X,4HDROT,13X,4HEROT)          RESU7600
 7100 FORMAT(///35H DUCTILITIES AND EXCURSIONS OF BEAM//                    RESU7605
     120H CODE 1 EQ. 1 X-DIR./                                              RESU7610
     120H CODE 2 EQ. 1 X-DIR.//                                             RESU7615
     17H  LEVEL,4X,3HBAY,3X,4HCODE,7X,4HDROT,13X,4HEROT)                    RESU7620
 7020 FORMAT (129HO   LEVEL LINE          TORSIONAL          MAJOR AXIS     RESU7625
     1          AXIAL          MINOR AXIS                MAJOR             RESU7630
     1    MINOR /129H                        MOMENT     TOP MOMENT     BOTRESU7635
     1T MOMENT          FORCE     TOP MOMENT     BOT MOMENT          SHEAR RESU7640
     1     SHEAR )                                                          RESU7645
 7030 FORMAT (1H )                                                          RESU7650
 7040 FORMAT  (60HO  LEVEL  BAY         TORS MOMENT      I  MOMENT         RESU7655
     1I  MOMENT )                                                           RESU7660
 7050 FORMAT(12HOLEVEL PANEL,6X,13H   TOP-MOMENT 4X,10HBOT-MOMENT 3X,11HRESU7665
     1AXIAL-FORCE 3X,11HSHEAR-FORCE )                                       RESU7670
 7060 FORMAT(13HOLEVEL  BRACE,10X,11HAXIAL-FORCE)                           RESU7675
 9000 FORMAT(8F10.6)                                                        RESU7680
 9001 FORMAT(8F10.0)                                                        RESU7685
C
      END                                                                   RESU7690



      SUBROUTINE INECOF(IENTRY,LM,IM,ITOR,AM,MJ,MK,MPJ,MPK,P,PP,SCM1,      INEC  10
     1SCM2,SCM3,SCM4,SCM8)                                                  INEC  20
C
C     FIND STIFFNESS COEFFICIENTS OF STEEL ELEMENT
C
      IMPLICIT REAL*8(A-H,O-Z)                                              INEC  30
      REAL*8  MJ,MK,MPJ,MPK,MJR,MJR1,MKR,MKR1,LM,IM,ITOR                   INEC  40
      COMMON/MAT/A,R,R1,R2,E,G,FYIELD,FCRITI,DCON                           INEC  50
C
      GO TO (350,365,380,390),IENTRY                                        INEC  60
C
C     I-END OF MEMBER
C
  350 IF(MJ.EQ.0) GO TO 355                                                 INEC  70
      MJR=MK/MJ                                                             INEC  80
      IF(MJR.EQ.-1.0) GO TO 363                                             INEC  90
      GO TO 360                                                             INEC 100
  355 MJR=0                                                                 INEC 110
  360 MJR1=MJR+1                                                            INEC 120
C
C     TO PREVENT UNDERFLOW OR OVERFLOW
C
      IF(DABS(MJ/MPJ).LT.0.3) GO TO 363                                     INEC 130
      IF(DABS(MJ/MPJ).GT.2.0) MPJ=0.5*MJ                                    INEC 140
C
C     INSLASTIC PARAMETERS FOR I-END
C
      RJ=6.0*A*(DABS(MJ/MPJ))**(R-1)/MJP1                                   INEC 150
      UJ=RJ/(R1*MJR1)                                                       INEC 160
      WJ=UJ/(R2*MJR1)                                                       INEC 170
      SJ=R+R1*MJR                                                           INEC 180
      GJ=R+R2*MJR                                                           INEC 190
      QJ=R*R1+2.0*R*R2*MJR+R1*R2*MJR*MJR                                    INEC 200
      RETURN                                                                INEC 210
  363 RJ=0                                                                  INEC 220
      UJ=0                                                                  INEC 230
      WJ=0                                                                  INEC 240
      SJ=0                                                                  INEC 250
      GJ=0                                                                  INEC 260
      QJ=0                                                                  INEC 270
C
      RETURN                                                                INEC 280
C
C     J-END OF MEMBER
C
  365 IF(MK.EQ.0) GO TO 370                                                 INEC 290
      MKR=MJ/MK                                                             INEC 300
      IF(MKR.EQ.-1.0) GO TO 377                                             INEC 310
      GO TO 375                                                             INEC 320
  370 MKR=0                                                                 INEC 330
  375 MKR1=MKR+1                                                            INEC 340
C
C     TO PREVENT UNDERFLOW OR OVERFLOW
C
      IF(DABS(MK/MPK).LT.0.3) GO TO 377                                     INEC 350
      IF(DABS(MK/MPK).GT.2.0) MPK=0.5*MK                                    INEC 360
C
C     INSLASTIC PARAMETERS FOR J-END
C
      RK=6.0*A*(DABS(MK/MPK))**(R-1)/MKR1                                   INEC 370
      UK=RK/(R1*MKR1)                                                       INEC 380
      WK=UK/(R2*MKR1)                                                       INEC 390
      SK=R+R1*MKR                                                           INEC 400
      GK=R+R2*MKR                                                           INEC 410
      QK=R*R1+2.0*R*R2*MKR+R1*R2*MKR*MKR                                    INEC 420
      GO TO 378                                                             INEC 430
  377 RK=0                                                                  INEC 440
      UK=0                                                                  INEC 450
      WK=0                                                                  INEC 460
      SK=0                                                                  INEC 470
      QK=0                                                                  INEC 480
      GK=0                                                                  INEC 490
C
C     FLEXURAL STIFFNESS COEFFICIENTS
C
  378 CONTINUE                                                              INEC 500
      C=((6.0+RJ+RK)*(2.0+2*WJ+WK*QK)-(3.0+UJ+UK*SK)**2)*LM/(6.0*E*IM)      INEC 510
      SCM2=(2.0+2.0*WJ+WK*QK)/C                                             INEC 520
      SCM3=(2.0+WJ*QJ+2.0*WK)/C                                             INEC 530
      SCM4=(1.0+WJ*GJ+WK*GK)/C                                              INEC 540
C
      RETURN                                                                INEC 550
C
C     AXIAL STIFFNESS COEFFICIENTS
C
  380 IF(DABS(P/PP).LT.0.3) GO TO 382                                       INEC 560
      IF(DABS(P/PP).GT.2.0) P=2.0*PP                                        INEC 570
      SCM1=AM*E/(LM*(1.0+A*R*(DABS(P/PP))**(R-1)))                          INEC 580
      RETURN                                                                INEC 590
  382 SCM1=AM*E/LM                                                          INEC 600
C
      RETURN                                                                INEC 610
C
C     TORSIONAL STIFFNESS COEFFICIENTS
C
  390 IF(DABS(P/PP).LT.0.3) GO TO 392                                       INEC 620
      IF(DABS(P/PP).GT.2.0) P=2.0*PP                                        INEC 630
      SCM8=G*ITOR/(LM*(1.0+A*R*(DABS(P/PP))**(R-1)))                        INEC 640
      RETURN                                                                INEC 650
  392 SCM8=G*ITOR/LM                                                        INEC 660
C
      RETURN                                                                INEC 670
      END                                                                   INEC 680



      SUBROUTINE INTRCT(D,BF,TF,TW,A,ZX,ZY,FY,P,MX,MY,T,TP,MXO,MYO,ISEC)INTR  10
C
C     FIND REDUCED PLASTIC MOMENT CAPACITY
C
      IMPLICIT REAL*8(A-H,L-N,O-Z)                                          INTR  20
C
      TMX=DABS(MX)                                                          INTR  30
      TMY=DABS(MY)                                                          INTR  40
      TPP=DABS(P)                                                           INTR  50
      TTT=DABS(T)                                                           INTR  60
C
C     TO PREVENT UNDERFLOW
C
      IF(TMX.LE.0.00001) TMX=0.                                             INTR  70
      IF(TMY.LE.0.00001) TMY=0.                                             INTR  80
      IF(TPP.LE.0.00001) TPP=0.                                             INTR  90
      IF(TTT.LE.0.00001) TTT=0.                                             INTR 100
C
C     CHECK TORSIONAL CAPACITY
C
      IF(TP.GT.TTT) GO TO 3                                                 INTR 110
      MXO=0.1*ZX*FY                                                         INTR 120
      MYO=0.1*ZY*FY                                                         INTR 130
C
      RETURN                                                                INTR 140
C
    3 KCT1=0                                                                INTR 150
      KCT2=0                                                                INTR 160
      KCT3=0                                                                INTR 170
      GO TO (1,2),ISEC                                                      INTR 180
C
C     REDUCED YIELD STRESS BY TORSION
C
    1 FYO=FY*DSQRT(1.0-(TTT/TP)**2)                                         INTR 190
      PY=A*FYO                                                              INTR 200
```

```
      MXO=ZX*FYO                                                        INTR 210
      MYO=ZY*FYO                                                        INTR 220
C
      IF(ZX.EQ.0.OR.ZY.EQ.0) RETURN                                     INTR 230
C
C     CHECK AXIAL CAPACITY
C
   10 IF(TPP.LT.PY) GO TO 20                                            INTR 240
      KCT1=KCT1+1                                                       INTR 250
      TPP=0.99*TPP                                                      INTR 260
      IF(KCT1.GT.20) TPP=0.9*PY                                         INTR 270
      GO TO 10                                                          INTR 280
C
C     FIND MP REDUCTION
C
   20 PR=TPP/PY                                                         INTR 290
      IF(PR.EQ.0) PR=2.0**(-10)                                         INTR 300
      ALFA=1.6-PR/(2.0*LOG(PR))                                         INTR 310
      IF(TPP.LE.0.15*PY) XMPC=ZX*FYO                                    INTR 320
      IF(TPP.GT.0.15*PY) XMPC=1.18*(1.0-PR)*ZX*FYO                      INTR 330
      IF(TPP.LE.0.4*PY) YMPC=ZY*FYO                                     INTR 340
      IF(TPP.GT.0.4*PY) YMPC=1.19*(1.0-(PR)**2)*ZY*FYO                  INTR 350
C
C     CHECK MY CAPACITY
C
   30 IF(TMY.LT.YMPC) GO TO 40                                          INTR 360
      KCT2=KCT2+1                                                       INTR 370
      TMY=0.99*TMY                                                      INTR 380
      IF(KCT2.GT.20) GO TO 50                                           INTR 390
      GO TO 30                                                          INTR 400
   40 MXO=((XMPC)**ALFA*(1.0-(TMY/YMPC)**ALFA))**(1.0/ALFA)             INTR 410
      GO TO 60                                                          INTR 420
   50 MXO=0.1*ZX*FY                                                     INTR 430
C
C     CHECK MX CAPACITY
C
   60 IF(TMX.LT.XMPC) GO TO 70                                          INTR 440
      KCT3=KCT3+1                                                       INTR 450
      TMX=0.99*TMX                                                      INTR 460
      IF(KCT3.GT.20) GO TO 80                                           INTR 470
      GO TO 60                                                          INTR 480
   70 MYO=((YMPC)**ALFA*(1.0-(TMX/XMPC)**ALFA))**(1.0/ALFA)             INTR 490
C
      RETURN                                                            INTR 500
C
   80 MYO=0.1*ZY*FY                                                     INTR 510
      RETURN                                                            INTR 520
C
    2 RETURN                                                            INTR 530
C
      END                                                               INTR 540


      SUBROUTINE SHRWL1(EKHI,EKHJ,BFII,BFJJ,BFIJ,SCM2X,SCM4X,SCM3X)     SHRW  10
C
C     FIND STIFFNESS COEFFICIENTS OF CONCRETE ELEMENT
C
      IMPLICIT REAL*8(A-H,O-Z)                                          SHRW  20
C
      FII=1.0/EKHI+BFII                                                 SHRW  30
      FJJ=1.0/EKHJ+BFJJ                                                 SHRW  40
      DET=FII*FJJ-BFIJ**2                                               SHRW  50
      SCM2X=FJJ/DET                                                     SHRW  60
      SCM3X=FII/DET                                                     SHRW  70
      SCM4X=-BFIJ/DET                                                   SHRW  80
C
      RETURN                                                            SHRW  90
      END                                                               SHRW 100
```

IV. SAMPLE INPUT DATA AND OUTPUT SOLUTIONS

A. DESCRIPTION OF SAMPLE PROBLEMS

Two sample structures are shown in Figs. 3 through 5. Example 1 of Figs. 3 and 4 is composed of steel and reinforced concrete members and is subjected to two horizontal components of the El Centro 1940 earthquake. The N-S component is applied in the direction of 45° measured from the x-axis of the reference coordinates as shown in Fig. 4 in which the other x- and y-coordinates represent the positive major and minor axes of the member cross sections. The improved step-by-step integration method, which has a time interval of 0.01 sec., is used for the first five seconds of the earthquake data multiplied by a scale of five. The steel columns and beams are W8x17 and W8x40 respectively. The masses associated with the transverse movements in the x- and y-directions are 0.4076 k-sec^2/in. (7,278.902 kg-s^2/m), at the top floor and 0.9059 k-sec^2/in. (16,177.536 kg-s^2/m) at the first floor. The masses at columns 1, 2, 3, and 4 at the top floor for the vertical motions are fictitious. However, the other masses are distributed according to the locations of the columns. The torsional masses are 10,393.8 k-in.-sec^2 (119,748.654 kg-m-s^2) and 40,489.3 k-in.-sec^2 (466,477.225 kg-m-s^2) for the top and the first floor respectively. Three sets of static loads are used. These are concentrated forces of 3 kips (13.344 kN) in the x- and y-directions at the mass centers of both floors, the vertical forces of 5 kips (22.24 kN) for each column at the top floor, 10 kips (44.48 kN) for each column at the first floor, and the uniform load of 0.02 k/ft. (0.2918 kN/m) on each beam. The

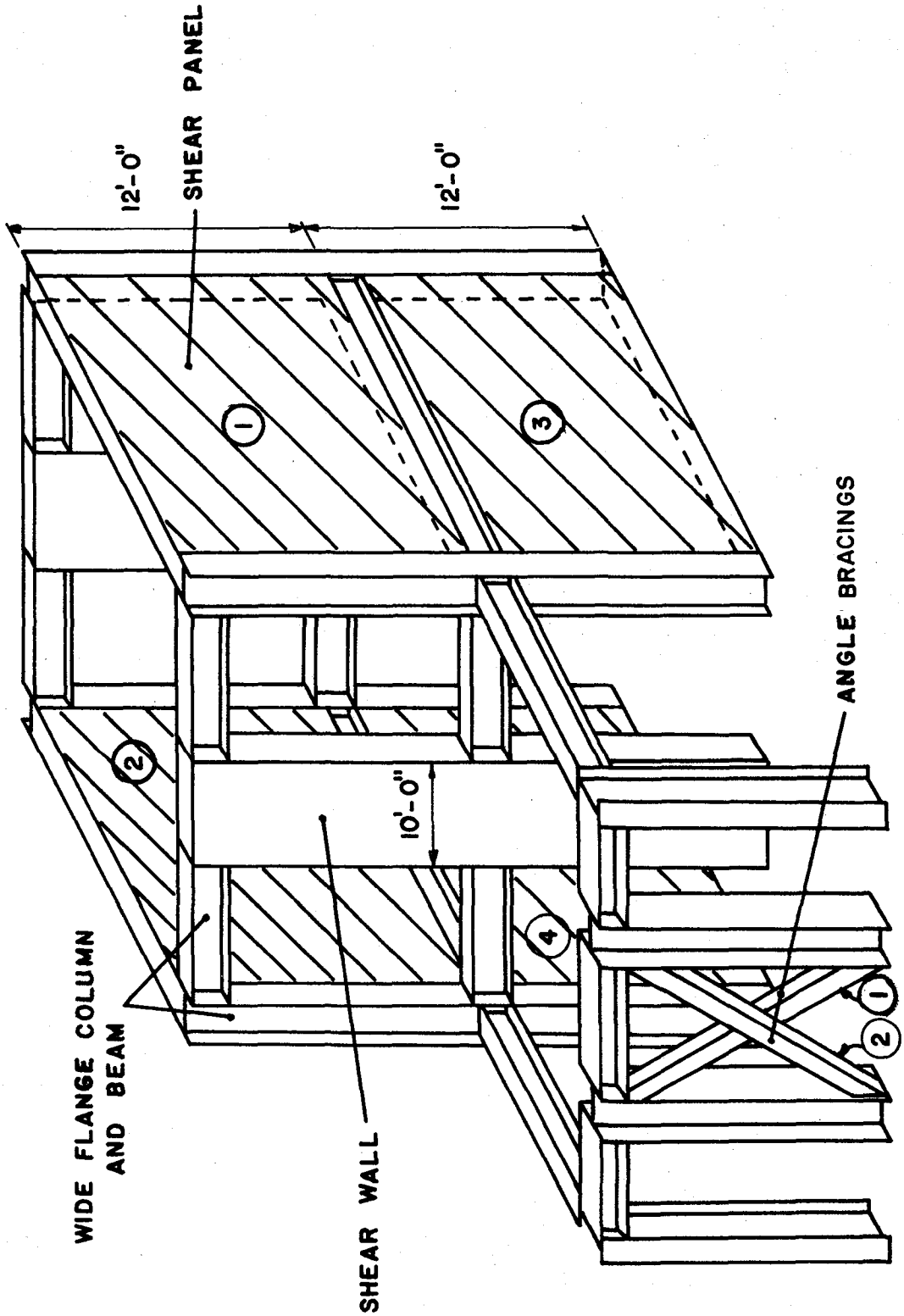

Fig. 3. Three-Dimensional View of Example 1

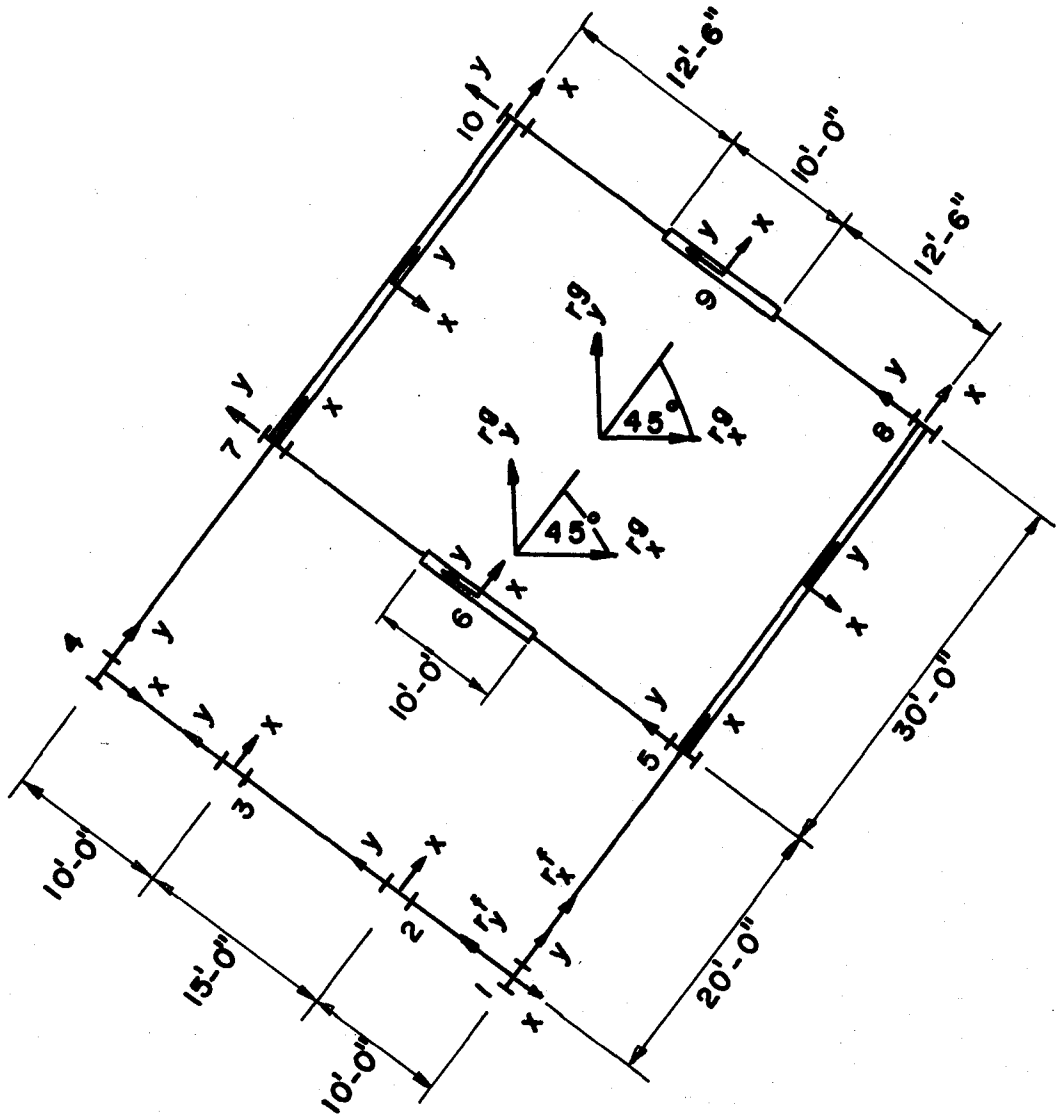

Fig. 4. Plane View of Example 1

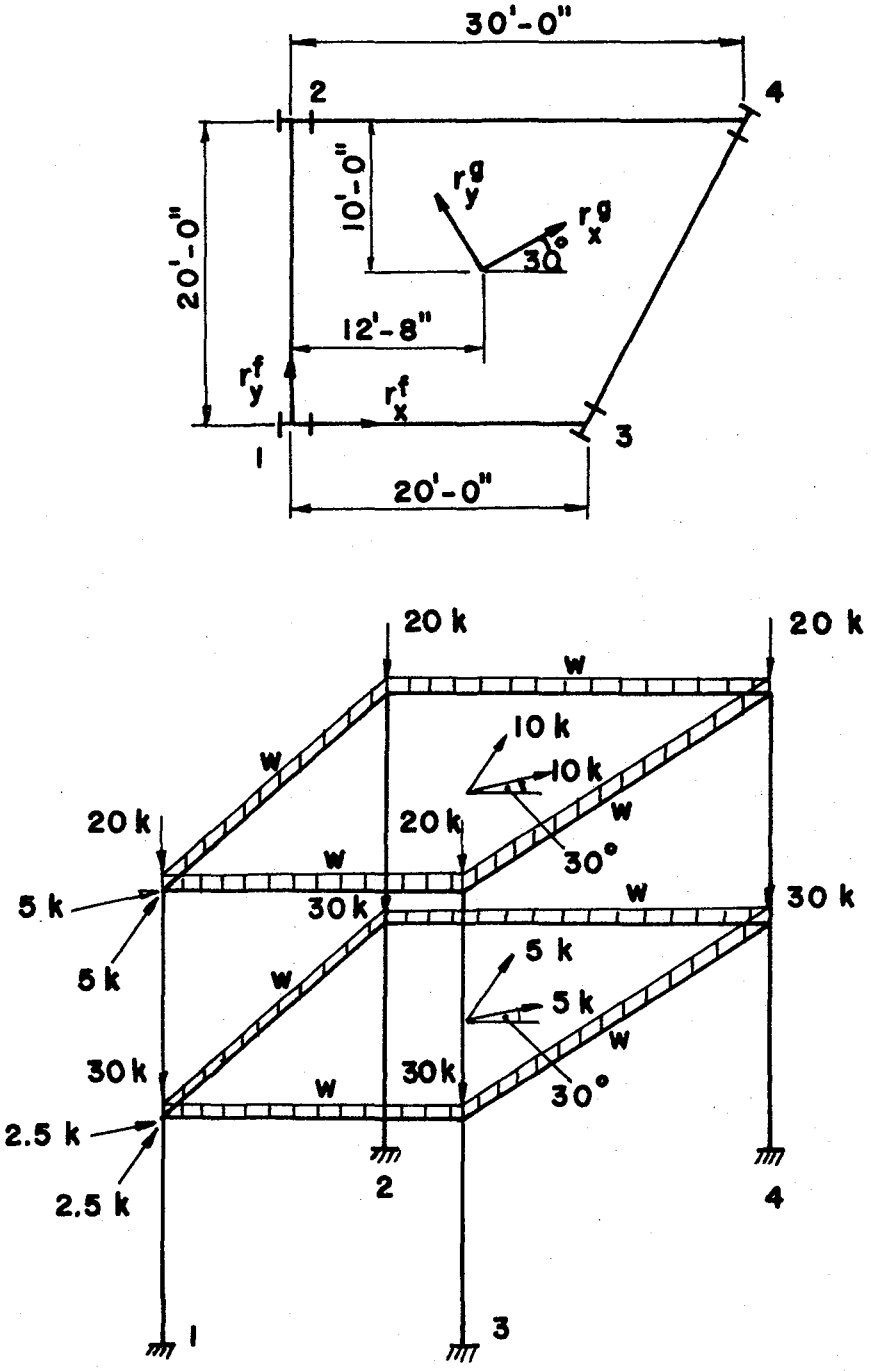

Fig. 5. Detailed Information of Example 2

results of these three independent loading cases are printed, and the combined results of the member forces and the nodal displacements are considered in the dynamic analysis.

The second example is shown in Fig. 5. The beams and columns are W8x40 and W8x17 respectively. The structure is subjected to the three components of the El Centro 1940 earthquake of which the first eight-second acceleration data with the scale of one were employed for the step-by-step integration and the time interval of 0.01 sec. The N-S component was applied in the direction of 30° counterclockwise from the x-axis of the reference coordinates. The translational and torsional masses are respectively equal to 0.19 k-sec^2/in. (3,393.015 kg-s^2/m) and 2,440.96 k-in.-sec^2 (28,122.300 kg-m-s^2) at the top floor, and 0.26 k-sec^2/in. (4.643.073 kg-s^2/m) and 3,254.62 k-in.-sec^2 (37,496.477 kg-m-s^2) at the first floor. Six independent static loading cases include two groups of laterals and four groups of verticals. These two different sets of concentrated lateral loads are respectively applied at the mass centers and the structural joints. The vertical loads have one group of concentrated loads acting on the columns and three groups of uniform loads on the beams. The concentrated forces can be found in Fig. 5, and the uniform loads, signified by w of the three groups, are respectively equal to 0.05 k/ft. (0.7295 kN/m), 0.1 k/ft. (1.459 kN/m), and 0.12 k/ft. (1.751 kN/m). The solutions of these six loading cases and the combined loading case are calculated and printed. The dynamic analysis, however, does not include the effect of the static loads.

In Sections B, and D, one may find the complete input data for these two examples except for the earthquake acceleration data. The output prints include all the prints for input data--only two lines of each earthquake component are printed herein--static soclutions, and some typical dynamic results. The dynamic results given are associated with the last time step of the examples. The maximum forces and the displacements of the entire dynamic response are printed at the end of the output solutions of each example.

B. INPUT DATA OF EXAMPLE 1

```
    2
    2   10   11     3     3     1     4   2TWO STORY MIXED STRUCTURE
SECND      144.       .4076      10393.8    420.       210.
3.         3.         420.       210.
FIRST      144.       .9058      40489.3    300.       210.
3.         3.         300.       210.
0.         0.         0.         0.         5.         5.         5.         5.
5.         5.         5.         5.         5.         5.         10.        10.
10.        10.        10.        10.
  520      1
    1      1      0
 0.01
EARTHQUAKE ACCELERATION INPUT IN X-DIRECTION
  .                    .                                                    .
  .                    .                                                    .
EARTHQUAKE ACCELERATION INPUT IN Y-DIRECTION
  .                    .                                                    .
  .                    .                                                    .
  .                    .                                                    .
.001       .001       .001       .001       .051       .102       .051       .051
.102       .051       .0302      .06038     .06038     .0302      .16423     .32846
.16423     .11894     .23788     .11894     .001       .001       .001       .001
.051       .102       .051       .051       .102       .051       .0302      .06038
.06038     .0302      .11323     .22646     .11323     .06794     .13588     .06794
    1 0.       0.
    2 0.       120.
    3 0.       300.
    4 0.       420.
    5 240.     0.
    6 240.     210.
    7 240.     420.
    8 600.     0.
    9 600.     210.
   10 600.     420.
    1 30000.          5.01                          .147 50.6 7.44
8.0       5.25           .308       .23        15.9       4.36       14.41
    2 30000.          1.005                     .001  .002 .002
1.     21   1.         1.         1.         10.        10.        20.
    21 3456000000.    2880000.   4000.      4.    4.   2.    .05  .05   0.
0.         0.         0.         0.         0.         1600.      1.
40000.     -40000.    40000.     -40000.
    1 30000.               1.12          146.       4.   4.   2.   0.   0.   39.8 62.15
    2 30000.               1.12          146.       4.   4.   2.   60.  0.   39.8 62.15
    3 30000.                .001         .004       4.   4.   2.   0.   0.   10.  20.
    1   1 0.          0.         0.         0.         .02
    1   1   2   3   0
    1   1   2   1   0   1
    2   6   5   2   1   1
    3   9   8   2   1   1
    4   2   3   3   0
    4   2   3   1   0   1
    5   3   4   3   0
    5   3   4   1   0   1
    6   6   7   2   1   1
    7   9  10   2   1   1
    8   1   5   3   0
    8   1   5   1   0   1
    9   4   7   3   0
    9   4   7   1   0   1
   10   5   8   1   1   1
   11   7  10   1   1   1
    1   2   5   0
    1   1   5   0
    2   2   3   0
    2   1   3   0
    3   7   4   0
    3   1   4   0
    4   2   7   0
    4   1   7   0
    5   1   6   1
    6  21   7   1
    7   1   6   1
    8   1   9   1
    9  21  10   1
   10   1   9   1
    2   5   8 46656000000.  4320000.   .05  .05  0.                  0.
0.   0.   0.   0.   1600.        1.   100000.    -100000.  100000.    -100000.
    2   7  10 46656000000.  4320000.   .05  .05  0.                  0.
0.   0.   0.   0.   1600.        1.   100000.    -100000.  100000.    -100000.
    1   5   8 46656000000.  4320000.   .05  .05  0.                  0.
0.   0.   0.   0.   1600.        1.   100000.    -100000.  100000.    -100000.
    1   7  10 46656000000.  4320000.   .05  .05  0.                  0.
0.   0.   0.   0.   1600.        1.   100000.    -100000.  100000.    -100000.
    1   3    2 30000.   3.63
    1   2    3 30000.   3.63
  500 .01                        1932.      1932.      0.
-45.       -135.      -135.      -45.       -135.      -135.      -135.      -135.      -135.
    2 1.         20.        36.        20.        3.         45.
    4
1.                                    1.                   1.
1.                                    1.                   1.
   50   50
  600    1   2   1   1   2   3   4   1   2   1   2   1   2   1   2
```

C. OUTPUT SOLUTIONS OF EXAMPLE 1

```
STATIC ANALYSIS PLUS DYNAMIC ANALYSIS


TWO STORY MIXED STRUCTURE
NUMBER OF STORY LEVELS----   2
NUMBER OF COLUMN LINES----  10
NUMBER OF BAYS------------  11
NUMBER OF DIFF. COL. PROP-   3
NUMBER OF DIFF. BEAM PROP-   3
NUMBER OF DIFF. FEE-------   1
NUMBER OF PANEL ELEMENTS--   4
NUMBER OF BRACING ELEMENTS   2
```

STORY DATA

LEVEL	NO.	ID	HEIGHT	MASS(M)	MR**2	X(M)	Y(M)	K-X	K-Y
	2	SECND	144.00	0.41	10393.80	420.00	210.00	0.0	0.0
	1	FIRST	144.00	0.91	40489.30	300.00	210.00	0.0	0.0

STATIC LATERAL LOADS...CASES A AND B

LEVEL	NO.	FX-A	FY-A	MOM-A	FX-B	FY-B	MOM-B	XA	YA	XB	YB
	2	3.00	3.00	0.0	0.0	0.0	0.0	420.0	210.0	0.0	0.0
	1	3.00	3.00	0.0	0.0	0.0	0.0	300.0	210.0	0.0	0.0

STATIC VERTICAL NODAL LOAD

STORY	1	2	3	4	5	6	7	8	9	10
2	0.0	0.0	0.0	0.0	5.00	5.00	5.00	5.00	5.00	5.00
1	5.00	5.00	5.00	5.00	10.00	10.00	10.00	10.00	10.00	10.00

EARTHQUAKE ACCELERATION IN X DIRECTION LIST FROM LEFT TO RIGHT WITH TIME INTERVAL 0.010

0.010966	0.008610	0.006255	0.003900	0.001545	0.003468	0.006144	0.008822	0.011499	0.014177
0.015244	0.012728	0.010212	0.007697	0.005182	0.002666	0.000150	0.002948	0.006084	0.009221

EARTHQUAKE ACCELERATION IN Y DIRECTION LIST FROM LEFT TO RIGHT WITH TIME INTERVAL 0.010

-0.011848	-0.008267	-0.004687	-0.002477	-0.004856	-0.007235	-0.009614	-0.011422	-0.006668	-0.006509
-0.006933	-0.004057	-0.005179	-0.006602	-0.008025	-0.009449	-0.010872	-0.008960	-0.001831	-0.004210

LUMP MASS FOR GEOMETRIC STIFFNESS

STORY	1	2	3	4	5	6	7	8	9	10
2	0.0010	0.0010	0.0010	0.0010	0.0510	0.1020	0.0510	0.0510	0.1020	0.0510
1	0.0302	0.0604	0.0604	0.0302	0.1642	0.3285	0.1642	0.1189	0.2379	0.1189

LUMP MASS FOR DYNAMIC ANALYSIS

STORY	1	2	3	4	5	6	7	8	9	10
2	0.0010	0.0010	0.0010	0.0010	0.0510	0.1020	0.0510	0.0510	0.1020	0.0510
1	0.0302	0.0604	0.0604	0.0302	0.1132	0.2265	0.1132	0.0679	0.1359	0.0679

COLUMN LINE COORDINATES

LINE	X	Y
1	0.0	0.0
2	0.0	120.00
3	0.0	300.00
4	0.0	420.00
5	240.00	0.0
6	240.00	210.00
7	240.00	420.00
8	600.00	0.0
9	600.00	210.00
10	600.00	420.00

COLUMN ID	E	A	TORS I	MAJ I	MIN I	DT	DB	D	BF	TF	TW	ZX	ZY	TP
1	30000.00	5.01	0.15	56.60	7.44	0.0	0.0	8.00	5.25	0.31	0.23	15.90	4.36	14.41
2	30000.00	0.01	0.00	0.00	0.00	0.0	0.0	1.00	1.00	1.00	1.00	10.00	10.00	20.00

COLUMN ID	EIX	EA	EIY	KII	KJJ	KIJ	PI	PJ	HI	HJ	AI	AJ	BI	BJ	GJ	N
21	34560000000.0	2880000.0	4000.0	4.00	4.00	2.00	0.05	0.05	0.0	0.0	0.0	0.0	0.0	0.0	1600.0	1.0

CONCRETE COLUMN YIELD MOMENT

COLUMN ID	POS MY I	NEG MY I	POS MY J	NEG MY J
21	40000.00	-40000.00	40000.00	-40000.00

BEAM ID	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP
1	30000.00	1.12	146.00	4.00	4.00	2.00	0.0	0.0	39.80	62.15
2	30000.00	1.12	146.00	4.00	4.00	2.00	60.00	0.0	39.80	62.15
3	30000.00	0.00	0.00	4.00	4.00	2.00	0.0	0.0	10.00	20.00

FEF ID	CODE	ML	VL	MR	VR	W
1	1	0.0	0.0	0.0	0.0	0.020

BEAM LOCATIONS

BAY	LEV	IC	JC	BID	GEN	VL1	VL2	VL3
1	2	1	2	3	0	0	0	0
1	1	1	2	1	0	1	0	0
2	2	6	5	2	1	1	0	0
3	2	9	8	2	1	1	0	0
4	2	2	3	3	0	0	0	0
4	1	2	3	1	0	1	0	0
5	2	3	4	3	0	0	0	0
5	1	3	4	1	0	1	0	0
6	2	6	7	2	1	1	0	0
7	2	9	10	2	1	1	0	0
8	2	1	5	3	0	0	0	0
8	1	1	5	1	0	1	0	0
9	2	4	7	3	0	0	0	0
9	1	4	7	1	0	1	0	0
10	2	5	8	1	1	1	0	0
11	2	7	10	1	1	1	0	0

GENERATED BEAM LOCATIONS

STORY	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	B 9	B10	B11
2	3	2	2	3	3	2	2	3	3	1	1
1	1	2	2	1	1	2	2	1	1	1	1

GENERATED BEAM LOADS...LOAD CASE

STORY	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	B 9	B10	B11
2	0	1	1	0	0	1	1	0	0	1	1
1	1	1	1	1	1	1	1	1	1	1	1

GENERATED BEAM LOADS...LOAD CASE

STORY	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	B 9	B10	B11
2	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0

GENERATED BEAM LOADS...LOAD CASE

STORY	B 1	B 2	B 3	B 4	B 5	B 6	B 7	B 8	B 9	B10	B11
2	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0

COLUMN LOCATIONS

LINE	LEV	CID	KCOL	GEN
1	2	2	5	0
1	1	1	5	0
2	2	2	3	0
2	1	1	3	0
3	2	2	4	0
3	1	1	4	0
4	2	2	7	0
4	1	1	7	0
5	2	1	6	1
6	2	21	7	1
7	2	1	6	1
8	2	1	9	1
9	2	21	10	1
10	2	1	9	1

GENERATED COLUMN LOCATIONS

STORY	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8	C 9	C10
2	2	2	2	2	1	21	1	1	21	1
1	1	1	1	1	1	21	1	1	21	1

PANEL CARDS

LEVEL	I	J	EIX	EA	PI	PJ	HI	HJ	AI	AJ	BI	BJ	GJ	N
2	5	8	46656000000.0	4320000.0	0.05	0.05	0.0	0.0	0.0	0.0	0.0	0.0	1600.0	1.0
2	7	10	46656000000.0	4320000.0	0.05	0.05	0.0	0.0	0.0	0.0	0.0	0.0	1600.0	1.0
1	5	8	46656000000.0	4320000.0	0.05	0.05	0.0	0.0	0.0	0.0	0.0	0.0	1600.0	1.0
1	7	10	46656000000.0	4320000.0	0.05	0.05	0.0	0.0	0.0	0.0	0.0	0.0	1600.0	1.0

PANEL YIELD MOMENT

LEVEL	I	J	POS MY I	NEG MY I	POS MY J	NEG MY J
2	5	8	100000.00	-100000.00	100000.00	-100000.00
2	7	10	100000.00	-100000.00	100000.00	-100000.00
1	5	8	100000.00	-100000.00	100000.00	-100000.00
1	7	10	100000.00	-100000.00	100000.00	-100000.00

BRACING ELEMENT CARDS

LEV	UC	LC	E	A
1	3	2	30000.00000	3.63000
1	2	3	30000.00000	3.63000

BEAM PROPERTIES AND LOADS

BAY NUMBER 1

LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	0.00	0.00	4.00	4.00	2.00	0.0	0.0	10.00	20.00	0.0	0.0	0.0
1	30000.00	1.12	146.00	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.0	0.0

BAY NUMBER 2

LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	1.12	146.00	4.00	4.00	2.00	60.00	0.0	39.80	62.15	0.00	0.0	0.0
1	30000.00	1.12	146.00	4.00	4.00	2.00	60.00	0.0	39.80	62.15	0.00	0.0	0.0

BAY NUMBER 3

LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	1.12	146.00	4.00	4.00	2.00	60.00	0.0	39.80	62.15	0.00	0.0	0.0
1	30000.00	1.12	146.00	4.00	4.00	2.00	60.00	0.0	39.80	62.15	0.00	0.0	0.0

BAY NUMBER 4

LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	0.00	0.00	4.00	4.00	2.00	0.0	0.0	10.00	20.00	0.0	0.0	0.0
1	30000.00	1.12	146.00	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.0	0.0

BAY NUMBER 5

LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	0.00	0.00	4.00	4.00	2.00	0.0	0.0	10.00	20.00	0.0	0.0	0.0

1	30000.00	1.12	146.00	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.0	0.0

BAY NUMBER 6

LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	1.12	146.00	4.00	4.00	2.00	60.00	0.0	39.80	62.15	0.00	0.0	0.0
1	30000.00	1.12	146.00	4.00	4.00	2.00	60.00	0.0	39.80	62.15	0.00	0.0	0.0

BAY NUMBER 7

LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	1.12	146.00	4.00	4.00	2.00	60.00	0.0	39.80	62.15	0.00	0.0	0.0
1	30000.00	1.12	146.00	4.00	4.00	2.00	60.00	0.0	39.80	62.15	0.00	0.0	0.0

BAY NUMBER 8

LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	0.00	0.00	4.00	4.00	2.00	0.0	0.0	10.00	20.00	0.0	0.0	0.0
1	30000.00	1.12	146.00	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.0	0.0

BAY NUMBER 9

LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	0.00	0.00	4.00	4.00	2.00	0.0	0.0	10.00	20.00	0.0	0.0	0.0
1	30000.00	1.12	146.00	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.0	0.0

BAY NUMBER 10

LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	1.12	146.00	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.0	0.0
1	30000.00	1.12	146.00	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.0	0.0

BAY NUMBER 11

LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	1.12	146.00	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.0	0.0
1	30000.00	1.12	146.00	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.0	0.0

COLUMN PROPERTIES

COLUMN LINE NO. 1

LEVEL	E	A	TORS I	MAJ I	MIN I	DT	DB	D	BF	TF	TW	ZX	ZY	TP
2	30000.00	0.01	0.00	0.00	0.00	0.0	0.0	1.00	1.00	1.00	1.00	10.00	10.00	20.00
1	30000.00	5.01	0.15	56.60	7.44	0.0	0.0	8.00	5.25	0.31	0.23	15.90	4.36	14.41

COLUMN LINE NO. 2

LEVEL	E	A	TORS I	MAJ I	MIN I	DT	DB	D	BF	TF	TW	ZX	ZY	TP
2	30000.00	0.01	0.00	0.00	0.00	0.0	0.0	1.00	1.00	1.00	1.00	10.00	10.00	20.00
1	30000.00	5.01	0.15	56.60	7.44	0.0	0.0	8.00	5.25	0.31	0.23	15.90	4.36	14.41

COLUMN LINE NO. 3

LEVEL	E	A	TORS I	MAJ I	MIN I	DT	DB	D	BF	TF	TW	ZX	ZY	TP
2	30000.00	0.01	0.00	0.00	0.00	0.0	0.0	1.00	1.00	1.00	1.00	10.00	10.00	20.00
1	30000.00	5.01	0.15	56.60	7.44	0.0	0.0	8.00	5.25	0.31	0.23	15.90	4.36	14.41

COLUMN LINE NO. 4

LEVEL	E	A	TORS I	MAJ I	MIN I	DT	DB	D	BF	TF	TW	ZX	ZY	TP
2	30000.00	0.01	0.00	0.00	0.00	0.0	0.0	1.00	1.00	1.00	1.00	10.00	10.00	20.00
1	30000.00	5.01	0.15	56.60	7.44	0.0	0.0	8.00	5.25	0.31	0.23	15.90	4.36	14.41

COLUMN LINE NO. 5

LEVEL	E	A	TORS I	MAJ I	MIN I	DT	DB	D	BF	TF	TW	ZX	ZY	TP
2	30000.00	5.01	0.15	56.60	7.44	0.0	0.0	8.00	5.25	0.31	0.23	15.90	4.36	14.41
1	30000.00	5.01	0.15	56.60	7.44	0.0	0.0	8.00	5.25	0.31	0.23	15.90	4.36	14.41

COLUMN LINE NO. 6

LEVEL	EIX	EA	EIY	KII	KJJ	KIJ	PI	PJ	HI	HJ	AI	AJ	BI	BJ	GJ	N
2	34560000000.0	2880000.0	4000.0	4.00	4.00	2.00	0.05	0.05	0.0	0.0	0.0	0.0	0.0	0.0	1600.0	1.0
1	34560000000.0	2880000.0	4000.0	4.00	4.00	2.00	0.05	0.05	0.0	0.0	0.0	0.0	0.0	0.0	1600.0	1.0

COLUMN LINE NO. 7

LEVEL	E	A	TORS I	MAJ I	MIN I	DT	DB	D	BF	TF	TW	ZX	ZY	TP
2	30000.00	5.01	0.15	56.60	7.44	0.0	0.0	8.00	5.25	0.31	0.23	15.90	4.36	14.41
1	30000.00	5.01	0.15	56.60	7.44	0.0	0.0	8.00	5.25	0.31	0.23	15.90	4.36	14.41

COLUMN LINE NO. 8

LEVEL	E	A	TORS I	MAJ I	MIN I	DT	DB	D	BF	TF	TW	ZX	ZY	TP
2	30000.00	5.01	0.15	56.60	7.44	0.0	0.0	8.00	5.25	0.31	0.23	15.90	4.36	14.41
1	30000.00	5.01	0.15	56.60	7.44	0.0	0.0	8.00	5.25	0.31	0.23	15.90	4.36	14.41

COLUMN LINE NO. 9

LEVEL	EIX	EA	EIY	KII	KJJ	KIJ	PI	PJ	HI	HJ	AI	AJ	BI	BJ	GJ	N
2	34560000000.0	2880000.0	4000.0	4.00	4.00	2.00	0.05	0.05	0.0	0.0	0.0	0.0	0.0	0.0	1600.0	1.0
1	34560000000.0	2880000.0	4000.0	4.00	4.00	2.00	0.05	0.05	0.0	0.0	0.0	0.0	0.0	0.0	1600.0	1.0

COLUMN LINE NO. 10

LEVEL	E	A	TORS I	MAJ I	MIN I	DT	DB	D	BF	TF	TW	ZX	ZY	TP
2	30000.00	5.01	0.15	56.60	7.44	0.0	0.0	8.00	5.25	0.31	0.23	15.90	4.36	14.41
1	30000.00	5.01	0.15	56.60	7.44	0.0	0.0	8.00	5.25	0.31	0.23	15.90	4.36	14.41

NUMERICAL INTEGRATION INFORMATION

TOTAL NUMBER OF TIME STEP--- 500
TIME INCREMENT--- 0.0100
ALFA DAMPING FACTOR--- 0.0
BETA DAMPING FACTOR--- 0.0
LOAD FACTOR IN X DIRECTION-- 1932.0000
LOAD FACTOR IN Y DIRECTION-- 1932.0000
LOAD FACTOR IN Z DIRECTION-- 0.0

ANGLE OF COLUMN AXIS IN DEGREES

ANGLE FROM Y AXIS OF COLUMN NO. 1 TO X GLOBAL---- -45.00
ANGLE FROM Y AXIS OF COLUMN NO. 2 TO X GLOBAL---- -135.00
ANGLE FROM Y AXIS OF COLUMN NO. 3 TO X GLOBAL---- -135.00
ANGLE FROM Y AXIS OF COLUMN NO. 4 TO X GLOBAL---- -45.00
ANGLE FROM Y AXIS OF COLUMN NO. 5 TO X GLOBAL---- -135.00
ANGLE FROM Y AXIS OF COLUMN NO. 6 TO X GLOBAL---- -135.00
ANGLE FROM Y AXIS OF COLUMN NO. 7 TO X GLOBAL---- -135.00
ANGLE FROM Y AXIS OF COLUMN NO. 8 TO X GLOBAL---- -135.00
ANGLE FROM Y AXIS OF COLUMN NO. 9 TO X GLOBAL---- -135.00
ANGLE FROM Y AXIS OF COLUMN NO. 10 TO X GLOBAL---- -135.00

GENERAL CONTROL

NUMERICAL INTEGRATION CODE--- 2
RAMBERG OSGOOD CONSTSNT A--- 1.00
RAMBERG OSGOOD CONSTSNT R--- 20.00
YIELD STRESS FOR STEEL COLUMN--- 36.00
BUCKLING STRESS FOR BRACING--- 20.00
PERCENTAGE OF MEMBER STIFFNESS DIFFERENT-- 5.00
ANGLE FROM X GLOBAL TO X REF.(DEGREES)---- 45.00

STATIC LOAD COMBINATION (MULTIPLIER)

V1	V2	V3	L1	L2	N1
1.0	0.0	0.0	0.0	0.0	0.0
0.0	0.0	0.0	1.0	0.0	0.0
0.0	0.0	0.0	0.0	0.0	1.0
1.0	0.0	0.0	1.0	0.0	1.0

CONTROL RESULT PRINTOUT

NO. OF TIME STEPS TO HAVE ENG.,FORCE,ACC. AND DIS. PRINTOUT-- 50
NO. OF TIME STEPS TO HAVE DUCT. AND EXCUR. PRINTOUT---------- 50

INFORMATION FOR PLOTTING

NO. OF TIME STEPS TO HAVE INFO. PLOT---- 600
PLOT DIS. X,Y AND ROT. OF LEVEL NO.----- 2
PLOT DIS. X,Y AND ROT. OF LEVEL NO.----- 1
PLOT DIS. X,Y AND ROT. OF LEVEL NO.----- 2
PLOT DIS. Z AT LEVEL 2 OF COLUMN NO.---- 1
PLOT DIS. Z AT LEVEL 2 OF COLUMN NO.---- 2
PLOT DIS. Z AT LEVEL 2 OF COLUMN NO.---- 3
PLOT DIS. Z AT LEVEL 2 OF COLUMN NO.---- 4
PLOT MOMENT-ROTATION OF COLUMN NUMBER--- 1 LEVEL NO.--- 1
PLOT MOMENT-ROTATION OF COLUMN NUMBER--- 1 LEVEL NO.--- 1
PLOT MOMENT-ROTATION OF COLUMN NUMBER--- 1 LEVEL NO.--- 1
PLOT MOMENT-ROTATION OF COLUMN NUMBER--- 1 LEVEL NO.--- 1

STATIC LOAD COMBINATION-----MEMBER FORCES-----LEVEL NO. 1

COLUMN FORCES

LINE	LOAD	TORSIONAL MOMENT	MAJOR AXIS TOP MOMENT	MAJOR AXIS BOT MOMENT	AXIAL FORCE	MINOR AXIS TOP MOMENT	MINOR AXIS BOT MOMENT	MAJOR SHEAR	MINOR SHEAR
1	1	-0.0000	-18.9402	-9.5043	-2.4510	-0.7364	-0.3682	-0.1975	-0.0077
1	2	0.0000	0.2155	0.1898	0.0003	-0.0304	-0.0272	0.0028	-0.0004
1	3	0.0000	-0.5334	-0.2666	4.9925	-0.0430	-0.0215	-0.0056	-0.0004
2	1	-0.0000	-4.3013	-2.1506	-2.8650	0.0443	0.0266	-0.0448	0.0005
2	2	0.0000	-0.1495	-0.1664	-0.0717	-0.0005	-0.0074	-0.0021	-0.0000
2	3	0.0000	-0.1537	-0.0769	4.2519	0.0012	0.0006	-0.0016	0.0000
3	1	-0.0000	4.3013	2.1506	-2.8651	0.0443	0.0266	0.0448	0.0005
3	2	0.0000	-0.1492	-0.1662	0.0717	0.0001	-0.0015	-0.0021	-0.0000
3	3	0.0000	0.1537	0.0769	4.2519	0.0012	0.0006	0.0016	0.0000
4	1	-0.0000	-18.9402	-9.5043	-2.4510	0.7364	0.3682	-0.1975	0.0077
4	2	0.0000	-0.0428	-0.0373	0.0012	-0.0303	-0.0272	-0.0006	-0.0004
4	3	0.0000	-0.5334	-0.2666	4.9925	0.0430	0.0215	-0.0056	0.0004
5	1	-0.0000	-14.1513	-7.0756	-1.1543	8.0336	4.0213	-0.1474	0.0837
5	2	0.0000	-0.2197	-0.1455	0.7303	-0.0256	-0.0236	-0.0025	-0.0002
5	3	0.0000	-0.0398	-0.0199	0.9766	0.0671	0.0335	-0.0004	0.0007
6	1	-0.0000	-0.0010	0.0022	-10.0757	-0.0009	-0.0004	0.0000	-0.0001
6	2	0.0000	24.2086	-60.4323	0.0112	-0.0001	-0.0001	-0.2514	0.0001
6	3	0.0000	0.0000	-0.0000	15.0077	0.0006	0.0003	-0.0000	0.0000
7	1	-0.0000	14.1513	7.0756	-1.1543	8.0336	4.0213	0.1474	0.0837
7	2	0.0000	-0.0982	-0.0848	-0.1463	0.0050	0.0046	-0.0012	0.0000
7	3	0.0000	0.0398	0.0199	0.9766	0.0671	0.0335	0.0004	0.0007
8	1	-0.0000	-14.3112	-7.1556	-0.4275	-22.9824	-11.4867	-0.1491	-0.2394
8	2	0.0000	0.2454	0.1711	-0.7302	0.0139	-0.0038	0.0028	0.0002
8	3	0.0000	-0.0394	-0.0197	0.9749	-0.0269	-0.0135	-0.0004	-0.0003
9	1	-0.0000	0.0010	-0.0032	-10.0507	-0.1229	-0.0614	-0.0000	-0.0014
9	2	0.0000	-23.4332	86.6583	-0.0112	0.0001	-0.0000	0.4389	0.0001
9	3	0.0000	-0.0000	0.0000	15.0076	-0.0002	-0.0001	0.0000	-0.0000
10	1	-0.0000	14.3112	7.1556	-0.4276	-22.9824	-11.4867	0.1491	-0.2394
10	2	0.0000	0.1240	0.1103	0.1462	-0.0029	0.0007	0.0016	-0.0000
10	3	0.0000	0.0394	0.0197	0.9749	-0.0269	-0.0135	0.0004	-0.0003

BEAM FORCES

BAY	LOAD	TORS MOMENT	I MOMENT	J MOMENT
1	1	-0.0442	0.7264	-45.2605
1	2	0.0004	0.0303	0.1563
1	3	-0.0012	0.0434	0.3123
2	1	-0.1168	91.7249	-37.7536
2	2	0.0001	-0.9623	-0.6756
2	3	-0.0005	-0.1671	-0.1178
3	1	0.2330	91.1111	-38.1693
3	2	-0.0003	1.0609	0.7428
3	3	0.0002	-0.1658	-0.1170
4	1	0.0000	49.5619	-49.5619
4	2	-0.0001	-0.0068	-0.0064
4	3	-0.0000	-0.1586	0.1586
5	1	0.0442	45.2605	-0.7264
5	2	-0.0000	0.1557	0.0303
5	3	0.0012	-0.3123	-0.0434
6	1	0.1168	91.7248	-37.7536
6	2	-0.0001	0.4605	0.3241
6	3	0.0005	-0.1671	-0.1178
7	1	-0.2330	91.1111	-38.1692
7	2	-0.0003	-0.5590	-0.3913
7	3	-0.0002	-0.1658	-0.1170
8	1	-0.0102	18.9835	-205.6540
8	2	-0.0001	-0.2159	-0.2322
8	3	0.0003	0.5347	0.5527
9	1	0.0102	18.9835	-205.6540
9	2	0.0000	0.0428	0.0465
9	3	-0.0003	0.5347	0.5527
10	1	-0.0001	243.1049	-67.1660
10	2	0.0002	0.1760	0.0212
10	3	0.0000	-0.4208	-0.0520
11	1	0.0001	243.1049	-67.1659
11	2	0.0000	-0.0353	-0.0044
11	3	-0.0000	-0.4208	-0.0520

PANEL FORCES

PANEL	LOAD	TOP-MOMENT	BOT-MOMENT	AXIAL-FORCE	SHEAR-FORCE
3	1	629.6568	-623.7269	-22.7328	0.0411
3	2	-529.3236	1989.3728	0.0001	10.1395
3	3	-1.0202	1.8827	28.0454	0.0060
4	1	629.6274	-623.6415	-22.7328	0.0415
4	2	132.9802	-371.3303	-0.0015	-1.6547
4	3	-1.0201	1.8925	28.0454	0.0060

BRACING ELEMENTS

BRACE	LOAD	AXIAL-FORCE
1	1	-0.8101
1	2	-0.1173
1	3	1.2022
2	1	-0.4101
2	2	0.1173
2	3	1.2022

STATIC LOAD COMBINATION-----MEMBER FORCES-----LEVEL NO. 2

COLUMN FORCES

LINE	LOAD	TORSIONAL MOMENT	MAJOR AXIS TOP MOMENT	MAJOR AXIS BOT MOMENT	AXIAL FORCE	MINOR AXIS TOP MOMENT	MINOR AXIS BOT MOMENT	MAJOR SHEAR	MINOR SHEAR
1	1	-0.0000	0.0029	0.0009	0.0001	-0.0001	-0.0002	0.0000	-0.0000
1	2	0.0000	0.0000	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	0.0000
1	3	0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
2	1	-0.0000	-0.0001	-0.0001	0.0000	-0.0002	-0.0001	-0.0000	-0.0000
2	2	0.0000	-0.0000	-0.0000	0.0000	-0.0000	-0.0000	0.0000	0.0000
2	3	0.0000	-0.0000	-0.0000	0.0000	0.0000	0.0000	-0.0000	0.0000
3	1	-0.0000	0.0001	0.0001	0.0000	-0.0002	-0.0001	0.0000	-0.0000
3	2	0.0000	-0.0000	-0.0000	-0.0000	0.0000	-0.0000	0.0000	0.0000
3	3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
4	1	-0.0000	0.0029	0.0009	0.0001	0.0001	0.0002	0.0000	0.0000
4	2	0.0000	-0.0000	-0.0000	0.0000	-0.0000	-0.0000	0.0000	0.0000
4	3	0.0000	-0.0000	-0.0000	-0.0000	0.0000	0.0000	-0.0000	0.0000
5	1	-0.0000	-25.9577	-23.5923	-0.3413	46.5461	29.3006	-0.3441	0.5267
5	2	0.0000	-0.5390	-0.4556	0.1902	-0.121	-0.0304	-0.0069	-0.0002
5	3	0.0000	-0.0970	-0.0784	0.3252	0.0280	0.0643	-0.0012	0.0006
6	1	-0.0000	0.0001	0.0011	-5.1561	0.4702	0.2345	0.0000	0.0048
6	2	0.0000	-2.5297	-26.6004	0.0055	-0.0000	-0.0001	-0.2022	0.0001
6	3	0.0000	-0.0000	-0.0000	5.0039	0.0001	0.0005	-0.0000	0.0000
7	1	-0.0000	25.9578	23.5923	-0.3413	46.5461	29.3005	0.3441	0.5267
7	2	0.0000	0.5390	0.4556	0.1902	-0.0446	0.0062	0.0033	0.0000
7	3	0.0000	0.0970	0.0784	0.3252	0.0280	0.0643	0.0012	0.0006
8	1	-0.0000	-26.2489	-23.8579	-0.3385	-53.4323	-43.9506	-0.3480	-0.6763
8	2	0.0000	0.5845	0.4971	-0.1902	0.0037	0.0070	0.0075	0.0002
8	3	0.0000	-0.0963	-0.0777	0.3252	-0.0095	-0.0249	-0.0012	-0.0002
9	1	-0.0000	-0.0001	-0.0011	-5.1448	-0.5019	-0.3431	-0.0000	-0.0059
9	2	0.0000	2.8064	26.1548	-0.0055	0.0000	0.0000	0.2010	0.0001
9	3	0.0000	0.0000	0.0000	5.0038	-0.0000	-0.0002	0.0000	-0.0000
10	1	-0.0000	26.2489	23.8579	-0.3385	-53.4323	-43.9506	0.3480	-0.6763
10	2	0.0000	0.3070	0.2673	0.0445	-0.0007	-0.0013	0.0039	-0.0000
10	3	0.0000	0.0963	0.0777	0.3252	-0.0095	-0.0249	0.0012	-0.0002

BEAM FORCES

BAY	LOAD	TORS MOMENT	I MOMENT	J MOMENT
1	1	0.0002	0.0001	0.0001
1	2	0.0000	0.0000	0.0000
1	3	-0.0000	0.0000	0.0000
2	1	-0.2351	97.6633	-25.9576
2	2	-0.0003	-1.0621	-0.5395
2	3	-0.0001	-0.1925	-0.0970
3	1	0.2509	97.1103	-26.2491
3	2	-0.0003	1.1479	0.5850
3	3	0.0000	-0.1912	-0.0963
4	1	0.0000	0.0000	-0.0000
4	2	-0.0000	0.0000	0.0000
4	3	-0.0000	-0.0000	0.0000
5	1	-0.0002	-0.0001	-0.0001
5	2	-0.0000	0.0000	0.0000
5	3	0.0000	-0.0000	-0.0000
6	1	0.2351	97.6632	-25.9576
6	2	-0.0003	0.5159	0.2617
6	3	0.0001	-0.1925	-0.0970
7	1	-0.2509	97.1104	-26.2490
7	2	-0.0002	-0.6017	-0.3072
7	3	-0.0000	-0.1912	-0.0963
8	1	-0.0000	-0.0030	-0.0118
8	2	-0.0000	-0.0000	-0.0000
8	3	0.0000	0.0000	0.0000
9	1	0.0000	-0.0030	-0.0118
9	2	-0.0000	0.0000	0.0000
9	3	-0.0000	0.0000	0.0000
10	1	-0.0002	46.7931	-53.6832
10	2	0.0005	-0.0118	0.0039
10	3	0.0000	0.0280	-0.0095
11	1	0.0002	46.7931	-53.6832
11	2	0.0002	0.0022	-0.0009
11	3	-0.0000	0.0280	-0.0095

PANEL FORCES

PANEL	LOAD	TOP-MOMENT	BOT-MOMENT	AXIAL-FORCE	SHEAR-FORCE
1	1	-8.4000	-13.2646	-9.7698	-0.1505
1	2	72.4586	728.4109	0.0008	5.5618
1	3	0.0223	0.0360	9.3458	0.0004
2	1	-8.3962	-13.2265	-9.7698	-0.1502
2	2	-18.0650	-171.7639	-0.0008	-1.3179
2	3	0.0223	0.0359	9.3458	0.0004

STATIC LOAD COMBINATION-----LATERAL FRAME DISPLACEMENTS

LEVEL	DIRECTION	1	2	3
2	X	-0.0004189	0.0009962	0.0000010
2	Y	0.0000000	-0.0011338	-0.0000000
2	ROT	-0.0000000	0.0000029	0.0000000
1	X	-0.0001390	0.0003339	0.0000004
1	Y	0.0000000	-0.0003730	-0.0000000
1	ROT	-0.0000000	0.0000009	0.0000000

LAST STATIC LOAD COMBINATION IS USED AS AN INITIAL INFORMATION FOR DYNAMIC ANALYSIS

COLUMN FORCES

LEVEL	LINE	TORSIONAL MOMENT	MAJOR AXIS TOP MOMENT	MAJOR AXIS BOT MOMENT	AXIAL FORCE	MINOR AXIS TOP MOMENT	MINOR AXIS BOT MOMENT	MAJOR SHEAR	MINOR SHEAR
2	1	0.0000	0.0028	0.0009	0.0001	-0.0001	-0.0002	0.0000	-0.0000
2	2	0.0000	-0.0001	-0.0002	0.0000	-0.0002	-0.0001	0.0000	-0.0000
2	3	0.0000	0.0001	0.0001	0.0000	-0.0002	-0.0001	0.0000	-0.0000
2	4	0.0000	0.0028	0.0009	0.0001	0.0001	0.0002	0.0000	0.0000
2	5	0.0000	-26.5938	-24.1263	0.1741	46.5620	29.3344	-0.3522	0.5271
2	6	0.0000	-2.5296	-26.5993	-0.1467	0.4703	0.2349	-0.2022	0.0049
2	7	0.0000	25.7932	23.4449	-0.0607	46.5766	29.3711	0.3420	0.5274
2	8	0.0000	-25.7607	-23.4385	-0.2035	-53.4381	-43.9685	-0.3417	-0.6764
2	9	0.0000	2.8063	26.1536	-0.1465	-0.5019	-0.3433	0.2010	-0.0059
2	10	0.0000	26.6522	24.2028	0.0312	-53.4424	-43.9768	0.3531	-0.6766
1	1	0.0000	-19.2581	-9.5811	2.5418	-0.8098	-0.4169	-0.2003	-0.0085
1	2	0.0000	-4.6045	-2.3939	1.3152	0.0450	0.0199	-0.0485	0.0005
1	3	0.0000	4.3058	2.0613	1.4585	0.0456	0.0257	0.0443	0.0005
1	4	0.0000	-19.5165	-9.8082	2.5427	0.7491	0.3625	-0.2036	0.0078
1	5	0.0000	-14.4107	-7.2410	0.5525	8.0751	4.0312	-0.1503	0.0842
1	6	0.0000	24.2075	-60.4301	4.9432	-0.0004	-0.0002	-0.2514	-0.0000
1	7	0.0000	14.0928	7.0108	-0.3240	8.1096	4.0594	0.1466	0.0844
1	8	0.0000	-14.1052	-7.0043	-0.1829	-22.9954	-11.5040	-0.1467	-0.2395
1	9	0.0000	-23.4321	86.6551	4.9457	-0.1231	-0.0615	0.4389	-0.0013
1	10	0.0000	14.4746	7.2856	0.6935	-23.0121	-11.4995	0.1510	-0.2397

BEAM FORCES

LEVEL	BAY	TORS MOMENT	I MOMENT	J MOMENT
2	1	0.0002	0.0001	0.0001
2	2	-0.2354	22.9087	46.9058
2	3	0.2507	24.5670	47.7396
2	4	-0.0000	0.0000	-0.0000
2	5	-0.0002	-0.0001	-0.0001
2	6	0.2349	24.4866	47.7071
2	7	-0.2512	22.8175	46.8475
2	8	-0.0000	-0.0030	-0.0118
2	9	0.0000	-0.0030	-0.0118
2	10	0.0003	-169.1907	162.3112
2	11	0.0003	-169.1768	162.3064
1	1	-0.0450	-23.1999	-20.7919
1	2	-0.1172	17.0954	34.9529
1	3	0.2329	18.5062	35.9565
1	4	-0.0001	-4.6034	4.5902
1	5	0.0454	21.1039	23.2605
1	6	0.1173	18.5182	35.9527
1	7	-0.2335	16.8863	34.8224
1	8	-0.0099	-76.6977	-109.3335
1	9	0.0098	-76.4391	-109.0548
1	10	0.0001	26.8601	148.8033
1	11	0.0002	26.6488	148.7776

PANEL FORCES

LEVEL	PANEL	TOP-MOMENT	BOT-MOMENT	AXIAL-FORCE	SHEAR-FORCE
2	1	64.0809	715.1823	-0.4231	5.4117
2	2	-26.4389	-184.9545	-0.4248	-1.4677
1	3	99.3131	1367.5287	5.3127	10.1865
1	4	761.5875	-993.0893	5.3111	-1.6072

BRACING FORCES

LEVEL	BRACE	AXIAL-FORCE
1	1	0.2748
1	2	0.5095

DISPLACEMENTS

LEVEL	X	Y	ROT
2	5.78272D-04	-1.13375D-03	2.85043D-06
1	1.95240D-04	-3.72941D-04	9.49473D-07

VELOCITIES

LEVEL	X	Y	ROT
2	0.0	0.0	0.0
1	0.0	0.0	0.0

ACCELERATIONS

LEVEL	X	Y	ROT
2	0.0	0.0	0.0
1	0.0	0.0	0.0

DYNAMIC ANALYSIS RESULT AT TIME--- 5.0000 SECOND

COLUMN FORCES

LEVEL	LINE	TORSIONAL MOMENT	MAJOR AXIS TOP MOMENT	MAJOR AXIS BOT MOMENT	AXIAL FORCE	MINOR AXIS TOP MOMENT	MINOR AXIS BOT MOMENT	MAJOR SHEAR	MINOR SHEAR
2	1	0.0000	0.0041	0.0021	-0.0020	0.0015	0.0024	-0.0001	-0.0004
2	2	0.0000	0.0024	0.0023	-0.0690	-0.0002	0.0002	-0.0004	0.0001
2	3	0.0000	0.0028	0.0029	0.0685	-0.0002	0.0000	-0.0004	0.0000
2	4	0.0000	0.0028	0.0008	0.0018	0.0021	0.0032	0.0000	-0.0004
2	5	0.0020	68.8442	54.2808	-4.4691	45.0930	26.0303	0.8266	0.5026
2	6	0.0018	720.6002	22086.2475	0.4596	0.4690	0.2279	158.3241	0.0131
2	7	0.0020	153.7076	134.1184	0.1966	46.6470	29.5183	1.9704	0.5285
2	8	0.0020	168.7269	150.5545	4.8187	-52.8576	-42.3917	2.1810	-0.6527
2	9	0.0018	1115.8709	11869.1559	-0.7445	-0.4996	-0.3329	90.1013	0.0025
2	10	0.0020	189.8564	169.0882	-0.6025	-53.4602	-44.0374	2.4564	-0.6775
1	1	0.0023	16.0620	26.4002	3.2017	4.5046	4.1673	0.2888	0.0554
1	2	0.0023	15.5859	22.3614	16.6269	-0.0366	-1.7197	0.2539	-0.0037
1	3	0.0023	28.9101	29.0235	-34.9576	0.0476	-0.6078	0.3927	-0.0007
1	4	0.0023	-20.8388	-11.0432	2.0574	7.3014	5.5657	-0.2212	0.0845
1	5	0.0023	24.5109	43.5684	73.0656	2.5627	-1.1333	0.4272	0.0429
1	6	0.0020	-14993.0729	30529.0135	6.2559	-0.0274	-0.0345	-27.0900	0.0314
1	7	0.0023	59.2454	55.0426	-4.7336	8.2788	4.2210	0.7481	0.0857
1	8	0.0023	94.8485	84.1214	-74.1865	-23.3663	-14.0978	1.1192	-0.2363
1	9	0.0020	-19223.9403	34190.5790	3.5749	-0.1293	-0.0856	282.0242	0.0216
1	10	0.0023	95.4757	89.4350	4.4162	-23.0574	-11.4471	1.2299	-0.2404

BEAM FORCES

LEVEL	BAY	TORS MOMENT	I MOMENT	J MOMENT
2	1	0.0002	-0.0015	0.0000
2	2	-0.2572	219.5189	142.3046
2	3	0.2310	400.4566	242.2696
2	4	-0.0000	-0.0024	-0.0023
2	5	-0.0002	-0.0005	-0.0020
2	6	0.2118	-231.6220	-80.2029
2	7	-0.2686	-294.1281	-116.3612
2	8	0.0000	-0.0043	-0.0136
2	9	0.0001	-0.0029	-0.0117
2	10	0.0397	-170.6361	162.9114
2	11	0.0048	-169.1295	162.2713
1	1	0.0117	-28.5622	-57.4774
1	2	-0.0951	167.3647	152.2025
1	3	0.1973	409.0336	308.9370
1	4	-0.0248	11.8891	25.6370
1	5	0.0229	-24.5499	16.6740
1	6	0.1056	-196.7544	-119.8395
1	7	-0.2650	-304.3216	-191.0668
1	8	-0.0551	-112.0757	-139.5922
1	9	-0.0214	-75.1392	-107.7513
1	10	0.0340	48.2804	150.0447
1	11	0.0029	25.6540	148.6402

PANEL FORCES

LEVEL	PANEL	TOP-MOMENT	BOT-MOMENT	AXIAL-FORCE	SHEAR-FORCE
2	1	-146.8177	-16164.0900	5.0246	-113.2527
2	2	-617.0459	760.9048	-5.8335	1.0349
1	3	51823.5124	-12373.4046	14.0272	-896.5808
1	4	-2960.4758	-18339.6789	-4.5613	-145.0244

BRACING FORCES

LEVEL	BRACE	AXIAL-FORCE
1	1	59.9314
1	2	-24.2151

DISPLACEMENTS

LEVEL	X	Y	ROT
2	1.385720-01	2.283780-01	3.439230-04
1	7.477510-02	5.930330-02	1.840530-04

VELOCITIES

LEVEL	X	Y	ROT
2	-3.23166D+00	1.39810D+00	-2.47857D-03
1	-9.42884D-01	5.08578D-01	-6.49058D-04

ACCELERATIONS

LEVEL	X	Y	ROT
2	5.18518D+02	-2.74190D+02	4.06118D-01
1	2.16401D+02	-1.48044D+02	1.47579D-01

DUCTILITIES AND EXCURSIONS AT TIME--- 5.0000 SECOND

DUCTILITIES AND EXCURSIONS OF COLUMN

CODE 1 EQ. TOP X-DIR.
CODE 2 EQ. BOT X-DIR.
CODE 3 EQ. TOP Y-DIR.
CODE 4 EQ. BOT Y-DIR.

LEVEL	COL	CODE	DROT	ERQT
2	1	1	0.100000D+01	0.0
2	1	2	0.100000D+01	0.0
2	1	3	0.100000D+01	0.0
2	1	4	0.100000D+01	0.0
2	2	1	0.100000D+01	0.0
2	2	2	0.100000D+01	0.0
2	2	3	0.100000D+01	0.0
2	2	4	0.100000D+01	0.0
2	3	1	0.100000D+01	0.0
2	3	2	0.100000D+01	0.0
2	3	3	0.100000D+01	0.0
2	3	4	0.100000D+01	0.0
2	4	1	0.100000D+01	0.0
2	4	2	0.100000D+01	0.0
2	4	3	0.100000D+01	0.0
2	4	4	0.100000D+01	0.0
2	5	1	0.128890D+01	0.11441D+01
2	5	2	0.119010+01	0.777400+00
2	5	3	0.100130+01	0.35428D-02
2	5	4	0.101260+01	0.29678D-01
2	6	1	0.100000+01	0.0
2	6	2	0.100000+01	0.0
2	6	3	0.100000+01	0.0
2	6	4	0.100000+01	0.0
2	7	1	0.121690+01	0.10539D+01
2	7	2	0.114350+01	0.70592D+00
2	7	3	0.100070+01	0.12097D-02
2	7	4	0.100360+01	0.69678D-02
2	8	1	0.139780+01	0.14479D+01
2	8	2	0.125720+01	0.94577D+00
2	8	3	0.100040+01	0.63864D-03
2	8	4	0.100440+01	0.94066D-02
2	9	1	0.100000+01	0.0
2	9	2	0.100000+01	0.0
2	9	3	0.100000+01	0.0
2	9	4	0.100000+01	0.0
2	10	1	0.133090+01	0.13609D+01
2	10	2	0.121540+01	0.89489D+00
2	10	3	0.100040+01	0.64327D-03
2	10	4	0.100950+01	0.16260D-02
1	1	1	0.100000+01	0.0
1	1	2	0.100000+01	0.0
1	1	3	0.100000+01	0.0
1	1	4	0.100000+01	0.0
1	2	1	0.104630+01	0.55131D-01
1	2	2	0.105560+01	0.68142D-01
1	2	3	0.100000+01	0.0
1	2	4	0.100000+01	0.0
1	3	1	0.102390+01	0.32126D-01
1	3	2	0.103250+01	0.45011D-01
1	3	3	0.100000+01	0.0
1	3	4	0.100000+01	0.0
1	4	1	0.100000+01	0.0
1	4	2	0.100000+01	0.0
1	4	3	0.100000+01	0.0
1	4	4	0.100000+01	0.0
1	5	1	0.113500+01	0.15042D+00
1	5	2	0.117020+01	0.18210D+00
1	5	3	0.100000+01	0.0
1	5	4	0.100000+01	0.0
1	6	1	0.414980+02	0.40498D+02
1	6	2	0.116850+02	0.14293D+03
1	6	3	0.100000+01	0.0
1	6	4	0.100000+01	0.0
1	7	1	0.100000+01	0.0
1	7	2	0.100000+01	0.0
1	7	3	0.100000+01	0.0
1	7	4	0.100000+01	0.0
1	8	1	0.113900+01	0.18690D+00
1	8	2	0.113040+01	0.16194D+00
1	8	3	0.100190+01	0.19267D-02
1	8	4	0.100240+01	0.23933D-02
1	9	1	0.409040+02	0.39904D+02
1	9	2	0.134480+02	0.14352D+03
1	9	3	0.100000+01	0.0
1	9	4	0.100000+01	0.0
1	10	1	0.100000+01	0.0
1	10	2	0.100000+01	0.0
1	10	3	0.100000+01	0.0
1	10	4	0.100000+01	0.0

DUCTILITIES AND EXCURSIONS OF BEAM

CODE 1 EQ. I X-DIR.
CODE 2 EQ. J X-DIR.

LEVEL	BAY	CODE	DROT	ERQT
2	1	1	0.100000+01	0.0
2	1	2	0.100000+01	0.0
2	2	1	0.114470+01	0.149300+00
2	2	2	0.100250+01	0.26514D-02
2	3	1	0.114980+01	0.30083D+00
2	3	2	0.100300+01	0.52458D-02
2	4	1	0.100000+01	0.0
2	4	2	0.100000+01	0.0
2	5	1	0.100000+01	0.0
2	5	2	0.100000+01	0.0
2	6	1	0.113450+01	0.13455D+00
2	6	2	0.100230+01	0.22818D-02
2	7	1	0.112270+01	0.27351D+00
2	7	2	0.100230+01	0.47688D-02
2	8	1	0.100000+01	0.0
2	8	2	0.100000+01	0.0
2	9	1	0.100000+01	0.0
2	9	2	0.100000+01	0.0
2	10	1	0.100000+01	0.0

2	10	2	0.100000D+01	0.0
2	11	1	0.100000D+01	0.0
2	11	2	0.100000D+01	0.0
1	1	1	0.100000D+01	0.0
1	1	2	0.100000D+01	0.0
1	2	1	0.113115D+01	0.178140D+00
1	2	2	0.104660+01	0.55671D-01
1	3	1	0.113830+01	0.24813D+00
1	3	2	0.104710+01	0.854100-01
1	4	1	0.100000+01	0.0
1	4	2	0.100000D+01	0.0
1	5	1	0.100000+01	0.0
1	5	2	0.100000+01	0.0
1	6	1	0.112790+01	0.122850+00
1	6	2	0.104400+01	0.440090-01
1	7	1	0.111420+01	0.252150+00
1	7	2	0.104080+01	0.893150-01
1	8	1	0.100000+01	0.0
1	8	2	0.100000+01	0.0
1	9	1	0.100000+01	0.0
1	9	2	0.100000+01	0.0
1	10	1	0.100000+01	0.0
1	10	2	0.100000+01	0.0
1	11	1	0.100000+01	0.0
1	11	2	0.100000+01	0.0

DUCTILITIES AND EXCURSIONS OF PANEL

CODE 1 EQ. TOP X-DIR.
CODE 2 EQ. BOT X-DIR.

LEVEL	PANEL	CODE	DROT	EROT
2	1	1	0.100000D+01	0.0
2	1	2	0.100000+01	0.0
2	2	1	0.100300+01	0.0
2	2	2	0.100000+01	0.0
1	3	1	0.100000+01	0.0
1	3	2	0.108370+02	0.30324D+02
1	4	1	0.100000+01	0.0
1	4	2	0.100000+01	0.0

MAX. DYNAMIC ANALYSIS RESULT AT TIME--- 5.0000 SECOND

COLUMN FORCES

LEVEL	LINE	TORSIONAL MOMENT	MAJOR AXIS TOP MOMENT	MAJOR AXIS BOT MOMENT	AXIAL FORCE	MINOR AXIS TOP MOMENT	MINOR AXIS BOT MOMENT	MAJOR SHEAR	MINOR SHEAR
2	1	0.0000	0.0041	0.0021	0.0020	0.0084	0.0098	0.0001	0.0012
2	2	0.0000	0.0071	0.0072	0.0690	0.0002	0.0002	0.0012	0.0001
2	3	0.0000	0.0068	0.0067	0.0685	0.0002	0.0001	0.0012	0.0000
2	4	0.0000	0.0030	0.0010	0.0018	0.0079	0.0090	0.0001	0.0012
2	5	0.0020	332.1123	291.8748	8.7132	46.8719	30.1831	4.2677	0.5325
2	6	0.0018	1868.5629	22086.2475	0.4596	0.4708	0.2378	156.3241	0.0131
2	7	0.0020	265.5893	232.3237	2.5841	46.7778	29.8548	3.3922	0.5307
2	8	0.0020	283.2153	250.2901	8.2806	53.5334	44.0844	3.6432	0.6805
2	9	0.0018	1648.1785	16957.4759	0.7445	0.5019	0.3433	125.5069	0.0077
2	10	0.0020	244.9455	214.6383	2.2150	53.5063	44.1231	3.1299	0.6795
1	1	0.0023	24.3039	26.4002	3.4220	30.4863	27.1658	0.2888	0.3704
1	2	0.0023	155.8889	168.6462	69.4292	0.0569	1.7197	2.1939	0.0037
1	3	0.0023	142.0489	161.7262	49.5114	0.0535	0.6078	2.0497	0.0007
1	4	0.0023	23.2430	13.1557	3.8951	27.5464	25.6958	0.2523	0.3398
1	5	0.0023	187.3578	181.8963	73.0656	8.5811	4.4929	2.4060	0.0880
1	6	0.0020	19904.5986	46506.4244	6.2559	0.0273	0.0345	296.1180	0.0314
1	7	0.0023	152.2983	164.3666	13.2280	8.5622	4.4828	2.0408	0.0878
1	8	0.0023	166.2697	167.6258	72.1865	23.5054	14.0978	2.2090	0.2454
1	9	0.0020	19223.9403	46214.1100	5.2500	0.1293	0.0856	282.0242	0.0216
1	10	0.0023	144.2471	156.6145	12.5137	23.2189	11.5147	1.9795	0.2425

DISPLACEMENTS

LEVEL	X	Y	ROT
2	1.38572D-01	-8.66822D-01	3.43923D-04
1	7.47751D-02	-3.69217D-01	1.84053D-04

D. INPUT DATA OF EXAMPLE 2

```
    2
    2       4    4     1    1     3     0     OTWO STORY WF COL.AND BEAM STRUCTURE
SECND      144.        .1941     2440.96    152.        120.        0.          0.
10.        10.         152.      120.       5.          5.          0.          0.
FIRST      144.        .2588     3254.62    152.        120.
5.         5.          152.      120.       2.5         2.5         0.          0.
20.        20.         20.       20.        30.         30.         30.         30.
  808      1
    1      1     1
.01
EARTHQUAKE ACCELERATION INPUT IN X-DIRECTION
  .                                  .                                    .
  .                                  .                                    .
EARTHQUAKE ACCELERATION INPUT IN Y-DIRECTION
  .                                  .                                    .
  .                                  .                                    .
EARTHQUAKE ACCELERATION INPUT IN Z-DIRECTION
  .                                  .                                    .
  .                                  .                                    .
.04367     .05338     .04367     .05338     .1019      .12455     .1019      .12455
.04367     .05338     .04367     .05338     .05823     .07117     .05823     .07117
    1  0.        0.
    2  0.      240.
    3  240.      0.
    4  360.    240.
    1  30000.             8.98                                .534 108.  37.
8.                  8.    .433          .288          30.4    4.   14.   2.    37.3244
    1  30000.                  1.12          144.6           4.   4.                39.8 62.15
    1    1  0.          0.          0.          0.            .05
    2    1  0.          0.          0.          0.            .1
    3    1  0.          0.          0.          0.            .12
    1    1       2     1     1     1     2     3
    2    3       4     1     1     1     2     3
    3    1       3     1     1     2     2     2
    4    2       4     1     1     2     2     2
    1    1       3     1
    2    1       4     1
    3    1       4     1
    4    1       3     1
  800 .01         0.          0.          386.4       386.4       386.4
30.         30.          -33.435     -33.435
    1  1.            20.         36.         36.         3.          -30.
    8
1.          0.          0.          0.          0.          0.
0.          1.          0.          0.          0.          0.
0.          0.          1.          0.          0.          0.
0.          0.          0.          1.          0.          0.
0.          0.          0.          0.          1.          0.
1.          1.          1.          1.          1.          1.
0.          0.          0.          0.          0.          0.
   50      50
 1000      1    2    2    1    2    3    4    1    2    2    2    3    2    4    2
```

E. OUTPUT SOLUTIONS OF EXAMPLE 2

STATIC ANALYSIS PLUS DYNAMIC ANALYSIS

TWO STORY WF COL.AND BEAM STRUCTURE
NUMBER OF STORY LEVELS---- 2
NUMBER OF COLUMN LINES---- 4
NUMBER OF BAYS------------ 4
NUMBER OF DIFF. COL. PROP- 1
NUMBER OF DIFF. BEAM PROP- 1
NUMBER OF DIFF. FEF------- 3
NUMBER OF PANEL ELEMENTS-- 0
NUMBER OF BRACING ELEMENTS 0

STORY DATA

LEVEL NO.	ID	HEIGHT	MASS(M)	MR**2	X(M)	Y(M)	K-X	K-Y
2	SECND	144.00	0.19	2440.96	152.00	120.00	0.0	0.0
1	FIRST	144.00	0.26	3254.62	152.00	120.00	0.0	0.0

STATIC LATERAL LOADS...CASES A AND B

LEVEL NO.	FX-A	FY-A	MOM-A	FX-B	FY-B	MOM-B	XA	YA	XB	YB
2	10.00	10.00	0.0	5.00	5.00	-160.00	152.0	120.0	0.0	0.0
1	5.00	5.00	0.0	2.50	2.50	-80.00	152.0	120.0	0.0	0.0

STATIC VERTICAL NODAL LOAD

STORY	1	2	3	4
2	20.00	20.00	20.00	20.00
1	30.00	30.00	30.00	30.00

EARTHQUAKE ACCELERATION IN X DIRECTION LIST FROM LEFT TO RIGHT WITH TIME INTERVAL 0.010

0.010966	0.008610	0.006255	0.003900	0.001545	0.003468	0.006144	0.008822	0.011499	0.014177
0.015244	0.012728	0.010212	0.007697	0.005182	0.002668	0.000150	0.002948	0.006084	0.009221

EARTHQUAKE ACCELERATION IN Y DIRECTION LIST FROM LEFT TO RIGHT WITH TIME INTERVAL 0.010

-0.011848	-0.008267	-0.004687	-0.002477	-0.004856	-0.007235	-0.009614	-0.011422	-0.006668	-0.006509
-0.006933	-0.004057	-0.005179	-0.006602	-0.008025	-0.009449	-0.010872	-0.008960	-0.001831	-0.004210

EARTHQUAKE ACCELERATION IN Z DIRECTION LIST FROM LEFT TO RIGHT WITH TIME INTERVAL 0.010

-0.085815	-0.053178	-0.020537	0.012104	0.044745	-0.022303	-0.052707	-0.019445	0.013817	0.047080
0.080342	0.113605	0.064463	0.009120	-0.035154	-0.021307	-0.042701	-0.074621	-0.106541	-0.063248

LUMP MASS FOR GEOMETRIC STIFFNESS

STORY	1	2	3	4
2	0.0437	0.0534	0.0437	0.0534
1	0.1019	0.1245	0.1019	0.1245

LUMP MASS FOR DYNAMIC ANALYSIS

STORY	1	2	3	4
2	0.0437	0.0534	0.0437	0.0534
1	0.0582	0.0712	0.0582	0.0712

COLUMN LINE COORDINATES

LINE	X	Y
1	0.0	0.0
2	0.0	240.00
3	240.00	0.0
4	360.00	240.00

COLUMN ID	E	A	TORS I	MAJ I	MIN I	DT	DB	D	BF	TF	TW	ZX	ZY	TP
1	30000.00	3.98	3.53	108.00	37.00	0.0	0.0	8.00	8.00	0.43	0.29	30.40	14.00	37.32

BEAM ID	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP
1	30000.00	1.12	144.60	4.00	4.00	2.00	0.0	0.0	39.80	62.15

FEF ID	CODE	WL	VL	MR	VR	W
1	1	0.0	0.0	0.0	0.0	0.050
2	1	0.0	0.0	0.0	0.0	0.100
3	1	0.0	0.0	0.0	0.0	0.120

BEAM LOCATIONS

BAY	LEV	IC	JC	BID	GEN	VL1	VL2	VL3
1	2	1	2	1	1	1	2	3
2	2	3	4	1	1	1	2	3
3	2	1	3	1	1	2	2	2
4	2	2	4	1	1	2	2	2

GENERATED BEAM LOCATIONS

STORY	B 1	B 2	B 3	B 4
2	1	1	1	1
1	1	1	1	1

GENERATED BEAM LOADS...LOAD CASE

STORY	B 1	B 2	B 3	B 4
2	1	1	2	2
1	1	1	2	2

GENERATED BEAM LOADS...LOAD CASE

STORY	B 1	B 2	B 3	B 4
2	2	2	2	2
1	2	2	2	2

GENERATED BEAM LOADS...LOAD CASE

STORY	B 1	B 2	B 3	B 4
2	3	3	2	2
1	3	3	2	2

COLUMN LOCATIONS

LINE	LEV	CID	KCOL	GEN
1	2	1	3	1
2	2	1	4	1
3	2	1	4	1
4	2	1	3	1

GENERATED COLUMN LOCATIONS

STORY	C 1	C 2	C 3	C 4
2	1	1	1	1
1	1	1	1	1

BEAM PROPERTIES AND LOADS

BAY NUMBER 1 LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	1.12	144.60	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.00	0.00
1	30000.00	1.12	144.60	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.00	0.00
BAY NUMBER 2 LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	1.12	144.60	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.00	0.00

1	30000.00	1.12	144.60	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.00	0.00

BAY NUMBER 3

LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	1.12	144.60	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.00	0.00
1	30000.00	1.12	144.60	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.00	0.00

BAY NUMBER 4

LEVEL	E	TORS I	FLEX I	KII	KJJ	KIJ	DI	DJ	Z	TP	V1	V2	V3
2	30000.00	1.12	144.60	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.00	0.00
1	30000.00	1.12	144.60	4.00	4.00	2.00	0.0	0.0	39.80	62.15	0.00	0.00	0.00

COLUMN PROPERTIES

COLUMN LINE NO. 1

LEVEL	E	A	TORS I	MAJ I	MIN I	DT	DB	D	BF	TF	TW	ZX	ZY	TP
2	30000.00	8.98	0.53	108.00	37.00	0.0	0.0	8.00	8.00	0.43	0.29	30.40	14.00	37.32
1	30000.00	8.98	0.53	108.00	37.00	0.0	0.0	8.00	8.00	0.43	0.29	30.40	14.00	37.32

COLUMN LINE NO. 2

LEVEL	E	A	TORS I	MAJ I	MIN I	DT	DB	D	BF	TF	TW	ZX	ZY	TP
2	30000.00	8.98	0.53	108.00	37.00	0.0	0.0	8.00	8.00	0.43	0.29	30.40	14.00	37.32
1	30000.00	8.98	0.53	108.00	37.00	0.0	0.0	8.00	8.00	0.43	0.29	30.40	14.00	37.32

COLUMN LINE NO. 3

LEVEL	E	A	TORS I	MAJ I	MIN I	DT	DB	D	BF	TF	TW	ZX	ZY	TP
2	30000.00	8.98	0.53	108.00	37.00	0.0	0.0	8.00	8.00	0.43	0.29	30.40	14.00	37.32
1	30000.00	8.98	0.53	108.00	37.00	0.0	0.0	8.00	8.00	0.43	0.29	30.40	14.00	37.32

COLUMN LINE NO. 4

LEVEL	E	A	TORS I	MAJ I	MIN I	DT	DB	D	BF	TF	TW	ZX	ZY	TP
2	30000.00	8.98	0.53	108.00	37.00	0.0	0.0	8.00	8.00	0.43	0.29	30.40	14.00	37.32
1	30000.00	8.98	0.53	108.00	37.00	0.0	0.0	8.00	8.00	0.43	0.29	30.40	14.00	37.32

NUMERICAL INTEGRATION INFORMATION

TOTAL NUMBER OF TIME STEP---	800
TIME INCREMENT---	0.0100
ALFA DAMPING FACTOR---	0.0
BETA DAMPING FACTOR---	0.0
LOAD FACTOR IN X DIRECTION--	386.4000
LOAD FACTOR IN Y DIRECTION--	386.4000
LOAD FACTOR IN Z DIRECTION--	386.4000

ANGLE OF COLUMN AXIS IN DEGREES

ANGLE FROM Y AXIS OF COLUMN NO. 1 TO X GLOBAL---	30.00
ANGLE FROM Y AXIS OF COLUMN NO. 2 TO X GLOBAL---	30.00
ANGLE FROM Y AXIS OF COLUMN NO. 3 TO X GLOBAL---	-33.43
ANGLE FROM Y AXIS OF COLUMN NO. 4 TO X GLOBAL---	-33.43

GENERAL CONTROL

NUMERICAL INTEGRATION CODE---	1
RAMBERG OSGOOD CONSTSNT A---	1.00
RAMBERG OSGOOD CONSTSNT R---	20.00
YIELD STRESS FOR STEEL COLUMN---	36.00
BUCKLING STRESS FOR BRACING---	36.00
PERCENTAGE OF MEMBER STIFFNESS DIFFERENT--	1.00
ANGLE FROM X GLOBAL TO X REF.(DEGREES)---	-30.00

STATIC LOAD COMBINATION (MULTIPLIER)

V1	V2	V3	L1	L2	N1
1.0	0.0	0.0	0.0	0.0	0.0
0.0	1.0	0.0	0.0	0.0	0.0
0.0	0.0	1.0	0.0	0.0	0.0
0.0	0.0	0.0	1.0	0.0	0.0
0.0	0.0	0.0	0.0	1.0	0.0
0.0	0.0	0.0	0.0	0.0	1.0
1.0	1.0	1.0	1.0	1.0	1.0
0.0	0.0	0.0	0.0	0.0	0.0

CONTROL RESULT PRINTOUT

NO. OF TIME STEPS TO HAVE ENG.,FORCE,ACC. AND DIS. PRINTOUT--	50
NO. OF TIME STEPS TO HAVE DUCT. AND EXCUR. PRINTOUT---	50

INFORMATION FOR PLOTTING

NO. OF TIME STEPS TO HAVE INFO. PLOT----1000			
PLOT DIS. X,Y AND ROT. OF LEVEL NO.----	2		
PLOT DIS. X,Y AND ROT. OF LEVEL NO.----	1		
PLOT DIS. X,Y AND ROT. OF LEVEL NO.----	1		
PLOT DIS. Z AT LEVEL 2 OF COLUMN NO.---	1		
PLOT DIS. Z AT LEVEL 2 OF COLUMN NO.---	2		
PLOT DIS. Z AT LEVEL 2 OF COLUMN NO.---	3		
PLOT DIS. Z AT LEVEL 2 OF COLUMN NO.---	4		
PLOT MOMENT-ROTATION OF COLUMN NUMBER---	1	LEVEL NO.---	1
PLOT MOMENT-ROTATION OF COLUMN NUMBER---	2	LEVEL NO.---	1
PLOT MOMENT-ROTATION OF COLUMN NUMBER---	3	LEVEL NO.---	1
PLOT MOMENT-ROTATION OF COLUMN NUMBER---	4	LEVEL NO.---	1

STATIC LOAD COMBINATION-----MEMBER FORCES-----LEVEL NO. 1

COLUMN FORCES

LINE	LOAD	TORSIONAL MOMENT	MAJOR AXIS TOP MOMENT	MAJOR AXIS BOT MOMENT	AXIAL FORCE	MINOR AXIS TOP MOMENT	MINOR AXIS BOT MOMENT	MAJOR SHEAR	MINOR SHEAR
1	1	-0.0098	-155.2784	-22.2007	-34.7342	-56.1384	-20.6110	-1.2648	-0.5446
1	2	-0.0122	-152.3933	-23.3890	-46.4647	-115.6392	-48.7404	-1.2515	-1.1570
1	3	-0.0131	-151.2393	-23.8643	-51.1565	-139.4396	-60.0722	-1.2462	-1.4019
1	4	-0.2012	-167.0720	-256.9649	7.0788	430.4615	537.8830	-2.8435	6.1752
1	5	-0.1179	-96.9040	-151.4756	3.6662	230.6020	288.0916	-1.6648	3.3078
1	6	0.0000	0.0000	0.0000	50.0000	0.0000	0.0000	0.0000	0.0000
1	7	-0.3542	-722.8871	-477.8948	-71.6108	349.8463	696.7510	-8.2708	6.3795
2	1	-0.0098	-364.1413	-101.9413	-49.0478	64.6576	40.0070	-3.2938	0.7112
2	2	-0.0122	-367.0921	-100.0214	-61.2281	126.0363	72.0973	-3.3034	1.3570
2	3	-0.0131	-368.2724	-99.2534	-66.1002	150.5717	84.9334	-3.3072	1.6154
2	4	-0.2012	228.6849	449.6583	-7.0812	430.4866	537.8956	4.4716	6.0534
2	5	-0.1179	131.7584	260.9947	-3.6577	230.6152	288.0982	2.5883	3.2426
2	6	0.0000	0.0000	0.0000	50.0000	0.0000	0.0000	0.0000	0.0000
2	7	-0.3542	-739.0625	409.4369	-137.0950	1002.4074	1023.0315	-2.8445	12.9796
3	1	-0.0098	-43.8342	0.7854	-38.7596	-121.3408	-78.0162	-0.3122	-1.3549
3	2	-0.0122	-129.4314	-44.8700	-52.4362	-124.7767	-79.2158	-1.2220	-1.3880
3	3	-0.0131	-163.6703	-63.1321	-57.9068	-126.1511	-79.6956	-1.5859	-1.4012
3	4	-0.2012	214.3932	416.9690	6.9528	116.3523	177.6676	4.2038	1.8384
3	5	-0.1179	92.9253	184.8398	3.3871	65.2636	95.7965	1.8482	1.0109
3	6	0.0000	-0.0000	0.0000	50.0000	-0.0000	-0.0000	0.0000	-0.0000
3	7	-0.3542	-29.6185	494.5922	-88.7627	-190.6527	36.5366	2.9318	-1.2948
4	1	-0.0098	197.8032	121.6041	-48.2911	-255.9953	-154.8008	2.2019	-2.7970
4	2	-0.0122	283.8166	161.7541	-61.5366	-253.1021	-155.1440	3.0801	-2.7755
4	3	-0.0131	318.2220	177.8141	-66.8348	-251.9448	-155.2813	3.4314	-2.7670
4	4	-0.2012	286.3396	452.9422	-6.9504	-118.2287	-134.4875	4.9130	-1.5981
4	5	-0.1179	135.2510	306.6027	-3.4156	-71.0102	-80.5367	2.2712	-0.9879
4	6	0.0000	0.0000	0.0000	50.0000	0.0000	0.0000	0.0000	0.0000
4	7	-0.3542	1221.4312	1120.1171	-137.0286	-950.2810	-686.2502	15.8976	-10.9255

BEAM FORCES

BAY	LOAD	TORS MOMENT	I MOMENT	J MOMENT
1	1	0.1607	133.8014	-204.5265
1	2	0.1718	290.3081	-380.2437
1	3	0.1763	361.3108	-450.6705
1	4	0.3869	-752.2174	-752.1879
1	5	0.2287	-402.6364	-402.6209
1	6	-0.0000	0.0	0.0
1	7	1.1244	-363.4333	-2190.3495
2	1	-0.1880	292.4721	-220.7169
2	2	-0.1702	567.9445	-483.5914
2	3	-0.1631	678.1334	-588.7412
2	4	0.2520	-408.1345	-382.2869
2	5	0.1496	-191.6076	-166.4016
2	6	0.0000	-0.0000	-0.0000
2	7	-0.1197	948.8079	-1841.7380
3	1	0.0097	341.9957	-436.2634
3	2	0.0749	336.3511	-451.8396
3	3	0.1009	338.2933	-458.0701
3	4	0.0651	200.2774	183.8826
3	5	0.0369	118.7620	105.9384
3	6	-0.0000	-0.0000	-0.0000
3	7	0.3076	1338.6796	-1056.3522
4	1	-0.1123	958.8147	-901.0214
4	2	-0.1461	960.1716	-870.5968
4	3	-0.1594	960.7140	-866.4270
4	4	0.1541	-299.3371	-243.6296
4	5	0.1035	-177.1052	-146.5468
4	6	-0.0000	-0.0000	-0.0000
4	7	-0.1808	2493.2577	-3068.2217

STATIC LOAD COMBINATION-----MEMBER FORCES-----LEVEL NO. 2

COLUMN FORCES

LINE	LOAD	TORSIONAL MOMENT	MAJOR AXIS TOP MOMENT	MAJOR AXIS BOT MOMENT	AXIAL FORCE	MINOR AXIS TOP MOMENT	MINOR AXIS BOT MOMENT	MAJOR SHEAR	MINOR SHEAR
1	1	-0.0277	-276.5899	-186.8780	-17.4217	-99.4047	-77.6533	-3.2563	-1.2190
1	2	-0.0344	-276.6889	-187.1296	-23.2836	-216.3014	-180.5940	-3.2430	-2.7766
1	3	-0.0370	-273.9285	-187.2303	-25.6283	-264.6601	-221.7703	-3.2377	-3.3996
1	4	-0.1760	-86.8812	-33.5922	2.4111	375.2490	321.8210	-0.8054	4.6253
1	5	-0.1057	-53.0960	-22.0867	1.2472	200.7153	172.0913	-0.5028	2.4737
1	6	0.0000	0.0000	0.0000	20.0000	0.0000	0.0000	0.0000	0.0000
1	7	-0.3809	-965.1853	-616.9169	-42.6752	-0.4019	13.8946	-11.0451	-0.2963
2	1	-0.0277	-844.7741	-594.5127	-24.5926	158.0800	139.7161	-10.0626	2.0469
2	2	-0.0344	-845.9311	-592.9074	-30.6847	290.6960	254.1613	-10.0624	3.7588
2	3	-0.0370	-846.3939	-592.2653	-33.1215	343.7424	299.9394	-10.0623	4.4436
2	4	-0.1760	164.9466	71.0391	-2.3211	375.2800	321.8554	1.5410	4.5778
2	5	-0.1057	99.4140	45.5756	-1.1815	200.7315	172.1092	0.9489	2.4483
2	6	0.0000	0.0000	0.0000	20.0000	0.0000	0.0000	0.0000	0.0000
2	7	-0.3809	-2272.7385	-1663.0708	-71.9014	1368.5299	1187.7813	-27.6975	17.2755
3	1	-0.0277	-106.2831	-53.5436	-19.3912	-315.2320	-269.0574	-1.1265	-4.0237
3	2	-0.0344	-338.0639	-236.5112	-26.2367	-332.6847	-279.5647	-4.0049	-4.2190
3	3	-0.0370	-430.7762	-309.6982	-28.9749	-339.6659	-283.7676	-5.1563	-4.2971
3	4	-0.1760	196.4290	111.4492	2.4064	76.2395	48.3402	2.0588	0.7906
3	5	-0.1057	80.4816	41.2544	1.1539	43.9576	29.6148	0.8107	0.4719
3	6	0.0000	0.0000	0.0000	20.0000	-0.0000	-0.0000	0.0000	-0.0000
3	7	-0.3809	-598.2125	-447.0494	-51.0425	-867.3857	-754.4347	-7.4183	-11.2773
4	1	-0.0277	490.2753	425.9636	-24.0109	-649.1038	-549.6643	6.3424	-8.2594
4	2	-0.0344	711.4713	598.1925	-30.6279	-636.2332	-543.2364	9.0767	-8.1210
4	3	-0.0370	799.9498	667.0840	-33.2746	-631.0850	-540.6652	10.1705	-8.0657
4	4	-0.1760	275.1415	204.7652	-2.4984	-112.2558	-100.0012	3.2358	-1.4131
4	5	-0.1057	127.6758	96.5958	-1.2196	-69.3438	-60.2612	1.5150	-0.8564
4	6	0.0000	-0.0000	0.0000	20.0000	0.0000	0.0000	0.0000	0.0000
4	7	-0.3809	2404.5137	1992.6011	-71.6294	-2098.0215	-1793.8283	30.3405	-26.7157

BEAM FORCES

BAY	LOAD	TORS MOMENT	I MOMENT	J MOMENT
1	1	0.3605	95.3452	-158.2473
1	2	0.3777	216.3067	-290.9472
1	3	0.3846	264.6913	-344.0072
1	4	0.2037	-375.2380	-375.2164
1	5	0.1231	-200.6954	-200.6841
1	6	-0.0000	-0.0000	-0.0000
1	7	1.4497	0.4097	-1369.1522
2	1	-0.3611	203.7851	-165.2999
2	2	-0.2998	504.2305	-392.9259
2	3	-0.2753	600.4366	-443.9735
2	4	0.1216	-234.5002	-219.1456
2	5	0.0735	-102.4458	-93.0938
2	6	0.0000	-0.0000	-0.0000
2	7	-0.7410	1031.5262	-1394.4367
3	1	-0.0095	276.2254	-352.0661
3	2	0.0052	274.3112	-371.6151
3	3	0.0311	273.5439	-379.4346
3	4	0.0110	86.6775	85.1079
3	5	0.0199	52.9737	49.0736
3	6	-0.0100	-0.0000	-0.0000
3	7	0.0078	963.7356	-968.9343
4	1	-0.2173	845.1346	-726.2324
4	2	-0.2513	846.3088	-711.7912
4	3	-0.2649	846.7785	-706.0147
4	4	0.0637	-164.7429	-125.3980
4	5	0.0474	-98.2904	-77.4228
4	6	-0.0000	-0.0000	-0.0000
4	7	-0.6223	2274.1881	-2346.7990

STATIC LOAD COMBINATION-----LATERAL FRAME DISPLACEMENTS

LEVEL	DIRECTION	1	2	3	4	5	6	7
2	X	0.4404740	0.4102617	0.4107768	-0.6366289	-0.3848961	0.0000000	0.2489875
2	Y	0.1948959	0.2303098	0.2446627	3.8681851	2.0596427	0.0000000	6.5776872
2	ROT	-0.0008429	-0.0010459	-0.0011270	-0.0084779	-0.0050245	0.0000000	-0.0165182
1	X	0.1102609	0.1126563	0.1106113	-0.3699816	-0.2197843	0.0000000	-0.2484294
1	Y	0.0676879	0.0956363	0.0600757	2.0091644	1.0759717	0.0000000	3.2494361
1	ROT	-0.0002169	-0.0002730	-0.0002945	-0.0045222	-0.0026501	0.0000000	-0.0079593

LAST STATIC LOAD COMBINATION IS USED AS AN INITIAL INFORMATION FOR DYNAMIC ANALYSIS

COLUMN FORCES

LEVEL	LINE	TORSIONAL MOMENT	MAJOR AXIS TOP MOMENT	MAJOR AXIS BOT MOMENT	AXIAL FORCE	MINOR AXIS TOP MOMENT	MINOR AXIS BOT MOMENT	MAJOR SHEAR	MINOR SHEAR
2	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

BEAM FORCES

LEVEL	BAY	TORS MOMENT	I MOMENT	J MOMENT
2	1	0.0	0.0	0.0
2	2	0.0	0.0	0.0
2	3	0.0	0.0	0.0
2	4	0.0	0.0	0.0
1	1	0.0	0.0	0.0
1	2	0.0	0.0	0.0
1	3	0.0	0.0	0.0
1	4	0.0	0.0	0.0

DISPLACEMENTS

LEVEL	X	Y	ROT
2	0.0	0.0	0.0
1	0.0	0.0	0.0

VELOCITIES

LEVEL	X	Y	ROT
2	0.0	0.0	0.0
1	0.0	0.0	0.0

ACCELERATIONS

LEVEL	X	Y	ROT
2	0.0	0.0	0.0
1	0.0	0.0	0.0

DYNAMIC ANALYSIS RESULT AT TIME--- 8.0000 SECOND

ENERGIES

INPUT ENG.	STRAIN ENG.	KINETIC ENG.	DAMPING ENG.	DIS STR ENG.	DISSP. ENG.	PERCENT ERROR
0.25458D+03	0.23865D+03	0.16051D+02	0.0	0.18532D+03	0.18532D+03	-0.49435D-01

COLUMN FORCES

LEVEL	LINE	TORSIONAL MOMENT	MAJOR AXIS TOP MOMENT	MAJOR AXIS BOT MOMENT	AXIAL FORCE	MINOR AXIS TOP MOMENT	MINOR AXIS BOT MOMENT	MAJOR SHEAR	MINOR SHEAR
2	1	-0.0004	-89.4633	-174.1567	2.5512	134.9337	126.3661	-1.7933	1.7483
2	2	-0.0004	-98.4866	-176.4927	181.5438	209.8904	171.2118	-1.8336	2.5655
2	3	-0.0004	42.7246	-215.9873	3.8413	134.0547	51.1341	-1.2678	1.2119
2	4	-0.0004	124.9395	-248.4859	17.7643	86.4129	130.9358	-0.9369	1.3852
1	1	0.3941	-178.9320	-422.9299	6.2713	347.1095	359.3953	-4.5929	4.4639
1	2	0.3941	136.7372	-79.2913	34.4263	421.4294	526.7748	0.6229	0.0440
1	3	0.3941	679.9520	442.1712	13.2886	231.3591	188.4870	6.6785	2.8206
1	4	0.3941	849.0470	941.5791	31.7193	-162.8663	-118.5004	11.0732	-2.8852

BEAM FORCES

LEVEL	BAY	TORS MOMENT	I MOMENT	J MOMENT
2	1	-0.0612	-134.9920	-209.9152
2	2	-0.0088	-109.6912	-168.1138
2	3	-0.0583	99.9245	149.8584
2	4	-0.0248	98.3954	96.5903
1	1	0.1139	-473.7689	-592.6114
1	2	0.2458	-604.7604	-584.7520
1	3	-0.2934	352.9752	315.4195
1	4	0.0297	39.8690	-35.4097

DISPLACEMENTS

LEVEL	X	Y	ROT
2	1.10087D+00	2.32948D+00	8.84663D-03
1	1.49061D+00	1.55513D+00	9.85569D-03

VELOCITIES

LEVEL	X	Y	ROT
2	-1.99701D+00	-6.41860D+00	3.87365D-02
1	9.85959D-01	2.05229D+00	1.71517D-02

ACCELERATIONS

LEVEL	X	Y	ROT
2	1.43343D+01	-3.71300D+01	3.61184D-01
1	-8.84222D+01	-5.89274D+01	-7.98753D-01

DUCTILITIES AND EXCURSIONS AT TIME--- 8.0000 SECOND

DUCTILITIES AND EXCURSIONS OF COLUMN

CODE 1 EQ. TOP X-DIR.
CODE 2 EQ. BOT X-DIR.
CODE 3 EQ. TOP Y-DIR.
CODE 4 EQ. BOT Y-DIR.

LEVEL	COL	CODE	DRCT	ERCT	DENG	EENG	DENGC	EENGC
2	1	1	0.17729D+01	0.41429D+01	0.35885D+01	0.39018D+01	0.11057D+01	0.29452D+00
2	1	2	0.17140D+01	0.50894D+01	0.27175D+01	0.21845D+01	0.10773D+01	0.14092D+00
2	1	3	0.19637D+01	0.10170D+02	0.11671D+01	0.24368D+00	0.11647D+01	0.22890D+00
2	1	4	0.21877D+01	0.11200D+02	0.10873D+01	0.18504D+00	0.10794D+01	0.15599D+00
2	2	1	0.18528D+01	0.58404D+01	0.41853D+01	0.36918D+01	0.11513D+01	0.21686D+00
2	2	2	0.20285D+01	0.84724D+01	0.32424D+01	0.35953D+01	0.11294D+01	0.35941D+00
2	2	3	0.21953D+01	0.10646D+02	0.17546D+01	0.15310D+01	0.13511D+01	0.10042D+01
2	2	4	0.23271D+01	0.11277D+02	0.15159D+01	0.10617D+01	0.12381D+01	0.67434D+00
2	3	1	0.13250D+01	0.12512D+01	0.12358D+01	0.23580D+00	0.10178D+01	0.17777D-01
2	3	2	0.12688D+01	0.97236D+00	0.13714D+01	0.37136D+00	0.10278D+01	0.27847D-01
2	3	3	0.18475D+01	0.69126D+01	0.11832D+01	0.19254D+00	0.11786D+01	0.18501D+00
2	3	4	0.19467D+01	0.78325D+01	0.10615D+01	0.68697D-01	0.10599D+01	0.64401D-01
2	4	1	0.17246D+01	0.13763D+01	0.31789D+01	0.25565D+01	0.10433D+01	0.57156D-01
2	4	2	0.16652D+01	0.19015D+01	0.44817D+01	0.46503D+01	0.10704D+01	0.11238D+00
2	4	3	0.24151D+01	0.92560D+01	0.11797D+01	0.29171D+00	0.11668D+01	0.28266D+00
2	4	4	0.20112D+01	0.81331D+01	0.10482D+01	0.10915D+00	0.10511D+01	0.10392D+00
1	1	1	0.26057D+01	0.80902D+01	0.17453D+01	0.15813D+01	0.14957D+01	0.76911D+00
1	1	2	0.36095D+01	0.12558D+02	0.22075D+01	0.25937D+01	0.18018D+01	0.11694D+01
1	1	3	0.24721D+01	0.91584D+01	0.12911D+01	0.11456D+01	0.13522D+01	0.11127D+01
1	1	4	0.32779D+01	0.12188D+02	0.15438D+01	0.22478D+01	0.16976D+01	0.21870D+01
1	2	1	0.23479D+01	0.89860D+01	0.11984D+01	0.48735D+00	0.12504D+01	0.47988D+00
1	2	2	0.38243D+01	0.16580D+02	0.17900D+01	0.31496D+01	0.18507D+01	0.28254D+01
1	2	3	0.27328D+01	0.10381D+02	0.24174D+01	0.34221D+01	0.17058D+01	0.14779D+01
1	2	4	0.32663D+01	0.12133D+02	0.21913D+01	0.39697D+01	0.15932D+01	0.20290D+01
1	3	1	0.27241D+01	0.10388D+02	0.18018D+01	0.17038D+01	0.16323D+01	0.16273D+01
1	3	2	0.36714D+01	0.20741D+02	0.18886D+01	0.23985D+01	0.21471D+01	0.27160D+01
1	3	3	0.17781D+01	0.59608D+01	0.26499D+01	0.23633D+01	0.11372D+01	0.20872D+00
1	3	4	0.22646D+01	0.87304D+01	0.24462D+01	0.28872D+01	0.11878D+01	0.37500D+00
1	4	1	0.41537D+01	0.15088D+02	0.10771D+02	0.15610D+02	0.19409D+01	0.29528D+01
1	4	2	0.41950D+01	0.23069D+02	0.98478D+01	0.19741D+02	0.22966D+01	0.54139D+01
1	4	3	0.27101D+01	0.12015D+02	0.36445D+01	0.55183D+01	0.25777D+01	0.38197D+01
1	4	4	0.35226D+01	0.14623D+02	0.24616D+01	0.54997D+01	0.28222D+01	0.43359D+01

DUCTILITIES AND EXCURSIONS OF BEAM

CODE 1 EQ. I X-DIR.
CODE 2 EQ. J X-DIR.

LEVEL	BAY	CODE	DRCT	ERCT	DENG	EENG	DENGC	EENGC
2	1	1	0.11205D+01	0.22511D+00	0.10000D+01	0.67825D-09	0.10000D+01	0.80931D-10
2	1	2	0.10356D+01	0.57813D-01	0.10000D+01	0.48945D-09	0.10000D+01	0.58773D-10
2	2	1	0.10111D+01	0.11105D-01	0.10000D+01	0.88876D-11	0.10000D+01	0.85243D-12
2	2	2	0.10289D+01	0.23885D-01	0.10000D+01	0.72006D-10	0.10000D+01	0.69011D-11
2	3	1	0.12337D+01	0.64728D+00	0.10000D+01	0.19666D-05	0.10000D+01	0.46144D-06
2	3	2	0.11351D+01	0.36017D+00	0.10000D+01	0.15487D-06	0.10000D+01	0.35543D-07
2	4	1	0.12672D+01	0.51293D+00	0.10000D+01	0.56066D-05	0.10000D+01	0.15149D-05

2	4	2	0.112800D+01	0.316040D+00	0.100000D+01	0.573400D-06	0.100000D+01	0.154940D-06
1	1	1	0.135000D+01	0.981110D+00	0.100000D+01	0.950310D-06	0.100000D+01	0.250920D-06
1	1	2	0.133670D+01	0.869380D+00	0.100000D+01	0.227210D-05	0.100000D+01	0.257330D-06
1	2	1	0.150550D+01	0.216640D+01	0.100000D+01	0.207510D-04	0.100000D+01	0.612600D-05
1	2	2	0.134160D+01	0.180590D+01	0.100000D+01	0.190130D-04	0.100000D+01	0.609190D-05
1	3	1	0.147120D+01	0.231700D+01	0.100010D+01	0.782980D-04	0.100000D+01	0.310420D-04
1	3	2	0.128430D+01	0.140750D+01	0.100000D+01	0.347650D-05	0.100000D+01	0.133100D-05
1	4	1	0.166090D+01	0.296950D+01	0.100010D+01	0.116760D-03	0.100000D+01	0.351380D-04
1	4	2	0.152330D+01	0.193100D+01	0.100010D+01	0.747770D-04	0.100000D+01	0.332530D-04

MAX. DYNAMIC ANALYSIS RESULT AT TIME--- 8.0000 SECOND

COLUMN FORCES

LEVEL	LINE	TORSIONAL MOMENT	MAJOR AXIS TOP MOMENT	MAJOR AXIS BOT MOMENT	AXIAL FORCE	MINOR AXIS TOP MOMENT	MINOR AXIS BOT MOMENT	MAJOR SHEAR	MINOR SHEAR
2	1	0.3720	758.9437	594.2133	7.3102	457.6057	408.0633	9.1106	5.7962
2	2	0.3720	683.6134	518.7874	21.6433	498.8107	461.5996	7.9731	6.4060
2	3	0.3720	328.8016	285.8247	8.8005	501.9033	474.5762	3.3013	6.4895
2	4	0.3720	313.7977	573.3082	20.7951	499.4030	445.4964	6.0239	6.0056
1	1	0.7660	548.5543	858.5001	12.6448	347.4329	437.1462	9.4253	4.7915
1	2	0.7660	584.1748	1099.5019	41.0359	621.4294	526.7748	10.4416	6.0440
1	3	0.7660	699.9421	442.1712	20.1538	303.4249	425.3844	6.7008	4.2924
1	4	0.7660	960.0963	1223.7818	42.3812	503.6582	530.7456	14.4236	6.4577

DISPLACEMENTS

LEVEL	X	Y	ROT
2	6.129490D+00	4.049760D+00	2.360040D-02
1	3.801760D+00	2.041310D+00	1.721440D-02

F. IDENTIFICATION OF POSITIVE MEMBER FORCES

The positive direction of moments is in the same direction as the local axes of the members. The positive local axes can be identified by using the following method:

1. Start from the column at the origin of the reference coordinates. The positive weak axis of this column must coincide with one of the positive coordinates. The positive strong axis of the member can be located by using the right-hand-screw rule, which states that the index finger points to the weak axis and the thumb to the strong axis.

2. The positive local axes of the other columns, shear walls, and shear panels can be located by rotating the column at the origin of the reference coordinates in counterclockwise direction such that the positive weak axis of the column coincides with that of the member being studied.

3. The positive major axes of a beam coincide with the positive local axes of the columns to which the beam is connected.

The positive axial force is assumed to be in tension, and the positive torsion is based on the right-hand-rule, which states that the thumb in representing the torsional vector points away from the member axis.

As an illustration, the positive axes of the vertical members of Example 1 are shown in Fig. 4. The origin of the reference coordinates is at column 1 whose positive weak axis coincides with the x-axis of the reference coordinates. Use of the right-hand-screw rule yields the strong axis as sketched in the figure. For the shear wall, which is identified as member 6, the positive

weak axis must be in the direction shown, because the counterclockwise rotation of column 1 sets the weak axis of the column in that direction. For shear panel 1, the strong axis has the same direction as that of column 1, thus no rotation is necessary.

The positive major axes of the beam in bay 1 are in the y-direction at column 1 and in the x-direction at column 2, because these two beam axes coincide with the two positive column axes.

The internal forces at the last time-step of some of the typical members of Example 1 are shown in Fig. 6 in which the arrows signify the positive direction.

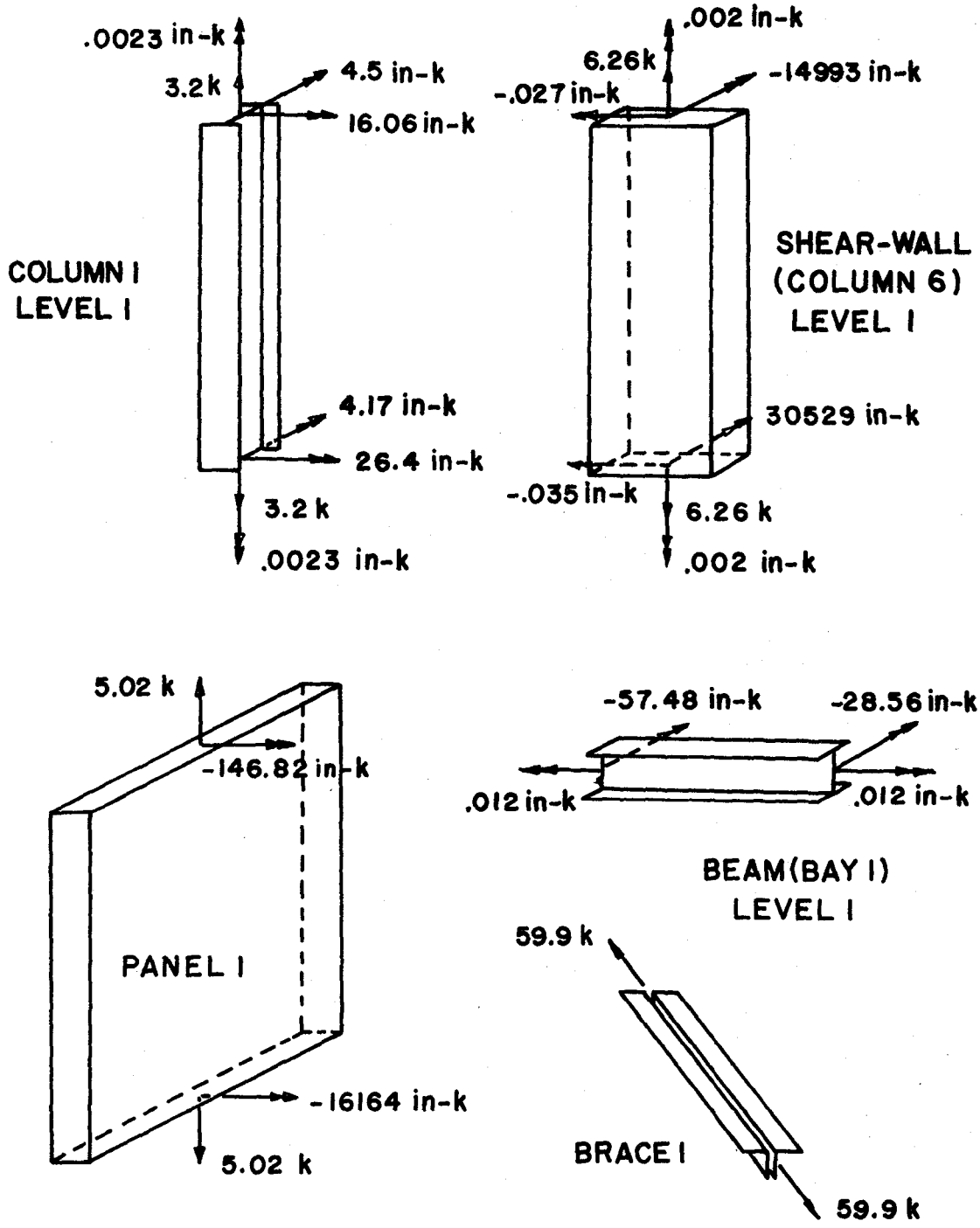

Fig. 6. Internal Forces of Typical Members of Example 1

1 kip = 4.448 kN, 1 in.- kip = 0.413 kN-m

V. PROGRAM CAPACITY AND GUIDE FOR MODIFICATION

A. PROGRAM CAPACITY

The computer program is written in FORTRAN IV with fixed commons and dimensions. The total required storage is approximately 1800 k with double precision. The capacity of the program is limited by the following constraints:

- The number of floor levels of the structure is not more than 10.
- The number of bays of the structure is not more than 13.
- The column lines in the structure are not more than 10.
- The panel elements in the structure are not more than 20.
- The braced elements in the structure are not more than 40.
- The number of sets of different fixed-end moments and shears of beams is not more than 10.
- The different column properties are not more than 40.
- The different beam properties are not more than 20.
- The total number of earthquake acceleration records in one direction are not more than 900.

B. MODIFICATION OF THE PROGRAM CAPACITY

The modification of the program capacity can be achieved by changing the numbers for appropriate variables in the following commons and dimensions.

```
COMMON/DATA1/CLN(NC,2), CP(16,NCP), BP(11,NBP), FEF(7,NFEF), LB(NST,
            NB,3), LDB(NST,NB,3), LCC(NST,NC,2), LP(3,NPAN), IFEF
            (NFEF), PP(16,NPAN), LT(3,NTRU), TP(2,NTRU)
COMMON/DATA2/COLUM1(10,NC,NST), BEAM1(5,NB,NST)
```

```
COMMON/DATA3/COLUM2(8,NC,NST), BEAM2(3,NB,NST), PANEL2(4,NPAN),
             DIAGO(4,NTRU)
COMMON/DATA4/COLUM3(14,NC,NST), BEAM3(6,NB,NST), PANEL3(4,NPAN),
             DISP(6,NST)
COMMON/DATA5/COCOL(9,NC,NST), COBM(5,NB,NST), COPAN(5,NPAN), CODIA
             (2,NTRU)
COMMON/DATA6/PLOAD(NSTXNC), A(NST,14), AMA(2XNSTXNC), IF, IFC, X1,
             Y1, ANG
COMMON/DATA7/PAA(4,MPC)
COMMON/DATA8/CDIS(6,NC,NST), BDIS(3,NB,NST), DDIS(1,NTRU), PDIS
             (3,NPAN)
COMMON/FOMR1/S(LS), C(MM,MM), SB(LS), EF(MN6,NAD1), PF(NAD2,3),
             SPAC2(937)
COMMON/FORM2/KH(NNL), SD(MM), E(MM,NE), EB(MM,NE), SPAC1(N1)
COMMON/FORM3/SL(LSL), NC, NSNC, N, NFR, NF, NL, KLAT, LLAT, MLAT
COMMON/FORM4/SF4(LS,NST), CF4(MM,MM,NST), EF4(MM,NE,NST), KH4(NNL,
             NST), RF4(MM,3,NST)
COMMON/STIF1/SS(NSTC,NSTC), SG(NSS,NSS)
COMMON/TRAN1/D(NST,1,2), AA(1,6), RR(NSTC,6)
COMMON/DYN1/ACCER(NSTC), VELO(NSTC), X11(NSTC), X2(NSTC)
COMMON/STIF/STF(N2)
COMMON/ENG/FPD(NSS), FPDD(NSS), DFO(NSTC), DFOO(NSTC), ED, EP
COMMON/DUCT1/CRVES(4,NC,NST), BRVES(2,NB,NST), NELAS
COMMON/DUCTJ/PRVES(4,NPAN)
COMMON/ESTIF/SCOCOL(5,NC,NST), SCOBM(2,NB,NST), SCODIA(1,NTRU)
COMMON/NEW/R(NN,5), XM(6,NLD), FM(8)
```

```
COMMON/SHER1/BMY(2,6,NC,NST), RY(2,6,NC,NST), BMA(2,2,NC,NST), BMB
            (2,2,NC,NST), RA(2,2,NC,NST), RB(2,2,NC,NST), RREC
            (2,2,NC,NST), EK1(2,NC,NST), RY1(2,2,NC,NST), KODY
            (2,NC,NST), KODYX(2,NC,NST), REVPT(2,NC,NST), EKEP
            (2,6,NC,NST), RTOT(2,NC,NST), IND(2,NC,NST)
COMMON/SHER2/BMMY(2,NCP)
COMMON/SHER3/EKH(2,NC,NST), EKHP(2,NPAN)
COMMON/SHER4/DDAD(3,NST)
COMMON/SHERP1/BMYP(2,6,NPAN), RYP(2,6,NPAN), BMAP(2,2,NPAN), BMBP
            (2,2,NPAN), RAP(2,2,NPAN), RBP(2,2,NPAN), RRECP(2,2,NPAN),
            EK1P(2,NPAN), RY1P(2,2,NPAN), KODYP(2,NPAN), KODYXP
            (2,NPAN), REVPTP(2,NPAN), EKEPP(2,6,NPAN), RTOTP(2,NPAN),
            INDP(2,NPAN)
DIMENSION   BCL(NC)--in MAIN program.
DIMENSION   PA(NST,2), PB(NST,2), BCL(NC)--in Subroutine INFORM.
DIMENSION   IMT(NCP)--in Subroutine INITIL.
DIMENSION   A(NSTC,NSTC), B(NSTC,6)--in Subroutine GAUSS.
DIMENSION   AA(NSTC), BB(NSTC), B(NSTC), S(NSTC,NSTC), SC(NSTC,NSTC)
            --in Subroutines LAC1 and LAC2.
DIMENSION   RF(3XNST,6)--in Subroutine REFDSP.
DIMENSION   TCDIS(4,NC,NST), DROT(4,NC,NST), EROT(4,NC,NST), CMAX
            (8,NC,NST), DENG(4,NC,NST), EENG(4,NC,NST), DETSE
            (4,NC,NST), DEDE(4,NC,NST), TBDIS(2,NB,NST) DROTB
            (2,NB,NST), EROTB(2,NB,NST), DMAX(3,NST), DEDE1(4,NC,NST),
            DEDB1(2,NB,NST), MIND(2), DENGC(4,NC,NST), EENGC
            (4,NC,NST), DENGBC(2,NB,NST), EENGBC(2,NB,NST), TPDIS
```

(2,NPAN), DROTP(2,NPAN), EROTP(2,NPAN), DD(3,NC,NST), DDP(3,NPAN), BCL(NC), RR(NSTC,6)--in Subroutine RESULT.

The following two commons are served for several purposes and should be modified accordingly in various subroutines:

COMMON/FORM2/S(NSTC,NSTC), R(NSTC,3), S1(NST,3), S2(NST,3)

COMMON/STIF/ASA(12,12), SA(8,12), T(8,12), TAC(8,12,NC,NST), TAB (3,6,NB,NST), TAD(1,8,NTRU), TAP(4,10,NPAN)

The variables in the above commons and dimensions are listed as follows in which the numbers in parantheses represent the program capacity in the present form:

NST = Number of stories in the structure (10).

NC = Number of vertical column lines in the structure (10).

NB = Number of bays in the structure (13).

NTRU = Number of bracing elements in the structure (40).

NPAN = Number of infilled shear panels in the structure (20).

NCP = Number of sets of different column properties (40).

NBP = Number of sets of different beam properties (20).

NFEF = Number of sets of different fixed-end moments and shears due to vertical loads acting on the beams (10).

MPC = Total number of earthquake acceleration records in one direction (900).

NLD = total number of static load combinations (10).

MM = 2 x NC

MN = 2 x MM

NN = MN + NC x NST + 3 x NST + 3 + NC

MN6 = MM + MN + 6

LS = (MM x (MM + 1))/2

LC = MM x MM

NE = NC x NST + 3 x NST + 6 + NC

LE = NE x MM

NNM = NN - MN

LSL = (NNM x (NNM + 1))/2 + NNM x 3

NNL = NN + 3

NAD1 = 6 + 2 x NC

NAD2 = MM + MN

NSTC = NST x NC + 3 x NST

NSS = 3 x NST

N1 = NSTC(NSTC + 9) - NNL - MM - 2 x MM x NE

N2 = 96 x NC x NST + 18 x NB x NST + 8 x NTRU + 40 x NPAN + 336

The number of the sets of different column properties (NCP) has two groups for steel and reinforced concrete. Each group has 20 different sets. The identification numbers for the steel groups are 1 through 20 and those for the concrete groups are 21 through 40. Thus when a structure having the properties exceed the limit, the changes must be made in accordance with the following three possible cases:

1. The different sets of steel column properties are in the limit (less than 20), but the different sets of concrete properties are more than 20. The variable, NCP, in the commons should be changes as NCP = 20 + NCON in which NCON = number of sets of different concrete properties.

2. The different sets of steel column properties are over 20 and the concrete groups are in the limit.

3. The different sets of both the steel and concrete column properties are over the limit.

For cases 2 and 3, let NSTL = number of sets of different steel properties, NCP = NSTL + NCON, and ISTAR = NSTL + 1, then the changes are to replace NCP in the commons by the new NCP computed above, and replace 20 by NSTL and 21 by ISTAR in the following subroutines:

. Subroutine INFORM; lines 960, 970, 980, 1000, 1020 and 1070.

. Subroutine INITIL; lines 1570 and 1680.

. Subroutine FORM; lines 680 and 730.

. Subroutine FORCES; lines 980 and 1620.

. Subroutine RESULT; lines 710, 715, 825 and 3005.