ANALYSIS OF SUPER STRUCTURE OF SURFACE POWER HOUSE

A DISSERTATION

submitted in partial fulfilment of the
requirements for the award of the degree
of
MASTER OF TECHNOLOGY
in
WATER RESOURCES DEVELOPMENT

By

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CANDIDATE'S DECLERATION

I hereby declare that the work, which is being presented in this dissertation entitled "***ANALYSIS OF SUPER STRUCTURE OF SURFACE POWER HOUSE***" in partial fulfillment of the requirement for the award of Degree of ***Master of Technology*** in ***Water Resources Development,*** and submitted in the department of *Water Resources Development Training Center* of the *Indian Institute of Technology, Roorkee* is an authentic record of my work carried out during a period July 2001 to February 2001 under the guidance of **Dr.B.N.Asthana**, Emeritus Fellow, WRDTC and **Prof. Gopal Chauhan,** Professor, WRDTC, Indian Institute of Technology, Roorkee.

I have not submitted the matter presented in this dissertation for award of any other degree.

Dated: February, 27th 2002
Place: Roorkee

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This is to certify that the statement made by the candidate is correct to the best of our knowledge.

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C O N T E N T S

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ABBREVIATIONS

2-D	- Two dimensional
3-D	- Three dimensional
CEA	- Central Electricity Authority
D/S	- Downstream
Fig. no.	- Figure number
m	- Meter
m/s	- Meters per second
Moment-Y	- Moment about local y axis
Moment-Z	- Moment about local z axis
MW	- Mega Watt
RCC	- Reinforced cement concrete
Shear-Y	- Shear in the direction of local y axis
Shear-Z	- Shear in the direction of local z axis
U/S	- Upstream

SYNOPSIS

The super structure of a surface power house is an important structure as it houses costly machines and other auxiliary equipments. The power houses are classified depending upon the nature of the super structure, such as indoor, outdoor or semi-outdoor. This study deals with the indoor type of powerhouse where the super structure provides the maximum protection against weather.

The super structure of a surface power house consists of a framework of beams and columns that support the panel walls, roof and crane, in addition the control rooms and other auxiliary housings usually form a single framework thus making the structure complicated having both structural and loading asymmetry.

The objective of this study is to evaluate the advantages of the space frame analysis of the super structure of the indoor type power house in terms of reduction of forces and moments by comparing it with the conventional two-dimensional approach.

Two frames, one asymmetrical frame having a combination of control room, machine hall and floors (main frame) and the other a symmetrical frame having only the machine hall (symmetrical frame), have been analyzed by both the two-dimensional and the three-dimensional approaches. The comparison of the results of 3-D and 2-D analyses for both the frames have been carried out .

The study reveals that the reduction in the bending moments in gantry columns at the base due to lateral loads is in the range of 20 to 30%. This is a substantial reduction which would result in saving of reinforcement. Therefore wherever possible 3-D analysis of powerhouse frames shall be carried out.

CHAPTER - 1

INTRODUCTION

1.1 GENERAL

Fossil fuels are the major source of energy today. With fast depletion of these resources, the development of new and renewable sources of energy such as hydropower, ocean energy, solar energy, wind power etc. is gaining increasing importance. Of these, hydropower is the most attractive source of energy owing to its inherent advantages such as flexibility of utilization, pollution free generation and non-inflationary tendencies after completion.

In the world scenario today hydropower is playing an important role and is supplying about one fourth of the total electricity generated. Based on the study [7] of "Reassessment of Hydro Electric Power Potential", by CEA, the total hydroelectric power potential of India has been assessed as 84044 MW at 60% load factor. Out of this, more than 70% of potential is yet to be harnessed. Hence, hydropower is going to play a major role in the near future.

In any hydro-electric development scheme, the power house is one of its main components as it houses very important and costly equipments like the generator, hydro-turbines, draft tube, scroll case and other auxiliary equipments. The control room is also usually located within or adjoining the powerhouse.

The hydel-power stations have been sub-divided into three divisions namely sub structure, intermediate structure and super structure (Fig. no.-1.1)

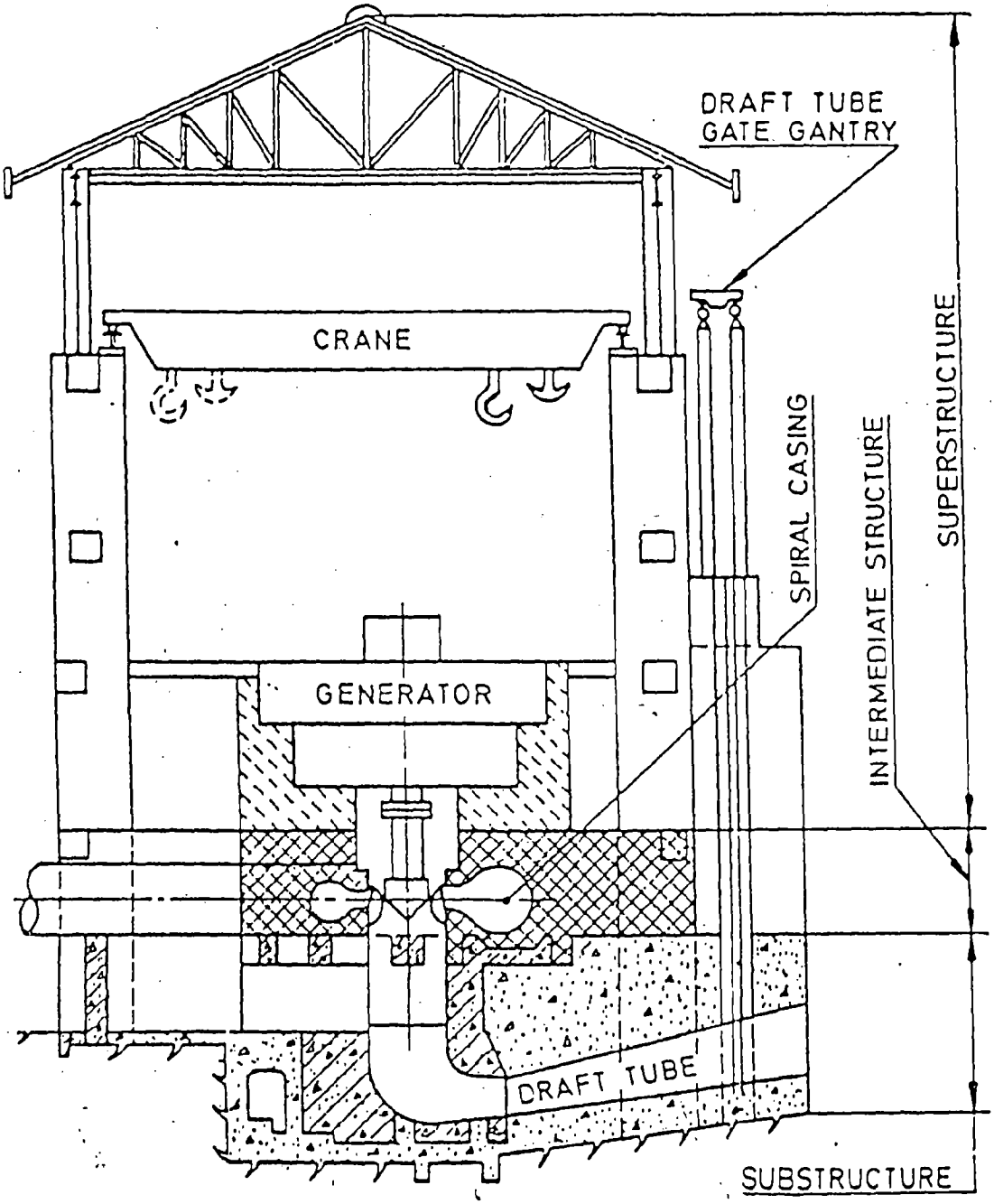

Fig. No. 1.1 : SHOWING THE SUB-DIVISIONS OF THE POWER HOUSE BUILDING

a) The Sub Structure: It is that part of the powerhouse extending from top of the draft tube to the foundation below. The hydraulic function of the substructure is to provide passage for water coming from the turbines such that minimum head loss is there. The structural function of the substructure is to safely carry the superimposed loads coming over it and then transfer and distribute the loads over the foundation. In addition, it usually houses the drainage galleries and the dewatering sumps.

b) The Intermediate Structure: It is that part of the powerhouse extending from top of the draft tube to the top of the generator foundation. Hence, its function is that it houses the scroll case and the generator foundation.

c) The Super Structure: It is that part of the powerhouse extending from the generator floor to the roof. The main function of the super structure is to provide protection to the equipments and at the same time, it supports the overhead travelling crane that is required for handling of heavy machine parts.

In general, the hydro-development schemes can be categorized depending upon various characteristics such as run of the river scheme, storage scheme, high or low head plant, base or peak load station etc. Power house is categorized depending upon the type of super structure used and degree of protection given to the machines.

There are four different types of hydropower station depending upon the nature of the super structure. The indoor type, it has a machine hall and gantry crane fully enclosed. The semi-outdoor type, it has the generator room fully enclosed with a low roof with hatches provided in the roof for erection and maintenance. The outdoor type, it has no generator room and a removable cover protects the generator. The underground type, where the powerhouse is sited underground.

The choice of the type of super structure to be provided depends upon various factors such as climate, tail water and access level, operation and maintenance, and economy. In India, considering the above factors the indoor type power houses are constructed mainly due to the prevailing climatic conditions. This dissertation deals with the analysis of the super structure of an indoor type power house.

1.2 LITERAURE REVIEW

Generally, super structure frames which consists gantry columns, roof members and cross-beams form a space frame but are analyzed for shear forces and moments as two-dimensional frames, gantry columns and roof member forming a transverse frame, and gantry columns and cross-beams forming the longitudinal frame, because of ease of computations. Analysis of space frames has now become possible with the help of computer.

Chandpuri G.S. [8] has done a three-dimensional analysis of a simple (uniform section of columns) and symmetrical service bay frame using a computer programme developed for an IBM-1620 II, using the stiffness matrix method. Further, he has also done a two-dimensional analysis for the same frame and a comparison has been made between the results of the above said two analyses. The loads he has considered are Dead and Live loads, Crane loads and wind loads.

He has concluded that in general the member forces in the 3-D analysis are less, the percentage reduction in design forces being of the order of 5 to 10 percent. The reduction is less in case of vertical loads but is appreciable in case of lateral loads. In the longitudinal load there is no significant change. The torsion by the 3-D analysis is insignificant as the members having very low torsional rigidity are used. Nigam P.S [12] has incorporated this in his book "Handbook of hydro electric engineering".

1.3 OBJECTIVE

The objective of this study is to evaluate the advantages of space frame analysis in terms of reduction in forces and moments in different members especially columns of machine hall frames having columns of varying shape and roof member (Truss) hinged at the top of the columns.

1.4 METHODOLOGY

Two super structure frames one a combination of control room and machine hall and the second of only machine hall have been analyzed for all the forces including seismic to evaluate the advantage of the space frame analysis. The STAAD Pro. Package is used for the analysis. The following analyses in respect of both the frames have been carried out.

- Two-dimensional analysis of the super structure frame
- Three-dimensional analysis of the super structure frame
- Comparison of the results of the two and three-dimensional analyses

1.5 ORGANIZATION OF THE STUDY

The studies presented in this dissertation are given in 7 chapters. The contents of each chapter are briefly indicated below:

In chapter-2 the super structure, loads and forces in the super structure and the dimensions of the power house frame analyzed in this study have been described.

In chapter-3 a brief description about the software used for analyses in this study is given.

In chapter-4 the loads and forces that have been considered in the analyses are briefly discussed.

In chapter-5 the results of the two-dimensional and three-dimensional analyses of the main frame and the symmetrical frame have been presented.

In chapter-6 comparative study of the three-dimensional and two-dimensional analyses of both the frames are done.

In chapter-7 discussion of results, conclusions and scope for further work are given.

CHAPTER – 2

THE SUPER STRUCTURE

2.1 THE SUPER STRUCTURE

The super structure of an indoor powerhouse consists of the following elements [2].

a) Roof
b) Roof supports
c) Gantry girder
d) Gantry columns
e) Cross beams or braces, if any
f) Panel walls
g) Floors, if any

The super structure of a power house consists of a framework of beams and columns that support the roof, panel walls and gantry crane. Generally, the control room and other auxiliary housings are so located that they form a single framework. In such a case the structure becomes complicated having both structural and loading asymmetry.

As, in the indoor type of power house full protection against weather is provided, it has a high roof and enclosed space so that everything is fully indoors. The super structure consists of a framework of beams and columns, hence these are the main load bearing structures and thus transfer various imposed loads to the sub structure below. The constructions of super structure columns are started even before the completion of the sub structure so that the overhead crane is made available for the erection of heavy machines and other parts.

The roof may be either of galvanized corrugated sheets or of reinforced concrete, precast or cast in situ. The galvanized corrugated sheets are supported by a steel truss or a gable steel frame, the RCC roof can be supported by steel truss or beam or RCC concrete beam or a gable frame. In India, generally steel trusses are

used as roof support owing to its constructional ease. Hence, the frame in the transverse direction acts as a bent with the truss hinged at the top of the gantry columns.

The gantry girder can be either of concrete or of steel. They are supported on brackets connected to the column or on steps provided in the columns at a level determined by crane clearances. The concrete girders normally form an integral part of the longitudinal frame along with column. The steel girder may be simply supported or continuous over the gantry columns.

The gantry columns are made either of steel or of reinforced concrete depending upon construction equipment facility, construction schedule, availability of materials and aesthetics. They usually have a varying cross-section and there is generally no bracing in the transverse direction except at the top by the roof-supporting member. In the longitudinal direction, a multi-storeyed framework is there due to the presence of crossbeams, which reduces the effective length of the columns as well as acts as stiffeners.

The crossbeams can be of either reinforced concrete or steel and support the panel walls. The probable locations for the provision of cross beams are the various floors and gantry girder level. The panel wall may be of RCC, reinforced brickwork or precast concrete blocks, the choice depending upon the availability of materials, economy and the expediency in construction. . The layout of the floors is decided with the general layout of the power house.

2.2 LOADS AND FORCES IN THE SUPER STRUCTURE

The Design loads and forces to be considered are as follows [2].

1) Dead Load: These shall consist of self-load of the structure and the permanent superimposed loads.
2) Live Load: The live load for floor and roof shall be taken in accordance with IS: 875 and IS: 4247 (Part I).
3) Wind Load: this also shall be taken in accordance with IS: 875.
4) Crane Load: The following loads due to crane shall be considered.

i) Weight of fully loaded crane.

ii) Vertical impact factor

iii) Crane surge

iv) Crane striking forces.

5) Earthquake forces: These shall be considered in accordance with IS: 1893

6) Water Pressure and Earth Pressure: Appropriate values of these forces shall be considered where applicable.

7) Temperature Effects: The total temperature variation in structure shall be considered as two third of the average maximum annual variation in temperature. The structure shall be designed to withstand stresses consequent to $\pm$ half the total temperature variation.

8) Special Loads: If the superstructure of the power station is to be subjected to any other load not covered by (1) to (8) due to its special use such as switch yard etc, appropriate additional loads shall also be considered.

2.3 DIMENSIONS OF THE POWER HOUSE FRAME ANALYSED

A powerhouse frame has been analyzed using the Kani's method [9]. The same power house frame has been analyzed in this study but with certain modifications. A roof truss hinged at the top of gantry columns has been considered fixed with columns. In this study the varying section of columns has been considered. The frame of a central unit is analyzed in this study.

The frame analyzed is of a surface powerhouse of 105 MW installed capacity with vertical shaft Francis turbine. The design head is taken as 100 m and the discharge as 40 cumecs. The dimensioning has been done as per the standard guidelines, and as such details are not given here in. Three units of 35 MW each are provided and the unit spacing is found out to be 12 m, and the width of the units is 17.8 m inclusive of columns. Control bay runs throughout the length of the powerhouse on the upstream side. On the downstream side floor in a width of 6 m are provide for auxiliary equipments. The erection bay has 9.5 m length.

The height of the power house is taken such that the EOT crane should be able to function with efficiency and ease. It worked out to be of 16.5 m height. The crane has a capacity of 200 tones, the trolley weight is 40 tones and the girder

weight is 110 tones. The number of wheels on each side is eight in number, the height of the crane girder is 13 m and the clearance above the rail girder is taken as 3.6 m.

A roof truss is provided and the loads coming from it have been estimated. The dimension of the gantry columns is 1.75 m by 1.0 m in the first three storeys and 0.8 by 1.0 m in the last storey, the downstream control bay columns are 1.0 m by 0.6 m and the upstream control bay column is 0.6 m by 0.6 m in section. All the beams have a section of 0.6 m by 0.4 m. The panel walls are considered to be 0.4 m thick and resting over all the longitudinal beams. The gantry girder provided is considered to be of steel.

The analysis is done for two frames. First the above described frame which has control room on the upstream and floors on downstream side (centre line space frame of one unit is shown in Fig. no.–2.1) and second a symmetrical frame of machine hall only (Fig. no.-2.2). The same loading conditions are used for both the frames in the analysis. The above two frames are referred to as the main frame and the symmetrical frame respectively in this report. The same nomenclature is used in the two-dimensional analysis also.

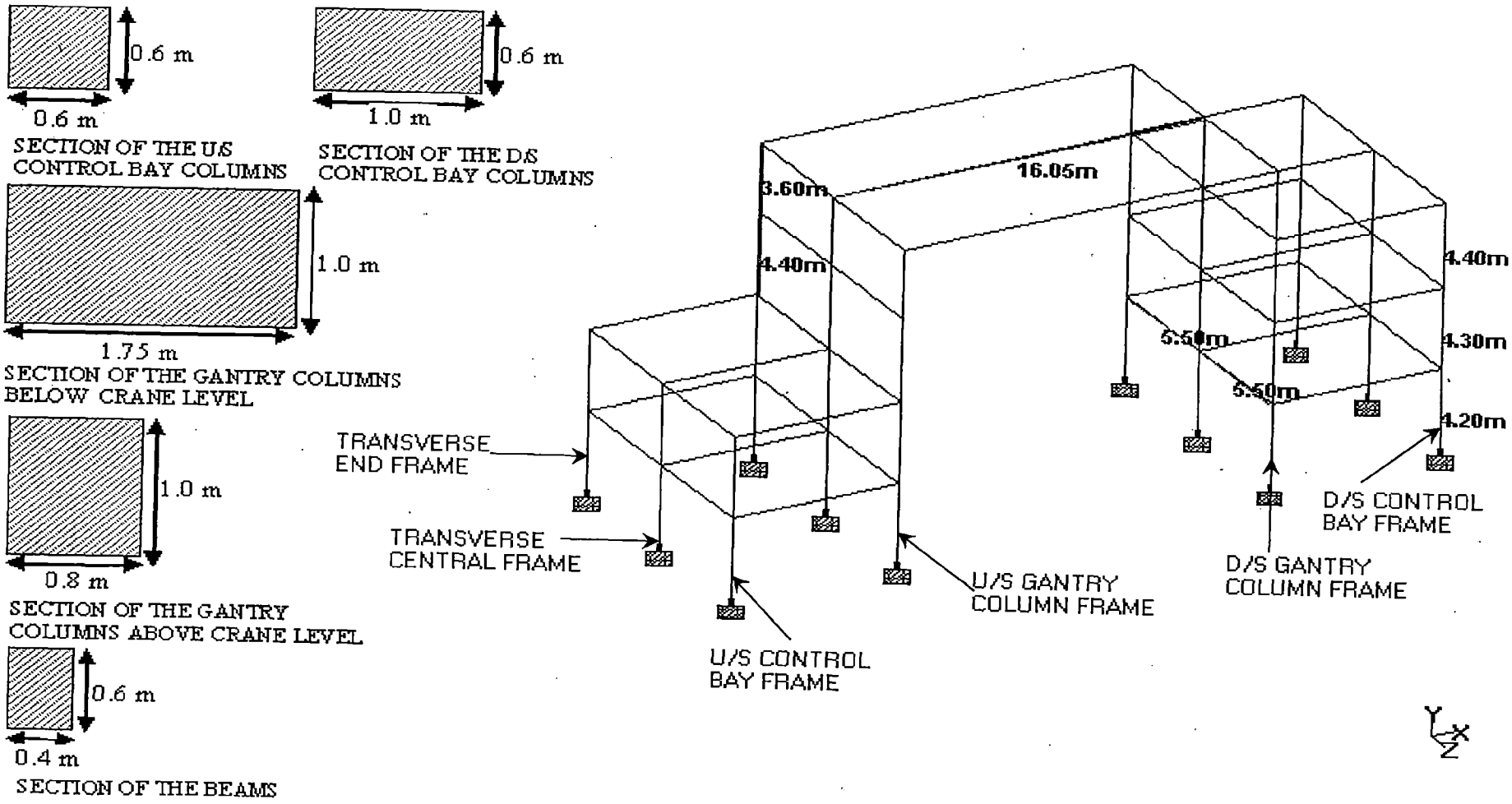

FIGURE NO.- 2.1 THE SKELETON OF THE MAIN FRAME

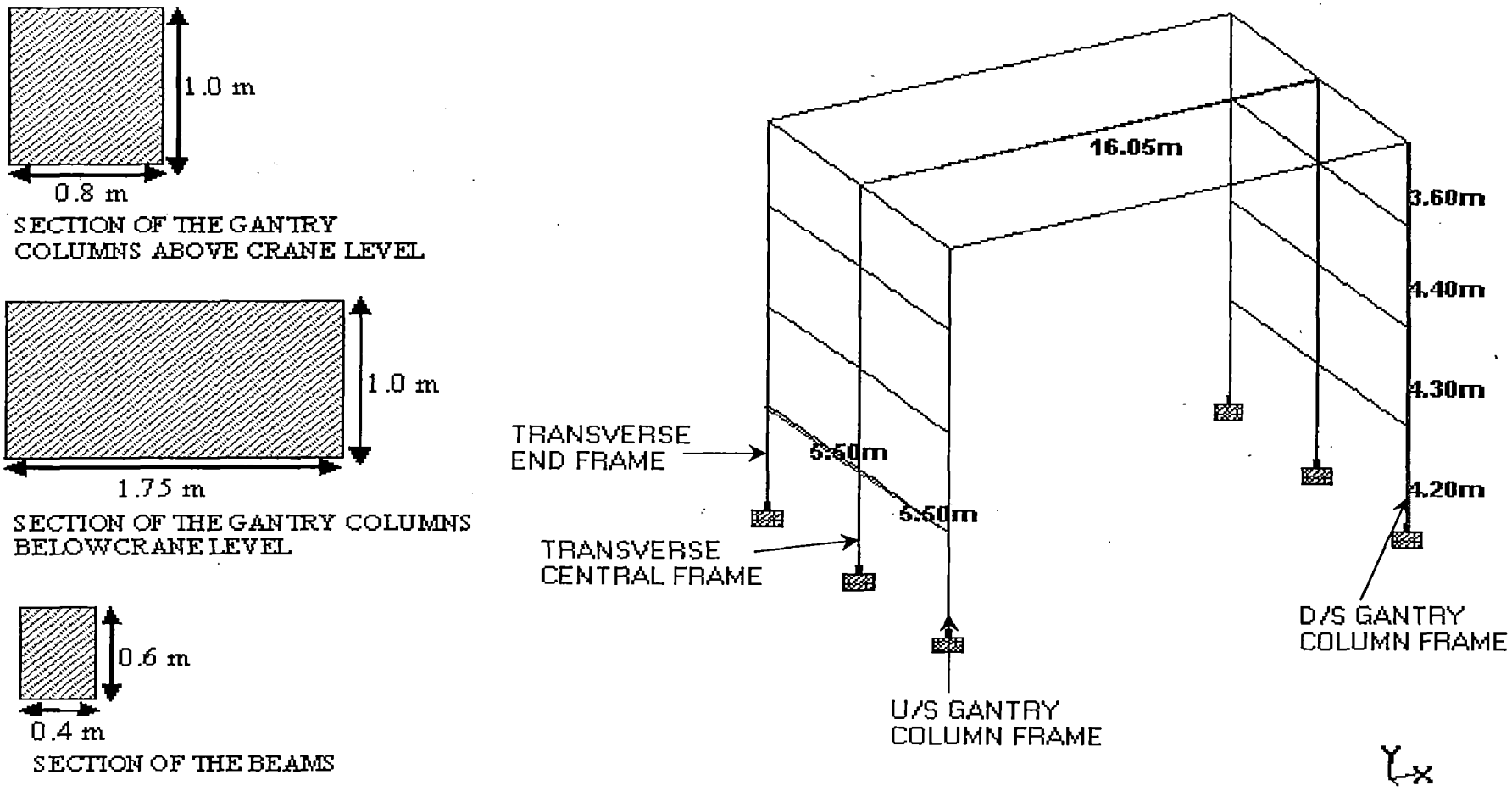

FIGURE NO.- 2.2 THE SKELETON OF THE SYMMETRICAL FRAME

CHAPTER - 3

SOFTWARE AND METHODOLOGY

3.1 ABOUT STAAD. PRO 2001 SOFTWARE PACKAGE

Structural Analysis and Design for Professionals (STAAD. Pro) is a software package made by the RESEARCH ENGINEERS, INC., headquartered in Yorba Linda, California. Its Indian headquarter is in Salt Lake, Calcutta and Delhi has a branch office. STAAD.Pro is an analysis and design software package for structural engineers, it can analyze as well as design structure as per codes of various countries such as America, Britain, Japan, India and so on.

The minimum hardware requirement is as follows,,

- PC with Intel-Pentium or equivalent.
- Graphics card and monitor with 1024x 768 resolutions, 256 colour display.
- 64 MB RAM or higher
- Windows 98/NT or higher operating system for optimum performance
- Sufficient space on hard disc to hold the program and data file. Usually 200 to 300 MB space is required.

The package comes with a Compact disc, a copy protection device in the form of hardware lock and eight numbers of manuals.

STAAD.Pro 2001 offers two analysis engines- the STAAD Analysis/Design and the STARDYNE Advanced Analysis.

In this dissertation the STAAD Analysis/Design engine has been used hence, it is necessary to briefly explain its features and other information. The user communicates with STAAD through an input file. The input file is a text file consisting of a series of commands containing data and instruction related to the structure, which is executed sequentially. The input file is created using either the text editor or the modelling facility. It was seen that the usage of both the facility together made the process of giving input a

lot more comfortable. STAAD is capable of analyzing and designing structures consisting of both space and plane frames, truss, plate or shell and solid elements.

The user is allowed to input data and request output in almost all commonly used unit system including MKS, SI and FPS. The input unit for angles is degrees but in Joint Displacement output the rotations are provided in radians. For all output, the units are clearly specified by the programme.

A structure is an assembly of individual components such as beams, columns, slabs, plates etc. In the package, frame elements and plate elements may be used to model the structure components. Modelling of the structure geometry consists of two steps. First is the identification and description of joints or nodes and the second is modelling of members or elements through specification of connectivity (incidences) between joints. The package uses two types of coordinate systems to define the structure geometry and loading patterns. The global coordinate system is an arbitrary coordinate system in space which is utilized to specify the overall geometry and loading pattern of the structure. A local coordinate system is associated with each member (or element) and is utilized in member end force output or local load specification.

GLOBAL COORDINATE SYSTEM: Following coordinate systems are available for specification of the structure geometry.

a) Conventional Cartesian coordinate system: This coordinate system is a rectangular coordinate system which follows the orthogonal right hand rule. This system may be used to define the joint locations and loading directions. The translational degrees of freedom are denoted by u_1, u_2, u_3, and the rotational degrees of freedom are denoted by u_4, u_5 and u_6 (Fig. no.-3.1).
b) Cylindrical coordinate system: In this coordinate system the X and Y coordinate of the conventional Cartesian system are replaced by R (radius) and Ø (angles in degrees). The Z coordinate remains the same and its positive direction is determined by the right hand rule (Fig. no.-3.2)

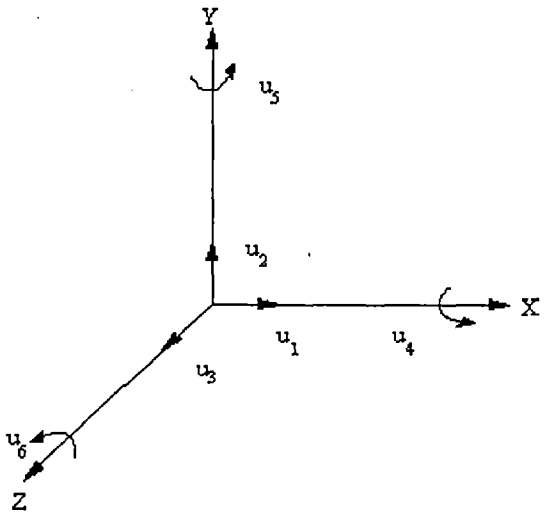

FIGURE NO.- 3.1 *Cartesian (Rectangular) Coordinate System*

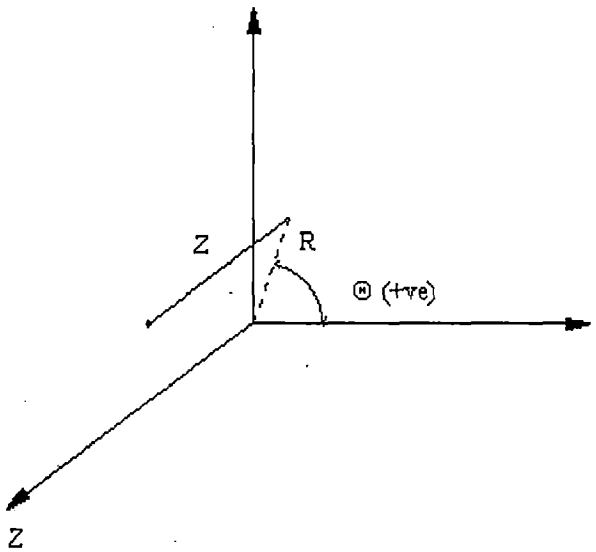

FIGURE NO.- 3.2 *Cylindrical Coordinate System*

c) Reverse cylindrical coordinate system: In this system R and Ø replace the X and Z coordinate of the Cartesian system. The right hand rule determines the positive direction of the Y axis (Fig. no.-3.3).

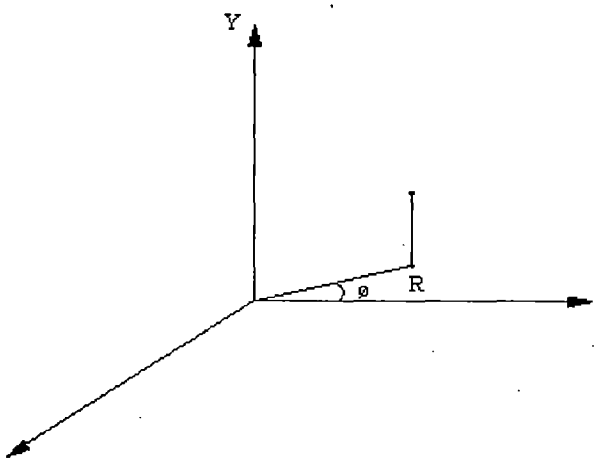

FIGURE NO.- 3.3 *Reverse Cylindrical Coordinate System*

LOCAL COORDINATE SYSTEM: This system is associated with each member. Each axis of the local orthogonal system is also based on the right hand rule. Figure no.-3.4 shows a beam member with start joint 'i' and end joint 'j'. The positive direction of the local axis is determined by joining 'i' to 'j' and projecting it in the same direction. The right hand rule may be applied to obtain the positive direction of the local y and z axes. The local coordinate system is always rectangular.

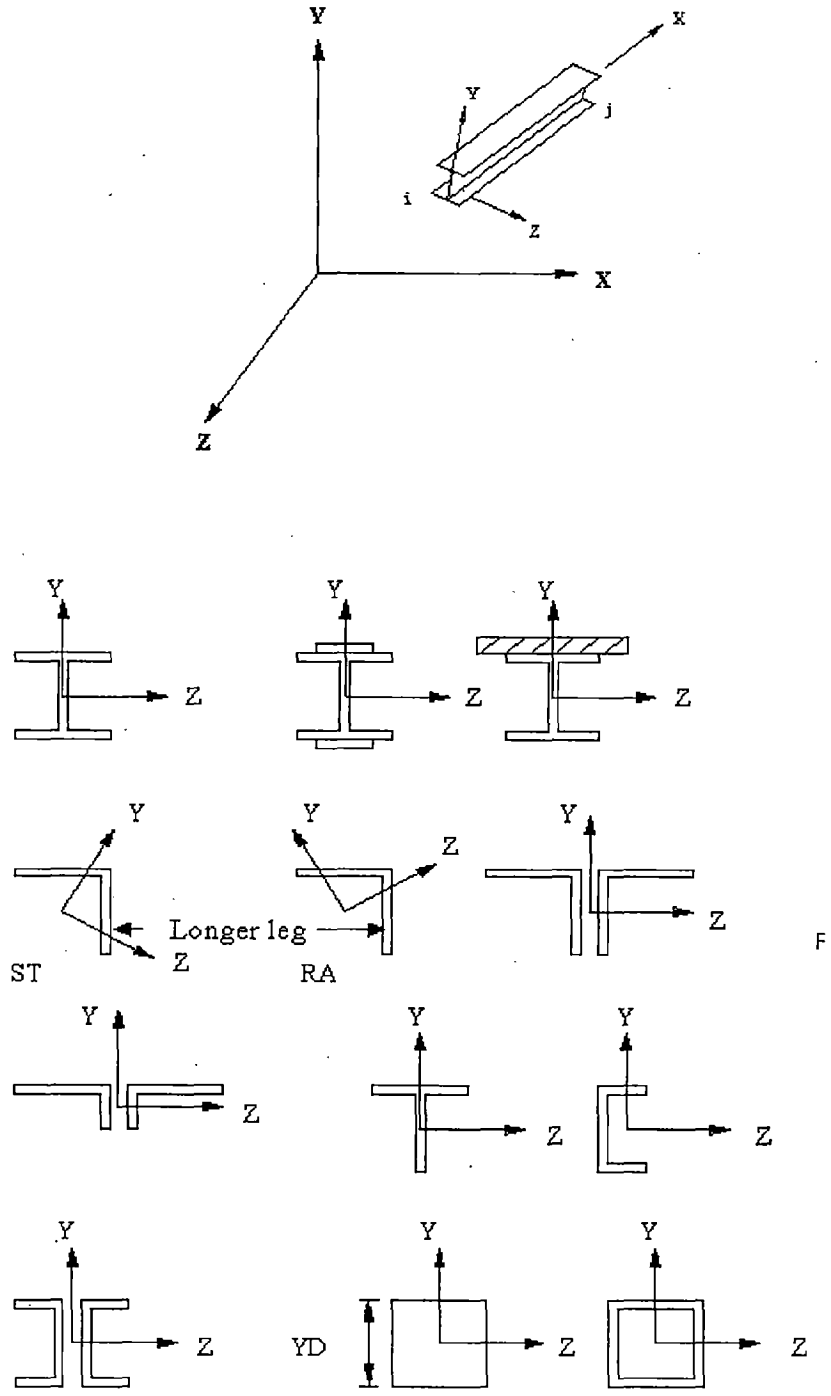

FIGURE NO.-3.4 LOCAL AXIS FOR DIFFERENT CROSS-SECTIONS

RELATIONSHIP BETWEEN GLOBAL AND LOCAL COORDINATES.

The input for member loads can be provided in the local and global coordinate system and the output for member end force is given in local coordinate system hence it is important to know the relationship between the above two. This relationship is defined by an angle defined as beta (β).

When the local axis is parallel to the global Y-axis as in the case of columns, the beta angle is the angle through which the local Z-axis has been rotated about the local X-axis from a position of being parallel and in the same positive direction of the global Z-axis. When the local X-axis is not parallel to the global Y-axis as in the case of beams, the beta angle is the angle through which the local coordinate system has been rotated about the local X-axis from the position of having the local Z-axis to the global X-Z plane and the local Y-axis in the same positive direction as the global Y-axis (Fig no.-3.5).

SIGN CONVENTION FOR MEMBER END FORCE

The member end force output i.e. moments, axial force and shear force are in the local coordinate system. They follow the right hand rule. Figure No.- 3.6 shows the sign convention used in the package. 1 and 2 refers to the node number. X, Y and Z refers to the local rectangular axes. M_Z^1 and M_Z^2 shows the positive moment about the local Z-axis, M_Y^1 and M_Y^2 shows the positive moment about the local Y-axis and T_X^1 and T_X^2 shows the positive moment about the local X-axis (torsion) of nodes 1 and 2 respectively. V_Y^1 and V_Y^2 shows the positive shear in the local Y direction and V_Z^1 and V_Z^2 shows the positive shear in the local Z direction of nodes 1 and 2 respectively. P_X^1 and P_X^2 shows the positive direction of the axial force of the member.

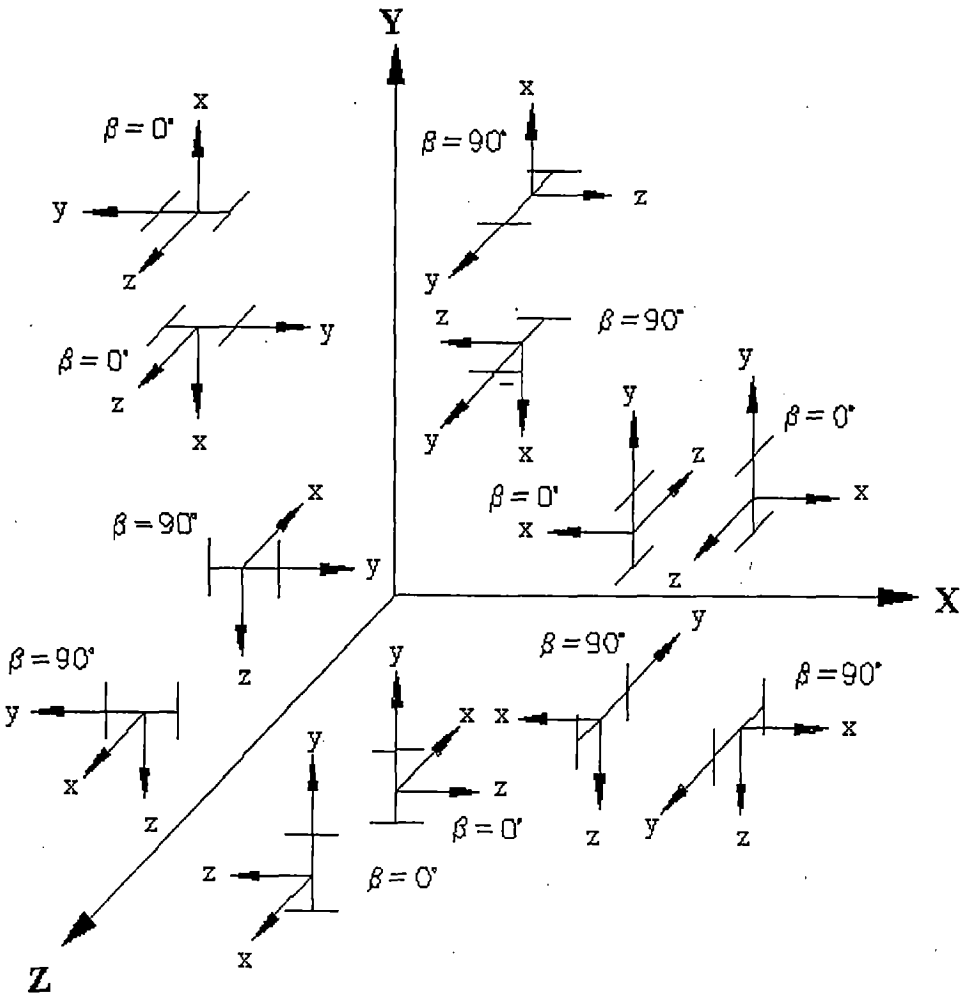

FIGURE NO.- 3.5 RELATIONSHIP BETWEEN GLOBAL AND LOCAL AXES

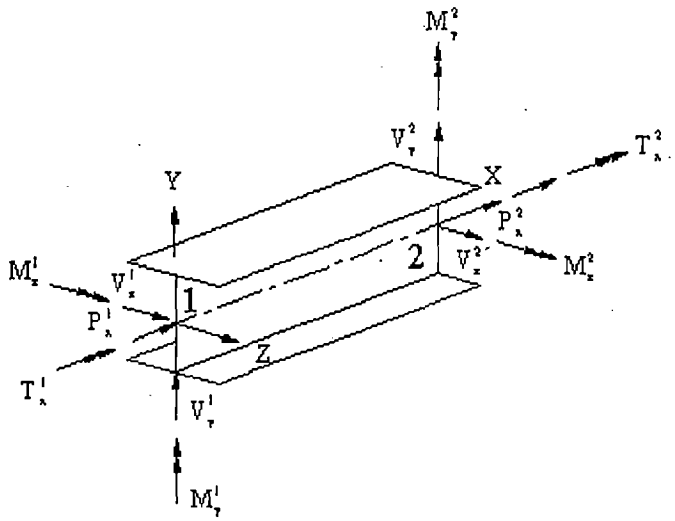

FIGURE NO.- 3.6 THE SIGN CONVENTION

MEMBER PROPERTIES

The following types of member property specifications are available in STAAD.

a) Prismatic property specification
b) Standard Steel shapes from built-in section library
c) User created steel tables
d) Tapered sections
e) Through Assign command

Prismatic Properties: The following prismatic properties are required for analysis.

AX- Cross sectional area

IX – Torsional constant

IY - Moment of inertia about y-axis

IZ – Moment of inertia about z-axis

In addition, the user may choose to specify the following properties

AY – Effective shear area for shear force parallel to local y-axis

AZ – Effective shear area for shear force parallel to local z-axis

YD – Depth of section parallel to local y-axis

ZD – Depth of section parallel to local z-axis

To specify T-beam or Trapezoidal beam, the following additional properties must be provided.

YB – Depth of web of T-section

ZB – Width of web of T-section or bottom width of Trapezoidal section.

To specify T-beam YD,ZD,YB and ZB and for Trapezoidal sections YD,ZD and ZB must be provided.

Built-In Steel Section Library: This feature allows the user to specify section names of standard steel shapes manufactured in different countries.

User Provided Steel Table: The user can provide a customized steel table with designated names and corresponding properties.

Tapered Section: Properties of tapered I-sections may be provided through member property specifications. Given key dimensions, the program can calculate cross-sectional properties, which are then used in the analysis.

Assign Command: Through this command, the user may instruct the program to automatically select a steel section from the table for analysis and subsequent design.

MEMBER/ELEMENT RELEASE

One or both end of member or element can be released. Members/element are assumed to be rigidly fixed at joints in accordance with the structure type specified. When this full rigidity is not applicable, individual degrees of freedom are removed from the analysis. Release components are given in the local coordinate system for each member. Partial moment release is also possible.

TRUSS/TENSION/COMPRESSION- ONLY MEMBERS

To analyze members that carry axial loads only i.e. truss members, there are two methods for specifying this condition. When all the members in the structure are truss then the whole structure can be declared as truss whereas when only some of the members are truss members the member truss command can be used where those members will be identified separately. The member tension or member compression command can be used to limit the load direction the member may carry.

TENSION/COMPRESSION- ONLY SPRINGS

Spring tension or spring compression command can be used to limit the load direction the support spring may carry.

CABLE MEMBERS

Cable members may be specified by using the member cable command, the initial tension in cable must also be specified.

MEMBER OFFSET

Some members of a structure may not be concurrent with the incident joints thereby creating offsets. Offset distance can be specified in the global or the local coordinate system. Secondary forces thus induced due to offset are taken into account by the program during analysis.

MATERIAL CONSTANTS

The material constants are the modulus of elasticity (E), density (DEN), Poisson's ratio (POISS), coefficient of thermal expansion (ALPHA). 'E' value for members must be provided otherwise the analysis will not be performed. Density must be specified when self weight of the structure is to be taken into account, Poisson's ratio is used to calculate the shear modulus and coefficient of thermal expansion is used to calculate the expansion of the members if temperature loads are applied.

SUPPORTS

The support condition that can be specified are pinned, fixed and fixed with different releases. A pinned support has restraints against all translational movement but non against rotational movement. A fixed support has restraints against all direction of movement.

LOADS

Loads in a structure can be specified as joint load, member load, temperature load and fixed-end member load. The self weight of the structure can be generated automatically by the package. Joint loads, both forces and moments can be applied to any joint of the structure. Member loads can be applied to any member of the structure, these loads are uniformly distributed loads, concentrated loads and linearly varying loads. Load effects on the member can also be specified in terms of fixed end loads, prestress and

poststress load, temperature/strain load and support displacement load. Area load or Floor load specification can be used to specify one or two-way distribution respectively.

The package is also equipped with load generation facility. It can generate moving loads, seismic loads and wind loads (For details manuals of the package may be referred).

ANALYSIS FACILITIES

The package has the facility for following types of analysis.

1) Stiffness Analysis / Linear static Analysis
2) Second Order Static Analysis
   - P-Delta Analysis
   - Non-Linear Analysis
   - Multi Linear Spring Support
   - Member Tension / Compression
3) Dynamic Analysis
   - Time History
   - Response Spectrum

In this study we are mainly concerned with the Stiffness Analysis, it is further explained briefly below.

3.2 THE METHODOLOGY USED

For the analysis of indeterminate structures [11], there are two general approaches, the displacement method or stiffness approach and force method or flexibility approach.

In the displacement method, certain displacements satisfying the geometrical conditions are selected as unknowns and relationships are developed between such displacement and forces in the structure. Such relations actually express the stiffness of the structure. The unknowns are solved by writing the equations of equilibrium. The

stiffness factors are based on the elasticity of the material. The methods of slope-deflection, moment distribution, Kani's method, deformation distribution lie in this group.

In the force method certain forces satisfying the condition of equilibrium are treated as unknowns. These forces are related with the deformation through flexibility coefficient. Equations are then written to satisfy the conditions of geometry. The flexibility relations are based on elasticity of material. The theorem of three moments and method of consistent deformation fall in this category.

With the development of matrix method of analysis the structure can be analysed by either the matrix displacement method or the matrix force method. The package, for stiffness analysis uses the matrix displacement method. In this method, the structure is first idealized into an assembly of discreet structural components. Each component has an assumed form of displacement in a manner that satisfies the force equilibrium and displacement compatibility at the joints.

To generate the necessary matrices the following assumptions are made.

i) The structure is idealized into an assembly of beam, plate and solid type elements, joined together at their vertices (nodes). The assemblage is loaded and reacted by concentrated loads acting at the nodes.

ii) A member is a structural member having a constant, doubly symmetric or near-doubly symmetric cross section along its length. Members always carry axial forces and may be subjected to shear and bending in two arbitrary perpendicular planes and may also be subjected to torsion.

iii) Internal and external loads acting on each node are in equilibrium. If torsional or bending properties are defined for any member, six degree of freedom are considered in the generation of relevant matrix and if the member is defined as truss member then only three degrees of freedom are considered at each node.

iv) Both the global and the local coordinate system are used in the generation of the required matrices.

The complete stiffness matrix of the structure is obtained by systematically summing the contribution of various member stiffness. The external loads are represented as discreet concentrated loads acting only at the nodal points of the structure. The matrixes generated are then solved by the method of decomposition.

CHAPTER – 4

LOADS AND FORCES CONSIDERED IN THE ANALYSES

The loads and forces that have been considered are the Dead and Live load, Earthquake load, Wind load and the Crane load. The same loads and loading conditions are used for both the 3-D and 2-D analyses. These are briefly discussed below.

4.1 DEAD LOAD AND LIVE LOAD

The dead load considered are the self weight of the structure i.e. the load coming from the weight of beams, columns, roof truss (4.0 tonne per column for central gantry columns and 2.0 tonne per column for the end gantry columns), slabs (0.5 m thickness), panel walls (0.4 m thick concrete wall is considered resting over all the longitudinal beams) and the steel gantry girder.

The live load considered is in accordance with IS: 4247 (Part I) – 1978, Table 2. For the floors of the control room a live load of 1 ton per metre square is considered.

4.2 EARTHQUAKE LOAD

Earthquake causes random motion of ground which can be resolved in any three mutually perpendicular directions. This motion causes the structure to vibrate. The predominant direction of vibration is horizontal and the structure shall be designed for the maximum vibration intensity expected at the place. The horizontal seismic force is considered to act in any one direction at a time.

The package is capable of generating earthquake load as per IS: 1893. There are two methods used for computing the seismic force, Seismic coefficient method and the Response spectrum method. In this study the seismic coefficient method is used.

In the seismic coefficient method the design seismic coefficient $\alpha_h = \beta\ I\ \alpha_o$

where

β = a coefficient depending upon the soil-foundation system.

I = a coefficient depending upon the importance of the structure.

α_o= basic horizontal seismic coefficient as given in Table 2 of the IS: 1893-1975.

The base shear V_B is given by the following formulae:

$$V_B = C\ \alpha_h\ W$$

where

C = a coefficient defining the flexibility of structure with the increase in number of storeys depending upon fundamental time period T.

α_h = design seismic coefficient as defined above.

W = total dead load + appropriate amount of live load as defined in 4.1 of IS: 1893-1975.

T = fundamental time period of the building in seconds.

The frame analyzed is assumed to be in Zone IV of the seismic zoning map of the country, hence from table 2 of IS: 1893-1975 αo is taken as 0.05, β and I have been taken as 1 and 1.5 respectively. W is taken as full dead load + 50% live load. After giving the above inputs the package automatically calculates the T and C and generates the seismic loads and carries out the analysis.

Table-4.1 ~THE VALUE OF T AND C AS CALCULATED BY THE PACKAGE (MAIN FRAME)

FRAME	T	C
3-D FRAME (TRANSVERSE DIRECTION)	0.47964	0.962
3-D FRAME (LONGITUDINAL DIRECTION)	0.54730	0.860
2-D TRANSVERSE CENTRAL FRAME	0.54406	0.864
2-D TRANSVERSE END FRAME	0.42707	1.000
2-D US CONTROL BAY FRAME	0.38155	1.000
2-D US GANTRY COLUMN FRAME	0.53514	0.876
2-D DS GANTRY COLUMN FRAME	0.57258	0.827
2-D DS CONTROL BAY FRAME	0.56602	0.835

Table-4.2 ~THE VALUE OF T AND C AS CALCULATED BY THE PACKAGE (SYMMETRICAL FRAME)

FRAME	T	C
3-D FRAME (TRANSVERSE DIRECTION)	0.49682	0.933
3-D FRAME (LONGITUDINAL DIRECTION)	0.52657	0.888
2-D TRANSVERSE CENTRAL FRAME	0.55680	0.847
2-D TRANSVERSE END FRAME	0.45905	0.998
2-D US GANTRY COLUMN FRAME	0.52657	0.888
2-D DS GANTRY COLUMN FRAME	0.52657	0.888

4.3 WIND LOAD

The wind load is calculated as per IS: 875 (Part 3) -1987. Figure (1) of the code gives basic wind speed map of India, as applicable to 10 m height above the mean ground level for different zones of the country. For the frame analyzed the basic wind speed V_b is taken as 47 m/s.

To get the design wind speed, the basic wind speed is modified to include the effect of risk level, terrain roughness, height and size of the structure and the local topography.

The design wind speed $V_Z = V_b k_1 k_2 k_3$

where

V_Z = design wind speed at any height z in m/s.

k_1 = probability factor (risk coefficient).

k_2 = terrain height and structure size factor.

k_3 = topography factor.

The risk coefficient k_1 as per Table (1) of the code for important buildings having basic wind speed of 47 m/s is taken as 1.07. The terrain height and structure size factor k_2 as per Table (2) of the code for terrain category 2 and class B is taken as 0.98 up to the height of 10 m and 1.05 above the height of 10 m. Topography factor k_3 is assumed to be

1. The design wind speed works out to be 50m/s up to the height of 10 m and 53 m/s above 10 m. Hence up to the first two storeys VZ = 50 m/s and from the second storey to the top V_Z = 53 m/s.

The design wind pressure at any height above mean ground level $P_Z = 0.6\ V_Z^2$ where

P_Z = design wind pressure in N/m^2.

Therefore the design wind pressure works out to be 150 kg/m^2 for the first two storeys and 170 kg/m^2 for the next two storeys. The wind load acting normal to the surface is obtained by multiplying the area of that surface or its appropriate portion by the pressure coefficient C_p and the design wind pressure at the height of the surface from the ground. Hence from Table 4 of the code external pressure coefficient considering the building height ratio and the building plan ratio is taken as 0.7 for the windward side and -0.3 for the leeward side.

4.4 CRANE LOAD

Overhead travelling cranes are required in the power house to carry heavy machines and equipments from one part of the powerhouse to other. These may be light hand-operated to heavy power operated crane depending on the load it has to carry. In the power house mostly power operated crane is required.

As per IS: 4247 (Part II)-1968, the following loads due to crane shall be considered which shall be supplied by the crane suppliers.

a) Weight of the fully loaded crane,
b) Vertical impact factor,
c) Crane surges, and
d) Crane striking forces.

In the power house analyzed, the crane capacity is taken as 200 tonnes, the weight of crane girder is 110 tonnes, weight of trolley as 40 tonnes. The total numbers of wheels are 16 with 8 wheels on each rail.

As per IS: 875 (Part 2)-1987, the vertical impact factor for electric overhead crane is taken as 25% of maximum static loads. Crane surge in the transverse direction is taken as 10% of weight lifted by the crane, in the longitudinal direction the surge is taken as 5% of all static wheel loads. The crane striking in the transverse direction is taken as 10% of the moving load.

For analysis, the wheel position is considered to be at equal distance from the centre of middle column on both sides such that the reaction is maximum on the middle column. In the transverse direction, at first the crane is assumed to be at a distance of two meters from the U/S columns and just starting to move towards the D/S side such that there is maximum reaction on the U/S side. Then the crane is assumed to be at distance of two meters from the D/S columns and just starting to move towards U/S such that there is maximum reaction on the D/S side.

In the longitudinal direction the position of the wheel is kept the same but it is assumed that the crane is now moving in the longitudinal direction. Usually when the crane is loaded and moving in the longitudinal direction the trolley is positioned at the centre of the crane girder so as to avoid unnecessary stress in the columns by putting the load closer to the columns. The crane striking the U/S and the D/S side are analysed separately.

CHAPTER – 5

TWO-DIMENSIONAL AND THREE-DIMENSIONAL ANALYSES

5.1 GENERAL

The main frame, which has the control room and space for auxiliaries in U/S and D/S of machine hall, and a simple frame of Gantry columns only, have been analyzed by both 2-D and 3-D (space frame) approaches for different loads with a view to evaluate the advantage of 3-D analysis in reducing the design loads and moments. These types of frames are generally used in the power house super structures. The units in this study are in, metric tonnes for loads, axial force and shear forces and metric tonnes- meter for moments and torsion.

5.2 TWO-DIMENSIONAL ANALYSIS OF THE MAIN FRAME

The two-dimensional analysis is a conventional method of analyzing the structure where the space frame for simplicity and ease of computation is split up into separate transverse and longitudinal frames and analyzed in each direction. In this study, two in the transverse direction and four in the longitudinal direction are analyzed for the main frame. It may be noted that unlike in three-dimensional analysis, here the transverse frames cannot be analyzed for longitudinal loads and vice versa. For example, the longitudinal frames cannot be analyzed for wind blowing from U/S to D/S and the transverse frame cannot be analyzed for crane moving in the longitudinal direction. The effect of torsion in the members is also not taken into account. The loads considered are as explained in chapter-4. The beam numbers and the node numbers are kept same as that in the three dimensional frame so that it becomes easier for a comparative study.

The frames for 2-D analysis will be referred to as follows (refer Fig. no. -2.1)

i) Transverse Central Frame (Transverse direction)

ii) Transverse End frame (Transverse direction)

iii) U/S Control bay frame (Longitudinal direction)

iv) U/S Gantry column frame (Longitudinal direction)

v) D/S Gantry column frame (Longitudinal direction)

vi) D/S Control bay frame (Longitudinal direction)

5.2.1 ANALYSIS IN THE TRANSVERSE DIRECTION

In the transverse direction, the machine hall gantry columns generally form a bent depending upon the type of columns and the kind of roof support (Fig. no.- 5.1). The type of bent analyzed in this study is different (Fig. no.- 2.1) and is made of RCC columns fixed at the base and hinged at the top by means of an inextensible link formed by the truss.

In the transverse direction, the central frame (Fig.no.-A2) and one of the end frames (Fig.no.-A1) have been analyzes using the STAAD.Pro package for different loads. The results of the analysis for the two frames are given in (Appendix A) Table no.-A-1 (for end frame) and Table no.-A-2 (for central frame).

5.2.2 ANALYSIS IN THE LONGITUDINAL DIRECTION

In the longitudinal direction, the frame is a network of cross beams and columns where the cross-beams act as stiffeners for the framework and at the same time reduces the effective length of the columns. The panel walls rest on these cross beams which in turn transfer the load to the columns. The frames in the longitudinal direction are analyzed as a multi-storey frame.

As mentioned in paragraph 5.2 there are four frames (Fig. no.- A3, A4, A5, A6) in the longitudinal direction which are analyzed, namely the U/S and D/S control bay frame and the U/S and D/S gantry column frames. For the crane moving in the longitudinal direction the control bay frames cannot be analyzed in the two-dimensional analysis. The results of analysis have been presented for each frame in tabular form (Appendix A) in the enclosed tables listed below.

- Results of analysis of the U/S control bay frame (Table no.- A-3).
- Results of analysis of the D/S control bay frame (Table no.- A- 4).

- Results of analysis of the U/S gantry column frame (Table no.- A-5).
- Results of analysis of the D/S gantry column frame (Table no.- A-6).

5.3 THREE-DIMENSIONAL ANALYSIS OF THE MAIN FRAME

The three-dimensional analysis is a method where the structure is analyzed as a space frame. Space frames are three-dimensional frames built by joining together members so that the resulting structure is stable against forces acting in any plane. Unlike the two-dimensional analysis, in the three-dimensional analysis there is no need to split the frames in different directions and the structure is analyzed as a whole. The members here have six degrees of freedom as against three degrees of freedom in the two-dimensional frames.

The results of the three- dimensional analysis are shown in (Appendix A) Table no.- A-7 for all the members for different loads.

5.4 TWO-DIMENSIONAL ANALYSIS OF THE SYMMETRICAL FRAME

The frame analyzed is symmetrical about both the transverse and the longitudinal direction. The same loading conditions as used in the analysis of main frame are used in analyzing this frame. The node and beam numbers also have been kept the same as that in the main frame.

For the two-dimensional analysis the frame have been resolved in two directions, the transverse and the longitudinal. In the transverse direction the end and the central frames have been analyzed and in the longitudinal direction frames through the U/S and D/S gantry columns have been analyzed. This analysis is done in order to compare the behaviour of symmetrical frame as well as the asymmetrical frame analyzed before.

5.4.1 ANALYSIS IN THE TRANSVERSE DIRECTION

The results of the analyses are given in tabular form (Appendix B)

- Results of analysis of the end frame (Table no.- B-1)
- Results of analysis of the transverse central frame (Table no.- B-2)

5.4.2 ANALYSIS IN THE LONGITUDINAL DIRECTION

The results of the analyses are given in tabular form (Appendix B).

- Results of analysis of the U/S gantry column frame (Table no.- B-3).
- Results of analysis of D/S gantry column frame (Table no.- B-4).

5.5 THREE-DIMENSIONAL ANALYSIS OF THE SYMMETRICAL FRAME

The three-dimensional analysis is done here for the symmetrical space frame of Gantry columns only (in machine hall only). The loading conditions have been kept the same as that for the other frames. The node and the beam numbers have been kept the same as that in the main frame.

The results of the analysis are shown in Appendix B (Table no.- B-5)

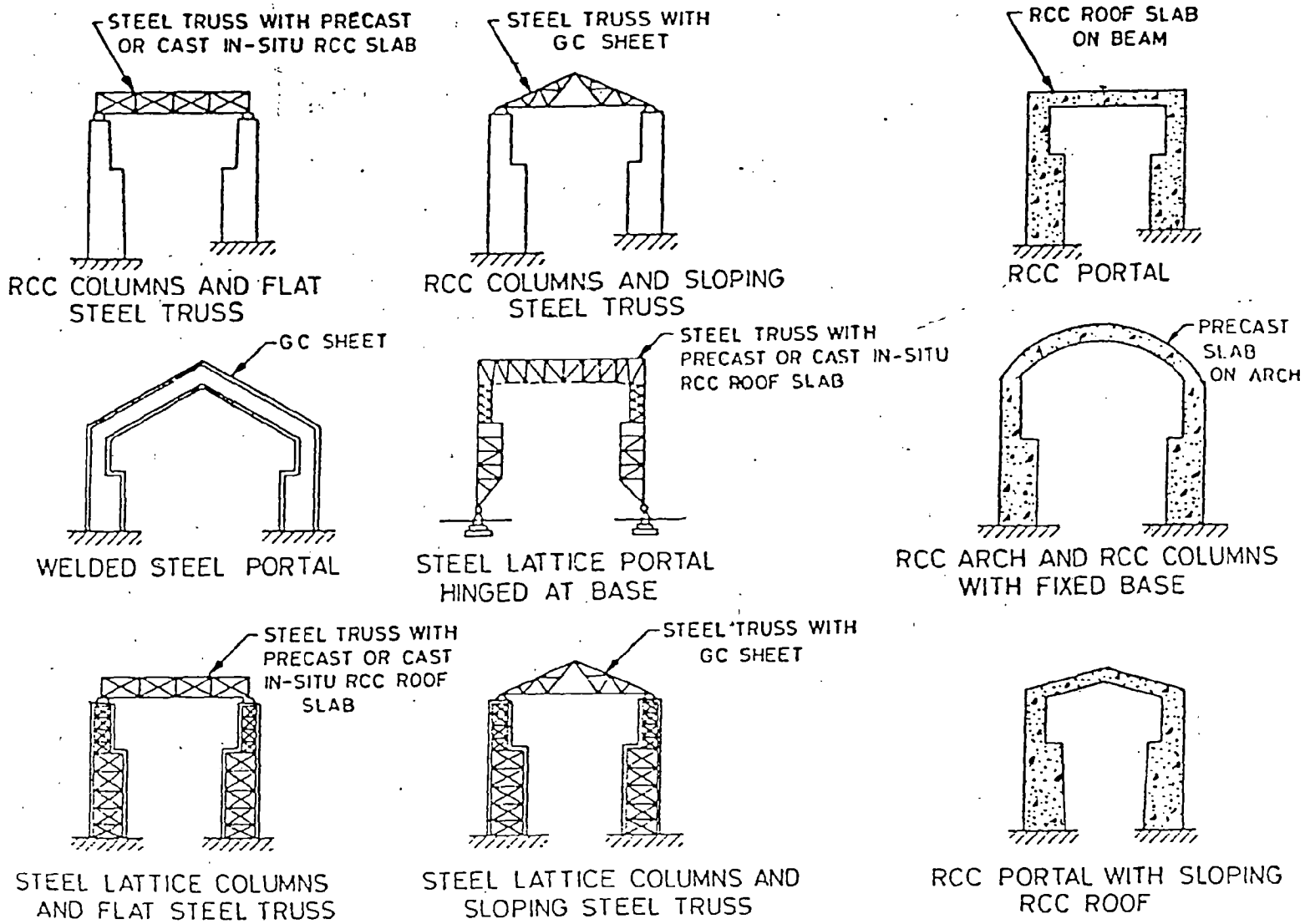

Fig. No. 5.1 : SOME TYPE OF TRANSVERSE FRAMES

CHAPTER- 6

COMPARATIVE STUDY OF TWO-DIMENSIONAL AND THREE-DIMENSIONAL ANALYSES

6.1 GENERAL

The comparison between the two and three-dimensional analyses have been done in this chapter. The comparisons are done by tabulating the percentage differences of the results of member forces (axial force, shear-y, shear-z, moment-y and moment-z) of the 3-D analysis as compared with 2-D analysis. The comparison of the transverse end frame columns, transverse central frame columns, transverse beams and the longitudinal beams are done separately so as to be able to understand the behaviour of the different members under different loading conditions. The comparison are tabulated in two phases i.e. firstly the comparison of all members are done and next, the range of the maximum percentage differences are tabulated.

6.2 COMPARATIVE STUDIES OF THE MAIN FRAME

The comparative studies of the main frame (Fig.no.-6.1) are organized as follows.

6.2.1 COMPARATIVE STUDY OF THE END BENT OF THE MAIN FRAME

1) Comparison of the 3-D and 2-D analyses of column members of the transverse end frame (Table no.- 6.1).
2) The range of percentage difference of member forces of end frame columns in 3-D analysis as compared with 2-D analysis (Table no.- 6.2).

It is seen from Table-6.1 and Table-6.2 that in the end bent there is in general increase of the member forces in the 3-D analysis especially in the case of lateral loads in the transverse direction. For the case of vertical loads the difference is negligible but in the case of lateral loads the difference is significant.

In the case of lateral loads in the transverse direction (wind loads) there is a general increase of member forces in the 3-D analysis. However, for the lateral loads in the longitudinal direction there is decrease in the member forces. For the crane moving in

the longitudinal direction the U/S and D/S control bay columns cannot be analyzed by the 2-D approach but it is seen that in the gantry columns there is a reduction of member forces. Further for the earthquake in the longitudinal direction there is reduction in the control bay frame columns and increase in the gantry columns. The range of the percentage difference of 3-D analysis as compared with 2-D analysis is shown in Table-6.2.

6.2.2 COMPARATIVE STUDY OF THE TRANSVERSE BENT OF THE MAIN FRAME

1) Comparison of the 3-D and 2-D analyses of column members of the transverse central frame (Table no.- 6.3).
2) The range of percentage difference of member forces of central frame columns in 3-D analysis as compared with 2-D analysis (Table no.- 6.4).

It is seen from Table 6.3 and Table-6.4 that in the central bent there is a general reduction of member forces in the 3-D analysis especially in the case of lateral loads in the transverse direction. However, in some members there is an increase in the 3-D analysis as can be seen from the above tables. It can be seen that in some cases like the bending moment for crane moving U/S to D/S there is an increase even up to 157% but this is in the case of only one member (45) and is of no real consequence as the magnitude of moments is very small. In the case of vertical loads the difference is small.

In the longitudinal direction, the trend is the same as in that in the end bent i.e. for the crane moving in the longitudinal there is reduction of member forces in the gantry columns. For the earthquake in the longitudinal direction there is reduction of member forces in the columns of the control bay frame and increase in the gantry columns. The range of the percentage difference is shown in Table- 6.4.

6.2.3 COMPARATIVE STUDY OF THE TRANSVERSE BEAMS OF THE MAIN FRAME

1) Comparison of the 3-D and 2-D analyses of the transverse beams (Table no.- 6.5)
2) The range of percentage difference of member forces of transverse beams in 3-D analysis as compared with 2-D analysis (Table no.- 6.6).

As stated before the transverse beams cannot be analyzed by the 2-D approach for the loads in the longitudinal. In general, it is seen from Table.-6.5 and Table-6.6 that there is very little difference in the member forces in 3-D analysis as compared with 2-D analysis. In case of vertical loads there is practically no difference of member forces. For the lateral loads although there is some difference but the difference is of no consequence as the magnitude of the forces are not very much. It is seen that for beams of the end bent there is an increase of member forces and in the beams of central bent there is reduction of member forces in the 3-D analysis.

It is further seen from the results of the three-dimensional analysis of the main frame (Appendix A, Table- A-7) that although there is torsion in most of the members, and maximum torsion for the transverse beams is seen in the case of earthquake in the longitudinal direction but it is small.

6.2.4 COMPARATIVE STUDY OF THE LONGITUDINAL BEAMS OF THE MAIN FRAME

1) Comparison of the 3-D and 2-D analyses of the longitudinal beams (Table no.- 6.7)
2) The range of percentage difference of member forces of longitudinal beams in 3-D analysis as compared with 2-D analysis (Table no.- 6.8).

The longitudinal beams cannot be analyzes by the 2-D approach for loads acting in the transverse direction. It is seen from Table- 6.7 and Table-6.8 that for vertical loads the difference in 3-D and 2-D analyses is negligible. Further, for the case of crane moving in the longitudinal direction (longitudinal beams of the U/S and D/S control bay

frame cannot be analyzed by the 2-D approach) it is seen that there is reduction of member forces in the 3-D analysis but the difference is not much.

In the case of earthquake in the longitudinal direction, there is a marked difference in the 3-D and 2-D analyses and it is seen that there is large reduction of member forces in the 3-D analysis for the beams of the U/S and D/S control bay frames and increase of member forces in the beams of the U/S and D/S gantry columns frames.

It is further seen from the results of the three-dimensional analysis of the main frame (Appendix A, Table- A-7) that although there is torsion in most of the members, but it is negligible.

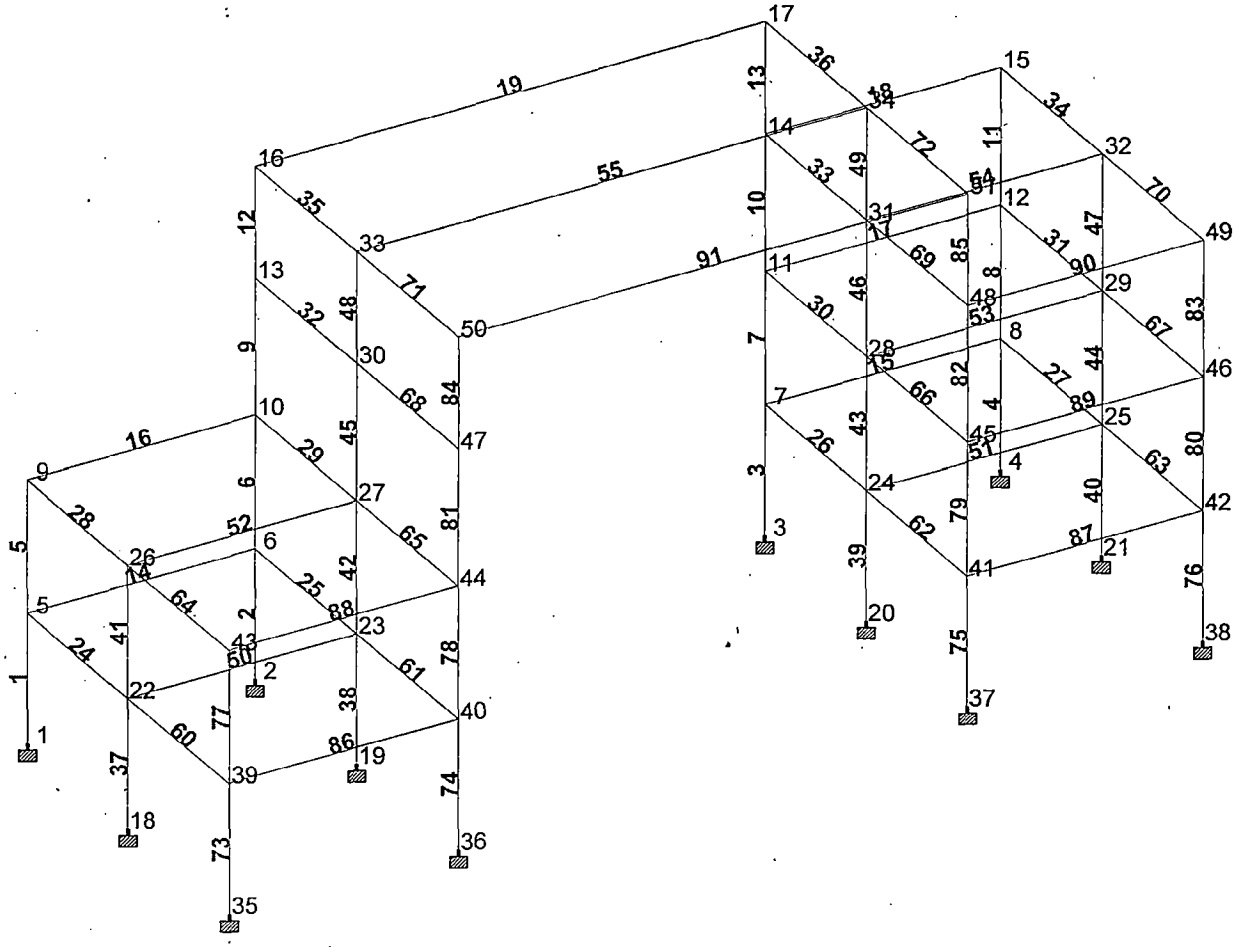

FIG. NO.- 6.1 THE NODE AND BEAM NUMBERS OF THE MAIN FRAME

TABLE NO.~ 6.1 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE END FRAME

DEAD LOAD + LIVE LOAD

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
1	1	3D	50.08	-1.50	2.45	0.01	-3.34	-2.16	-1%	3%	-2%	-1%	2%
	1	2D	50.76	-1.46	2.49	0.00	-3.39	-2.11					
	5	3D	-46.37	1.50	-2.45	-0.01	-6.94	-4.12	-1%	3%	-2%	-2%	2%
	5	2D	-47.06	1.46	-2.49	0.00	-7.05	-4.04					
2	2	3D	143.64	3.89	3.11	0.33	-4.38	1.78	0%	-2%	1%	0%	-13%
	2	2D	143.32	3.96	3.07	0.00	-4.40	2.05					
	6	3D	-125.65	-3.89	-3.11	-0.33	-8.70	14.56	0%	-2%	1%	3%	0%
	6	2D	-125.33	-3.96	-3.07	0.00	-8.48	14.58					
3	3	3D	162.35	-3.89	3.07	-0.29	-4.42	0.76	1%	-4%	1%	1%	negligible
	3	2D	160.83	-4.04	3.04	0.00	-4.38	-0.39					
	7	3D	-144.36	3.89	-3.07	0.29	-8.49	-17.08	1%	-4%	1%	1%	3%
	7	2D	-142.84	4.04	-3.04	0.00	-8.40	-16.58					
4	4	3D	94.48	1.57	2.44	-0.06	-3.40	2.74	0%	2%	-1%	-1%	6%
	4	2D	94.78	1.54	2.46	0.00	-3.43	2.59					
	8	3D	-88.31	-1.57	-2.44	0.06	-6.83	3.87	0%	2%	-1%	-1%	-1%
	8	2D	-88.62	-1.54	-2.46	0.00	-6.88	3.90					
5	5	3D	17.00	-3.33	2.83	0.01	-7.38	-6.62	0%	2%	-1%	-1%	2%
	5	2D	16.98	-3.26	2.87	0.00	-7.49	-6.49					
	9	3D	-13.21	3.33	-2.83	-0.01	-4.80	-7.69	0%	2%	-1%	-1%	2%
	9	2D	-13.19	3.26	-2.87	0.00	-4.85	-7.52					
6	6	3D	94.91	5.74	4.07	0.35	-9.04	8.78	0%	0%	-4%	1%	1%
	6	2D	94.61	5.75	4.24	0.00	-8.96	8.67					
	10	3D	-76.49	-5.74	-4.07	-0.35	-8.45	15.89	0%	0%	-4%	-9%	-1%
	10	2D	-76.19	-5.75	-4.24	0.00	-9.25	16.07					
7	7	3D	113.48	-4.80	4.28	-0.30	-9.18	-6.41	1%	-3%	1%	1%	-8%
	7	2D	111.94	-4.94	4.24	0.00	-9.09	-6.94					
	11	3D	-95.06	4.80	-4.28	0.30	-9.23	-14.22	2%	-3%	1%	1%	-1%
	11	2D	-93.52	4.94	-4.24	0.00	-9.14	-14.31					
8	8	3D	57.82	2.48	4.28	-0.08	-9.18	6.26	0%	1%	-1%	-1%	1%
	8	2D	57.80	2.45	4.32	0.00	-9.25	6.17					
	12	3D	-51.51	-2.48	-4.28	0.08	-9.23	4.39	0%	1%	-1%	-1%	1%
	12	2D	-51.49	-2.45	-4.32	0.00	-9.31	4.35					
9	10	3D	50.24	2.48	3.44	0.32	-7.79	4.21	0%	-1%	-5%	-9%	7%
	10	2D	50.01	2.50	3.63	0.00	-8.59	3.95					
	13	3D	-31.40	-2.48	-3.44	-0.32	-7.35	6.69	1%	-1%	-5%	-1%	-5%
	13	2D	-31.16	-2.50	-3.63	0.00	-7.40	7.02					
10	11	3D	63.90	-6.01	4.20	-0.25	-8.89	-9.28	2%	-1%	1%	1%	1%
	11	2D	62.41	-6.08	4.17	0.00	-8.81	-9.21					
	14	3D	-45.05	6.01	-4.20	0.25	-9.59	-17.18	3%	-1%	1%	0%	-2%
	14	2D	-43.56	6.08	-4.17	0.00	-9.55	-17.52					
11	12	3D	20.54	3.61	2.89	-0.07	-7.39	5.91	1%	1%	-1%	-1%	0%
	12	2D	20.34	3.58	2.91	0.00	-7.45	5.89					
	15	3D	-14.08	-3.61	-2.89	0.07	-5.33	9.98	2%	1%	-1%	0%	1%
	15	2D	-13.87	-3.58	-2.91	0.00	-5.35	9.86					
12	13	3D	18.94	2.58	1.51	0.04	-3.45	9.40	1%	3%	0%	1%	5%
	13	2D	18.79	2.50	1.51	0.00	-3.42	8.98					
	16	3D	-11.90	-2.58	-1.51	-0.04	-1.99	-0.10	1%	3%	0%	-1%	negligible
	16	2D	-11.74	-2.50	-1.51	0.00	-2.01	0.00					
13	14	3D	19.00	-2.58	1.91	-0.06	-4.73	-9.37	1%	3%	0%	0%	4%
	14	2D	18.79	-2.50	1.91	0.00	-4.71	-8.98					
	17	3D	-11.95	2.58	-1.91	0.06	-2.15	0.10	2%	3%	0%	0%	negligible
	17	2D	-11.74	2.50	-1.91	0.00	-2.16	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.1 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE END FRAME

EARTHQUAKE IN THE TRANSVERSE DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
1	1	3D	-3.88	0.89	0.00	-0.10	0.00	4.41	20%	27%			23%
	1	2D	-3.24	0.70	0.00	0.00	0.00	3.60					
	5	3D	3.88	-0.89	0.00	0.10	0.00	-0.69	20%	27%			8%
	5	2D	3.24	-0.70	0.00	0.00	0.00	-0.64					
2	2	3D	3.87	13.61	0.01	-2.44	-0.03	143.00	19%	30%			22%
	2	2D	3.24	10.49	0.00	0.00	0.00	116.88					
	6	3D	-3.87	-13.61	-0.01	2.44	0.00	-85.85	19%	30%			18%
	6	2D	-3.24	-10.49	0.00	0.00	0.00	-72.82					
3	3	3D	-7.41	16.57	-0.01	-2.30	0.03	159.21	16%	13%			14%
	3	2D	-6.40	14.67	0.00	0.00	0.00	139.17					
	7	3D	7.41	-16.57	0.01	2.30	0.00	-89.60	16%	13%			16%
	7	2D	6.40	-14.67	0.00	0.00	0.00	-77.56					
4	4	3D	7.41	2.87	0.00	-0.38	-0.01	19.71	16%	13%			14%
	4	2D	6.40	2.54	0.00	0.00	0.00	17.26					
	8	3D	-7.41	-2.87	0.00	0.38	0.00	-7.67	16%	13%			16%
	8	2D	-6.40	-2.54	0.00	0.00	0.00	-6.59					
5	5	3D	-2.18	3.15	0.00	-0.14	0.01	6.59	18%	18%			17%
	5	2D	-1.84	2.67	0.00	0.00	0.00	5.61					
	9	3D	2.18	-3.15	0.00	0.14	0.01	6.93	18%	18%			18%
	9	2D	1.84	-2.67	0.00	0.00	0.00	5.88					
6	6	3D	2.18	10.31	0.01	-2.51	0.00	91.90	18%	36%			18%
	6	2D	1.84	7.57	0.00	0.00	0.00	77.92					
	10	3D	-2.18	-10.31	-0.01	2.51	-0.03	-47.59	18%	36%			5%
	10	2D	-1.84	-7.57	0.00	0.00	0.00	-45.36					
7	7	3D	-5.61	15.00	0.00	-2.33	0.00	96.13	16%	13%			15%
	7	2D	-4.84	13.26	0.00	0.00	0.00	83.34					
	11	3D	5.61	-15.00	0.00	2.33	0.01	-31.65	16%	13%			20%
	11	2D	4.84	-13.26	0.00	0.00	0.00	-26.34					
8	8	3D	5.62	3.34	0.00	-0.47	-0.01	14.16	16%	13%			15%
	8	2D	4.84	2.96	0.00	0.00	0.00	12.33					
	12	3D	-5.62	-3.34	0.00	0.47	-0.01	0.21	16%	13%			negligible
	12	2D	-4.84	-2.96	0.00	0.00	0.00	0.39					
9	10	3D	0.00	9.79	-0.01	-2.36	0.03	56.10		6%			7%
	10	2D	0.00	9.23	0.00	0.00	0.00	52.67					
	13	3D	0.00	-9.79	0.01	2.36	0.01	-13.02		6%			8%
	13	2D	0.00	-9.23	0.00	0.00	0.00	-12.07					
10	11	3D	-2.87	9.24	-0.01	-2.06	0.00	41.60	16%	13%			19%
	11	2D	-2.47	8.17	0.00	0.00	0.00	35.10					
	14	3D	2.87	-9.24	0.01	2.06	0.04	-0.92	16%	13%			negligible
	14	2D	2.47	-8.17	0.00	0.00	0.00	0.86					
11	12	3D	2.88	4.52	0.01	-0.39	-0.01	9.69	17%	16%			17%
	12	2D	2.47	3.91	0.00	0.00	0.00	8.30					
	15	3D	-2.88	-4.52	-0.01	0.39	-0.02	10.19	17%	16%			15%
	15	2D	-2.47	-3.91	0.00	0.00	0.00	8.89					
12	13	3D	0.00	3.54	0.00	-1.29	-0.01	12.87		6%			7%
	13	2D	0.00	3.35	0.00	0.00	0.00	12.07					
	16	3D	0.00	-3.54	0.00	1.29	0.00	-0.12		6%			negligible
	16	2D	0.00	-3.35	0.00	0.00	0.00	0.00					
13	14	3D	0.00	3.21	0.01	-1.35	-0.03	11.62		36%			37%
	14	2D	0.00	2.36	0.00	0.00	0.00	8.48					
	17	3D	0.00	-3.21	-0.01	1.35	0.00	-0.08		36%			negligible
	17	2D	0.00	-2.36	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.1 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE END FRAME

EARTHQUAKE IN THE LONGITUDINAL DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
1	1	3D	-2.93	0.02	-1.88	0.24	5.72	0.07	-44%		-52%	-50%	
	1	2D	-5.24	0.00	-3.89	0.00	11.52	0.00					
	5	3D	2.93	-0.02	1.88	-0.24	2.19	0.02	-44%		-52%	-54%	
	5	2D	5.24	0.00	3.89	0.00	4.81	0.00					
2	2	3D	-18.74	0.42	-10.89	1.37	74.52	2.00	8%		6%	7%	
	2	2D	-17.41	0.00	-10.25	0.00	69.94	0.00					
	6	3D	18.74	-0.42	10.89	-1.37	-28.79	-0.24	8%		6%	7%	
	6	2D	17.41	0.00	10.25	0.00	-26.88	0.00					
3	3	3D	-21.31	-0.07	-12.79	-0.22	86.74	-0.46	18%		20%	19%	
	3	2D	-18.01	0.00	-10.65	0.00	72.80	0.00					
	7	3D	21.31	0.07	12.79	0.22	-33.02	0.16	18%		20%	18%	
	7	2D	18.01	0.00	10.65	0.00	-28.06	0.00					
4	4	3D	-10.92	-0.01	-4.77	0.05	17.05	-0.05	-11%		-15%	-15%	
	4	2D	-12.24	0.00	-5.64	0.00	19.97	0.00					
	8	3D	10.92	0.01	4.77	-0.05	2.98	0.02	-11%		-15%	-19%	
	8	2D	12.24	0.00	5.64	0.00	3.70	0.00					
5	5	3D	-1.24	0.03	-1.21	0.43	2.25	0.05	-40%		-50%	-47%	
	5	2D	-2.08	0.00	-2.42	0.00	4.26	0.00					
	9	3D	1.24	-0.03	1.21	-0.43	2.95	0.07	-40%		-50%	-52%	
	9	2D	2.08	0.00	2.42	0.00	6.15	0.00					
6	6	3D	-14.71	0.28	-9.88	1.25	40.32	0.32	8%		7%	8%	
	6	2D	-13.61	0.00	-9.27	0.00	37.35	0.00					
	10	3D	14.71	-0.28	9.88	-1.25	2.15	0.87	8%		7%	-15%	
	10	2D	13.61	0.00	9.27	0.00	2.52	0.00					
7	7	3D	-16.62	-0.08	-11.56	-0.56	46.00	-0.16	18%		19%	18%	
	7	2D	-14.06	0.00	-9.70	0.00	38.96	0.00					
	11	3D	16.62	0.08	11.56	0.56	3.72	-0.19	18%		19%	36%	
	11	2D	14.06	0.00	9.70	0.00	2.74	0.00					
8	8	3D	-6.78	-0.01	-4.06	-0.22	8.71	-0.02	-9%		-14%	-11%	
	8	2D	-7.47	0.00	-4.70	0.00	9.84	0.00					
	12	3D	6.78	0.01	4.06	0.22	8.73	-0.02	-9%		-14%	-16%	
	12	2D	7.47	0.00	4.70	0.00	10.39	0.00					
9	10	3D	-9.16	-0.08	-7.79	-0.26	13.90	-0.80	9%		11%	18%	
	10	2D	-8.43	0.00	-6.99	0.00	11.78	0.00					
	13	3D	9.16	0.08	7.79	0.26	20.39	0.45	9%		11%	7%	
	13	2D	8.43	0.00	6.99	0.00	18.97	0.00					
10	11	3D	-10.23	-0.06	-8.78	-0.75	14.20	0.20	18%		18%	17%	
	11	2D	-8.67	0.00	-7.42	0.00	12.16	0.00					
	14	3D	10.23	0.06	8.78	0.75	24.41	-0.44	18%		18%	19%	
	14	2D	8.67	0.00	7.42	0.00	20.50	0.00					
11	12	3D	-2.60	0.01	-2.23	-0.46	2.73	0.03	-7%		-9%	-2%	
	12	2D	-2.79	0.00	-2.46	0.00	2.78	0.00					
	15	3D	2.60	-0.01	2.23	0.46	7.06	0.01	-7%		-9%	-12%	
	15	2D	2.79	0.00	2.46	0.00	8.06	0.00					
12	13	3D	-3.88	-0.13	-1.41	-0.12	-5.80	-0.45	9%		14%	5%	
	13	2D	-3.56	0.00	-1.24	0.00	-5.52	0.00					
	16	3D	3.88	0.13	1.41	0.12	10.87	-0.01	9%		14%	9%	
	16	2D	3.56	0.00	1.24	0.00	9.98	0.00					
13	14	3D	-4.29	0.13	-1.25	0.10	-7.55	0.46	18%		26%	14%	
	14	2D	-3.63	0.00	-0.99	0.00	-6.60	0.00					
	17	3D	4.29	-0.13	1.25	-0.10	12.04	0.01	18%		26%	18%	
	17	2D	3.63	0.00	0.99	0.00	10.18	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.1 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE END FRAME

WIND BLOWING FROM U/S TO D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
1	1	3D	-1.14	0.93	0.00	-0.07	0.00	1.91	24%	4%			14%
	1	2D	-0.92	0.89	0.00	0.00	0.00	1.68					
	5	3D	1.14	0.28	0.00	0.07	0.00	-0.56	24%	-15%			12%
	5	2D	0.92	0.33	0.00	0.00	0.00	-0.50					
2	2	3D	1.14	5.12	0.00	-1.37	-0.02	45.85	24%	17%			21%
	2	2D	0.92	4.38	0.00	0.00	0.00	37.99					
	6	3D	-1.14	-5.12	0.00	1.37	0.00	-24.33	24%	17%			24%
	6	2D	-0.92	-4.38	0.00	0.00	0.00	-19.60					
3	3	3D	-1.93	3.73	0.00	-0.90	0.01	38.58	21%	23%			25%
	3	2D	-1.60	3.03	0.00	0.00	0.00	30.93					
	7	3D	1.93	-3.73	0.00	0.90	0.00	-22.90	21%	23%			26%
	7	2D	1.60	-3.03	0.00	0.00	0.00	-18.22					
4	4	3D	1.93	0.97	0.00	-0.12	0.00	5.07	25%	15%			23%
	4	2D	1.54	0.84	0.00	0.00	0.00	4.13					
	8	3D	-1.93	-0.45	0.00	0.12	0.00	-2.10	25%	negligible			25%
	8	2D	-1.54	-0.32	0.00	0.00	0.00	-1.68					
5	5	3D	-0.61	1.62	0.00	-0.08	0.00	2.38	24%	12%			17%
	5	2D	-0.49	1.45	0.00	0.00	0.00	2.04					
	9	3D	0.61	-0.37	0.00	0.08	0.00	1.90	24%	negligible			24%
	9	2D	0.49	-0.21	0.00	0.00	0.00	1.53					
6	6	3D	0.61	3.15	0.00	-1.40	0.00	26.19	24%	21%			24%
	6	2D	0.49	2.60	0.00	0.00	0.00	21.17					
	10	3D	-0.61	-3.15	0.00	1.40	-0.02	-12.64	24%	21%			27%
	10	2D	-0.49	-2.60	0.00	0.00	0.00	-9.98					
7	7	3D	-1.48	3.15	0.00	-0.93	0.00	24.50	25%	26%			25%
	7	2D	-1.18	2.50	0.00	0.00	0.00	19.54					
	11	3D	1.48	-3.15	0.00	0.93	0.00	-10.94	25%	26%			24%
	11	2D	1.18	-2.50	0.00	0.00	0.00	-8.79					
8	8	3D	1.48	0.99	0.00	-0.15	0.00	3.70	25%	16%			24%
	8	2D	1.18	0.85	0.00	0.00	0.00	2.99					
	12	3D	-1.48	-0.46	0.00	0.15	0.00	-0.58	25%	48%			negligible
	12	2D	-1.18	-0.31	0.00	0.00	0.00	-0.50					
9	10	3D	0.00	3.28	-0.01	-1.31	0.02	15.05		17%			26%
	10	2D	0.00	2.81	0.00	0.00	0.00	11.98					
	13	3D	0.00	-1.84	0.01	1.31	0.01	-3.78		34%			35%
	13	2D	0.00	-1.37	0.00	0.00	0.00	-2.79					
10	11	3D	-0.78	1.83	0.00	-0.89	0.00	13.50	26%	29%			24%
	11	2D	-0.62	1.42	0.00	0.00	0.00	10.87					
	14	3D	0.78	-1.83	0.00	0.89	0.01	-5.44	26%	29%			18%
	14	2D	0.62	-1.42	0.00	0.00	0.00	-4.62					
11	12	3D	0.78	1.64	0.00	-0.14	0.00	3.12	26%	18%			21%
	12	2D	0.62	1.39	0.00	0.00	0.00	2.57					
	15	3D	-0.78	-1.00	0.00	0.14	-0.01	2.71	26%	25%			23%
	15	2D	-0.62	-0.80	0.00	0.00	0.00	2.20					
12	13	3D	0.00	1.60	0.00	-0.71	-0.01	3.70		17%			33%
	13	2D	0.00	1.37	0.00	0.00	0.00	2.79					
	16	3D	0.00	-0.42	0.00	0.71	0.00	-0.06		negligible			negligible
	16	2D	0.00	-0.19	0.00	0.00	0.00	0.00					
13	14	3D	0.00	2.53	0.00	-0.68	-0.01	8.33		16%			19%
	14	2D	0.00	2.19	0.00	0.00	0.00	6.98					
	17	3D	0.00	-2.03	0.00	0.68	0.00	-0.12		20%			negligible
	17	2D	0.00	-1.69	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.1 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE END FRAME

WIND BLOWING FROM D/S TO U/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
1	1	3D	1.00	-0.49	0.00	0.04	0.00	-1.37	22%	7%			19%
	1	2D	0.82	-0.46	0.00	0.00	0.00	-1.15					
	5	3D	-1.00	-0.03	0.00	-0.04	0.00	0.39	22%	negligible			18%
	5	2D	-0.82	-0.07	0.00	0.00	0.00	0.33					
2	2	3D	-1.00	-3.51	0.00	1.08	0.01	-37.74	22%	22%			24%
	2	2D	-0.82	-2.88	0.00	0.00	0.00	-30.48					
	6	3D	1.00	3.51	0.00	-1.08	0.00	23.01	22%	22%			25%
	6	2D	0.82	2.88	0.00	0.00	0.00	18.41					
3	3	3D	2.06	-5.17	0.00	1.09	-0.01	-45.79	24%	19%			22%
	3	2D	1.66	-4.35	0.00	0.00	0.00	-37.56					
	7	3D	-2.06	5.17	0.00	-1.09	0.00	24.09	24%	19%			25%
	7	2D	-1.66	4.35	0.00	0.00	0.00	19.27					
4	4	3D	-2.07	-1.59	0.00	0.18	0.00	-6.40	25%	10%			19%
	4	2D	-1.66	-1.45	0.00	0.00	0.00	-5.38					
	8	3D	2.07	0.37	0.00	-0.18	0.00	2.28	25%	negligible			23%
	8	2D	1.66	0.24	0.00	0.00	0.00	1.85					
5	5	3D	0.58	-1.14	0.00	0.05	0.00	-1.96	26%	16%			20%
	5	2D	0.46	-0.98	0.00	0.00	0.00	-1.63					
	9	3D	-0.58	0.61	0.00	-0.05	0.00	-1.79	26%	36%			24%
	9	2D	-0.46	0.45	0.00	0.00	0.00	-1.44					
6	6	3D	-0.57	-2.30	0.00	1.12	0.00	-24.62	24%	26%			25%
	6	2D	-0.46	-1.83	0.00	0.00	0.00	-19.73					
	10	3D	0.57	2.30	0.00	-1.12	0.01	14.73	24%	26%			24%
	10	2D	0.46	1.83	0.00	0.00	0.00	11.86					
7	7	3D	1.55	-4.01	0.00	1.10	0.00	-25.92	25%	22%			25%
	7	2D	1.24	-3.28	0.00	0.00	0.00	-20.79					
	11	3D	-1.55	4.01	0.00	-1.10	0.00	8.66	25%	22%			29%
	11	2D	-1.24	3.28	0.00	0.00	0.00	6.69					
8	8	3D	-1.56	-1.47	0.00	0.21	0.00	-4.11	26%	12%			22%
	8	2D	-1.24	-1.31	0.00	0.00	0.00	-3.38					
	12	3D	1.56	0.22	0.00	-0.21	0.00	0.47	26%	negligible			12%
	12	2D	1.24	0.10	0.00	0.00	0.00	0.42					
9	10	3D	0.00	-2.74	0.00	1.09	-0.01	-16.98		20%			24%
	10	2D	0.00	-2.28	0.00	0.00	0.00	-13.70					
	13	3D	0.00	2.12	0.00	-1.09	-0.01	6.27		28%			24%
	13	2D	0.00	1.66	0.00	0.00	0.00	5.05					
10	11	3D	0.79	-1.94	0.00	1.00	0.00	-11.40	25%	28%			27%
	11	2D	0.63	-1.51	0.00	0.00	0.00	-8.95					
	14	3D	-0.79	1.94	0.00	-1.00	-0.02	2.85	25%	28%			23%
	14	2D	-0.63	1.51	0.00	0.00	0.00	2.31					
11	12	3D	-0.79	-2.08	0.00	0.16	0.00	-3.20	25%	13%			20%
	12	2D	-0.63	-1.84	0.00	0.00	0.00	-2.67					
	15	3D	0.79	0.63	0.00	-0.16	0.01	-2.77	25%	negligible			24%
	15	2D	0.63	0.39	0.00	0.00	0.00	-2.24					
12	13	3D	0.00	-1.95	0.00	0.65	0.01	-6.19		17%			23%
	13	2D	0.00	-1.66	0.00	0.00	0.00	-5.05					
	16	3D	0.00	1.44	0.00	-0.65	0.00	0.10		25%			negligible
	16	2D	0.00	1.15	0.00	0.00	0.00	0.00					
13	14	3D	0.00	-2.18	0.00	0.72	0.01	-5.79		15%			22%
	14	2D	0.00	-1.90	0.00	0.00	0.00	-4.73					
	17	3D	0.00	0.99	0.00	-0.72	0.00	0.09		38%			negligible
	17	2D	0.00	0.72	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.1 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE END FRAME

CRANE AT U/S MOVING TOWARDS D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
1	1	3D	-1.59	0.21	0.00	-0.04	0.00	1.53	16%	24%			19%
	1	2D	-1.37	0.17	0.00	0.00	0.00	1.29					
	5	3D	1.59	-0.21	0.00	0.04	0.00	-0.62	16%	24%			9%
	5	2D	1.37	-0.17	0.00	0.00	0.00	-0.57					
2	2	3D	80.96	2.58	0.03	-1.56	-0.06	52.00	1%	39%			18%
	2	2D	80.19	1.86	0.00	0.00	0.00	44.19					
	6	3D	-80.96	-2.58	-0.03	1.56	-0.07	-41.17	1%	39%			13%
	6	2D	-80.19	-1.86	0.00	0.00	0.00	-36.36					
3	3	3D	22.60	4.44	0.01	-0.71	-0.01	47.14	-1%	16%			17%
	3	2D	22.78	3.82	0.00	0.00	0.00	40.24					
	7	3D	-22.60	-4.44	-0.01	0.71	-0.02	-28.50	-1%	16%			18%
	7	2D	-22.78	-3.82	0.00	0.00	0.00	-24.18					
4	4	3D	2.40	0.80	0.00	-0.08	0.00	5.82	18%	16%			17%
	4	2D	2.04	0.69	0.00	0.00	0.00	4.97					
	8	3D	-2.40	-0.80	0.00	0.08	0.00	-2.45	18%	16%			18%
	8	2D	-2.04	-0.69	0.00	0.00	0.00	-2.07					
5	5	3D	-0.93	1.35	0.00	-0.08	0.00	2.92	15%	13%			14%
	5	2D	-0.81	1.19	0.00	0.00	0.00	2.57					
	9	3D	0.93	-1.35	0.00	0.08	0.00	2.89	15%	13%			14%
	9	2D	0.81	-1.19	0.00	0.00	0.00	2.54					
6	6	3D	80.24	1.42	0.06	-1.66	-0.10	43.50	1%	42%			13%
	6	2D	79.63	1.00	0.00	0.00	0.00	38.39					
	10	3D	-80.24	-1.42	-0.06	1.66	-0.15	-37.39	1%	42%			8%
	10	2D	-79.63	-1.00	0.00	0.00	0.00	-34.75					
7	7	3D	23.13	4.22	0.02	-0.73	-0.03	30.53	-1%	16%			18%
	7	2D	23.26	3.65	0.00	0.00	0.00	25.94					
	11	3D	-23.13	-4.22	-0.02	0.73	-0.04	-12.40	-1%	16%			21%
	11	2D	-23.26	-3.65	0.00	0.00	0.00	-10.25					
8	8	3D	1.84	1.00	0.00	-0.10	0.00	4.47	18%	16%			17%
	8	2D	1.56	0.86	0.00	0.00	0.00	3.81					
	12	3D	-1.84	-1.00	0.00	0.10	0.00	-0.19	18%	16%			negligible
	12	2D	-1.56	-0.86	0.00	0.00	0.00	-0.10					
9	10	3D	79.18	2.56	0.11	-1.64	-0.19	41.03	0%	25%			8%
	10	2D	78.82	2.04	0.00	0.00	0.00	38.02					
	13	3D	-79.18	-2.56	-0.11	1.64	-0.29	-29.79	0%	25%			2%
	13	2D	-78.82	-2.04	0.00	0.00	0.00	-29.07					
10	11	3D	23.98	3.56	0.03	-0.70	-0.07	15.64	0%	11%			20%
	11	2D	24.01	3.20	0.00	0.00	0.00	13.03					
	14	3D	-23.98	-3.56	-0.03	0.70	-0.08	0.03	0%	11%			negligible
	14	2D	-24.01	-3.20	0.00	0.00	0.00	1.07					
11	12	3D	0.96	1.55	0.00	-0.08	0.00	3.40	19%	18%			19%
	12	2D	0.81	1.31	0.00	0.00	0.00	2.86					
	15	3D	-0.96	-1.55	0.00	0.08	0.00	3.40	19%	18%			17%
	15	2D	-0.81	-1.31	0.00	0.00	0.00	2.91					
12	13	3D	0.18	-4.35	0.19	-0.74	-0.22	-15.74	negligible	-4%			-3%
	13	2D	0.00	-4.51	0.00	0.00	0.00	-16.25					
	16	3D	-0.18	4.35	-0.19	0.74	-0.47	0.09	negligible	-4%			negligible
	16	2D	0.00	4.51	0.00	0.00	0.00	0.00					
13	14	3D	0.06	4.91	0.06	-0.61	-0.08	17.82	negligible	9%			10%
	14	2D	0.00	4.51	0.00	0.00	0.00	16.25					
	17	3D	-0.06	-4.91	-0.06	0.61	-0.15	-0.17	negligible	9%			negligible
	17	2D	0.00	-4.51	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.1 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE END FRAME

CRANE AT D/S MOVING TOWARDS U/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
1	1	3D	1.25	-0.27	0.00	0.03	0.00	-1.35	18%	17%			16%
	1	2D	1.06	-0.23	0.00	0.00	0.00	-1.16					
	5	3D	-1.25	0.27	0.00	-0.03	0.00	0.23	18%	17%			28%
	5	2D	-1.06	0.23	0.00	0.00	0.00	0.18					
2	2	3D	23.74	-3.97	0.01	0.73	-0.01	-44.00	0%	15%			17%
	2	2D	23.76	-3.45	0.00	0.00	0.00	-37.67					
	6	3D	-23.74	3.97	-0.01	-0.73	-0.02	27.35	0%	15%			18%
	6	2D	-23.76	3.45	0.00	0.00	0.00	23.19					
3	3	3D	82.43	-3.14	0.03	1.13	-0.06	-52.17	1%	33%			18%
	3	2D	81.49	-2.36	0.00	0.00	0.00	-44.07					
	7	3D	-82.43	3.14	-0.03	-1.13	-0.06	38.98	1%	33%			14%
	7	2D	-81.49	2.36	0.00	0.00	0.00	34.16					
4	4	3D	-3.07	-0.64	0.00	0.16	0.00	-6.33	15%	25%			19%
	4	2D	-2.67	-0.51	0.00	0.00	0.00	-5.34					
	8	3D	3.07	0.64	0.00	-0.16	0.00	3.63	15%	25%			13%
	8	2D	2.67	0.51	0.00	0.00	0.00	3.20					
5	5	3D	0.71	-1.02	0.00	0.03	0.00	-2.12	18%	17%			17%
	5	2D	0.60	-0.87	0.00	0.00	0.00	-1.81					
	9	3D	-0.71	1.02	0.00	-0.03	0.00	-2.25	18%	17%			17%
	9	2D	-0.60	0.87	0.00	0.00	0.00	-1.93					
6	6	3D	24.27	-3.19	0.02	0.76	-0.03	-29.29	0%	14%			18%
	6	2D	24.22	-2.81	0.00	0.00	0.00	-24.87					
	10	3D	-24.27	3.19	-0.02	-0.76	-0.03	15.57	0%	14%			22%
	10	2D	-24.22	2.81	0.00	0.00	0.00	12.79					
7	7	3D	81.75	-2.93	0.06	1.21	-0.11	-41.22	1%	34%			14%
	7	2D	80.96	-2.18	0.00	0.00	0.00	-36.09					
	11	3D	-81.75	2.93	-0.06	-1.21	-0.13	28.63	1%	34%			7%
	11	2D	-80.96	2.18	0.00	0.00	0.00	26.70					
8	8	3D	-2.45	-0.84	0.00	0.24	0.00	-5.85	14%	24%			14%
	8	2D	-2.14	-0.68	0.00	0.00	0.00	-5.12					
	12	3D	2.45	0.84	0.00	-0.24	0.00	2.24	14%	24%			3%
	12	2D	2.14	0.68	0.00	0.00	0.00	2.18					
9	10	3D	24.93	-4.10	0.04	0.74	-0.07	-18.35	0%	11%			21%
	10	2D	24.82	-3.68	0.00	0.00	0.00	-15.18					
	13	3D	-24.93	4.10	-0.04	-0.74	-0.10	0.31	0%	11%			negligible
	13	2D	-24.82	3.68	0.00	0.00	0.00	-1.02					
10	11	3D	80.53	-1.14	0.12	1.17	-0.21	-32.60	1%	84%			8%
	11	2D	80.01	-0.62	0.00	0.00	0.00	-30.23					
	14	3D	-80.53	1.14	-0.12	-1.17	-0.32	27.60	1%	negligible			0%
	14	2D	-80.01	0.62	0.00	0.00	0.00	27.48					
11	12	3D	-1.35	-2.46	0.00	0.28	0.01	-6.20	13%	10%			9%
	12	2D	-1.19	-2.24	0.00	0.00	0.00	-5.71					
	15	3D	1.35	2.46	0.00	-0.28	0.01	-4.61	13%	10%			11%
	15	2D	1.19	2.24	0.00	0.00	0.00	-4.17					
12	13	3D	0.06	-4.01	0.06	0.51	-0.06	-14.55	negligible	9%			10%
	13	2D	0.00	-3.68	0.00	0.00	0.00	-13.25					
	16	3D	-0.06	4.01	-0.06	-0.51	-0.15	0.13	negligible	9%			negligible
	16	2D	0.00	3.68	0.00	0.00	0.00	0.00					
13	14	3D	0.18	3.52	0.19	0.67	-0.20	12.73	negligible	-4%			-4%
	14	2D	0.00	3.68	0.00	0.00	0.00	13.25					
	17	3D	-0.18	-3.52	-0.19	-0.67	-0.47	-0.07	negligible	-4%			negligible
	17	2D	0.00	-3.68	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-)sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.- 6.1 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE END FRAME

CRANE STRIKING U/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
1	1	3D	1.20	-0.30	0.00	0.05	0.00	-1.42	13%	11%			13%
	1	2D	1.06	-0.27	0.00	0.00	0.00	-1.26					
	5	3D	-1.20	0.30	0.00	-0.05	0.00	0.17	13%	11%			21%
	5	2D	-1.06	0.27	0.00	0.00	0.00	0.14					
2	2	3D	-1.20	-4.72	0.00	1.08	0.01	-46.10	13%	13%			13%
	2	2D	-1.06	-4.17	0.00	0.00	0.00	-40.78					
	6	3D	1.20	4.72	0.00	-1.08	0.00	26.28	13%	13%			13%
	6	2D	1.06	4.17	0.00	0.00	0.00	23.27					
3	3	3D	1.49	-2.14	0.00	0.42	0.00	-26.97	17%	21%			19%
	3	2D	1.27	-1.77	0.00	0.00	0.00	-22.72					
	7	3D	-1.49	2.14	0.00	-0.42	0.00	17.97	17%	21%			18%
	7	2D	-1.27	1.77	0.00	0.00	0.00	15.28					
4	4	3D	-1.49	-0.41	0.00	0.04	0.00	-3.31	17%	21%			19%
	4	2D	-1.27	-0.34	0.00	0.00	0.00	-2.79					
	8	3D	1.49	0.41	0.00	-0.04	0.00	1.60	17%	21%			18%
	8	2D	1.27	0.34	0.00	0.00	0.00	1.36					
5	5	3D	0.67	-0.96	0.00	0.07	0.00	-2.01	14%	12%			12%
	5	2D	0.59	-0.86	0.00	0.00	0.00	-1.80					
	9	3D	-0.67	0.96	0.00	-0.07	0.00	-2.12	14%	12%			12%
	9	2D	-0.59	0.86	0.00	0.00	0.00	-1.90					
6	6	3D	-0.67	-4.00	0.00	1.10	0.00	-28.17	14%	12%			13%
	6	2D	-0.59	-3.58	0.00	0.00	0.00	-24.98					
	10	3D	0.67	4.00	0.00	-1.10	0.01	10.96	14%	12%			14%
	10	2D	0.59	3.58	0.00	0.00	0.00	9.59					
7	7	3D	1.17	-2.02	0.00	0.44	0.00	-19.15	18%	20%			18%
	7	2D	0.99	-1.68	0.00	0.00	0.00	-16.29					
	11	3D	-1.17	2.02	0.00	-0.44	0.00	10.45	18%	20%			15%
	11	2D	-0.99	1.68	0.00	0.00	0.00	9.08					
8	8	3D	-1.17	-0.52	0.00	0.06	0.00	-2.78	18%	18%			18%
	8	2D	-0.99	-0.44	0.00	-0.00	0.00	-2.36					
	12	3D	1.17	0.52	0.00	-0.06	0.00	0.55	18%	18%			12%
	12	2D	0.99	0.44	0.00	0.00	0.00	0.49					
9	10	3D	0.00	-4.74	0.00	0.97	-0.01	-13.52		7%			13%
	10	2D	0.00	-4.44	0.00	0.00	0.00	-11.92					
	13	3D	0.00	4.74	0.00	-0.97	-0.01	-7.34		7%			-4%
	13	2D	0.00	4.44	0.00	0.00	0.00	-7.61					
10	11	3D	0.63	-1.42	0.00	0.44	0.00	-12.44	19%	19%			15%
	11	2D	0.53	-1.19	0.00	0.00	0.00	-10.78					
	14	3D	-0.63	1.42	0.00	-0.44	-0.01	6.21	19%	19%			11%
	14	2D	-0.53	1.19	0.00	0.00	0.00	5.57					
11	12	3D	-0.63	-1.07	0.00	0.06	0.00	-2.52	19%	15%			16%
	12	2D	-0.53	-0.93	0.00	0.00	0.00	-2.18					
	15	3D	0.63	1.07	0.00	-0.06	0.00	-2.20	19%	15%			16%
	15	2D	0.53	0.93	0.00	0.00	0.00	-1.90					
12	13	3D	0.00	2.04	0.00	0.39	0.01	7.41		-3%			-3%
	13	2D	0.00	2.11	0.00	0.00	0.00	7.61					
	16	3D	0.00	-2.04	0.00	-0.39	0.00	-0.07		-3%			negligible
	16	2D	0.00	-2.11	0.00	0.00	0.00	0.00					
13	14	3D	0.00	-2.35	0.00	0.36	0.01	-8.56		11%			12%
	14	2D	0.00	-2.11	0.00	0.00	0.00	-7.61					
	17	3D	0.00	2.35	0.00	-0.36	0.00	0.08		11%			negligible
	17	2D	0.00	2.11	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (,-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.1 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE END FRAME

CRANE STRIKING D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
1	1	3D	-0.76	0.13	0.00	-0.01	0.00	0.77	19%	18%			18%
	1	2D	-0.64	0.11	0.00	0.00	0.00	0.65					
	5	3D	0.76	-0.13	0.00	0.01	0.00	-0.21	19%	18%			24%
	5	2D	0.64	-0.11	0.00	0.00	0.00	-0.17					
2	2	3D	0.76	1.81	0.00	-0.45	0.00	25.32	19%	21%			19%
	2	2D	0.64	1.50	0.00	0.00	0.00	21.34					
	6	3D	-0.76	-1.81	0.00	0.45	0.00	-17.70	19%	21%			18%
	6	2D	-0.64	-1.50	0.00	0.00	0.00	-15.05					
3	3	3D	-2.03	4.79	0.00	-0.81	0.01	45.47	15%	14%			14%
	3	2D	-1.77	4.21	0.00	0.00	0.00	39.92					
	7	3D	2.03	-4.79	0.00	0.81	0.00	-25.34	15%	14%			14%
	7	2D	1.77	-4.21	0.00	0.00	0.00	-22.25					
4	4	3D	2.03	0.83	0.00	-0.15	0.00	5.62	15%	14%			14%
	4	2D	1.77	0.73	0.00	0.00	0.00	4.94					
	8	3D	-2.03	-0.83	0.00	0.15	0.00	-2.14	15%	14%			15%
	8	2D	-1.77	-0.73	0.00	0.00	0.00	-1.86					
5	5	3D	-0.44	0.63	0.00	-0.02	0.00	1.33	19%	17%			18%
	5	2D	-0.37	0.54	0.00	0.00	0.00	1.13					
	9	3D	0.44	-0.63	0.00	0.02	0.00	1.38	19%	17%			17%
	9	2D	0.37	-0.54	0.00	0.00	0.00	1.18					
6	6	3D	0.44	1.31	0.00	-0.48	0.00	18.85	19%	22%			18%
	6	2D	0.37	1.07	0.00	0.00	0.00	16.03					
	10	3D	-0.44	-1.31	0.00	0.48	0.00	-13.22	19%	22%			16%
	10	2D	-0.37	-1.07	0.00	0.00	0.00	-11.41					
7	7	3D	-1.52	4.57	0.00	-0.81	0.00	27.18	15%	13%			14%
	7	2D	-1.32	4.04	0.00	0.00	0.00	23.91					
	11	3D	1.52	-4.57	0.00	0.81	0.00	-7.52	15%	13%			15%
	11	2D	1.32	-4.04	0.00	0.00	0.00	-6.52					
8	8	3D	1.52	1.00	0.00	-0.19	0.00	3.97	15%	11%			13%
	8	2D	1.32	0.90	0.00	0.00	0.00	3.51					
	12	3D	-1.52	-1.00	0.00	0.19	0.00	0.34	15%	11%			0%
	12	2D	-1.32	-0.90	0.00	0.00	0.00	0.34					
9	10	3D	0.00	1.89	0.00	-0.48	0.00	14.94		17%			16%
	10	2D	0.00	1.61	0.00	0.00	0.00	12.89					
	13	3D	0.00	-1.89	0.00	0.48	0.00	-6.64		17%			14%
	13	2D	0.00	-1.61	0.00	0.00	0.00	-5.80					
10	11	3D	-0.76	4.23	0.00	-0.68	0.00	10.27	15%	8%			14%
	11	2D	-0.66	3.92	0.00	0.00	0.00	8.99					
	14	3D	0.76	-4.23	0.00	0.68	0.01	8.35	15%	8%			1%
	14	2D	0.66	-3.92	0.00	0.00	0.00	8.25					
11	12	3D	0.76	1.15	0.00	-0.16	0.00	2.38	15%	13%			14%
	12	2D	0.66	1.02	0.00	0.00	0.00	2.09					
	15	3D	-0.76	-1.15	0.00	0.16	-0.01	2.69	15%	13%			13%
	15	2D	-0.66	-1.02	0.00	0.00	0.00	2.39					
12	13	3D	0.00	1.82	0.00	-0.32	0.00	6.61		13%			14%
	13	2D	0.00	1.61	0.00	0.00	0.00	5.80					
	16	3D	0.00	-1.82	0.00	0.32	0.00	-0.07		13%			negligible
	16	2D	0.00	-1.61	0.00	0.00	0.00	0.00					
13	14	3D	0.00	-1.54	0.00	-0.36	-0.01	-5.58		-4%			-4%
	14	2D	0.00	-1.61	0.00	0.00	0.00	-5.80					
	17	3D	0.00	1.54	0.00	0.36	0.00	0.05		-4%			negligible
	17	2D	0.00	1.61	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.- 6.1 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE END FRAME

CRANE MOVING IN THE LONGITUDINAL DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
1	1	3D	-0.33	-0.10	-0.20	0.12	0.64	-0.23					
		2D											
	5	3D	0.33	0.10	0.20	-0.12	0.20	-0.20					
		2D											
2	2	3D	48.18	-2.03	-2.54	0.42	18.37	-6.19	0%		-8%	-6%	
	2	2D	48.03	0.00	-2.75	0.00	19.64	0.00					
	6	3D	-48.18	2.03	2.54	-0.42	-7.72	-2.35	0%		-8%	-5%	
	6	2D	-48.03	0.00	2.75	0.00	-8.10	0.00					
3	3	3D	48.72	1.74	-2.40	-0.95	17.21	5.11	1%		-13%	-12%	
	3	2D	48.03	0.00	-2.75	0.00	19.64	0.00					
	7	3D	-48.72	-1.74	2.40	0.95	-7.14	2.19	1%		-13%	-12%	
	7	2D	-48.03	0.00	2.75	0.00	-8.10	0.00					
4	4	3D	-1.01	0.25	-0.33	-0.26	1.23	0.69					
		2D											
	8	3D	1.01	-0.25	0.33	0.26	0.16	0.36					
		2D											
5	5	3D	-0.17	0.00	-0.13	0.16	0.26	0.05					
		2D											
	9	3D	0.17	0.00	0.13	-0.16	0.30	-0.05					
		2D											
6	6	3D	49.21	-2.17	-2.45	0.27	10.56	2.17	0%		-6%	-4%	
	6	2D	49.07	0.00	-2.61	0.00	10.98	0.00					
	10	3D	-49.21	2.17	2.45	-0.27	-0.04	-11.52	0%		-6%	egligible	
	10	2D	-49.07	0.00	2.61	0.00	0.26	0.00					
7	7	3D	49.68	1.74	-2.30	-0.90	9.76	-2.04	1%		-12%	-11%	
	7	2D	49.07	0.00	-2.61	0.00	10.98	0.00					
	11	3D	-49.68	-1.74	2.30	0.90	0.12	9.53	1%		-12%	egligible	
	11	2D	-49.07	0.00	2.61	0.00	0.26	0.00					
8	8	3D	-0.74	0.28	-0.28	-0.32	0.64	-0.20					
		2D											
	12	3D	0.74	-0.28	0.28	0.32	0.58	1.42					
		2D											
9	10	3D	50.58	-2.31	-2.48	-0.38	4.01	11.52	0%		0%	8%	
	10	2D	50.51	0.00	-2.47	0.00	3.70	0.00					
	13	3D	-50.58	2.31	2.48	0.38	6.92	-21.67	0%		0%	-4%	
	13	2D	-50.51	0.00	2.47	0.00	7.18	0.00					
10	11	3D	50.91	2.58	-2.27	-0.54	3.51	-9.60	1%		-8%	-5%	
	11	2D	50.51	0.00	-2.47	0.00	3.70	0.00					
	14	3D	-50.91	-2.58	2.27	0.54	6.48	20.93	1%		-8%	-10%	
	14	2D	-50.51	0.00	2.47	0.00	7.18	0.00					
11	12	3D	-0.38	-0.44	-0.17	-0.25	0.22	-1.52					
		2D											
	15	3D	0.38	0.44	0.17	0.25	0.51	-0.44					
		2D											
12	13	3D	-0.73	-2.38	0.44	-0.17	-3.62	-8.61					
		2D											
	16	3D	0.73	2.38	-0.44	0.17	2.05	0.03					
		2D											
13	14	3D	-0.66	2.40	0.41	0.13	-3.33	8.68	-12%		-9%	-11%	
	14	2D	-0.75	0.00	0.45	0.00	-3.75	0.00					
	17	3D	0.66	-2.40	-0.41	-0.13	1.86	-0.05	-12%		-9%	-13%	
	17	2D	0.75	0.00	-0.45	0.00	2.13	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO. – 6.2 THE RANGE OF PERCENTAGE DIFFERENCE OF MEMBER FORCES OF END FRAME COLUMNS IN 3-D ANALYSIS AS COMPARED WITH 2-D ANALYSIS (MAIN FRAME).

LOADING CONDITION(↓)	AXIAL FORCE	SHEAR FORCE (y)	(z)	BENDING MOMENT (Y)	(Z)
DEAD LOAD + LIVE LOAD	-1% (1) to 3% (10)	-4% (3) to 3% (1,12,13)	-5% (9) to 1% (2,3,7,10)	-9 (6,9) to 3% (2)	-13% (2) to 7% (9)
EARTHQUAKE (TRANSVERSE)	16% (3,4,7,8,10) to 20% (1)	6% (9,12) to 36% (6,13)			7% (9,12) to 37% (13)
EARTHQUAKE (LONGITUDINAL)	-44% (1) to 18% (3,7,10,13)		-52% (1) to 26% (13)	-54% (1) to 36% (7)	
WIND FROM US TO DS	24% (1,2,5,6) to 26% (11,12)	4% (1) to 48% (8)			12% (1) to 33% (13)
WIND FROM DS TO US	24% (3,6) to 26% (1,2,5,8)	7% (1) to 38% (13)			12% (8) to 27% (10)
CRANE MOVING US TO DS	-1% (3,7) to 19% (11)	-4% (12) to 42% (6)			-3%% (12) to 21% (7)
CRANE MOVING DS TO US	0% (2,6,9) to 18% (1,5)	-4% (13) to 34% (7)			-4% (13) to 28% (1)
CRANE STRIKING US	13% (1,2) to 19% (10,11)	-3% (12) to 21% (3,4)			-4% (9) to 19% (3,4)
CRANE STRIKING DS	15% (3,4,7,8,10,11) to 19% (1,2,5,6,)	-4% (13) to 22% (6)			-4 (13) to 24% (1)
CRANE MOVING LEFT TO RIGHT	-12% (13) to 1% (3,7,10)		-13% (3) to 0% (9)	-12% (3) to 8% (9)	

Negative sign indicates reduction of member force in the 3-D analysis.
The number in ( ) indicates the member number.

TABLE NO.~ 6.3 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE CENTRAL FRAME

DEAD LOAD + LIVE LOAD

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
37	18	3D	91.28	-2.61	0.00	0.00	0.00	-3.76	1%	-1%			-2%
	18	2D	90.04	-2.64	0.00	0.00	0.00	-3.82					
	22	3D	-87.58	2.61	0.00	0.00	0.00	-7.20	1%	-1%			-1%
	22	2D	-86.34	2.64	0.00	0.00	0.00	-7.27					
38	19	3D	218.38	7.50	0.00	0.00	0.00	3.73	0%	2%			17%
	19	2D	219.43	7.33	0.00	0.00	0.00	3.19					
	23	3D	-200.39	-7.50	0.00	0.00	0.00	27.76	-1%	2%			1%
	23	2D	-201.44	-7.33	0.00	0.00	0.00	27.57					
39	20	3D	251.05	-7.71	0.00	0.00	0.00	-1.49	-1%	4%			negligible
	20	2D	252.33	-7.40	0.00	0.00	0.00	0.84					
	24	3D	-233.06	7.71	0.00	0.00	0.00	-30.88	-1%	4%			-3%
	24	2D	-234.34	7.40	0.00	0.00	0.00	-31.92					
40	21	3D	164.45	2.66	0.00	0.00	0.00	4.46	0%	-2%			-6%
	21	2D	164.32	2.72	0.00	0.00	0.00	4.76					
	25	3D	-158.29	-2.66	0.00	0.00	0.00	6.70	0%	-2%			1%
	25	2D	-158.15	-2.72	0.00	0.00	0.00	6.65					
41	22	3D	28.03	-5.61	0.00	0.00	0.00	-11.34	-1%	-2%			-2%
	22	2D	28.20	-5.73	0.00	0.00	0.00	-11.52					
	26	3D	-24.24	5.61	0.00	0.00	0.00	-12.79	-1%	-2%			-2%
	26	2D	-24.42	5.73	0.00	0.00	0.00	-13.11					
42	23	3D	141.14	10.47	0.00	0.00	0.00	16.11	-1%	1%			-1%
	23	2D	142.14	10.41	0.00	0.00	0.00	16.26					
	27	3D	-122.72	-10.47	0.00	0.00	0.00	28.89	-1%	1%			1%
	27	2D	-123.73	-10.41	0.00	0.00	0.00	28.51					
43	24	3D	173.54	-9.30	0.00	0.00	0.00	-13.44	-1%	3%			9%
	24	2D	174.68	-9.01	0.00	0.00	0.00	-12.37					
	28	3D	-155.13	9.30	0.00	0.00	0.00	-26.55	-1%	3%			1%
	28	2D	-156.27	9.01	0.00	0.00	0.00	-26.38					
44	25	3D	98.27	4.27	0.00	0.00	0.00	10.75	0%	-1%			-2%
	25	2D	98.61	4.33	0.00	0.00	0.00	10.95					
	29	3D	-91.95	-4.27	0.00	0.00	0.00	7.59	0%	-1%			-1%
	29	2D	-92.30	-4.33	0.00	0.00	0.00	7.66					
45	27	3D	72.79	4.72	0.00	0.00	0.00	8.27	-1%	1%			-6%
	27	2D	73.53	4.68	0.00	0.00	0.00	8.82					
	30	3D	-53.95	-4.72	0.00	0.00	0.00	12.51	-1%	1%			6%
	30	2D	-54.69	-4.68	0.00	0.00	0.00	11.79					
46	28	3D	95.30	-11.06	0.00	0.00	0.00	-17.82	-1%	1%			-1%
	28	2D	96.17	-10.93	0.00	0.00	0.00	-17.97					
	31	3D	-76.46	11.06	0.00	0.00	0.00	-30.84	-1%	1%			2%
	31	2D	-77.32	10.93	0.00	0.00	0.00	-30.11					
47	29	3D	31.56	6.19	0.00	0.00	0.00	10.18	-2%	-1%			0%
	29	2D	32.10	6.24	0.00	0.00	0.00	10.23					
	32	3D	-25.10	-6.19	0.00	0.00	0.00	17.03	-2%	-1%			-1%
	32	2D	-25.64	-6.24	0.00	0.00	0.00	17.25					
48	30	3D	29.49	4.51	0.00	0.00	0.00	16.03	-2%	-4%			-5%
	30	2D	29.94	4.68	0.00	0.00	0.00	16.86					
	33	3D	-22.44	-4.51	0.00	0.00	0.00	0.21	-2%	-4%			negligible
	33	2D	-22.89	-4.68	0.00	0.00	0.00	0.00					
49	31	3D	29.38	-4.53	0.00	0.00	0.00	-16.10	-2%	-3%			-5%
	31	2D	29.94	-4.68	0.00	0.00	0.00	-16.86					
	34	3D	-22.33	4.53	0.00	0.00	0.00	-0.19	-2%	-3%			negligible
	34	2D	-22.89	4.68	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.3 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE CENTRAL FRAME

EARTHQUAKE IN THE TRANSVERSE DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
37	18	3D	-4.39	1.07	0.00	0.00	0.00	5.14	-8%	-4%			-7%
	18	2D	-4.78	1.12	0.00	0.00	0.00	5.51					
	22	3D	4.39	-1.07	0.00	0.00	0.00	-0.66	-8%	-4%			-18%
	22	2D	4.78	-1.12	0.00	0.00	0.00	-0.80					
38	19	3D	4.40	16.06	0.00	0.00	0.00	164.82	-8%	-6%			-7%
	19	2D	4.78	17.11	0.00	0.00	0.00	177.74					
	23	3D	-4.40	-16.06	0.00	0.00	0.00	-97.36	-8%	-6%			-8%
	23	2D	-4.78	-17.11	0.00	0.00	0.00	-105.89					
39	20	3D	-8.44	19.79	0.00	0.00	0.00	185.58	-8%	-6%			-7%
	20	2D	-9.19	21.09	0.00	0.00	0.00	199.90					
	24	3D	8.44	-19.79	0.00	0.00	0.00	-102.47	-8%	-6%			-8%
	24	2D	9.19	-21.09	0.00	0.00	0.00	-111.34					
40	21	3D	8.42	3.44	0.00	0.00	0.00	23.06	-8%	-6%			-7%
	21	2D	9.19	3.65	0.00	0.00	0.00	24.79					
	25	3D	-8.42	-3.44	0.00	0.00	0.00	-8.61	-8%	-6%			-9%
	25	2D	-9.19	-3.65	0.00	0.00	0.00	-9.46					
41	22	3D	-2.47	3.65	0.00	0.00	0.00	7.64	-8%	-7%			-7%
	22	2D	-2.69	3.91	0.00	0.00	0.00	8.20					
	26	3D	2.47	-3.65	0.00	0.00	0.00	8.06	-8%	-7%			-7%
	26	2D	2.69	-3.91	0.00	0.00	0.00	8.63					
42	23	3D	2.47	12.16	0.00	0.00	0.00	104.57	-8%	-6%			-8%
	23	2D	2.69	12.94	0.00	0.00	0.00	113.50					
	27	3D	-2.47	-12.16	0.00	0.00	0.00	-52.28	-8%	-6%			-10%
	27	2D	-2.69	-12.94	0.00	0.00	0.00	-57.87					
43	24	3D	-6.36	17.88	0.00	0.00	0.00	110.36	-8%	-6%			-8%
	24	2D	-6.94	19.06	0.00	0.00	0.00	119.65					
	28	3D	6.36	-17.88	0.00	0.00	0.00	-33.50	-8%	-6%			-11%
	28	2D	6.94	-19.06	0.00	0.00	0.00	-37.69					
44	25	3D	6.35	4.02	0.00	0.00	0.00	16.45	-9%	-6%			-7%
	25	2D	6.94	4.26	0.00	0.00	0.00	17.71					
	29	3D	-6.35	-4.02	0.00	0.00	0.00	0.85	-9%	-6%			44%
	29	2D	-6.94	-4.26	0.00	0.00	0.00	0.59					
45	27	3D	0.00	11.56	0.00	0.00	0.00	62.38		-6%			-9%
	27	2D	0.00	12.26	0.00	0.00	0.00	68.54					
	30	3D	0.00	-11.56	0.00	0.00	0.00	-11.53		-6%			-21%
	30	2D	0.00	-12.26	0.00	0.00	0.00	-14.61					
46	28	3D	-3.24	11.15	0.00	0.00	0.00	45.39	-9%	-6%			-10%
	28	2D	-3.55	11.82	0.00	0.00	0.00	50.26					
	31	3D	3.24	-11.15	0.00	0.00	0.00	3.66	-9%	-6%			109%
	31	2D	3.55	-11.82	0.00	0.00	0.00	1.75					
47	29	3D	3.23	5.20	0.00	0.00	0.00	10.93	-9%	-7%			-8%
	29	2D	3.55	5.60	0.00	0.00	0.00	11.89					
	32	3D	-3.23	-5.20	0.00	0.00	0.00	11.95	-9%	-7%			-6%
	32	2D	-3.55	-5.60	0.00	0.00	0.00	12.76					
48	30	3D	0.00	3.35	0.00	0.00	0.00	11.83		-17%			-19%
	30	2D	0.00	4.06	0.00	0.00	0.00	14.61					
	33	3D	0.00	-3.35	0.00	0.00	0.00	0.24		-17%			negligible
	33	2D	0.00	-4.06	0.00	0.00	0.00	0.00					
49	31	3D	0.00	2.51	0.00	0.00	0.00	8.90		-22%			-24%
	31	2D	0.00	3.23	0.00	0.00	0.00	11.64					
	34	3D	0.00	-2.51	0.00	0.00	0.00	0.16		-22%			negligible
	34	2D	0.00	-3.23	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.- 6.3 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE CENTRAL FRAME

EARTHQUAKE IN THE LONGITUDINAL DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
37	18	3D	0.00	0.00	-2.44	0.08	6.48	0.00			-51%	-50%	
	18	2D	0.00	0.00	-4.98	0.00	13.02	0.00					
	22	3D	0.00	0.00	2.44	-0.08	3.75	0.00			-51%	-52%	
	22	2D	0.00	0.00	4.98	0.00	7.88	0.00					
38	19	3D	0.00	0.00	-12.57	1.21	76.90	0.00			6%	7%	
	19	2D	0.00	0.00	-11.82	0.00	72.16	0.00					
	23	3D	0.00	0.00	12.57	-1.21	-24.10	0.00			6%	7%	
	23	2D	0.00	0.00	11.82	0.00	-22.50	0.00					
39	20	3D	0.00	0.00	-14.75	-0.13	89.51	0.00			20%	19%	
	20	2D	0.00	0.00	-12.29	0.00	75.11	0.00					
	24	3D	0.00	0.00	14.75	0.13	-27.56	0.00			20%	17%	
	24	2D	0.00	0.00	12.29	0.00	-23.50	0.00					
40	21	3D	0.00	0.00	-6.33	0.07	19.19	0.00			-15%	-15%	
	21	2D	0.00	0.00	-7.47	0.00	22.48	0.00					
	25	3D	0.00	0.00	6.33	-0.07	7.39	0.00			-15%	-17%	
	25	2D	0.00	0.00	7.47	0.00	8.87	0.00					
41	22	3D	0.00	0.00	-2.35	0.24	4.61	0.00			-48%	-47%	
	22	2D	0.00	0.00	-4.48	0.00	8.66	0.00					
	26	3D	0.00	0.00	2.35	-0.24	5.50	0.00			-48%	-48%	
	26	2D	0.00	0.00	4.48	0.00	10.62	0.00					
42	23	3D	0.00	0.00	-12.99	1.09	46.68	0.00			7%	8%	
	23	2D	0.00	0.00	-12.17	0.00	43.28	0.00					
	27	3D	0.00	0.00	12.99	-1.09	9.16	0.00			7%	1%	
	27	2D	0.00	0.00	12.17	0.00	9.04	0.00					
43	24	3D	0.00	0.00	-15.15	-0.46	53.38	0.00			19%	18%	
	24	2D	0.00	0.00	-12.71	0.00	45.14	0.00					
	28	3D	0.00	0.00	15.15	0.46	11.75	0.00			19%	24%	
	28	2D	0.00	0.00	12.71	0.00	9.50	0.00					
44	25	3D	0.00	0.00	-6.65	-0.12	14.54	0.00			-14%	-12%	
	25	2D	0.00	0.00	-7.69	0.00	16.60	0.00					
	29	3D	0.00	0.00	6.65	0.12	14.06	0.00			-14%	-15%	
	29	2D	0.00	0.00	7.69	0.00	16.48	0.00					
45	27	3D	0.00	0.00	-11.58	-0.44	22.11	0.00			10%	14%	
	27	2D	0.00	0.00	-10.48	0.00	19.36	0.00					
	30	3D	0.00	0.00	11.58	0.44	28.82	0.00			10%	8%	
	30	2D	0.00	0.00	10.48	0.00	26.74	0.00					
46	28	3D	0.00	0.00	-13.11	-0.66	23.60	0.00			18%	18%	
	28	2D	0.00	0.00	-11.07	0.00	20.08	0.00					
	31	3D	0.00	0.00	13.11	0.66	34.07	0.00			18%	19%	
	31	2D	0.00	0.00	11.07	0.00	28.63	0.00					
47	29	3D	0.00	0.00	-4.78	-0.32	8.04	0.00			-9%	-7%	
	29	2D	0.00	0.00	-5.27	0.00	8.65	0.00					
	32	3D	0.00	0.00	4.78	0.32	13.01	0.00			-9%	-10%	
	32	2D	0.00	0.00	5.27	0.00	14.52	0.00					
48	30	3D	0.00	0.00	-5.84	-0.19	0.12	0.00			10%	negligible	
	30	2D	0.00	0.00	-5.32	0.00	-0.10	0.00					
	33	3D	0.00	0.00	5.84	0.19	20.91	0.00			10%	9%	
	33	2D	0.00	0.00	5.32	0.00	19.21	0.00					
49	31	3D	0.00	0.00	-6.16	0.18	-0.98	0.00			12%	negligible	
	31	2D	0.00	0.00	-5.51	0.00	-1.05	0.00					
	34	3D	0.00	0.00	6.16	-0.18	23.16	0.00			12%	18%	
	34	2D	0.00	0.00	5.51	0.00	19.58	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.3 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE CENTRAL FRAME

WIND BLOWING FROM U/S TO D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
37	18	3D	-1.41	1.69	0.00	0.00	0.00	2.88	-24%	-5%			-14%
	18	2D	-1.85	1.77	0.00	0.00	0.00	3.35					
	22	3D	1.41	0.74	0.00	0.00	0.00	-0.88	-24%	negligible			-12%
	22	2D	1.85	0.65	0.00	0.00	0.00	-1.00					
38	19	3D	1.41	7.26	0.00	0.00	0.00	60.20	-24%	-17%			-21%
	19	2D	1.85	8.75	0.00	0.00	0.00	75.91					
	23	3D	-1.41	-7.26	0.00	0.00	0.00	-29.69	-24%	-17%			-24%
	23	2D	-1.85	-8.75	0.00	0.00	0.00	-39.16					
39	20	3D	-2.29	4.62	0.00	0.00	0.00	46.48	-25%	-24%			-25%
	20	2D	-3.07	6.04	0.00	0.00	0.00	61.78					
	24	3D	2.29	-4.62	0.00	0.00	0.00	-27.07	-25%	-24%			-26%
	24	2D	3.07	-6.04	0.00	0.00	0.00	-36.41					
40	21	3D	2.29	1.44	0.00	0.00	0.00	6.37	-25%	-15%			-23%
	21	2D	3.07	1.69	0.00	0.00	0.00	8.25					
	25	3D	-2.29	-0.40	0.00	0.00	0.00	-2.52	-25%	-38%			-25%
	25	2D	-3.07	-0.64	0.00	0.00	0.00	-3.36					
41	22	3D	-0.74	2.57	0.00	0.00	0.00	3.39	-24%	-11%			-17%
	22	2D	-0.98	2.90	0.00	0.00	0.00	4.07					
	26	3D	0.74	-0.10	0.00	0.00	0.00	2.31	-24%	-75%			-24%
	26	2D	0.98	-0.40	0.00	0.00	0.00	3.05					
42	23	3D	0.74	4.10	0.00	0.00	0.00	32.24	negligible	-21%			-24%
	23	2D	0.98	5.20	0.00	0.00	0.00	42.28					
	27	3D	-0.74	-4.10	0.00	0.00	0.00	-14.60	negligible	-21%			-27%
	27	2D	-0.98	-5.20	0.00	0.00	0.00	-19.93					
43	24	3D	-1.76	3.69	0.00	0.00	0.00	29.10	-25%	-26%			-25%
	24	2D	-2.36	4.99	0.00	0.00	0.00	39.03					
	28	3D	1.76	-3.69	0.00	0.00	0.00	-13.24	-25%	-26%			-25%
	28	2D	2.36	-4.99	0.00	0.00	0.00	-17.55					
44	25	3D	1.76	1.40	0.00	0.00	0.00	4.55	-25%	-17%			-24%
	25	2D	2.36	1.69	0.00	0.00	0.00	5.97					
	29	3D	-1.76	-0.33	0.00	0.00	0.00	-0.82	-25%	-48%			-17%
	29	2D	-2.36	-0.63	0.00	0.00	0.00	-0.99					
45	27	3D	0.00	4.67	0.00	0.00	0.00	17.81		-17%			-26%
	27	2D	0.00	5.61	0.00	0.00	0.00	23.94					
	30	3D	0.00	-1.78	0.00	0.00	0.00	-3.61		-35%			-35%
	30	2D	0.00	-2.73	0.00	0.00	0.00	-5.58					
46	28	3D	-0.92	2.02	0.00	0.00	0.00	16.46	-26%	-29%			-24%
	28	2D	-1.24	2.84	0.00	0.00	0.00	21.72					
	31	3D	0.92	-2.02	0.00	0.00	0.00	-7.58	-26%	-29%			-18%
	31	2D	1.24	-2.84	0.00	0.00	0.00	-9.23					
47	29	3D	0.92	2.30	0.00	0.00	0.00	4.02	-26%	-17%			-22%
	29	2D	1.24	2.78	0.00	0.00	0.00	5.13					
	32	3D	-0.92	-1.06	0.00	0.00	0.00	3.37	-26%	-32%			-23%
	32	2D	-1.24	-1.55	0.00	0.00	0.00	4.39					
48	30	3D	0.00	2.26	0.00	0.00	0.00	3.78		-17%			-32%
	30	2D	0.00	2.73	0.00	0.00	0.00	5.58					
	33	3D	0.00	0.10	0.00	0.00	0.00	0.12		negligible			negligible
	33	2D	0.00	-0.37	0.00	0.00	0.00	0.00					
49	31	3D	0.00	3.70	0.00	0.00	0.00	11.26		-16%			-19%
	31	2D	0.00	4.38	0.00	0.00	0.00	13.96					
	34	3D	0.00	-2.69	0.00	0.00	0.00	0.25		-20%			negligible
	34	2D	0.00	-3.37	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.- 6.3 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE CENTRAL FRAME

WIND BLOWING FROM D/S TO U/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
37	18	3D	1.23	-0.83	0.00	0.00	0.00	-1.86	-25%	-9%			-19%
	18	2D	1.64	-0.91	0.00	0.00	0.00	-2.29					
	22	3D	-1.23	-0.21	0.00	0.00	0.00	0.55	-25%	negligible			-17%
	22	2D	-1.64	-0.13	0.00	0.00	0.00	0.66					
38	19	3D	-1.23	-4.48	0.00	0.00	0.00	-46.37	-25%	-22%			-24%
	19	2D	-1.64	-5.74	0.00	0.00	0.00	-60.89					
	23	3D	1.23	4.48	0.00	0.00	0.00	27.55	-25%	-22%			-25%
	23	2D	1.64	5.74	0.00	0.00	0.00	36.77					
39	20	3D	2.51	-7.08	0.00	0.00	0.00	-58.56	-24%	-19%			-22%
	20	2D	3.31	-8.70	0.00	0.00	0.00	-75.04					
	24	3D	-2.51	7.08	0.00	0.00	0.00	28.84	-24%	-19%			-25%
	24	2D	-3.31	8.70	0.00	0.00	0.00	38.49					
40	21	3D	-2.50	-2.62	0.00	0.00	0.00	-8.73	-24%	-10%			-19%
	21	2D	-3.31	-2.90	0.00	0.00	0.00	-10.76					
	25	3D	2.50	0.19	0.00	0.00	0.00	2.82	-24%	-60%			-24%
	25	2D	3.31	0.47	0.00	0.00	0.00	3.69					
41	22	3D	0.68	-1.63	0.00	0.00	0.00	-2.58	-25%	-17%			-21%
	22	2D	0.91	-1.96	0.00	0.00	0.00	-3.25					
	26	3D	-0.68	0.57	0.00	0.00	0.00	-2.16	-25%	-36%			-25%
	26	2D	-0.91	0.89	0.00	0.00	0.00	-2.87					
42	23	3D	-0.68	-2.72	0.00	0.00	0.00	-29.63	-25%	-26%			-25%
	23	2D	-0.91	-3.66	0.00	0.00	0.00	-39.41					
	27	3D	0.68	2.72	0.00	0.00	0.00	17.94	-25%	-26%			-24%
	27	2D	0.91	3.66	0.00	0.00	0.00	23.69					
43	24	3D	1.87	-5.09	0.00	0.00	0.00	-31.29	-25%	-22%			-25%
	24	2D	2.49	-6.55	0.00	0.00	0.00	-41.54					
	28	3D	-1.87	5.09	0.00	0.00	0.00	9.42	-25%	-22%			-29%
	28	2D	-2.49	6.55	0.00	0.00	0.00	13.36					
44	25	3D	-1.87	-2.30	0.00	0.00	0.00	-5.28	-25%	-12%			-22%
	25	2D	-2.49	-2.62	0.00	0.00	0.00	-6.74					
	29	3D	1.87	-0.18	0.00	0.00	0.00	0.72	-25%	negligible			-13%
	29	2D	2.49	0.13	0.00	0.00	0.00	0.83					
45	27	3D	0.00	-3.61	0.00	0.00	0.00	-20.82		-21%			-24%
	27	2D	0.00	-4.55	0.00	0.00	0.00	-27.38					
	30	3D	0.00	2.37	0.00	0.00	0.00	7.66		-28%			-24%
	30	2D	0.00	3.31	0.00	0.00	0.00	10.09					
46	28	3D	0.94	-2.15	0.00	0.00	0.00	-12.99	-25%	-29%			-27%
	28	2D	1.26	-3.02	0.00	0.00	0.00	-17.88					
	31	3D	-0.94	2.15	0.00	0.00	0.00	3.54	-25%	-29%			-23%
	31	2D	-1.26	3.02	0.00	0.00	0.00	4.62					
47	29	3D	-0.94	-3.19	0.00	0.00	0.00	-4.26	-25%	-13%			-20%
	29	2D	-1.26	-3.67	0.00	0.00	0.00	-5.33					
	32	3D	0.94	0.31	0.00	0.00	0.00	-3.44	-25%	-61%			-23%
	32	2D	1.26	0.79	0.00	0.00	0.00	-4.48					
48	30	3D	0.00	-2.73	0.00	0.00	0.00	-7.80		-18%			-23%
	30	2D	0.00	-3.31	0.00	0.00	0.00	-10.09					
	33	3D	0.00	1.72	0.00	0.00	0.00	-0.20		-25%			negligible
	33	2D	0.00	2.30	0.00	0.00	0.00	0.00					
49	31	3D	0.00	-3.26	0.00	0.00	0.00	-7.32		-14%			-23%
	31	2D	0.00	-3.80	0.00	0.00	0.00	-9.45					
	34	3D	0.00	0.90	0.00	0.00	0.00	-0.17		-38%			negligible
	34	2D	0.00	1.45	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.3 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE CENTRAL FRAME

CRANE AT U/S MOVING TOWARDS D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
37	18	3D	-1.84	0.20	0.00	0.00	0.00	1.68	-19%	-31%			-22%
	18	2D	-2.28	0.29	0.00	0.00	0.00	2.15					
	22	3D	1.84	-0.20	0.00	0.00	0.00	-0.84	-19%	-31%			-12%
	22	2D	2.28	-0.29	0.00	0.00	0.00	-0.95					
38	19	3D	132.11	1.66	0.00	0.00	0.00	57.91	-1%	-46%			-21%
	19	2D	133.64	3.10	0.00	0.00	0.00	73.55					
	23	3D	-132.11	-1.66	0.00	0.00	0.00	-50.92	-1%	-46%			-16%
	23	2D	-133.64	-3.10	0.00	0.00	0.00	-60.54					
39	20	3D	38.35	5.14	0.00	0.00	0.00	53.21	1%	-19%			-21%
	20	2D	37.97	6.37	0.00	0.00	0.00	67.01					
	24	3D	-38.35	-5.14	0.00	0.00	0.00	-31.63	1%	-19%			-21%
	24	2D	-37.97	-6.37	0.00	0.00	0.00	-40.27					
40	21	3D	2.66	0.93	0.00	0.00	0.00	6.59	-22%	-19%			-20%
	21	2D	3.39	1.15	0.00	0.00	0.00	8.28					
	25	3D	-2.66	-0.93	0.00	0.00	0.00	-2.67	-22%	-19%			-22%
	25	2D	-3.39	-1.15	0.00	0.00	0.00	-3.44					
41	22	3D	-1.10	1.66	0.00	0.00	0.00	3.59	-19%	-16%			-16%
	22	2D	-1.35	1.98	0.00	0.00	0.00	4.28					
	26	3D	1.10	-1.66	0.00	0.00	0.00	3.53	-19%	-16%			-17%
	26	2D	1.35	-1.98	0.00	0.00	0.00	4.23					
42	23	3D	131.49	0.26	0.00	0.00	0.00	53.71	-1%	-81%			-16%
	23	2D	132.71	1.40	0.00	0.00	0.00	63.93					
	27	3D	-131.49	-0.26	0.00	0.00	0.00	-52.61	-1%	-81%			-9%
	27	2D	-132.71	-1.40	0.00	0.00	0.00	-57.90					
43	24	3D	39.01	4.95	0.00	0.00	0.00	34.01	1%	-19%			-21%
	24	2D	38.76	6.08	0.00	0.00	0.00	43.20					
	28	3D	-39.01	-4.95	0.00	0.00	0.00	-12.74	1%	-19%			-25%
	28	2D	-38.76	-6.08	0.00	0.00	0.00	-17.06					
44	25	3D	2.04	1.18	0.00	0.00	0.00	5.03	-22%	-18%			-21%
	25	2D	2.60	1.44	0.00	0.00	0.00	6.35					
	29	3D	-2.04	-1.18	0.00	0.00	0.00	0.03	-22%	-18%			negligible
	29	2D	-2.60	-1.44	0.00	0.00	0.00	-0.16					
45	27	3D	130.63	2.34	0.00	0.00	0.00	57.31	-1%	-31%			-10%
	27	2D	131.36	3.38	0.00	0.00	0.00	63.34					
	30	3D	-130.63	-2.34	0.00	0.00	0.00	-47.01	-1%	-31%			-3%
	30	2D	-131.36	-3.38	0.00	0.00	0.00	-48.46					
46	28	3D	40.08	4.63	0.00	0.00	0.00	16.49	0%	-13%			-24%
	28	2D	40.02	5.34	0.00	0.00	0.00	21.70					
	31	3D	-40.08	-4.63	0.00	0.00	0.00	3.88	0%	-13%			118%
	31	2D	-40.02	-5.34	0.00	0.00	0.00	1.78					
47	29	3D	1.05	1.71	0.00	0.00	0.00	3.67	-22%	-22%			-23%
	29	2D	1.35	2.18	0.00	0.00	0.00	4.76					
	32	3D	-1.05	-1.71	0.00	0.00	0.00	3.85	-22%	-22%			-20%
	32	2D	-1.35	-2.18	0.00	0.00	0.00	4.84					
48	30	3D	-0.35	-7.85	0.00	0.00	0.00	-28.09	negligible	4%			4%
	30	2D	0.00	-7.52	0.00	0.00	0.00	-27.07					
	33	3D	0.35	7.85	0.00	0.00	0.00	-0.17	negligible	4%			negligible
	33	2D	0.00	7.52	0.00	0.00	0.00	0.00					
49	31	3D	-0.11	6.74	0.00	0.00	0.00	23.93	negligible	-10%			-12%
	31	2D	0.00	7.52	0.00	0.00	0.00	27.07					
	34	3D	0.11	-6.74	0.00	0.00	0.00	0.33	negligible	-10%			negligible
	34	2D	0.00	-7.52	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.3 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE CENTRAL FRAME

CRANE AT D/S MOVING TOWARDS D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
37	18	3D	1.40	-0.32	0.00	0.00	0.00	-1.56	-21%	-18%			-20%
	18	2D	1.77	-0.39	0.00	0.00	0.00	-1.94					
	22	3D	-1.40	0.32	0.00	0.00	0.00	0.21	-21%	-18%			-30%
	22	2D	-1.77	0.39	0.00	0.00	0.00	0.30					
38	19	3D	39.61	-4.71	0.00	0.00	0.00	-50.07	0%	-18%			-20%
	19	2D	39.59	-5.74	0.00	0.00	0.00	-62.74					
	23	3D	-39.61	4.71	0.00	0.00	0.00	30.31	0%	-18%			-22%
	23	2D	-39.59	5.74	0.00	0.00	0.00	38.63					
39	20	3D	133.91	-2.36	0.00	0.00	0.00	-57.17	-1%	-40%			-22%
	20	2D	135.80	-3.92	0.00	0.00	0.00	-73.37					
	24	3D	-133.91	2.36	0.00	0.00	0.00	47.24	-1%	-40%			-17%
	24	2D	-135.80	3.92	0.00	0.00	0.00	56.89					
40	21	3D	-3.63	-0.58	0.00	0.00	0.00	-6.91	-18%	-32%			-22%
	21	2D	-4.44	-0.85	0.00	0.00	0.00	-8.89					
	25	3D	3.63	0.58	0.00	0.00	0.00	4.48	-18%	-32%			-16%
	25	2D	4.44	0.85	0.00	0.00	0.00	5.34					
41	22	3D	0.79	-1.16	0.00	0.00	0.00	-2.40	negligible	-20%			-21%
	22	2D	1.00	-1.45	0.00	0.00	0.00	-3.02					
	26	3D	-0.79	1.16	0.00	0.00	0.00	-2.58	negligible	-20%			-20%
	26	2D	-1.00	1.45	0.00	0.00	0.00	-3.22					
42	23	3D	40.26	-3.92	0.00	0.00	0.00	-32.59	0%	-16%			-21%
	23	2D	40.36	-4.68	0.00	0.00	0.00	-41.42					
	27	3D	-40.26	3.92	0.00	0.00	0.00	15.72	0%	-16%			-26%
	27	2D	-40.36	4.68	0.00	0.00	0.00	21.30					
43	24	3D	133.35	-2.14	0.00	0.00	0.00	-49.85	-1%	-41%			-17%
	24	2D	134.93	-3.63	0.00	0.00	0.00	-60.10					
	28	3D	-133.35	2.14	0.00	0.00	0.00	40.63	-1%	-41%			-9%
	28	2D	-134.93	3.63	0.00	0.00	0.00	44.49					
44	25	3D	-2.95	-0.83	0.00	0.00	0.00	-7.05	-17%	-27%			-17%
	25	2D	-3.57	-1.14	0.00	0.00	0.00	-8.52					
	29	3D	2.95	0.83	0.00	0.00	0.00	3.51	-17%	-27%			-3%
	29	2D	3.57	1.14	0.00	0.00	0.00	3.63					
45	27	3D	41.13	-5.29	0.00	0.00	0.00	-18.94	-1%	-14%			-25%
	27	2D	41.36	-6.13	0.00	0.00	0.00	-25.28					
	30	3D	-41.13	5.29	0.00	0.00	0.00	-4.35	-1%	-14%			157%
	30	2D	-41.36	6.13	0.00	0.00	0.00	-1.69					
46	28	3D	132.29	-0.01	0.00	0.00	0.00	-45.62	-1%	-99%			-9%
	28	2D	133.34	-1.03	0.00	0.00	0.00	-50.36					
	31	3D	-132.29	0.01	0.00	0.00	0.00	45.58	-1%	-99%			-1%
	31	2D	-133.34	1.03	0.00	0.00	0.00	45.82					
47	29	3D	-1.66	-3.31	0.00	0.00	0.00	-8.51	-16%	-11%			-10%
	29	2D	-1.98	-3.74	0.00	0.00	0.00	-9.50					
	32	3D	1.66	3.31	0.00	0.00	0.00	-6.05	-16%	-11%			-13%
	32	2D	1.98	3.74	0.00	0.00	0.00	-6.94					
48	30	3D	-0.11	-5.48	0.00	0.00	0.00	-19.47	negligible	-11%			-12%
	30	2D	0.00	-6.13	0.00	0.00	0.00	-22.07					
	33	3D	0.11	5.48	0.00	0.00	0.00	-0.27	negligible	-11%			negligible
	33	2D	0.00	6.13	0.00	0.00	0.00	0.00					
49	31	3D	-0.35	6.46	0.00	0.00	0.00	23.11	negligible	5%			5%
	31	2D	0.00	6.13	0.00	0.00	0.00	22.07					
	34	3D	0.35	-6.46	0.00	0.00	0.00	0.13	negligible	5%			negligible
	34	2D	0.00	-6.13	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.3 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE CENTRAL FRAME

CRANE STRIKING U/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
37	18	3D	1.47	-0.39	0.00	0.00	0.00	-1.79	-16%	-13%			-15%
	18	2D	1.76	-0.45	0.00	0.00	0.00	-2.10					
	22	3D	-1.47	0.39	0.00	0.00	0.00	0.17	-16%	-13%			-26%
	22	2D	-1.76	0.45	0.00	0.00	0.00	0.23					
38	19	3D	-1.47	-5.84	0.00	0.00	0.00	-57.22	-16%	-16%			-16%
	19	2D	-1.76	-6.94	0.00	0.00	0.00	-67.86					
	23	3D	1.47	5.84	0.00	0.00	0.00	32.69	-16%	-16%			-16%
	23	2D	1.76	6.94	0.00	0.00	0.00	38.72					
39	20	3D	1.66	-2.21	0.00	0.00	0.00	-29.32	-21%	-25%			-22%
	20	2D	2.11	-2.95	0.00	0.00	0.00	-37.82					
	24	3D	-1.66	2.21	0.00	0.00	0.00	20.04	-21%	-25%			-21%
	24	2D	-2.11	2.95	0.00	0.00	0.00	25.42					
40	21	3D	-1.66	-0.43	0.00	0.00	0.00	-3.60	-21%	-25%			-22%
	21	2D	-2.11	-0.57	0.00	0.00	0.00	-4.64					
	25	3D	1.66	0.43	0.00	0.00	0.00	1.78	-21%	-25%			-22%
	25	2D	2.11	0.57	0.00	0.00	0.00	2.27					
41	22	3D	0.82	-1.23	0.00	0.00	0.00	-2.56	-16%	-14%			-14%
	22	2D	0.98	-1.43	0.00	0.00	0.00	-2.99					
	26	3D	-0.82	1.23	0.00	0.00	0.00	-2.71	-16%	-14%			-14%
	26	2D	-0.98	1.43	0.00	0.00	0.00	-3.15					
42	23	3D	-0.82	-5.11	0.00	0.00	0.00	-35.18	-16%	-14%			-15%
	23	2D	-0.98	-5.96	0.00	0.00	0.00	-41.57					
	27	3D	0.82	5.11	0.00	0.00	0.00	13.22	-16%	-14%			-17%
	27	2D	0.98	5.96	0.00	0.00	0.00	15.96					
43	24	3D	1.31	-2.10	0.00	0.00	0.00	-21.37	-21%	-25%			-21%
	24	2D	1.66	-2.79	0.00	0.00	0.00	-27.10					
	28	3D	-1.31	2.10	0.00	0.00	0.00	12.36	-21%	-25%			-18%
	28	2D	-1.66	2.79	0.00	0.00	0.00	15.11					
44	25	3D	-1.31	-0.56	0.00	0.00	0.00	-3.11	-21%	-23%			-21%
	25	2D	-1.66	-0.73	0.00	0.00	0.00	-3.93					
	29	3D	1.31	0.56	0.00	0.00	0.00	0.68	-21%	-23%			-16%
	29	2D	1.66	0.73	0.00	0.00	0.00	0.81					
45	27	3D	0.00	-6.78	0.00	0.00	0.00	-16.62		-8%			-16%
	27	2D	0.00	-7.38	0.00	0.00	0.00	-19.83					
	30	3D	0.00	6.78	0.00	0.00	0.00	-13.19		-8%			4%
	30	2D	0.00	7.38	0.00	0.00	0.00	-12.66					
46	28	3D	0.70	-1.51	0.00	0.00	0.00	-14.65	-21%	-23%			-18%
	28	2D	0.89	-1.97	0.00	0.00	0.00	-17.95					
	31	3D	-0.70	1.51	0.00	0.00	0.00	7.99	-21%	-23%			-14%
	31	2D	-0.89	1.97	0.00	0.00	0.00	9.27					
47	29	3D	-0.70	-1.25	0.00	0.00	0.00	-2.96	-21%	-19%			-19%
	29	2D	-0.89	-1.54	0.00	0.00	0.00	-3.64					
	32	3D	0.70	1.25	0.00	0.00	0.00	-2.55	-21%	-19%			-19%
	32	2D	0.89	1.54	0.00	0.00	0.00	-3.16					
48	30	3D	0.00	3.66	0.00	0.00	0.00	13.05		4%			3%
	30	2D	0.00	3.52	0.00	0.00	0.00	12.66					
	33	3D	0.00	-3.66	0.00	0.00	0.00	0.14		4%			negligible
	33	2D	0.00	-3.52	0.00	0.00	0.00	0.00					
49	31	3D	0.00	-3.03	0.00	0.00	0.00	-10.76		-14%			-15%
	31	2D	0.00	-3.52	0.00	0.00	0.00	-12.66					
	34	3D	0.00	3.03	0.00	0.00	0.00	-0.17		-14%			negligible
	34	2D	0.00	3.52	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.3 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE CENTRAL FRAME

CRANE STRIKING D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
37	18	3D	-0.83	0.14	0.00	0.00	0.00	0.84	-22%	-26%			-21%
	18	2D	-1.07	0.19	0.00	0.00	0.00	1.07					
	22	3D	0.83	-0.14	0.00	0.00	0.00	-0.23	-22%	-26%			-21%
	22	2D	1.07	-0.19	0.00	0.00	0.00	-0.29					
38	19	3D	0.83	1.86	0.00	0.00	0.00	27.57	-22%	-25%			-22%
	19	2D	1.07	2.49	0.00	0.00	0.00	35.52					
	23	3D	-0.83	-1.86	0.00	0.00	0.00	-19.74	-22%	-25%			-21%
	23	2D	-1.07	-2.49	0.00	0.00	0.00	-25.04					
39	20	3D	-2.43	5.83	0.00	0.00	0.00	55.32	-17%	-17%			-17%
	20	2D	-2.94	7.00	0.00	0.00	0.00	66.43					
	24	3D	2.43	-5.83	0.00	0.00	0.00	-30.86	-17%	-17%			-17%
	24	2D	2.94	-7.00	0.00	0.00	0.00	-37.03					
40	21	3D	2.42	1.03	0.00	0.00	0.00	6.86	-18%	-16%			-17%
	21	2D	2.94	1.22	0.00	0.00	0.00	8.22					
	25	3D	-2.42	-1.03	0.00	0.00	0.00	-2.55	-18%	-16%			-18%
	25	2D	-2.94	-1.22	0.00	0.00	0.00	-3.10					
41	22	3D	-0.48	0.71	0.00	0.00	0.00	1.49	-23%	-20%			-21%
	22	2D	-0.62	0.89	0.00	0.00	0.00	1.88					
	26	3D	0.48	-0.71	0.00	0.00	0.00	1.55	-23%	-20%			-21%
	26	2D	0.62	-0.89	0.00	0.00	0.00	1.96					
42	23	3D	0.48	1.32	0.00	0.00	0.00	21.04	-23%	-26%			-21%
	23	2D	0.62	1.79	0.00	0.00	0.00	26.67					
	27	3D	-0.48	-1.32	0.00	0.00	0.00	-15.37	-23%	-26%			-19%
	27	2D	-0.62	-1.79	0.00	0.00	0.00	-18.98					
43	24	3D	-1.81	5.67	0.00	0.00	0.00	33.24	-18%	-16%			-16%
	24	2D	-2.20	6.73	0.00	0.00	0.00	39.79					
	28	3D	1.81	-5.67	0.00	0.00	0.00	-8.87	-18%	-16%			-18%
	28	2D	2.20	-6.73	0.00	0.00	0.00	-10.86					
44	25	3D	1.81	1.27	0.00	0.00	0.00	4.91	-18%	-15%			-16%
	25	2D	2.20	1.49	0.00	0.00	0.00	5.84					
	29	3D	-1.81	-1.27	0.00	0.00	0.00	0.58	-18%	-15%			2%
	29	2D	-2.20	-1.49	0.00	0.00	0.00	0.57					
45	27	3D	0.00	2.13	0.00	0.00	0.00	17.36		-21%			-19%
	27	2D	0.00	2.68	0.00	0.00	0.00	21.45					
	30	3D	0.00	-2.13	0.00	0.00	0.00	-7.97		-21%			-17%
	30	2D	0.00	-2.68	0.00	0.00	0.00	-9.65					
46	28	3D	-0.89	5.90	0.00	0.00	0.00	12.41	-18%	-10%			-17%
	28	2D	-1.09	6.52	0.00	0.00	0.00	14.97					
	31	3D	0.89	-5.90	0.00	0.00	0.00	13.55	-18%	-10%			-1%
	31	2D	1.09	-6.52	0.00	0.00	0.00	13.74					
47	29	3D	0.89	1.43	0.00	0.00	0.00	2.90	-18%	-16%			-17%
	29	2D	1.09	1.70	0.00	0.00	0.00	3.48					
	32	3D	-0.89	-1.43	0.00	0.00	0.00	3.37	-18%	-16%			-15%
	32	2D	-1.09	-1.70	0.00	0.00	0.00	3.97					
48	30	3D	0.00	2.27	0.00	0.00	0.00	8.04		-15%			-17%
	30	2D	0.00	2.68	0.00	0.00	0.00	9.65					
	33	3D	0.00	-2.27	0.00	0.00	0.00	0.13		-15%			negligible
	33	2D	0.00	-2.68	0.00	0.00	0.00	0.00					
49	31	3D	0.00	-2.83	0.00	0.00	0.00	-10.09		6%			5%
	31	2D	0.00	-2.68	0.00	0.00	0.00	-9.65					
	34	3D	0.00	2.83	0.00	0.00	0.00	-0.11		6%			negligible
	34	2D	0.00	2.68	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.3 COMPARISON OF 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE CENTRAL FRAME

CRANE MOVING IN THE LONGITUDINAL DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
37	18	3D	0.10	-0.18	-0.27	0.04	0.73	-0.42					
		2D											
	22	3D	-0.10	0.18	0.27	-0.04	0.39	-0.35					
		2D											
38	19	3D	86.67	-3.56	-2.98	0.41	18.99	-11.05	0%		-7%	-6%	
	19	2D	86.77	0.00	-3.22	0.00	20.30	0.00					
	23	3D	-86.67	3.56	2.98	-0.41	-6.49	-3.88	0%		-7%	-4%	
	23	2D	-86.77	0.00	3.22	0.00	-6.79	0.00					
39	20	3D	86.87	3.24	-2.81	-0.83	17.79	11.16	0%		-13%	-12%	
	20	2D	86.77	0.00	-3.22	0.00	20.30	0.00					
	24	3D	-86.87	-3.24	2.81	0.83	-5.99	2.43	0%		-13%	-12%	
	24	2D	-86.77	0.00	3.22	0.00	-6.79	0.00					
40	21	3D	-0.10	0.48	-0.45	-0.10	1.40	1.49					
		2D											
	25	3D	0.10	-0.48	0.45	0.10	0.49	0.53					
		2D											
41	22	3D	0.01	-0.01	-0.28	0.08	0.56	0.06					
		2D											
	26	3D	-0.01	0.01	0.28	-0.08	0.65	-0.11					
		2D											
42	23	3D	86.84	-3.78	-3.24	0.30	12.22	3.53					
		2D											
	27	3D	-86.84	3.78	3.24	-0.30	1.70	-19.78					
		2D											
43	24	3D	87.06	3.23	-3.03	-0.84	11.31	-2.01	0%		-12%		
	24	2D	86.85	0.00	-3.45	0.00	12.73	0.00					
	28	3D	-87.06	-3.23	3.03	0.84	1.73	15.90	0%		-12%		
	28	2D	-86.85	0.00	3.45	0.00	2.09	0.00					
44	25	3D	-0.21	0.54	-0.48	-0.18	1.09	-0.12					
		2D											
	29	3D	0.21	-0.54	0.48	0.18	0.99	2.43					
		2D											
45	27	3D	87.02	-3.85	-3.63	-0.30	6.44	19.81	0%		-1%	4%	
	27	2D	87.02	0.00	-3.65	0.00	6.22	0.00					
	30	3D	-87.02	3.85	3.63	0.30	9.52	-36.74	0%		-1%	-3%	
	30	2D	-87.02	0.00	3.65	0.00	9.85	0.00					
46	28	3D	87.23	4.56	-3.34	-0.57	5.78	-15.89	0%		-8%	-7%	
	28	2D	87.02	0.00	-3.65	0.00	6.22	0.00					
	31	3D	-87.23	-4.56	3.34	0.57	8.91	35.97	0%		-8%	-10%	
	31	2D	-87.02	0.00	3.65	0.00	9.85	0.00					
47	29	3D	-0.21	-0.72	-0.38	-0.19	0.66	-2.48					
		2D											
	32	3D	0.21	0.72	0.38	0.19	1.03	-0.70					
		2D											
48	30	3D	-0.23	-3.75	-0.62	-0.15	-2.30	-13.41	0%		-3%	-3%	
	30	2D	-0.23	0.00	-0.64	0.00	-2.38	0.00					
	33	3D	0.23	3.75	0.62	0.15	4.53	-0.09	0%		-3%	-3%	
	33	2D	0.23	0.00	0.64	0.00	4.69	0.00					
49	31	3D	-0.23	3.71	-0.56	0.16	-2.13	13.27	0%		-13%	-11%	
	31	2D	-0.23	0.00	-0.64	0.00	-2.38	0.00					
	34	3D	0.23	-3.71	0.56	-0.16	4.16	0.10	0%		-13%	-11%	
	34	2D	0.23	0.00	0.64	0.00	4.69	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO. – 6.4 THE RANGE OF PERCENTAGE DIFFRENCE OF MEMBER FORCES OF CENTRAL FRAME COLUMNS IN 3-D ANALYSIS AS COMPARED WITH 2-D ANALYSIS (MAIN FRAME)

LOADING CONDITION(↓)	AXIAL FORCE	SHEAR FORCE (y)	(z)	BENDING MOMENT (Y)	(Z)
DEAD LOAD + LIVE LOAD	-2% (47,48,49) to 1% (37)	-4% (48) to 4% (39)			-6% (40,45) to 17% (38)
EARTHQUAKE (TRANSVERSE)	-9% (44,46,47) to -8% (37 to 43)	-22% (49) to -4% (37)			-24% (49) to 109% (46)
EARTHQUAKE (LONGITUDINAL)			-51% (37) to 20% (39)	-52% (37) to 24% (43)	
WIND FROM US TO DS	-26% (46,47) to –24% (37,38,41,42)	-75% (41) to -5% (37)			-35% (45) to -12% (37)
WIND FROM DS TO US	-25% (37,38,41,42,43,44 46,47) to -24% (39,40)	-61% (47) to -9% (37)			-27% (46) to -13% (44)
CRANE MOVING US TO DS	-22% (40,44,47) to 1% (39,43)	-81% (42) to 4% (48)			-25% (43) to 118% (46)
CRANE MOVING DS TO US	-21% (37,41) to 0% (38,42)	-99% (46) to 5% (49)			-30% (37) to 157% (45)
CRANE STRIKING US	-21% (39,40,43,44,46,47) to -16% (37,38,41,42)	-25% (39,40,43) to 4% (48)			-26% (37) to 4% (45)
CRANE STRIKING DS	-23% (41,42) to -17% (39)	-26% (37,42) to 6% (49)			-22% (38) to 5% (49)
CRANE MOVING LEFT TO RIGHT	NO DIFFERENCE		-13% (39,49) to -1% (45)	-12% (39) to 4% (45)	

Negative sign indicates reduction of member force in the 3-D analysis.
The number in ( ) indicates the member number.

TABLE NO.~ 6.5 COMPARISON OF THE 3-D AND 2-D ANALYSES OF THE TRANSVERSE BEAMS

DEAD LOAD + LIVE LOAD

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
14	5	3D	-1.84	10.98	0.01	0.29	-0.02	11.92	3%	0%			0%
	5	2D	-1.79	10.93	0.00	0.00	0.00	11.88					
	6	3D	1.84	11.62	-0.01	-0.29	-0.03	-14.22	3%	0%			0%
	6	2D	1.79	11.57	0.00	0.00	0.00	-14.15					
15	7	3D	-0.91	11.73	-0.01	-0.15	0.02	14.37	1%	0%			0%
	7	2D	-0.90	11.75	0.00	0.00	0.00	14.41					
	8	3D	0.91	11.68	0.01	0.15	0.02	-14.15	1%	0%			0%
	8	2D	0.90	11.66	0.00	0.00	0.00	-14.10					
16	9	3D	3.30	7.75	0.02	0.06	-0.06	7.48	1%	0%			-1%
	9	2D	3.26	7.75	0.00	0.00	0.00	7.52					
	10	3D	-3.30	8.67	-0.02	-0.06	-0.06	-10.77	1%	0%			0%
	10	2D	-3.26	8.65	0.00	0.00	0.00	-10.74					
17	11	3D	-1.17	11.67	-0.02	-0.15	0.06	14.17	4%	0%			0%
	11	2D	-1.13	11.69	0.00	0.00	0.00	14.24					
	12	3D	1.17	11.74	0.02	0.15	0.08	-14.43	4%	0%			0%
	12	2D	1.13	11.72	0.00	0.00	0.00	-14.36					
18	14	3D	3.54	8.60	-0.02	-0.04	0.08	10.44	-1%	0%			-1%
	14	2D	3.58	8.61	0.00	0.00	0.00	10.50					
	15	3D	-3.54	8.45	0.02	0.04	0.10	-9.91	-1%	0%			1%
	15	2D	-3.58	8.44	0.00	0.00	0.00	-9.86					
50	22	3D	-2.98	19.86	0.00	0.00	0.00	21.57	-4%	0%			0%
	22	2D	-3.09	19.79	0.00	0.00	0.00	21.49					
	23	3D	2.98	21.02	0.00	0.00	0.00	-25.74	-4%	0%			0%
	23	2D	3.09	20.95	0.00	0.00	0.00	-25.64					
51	24	3D	-1.60	21.33	0.00	0.00	0.00	26.19	-1%	0%			0%
	24	2D	-1.61	21.31	0.00	0.00	0.00	26.10					
	25	3D	1.60	21.17	0.00	0.00	0.00	-25.59	-1%	0%			0%
	25	2D	1.61	21.19	0.00	0.00	0.00	-25.68					
52	26	3D	5.66	13.53	0.00	0.00	0.00	13.21	-1%	0%			1%
	26	2D	5.73	13.52	0.00	0.00	0.00	13.11					
	27	3D	-5.66	15.06	0.00	0.00	0.00	-18.70	-1%	0%			0%
	27	2D	-5.73	15.09	0.00	0.00	0.00	-18.77					
53	28	3D	-1.84	21.23	0.00	0.00	0.00	25.91	-4%	0%			0%
	28	2D	-1.92	21.20	0.00	0.00	0.00	25.79					
	29	3D	1.84	21.26	0.00	0.00	0.00	-26.02	-4%	0%			0%
	29	2D	1.92	21.30	0.00	0.00	0.00	-26.14					
54	31	3D	6.33	15.06	0.00	0.00	0.00	18.41	1%	0%			0%
	31	2D	6.24	15.03	0.00	0.00	0.00	18.32					
	32	3D	-6.33	14.72	0.00	0.00	0.00	-17.16	1%	0%			-1%
	32	2D	-6.24	14.74	0.00	0.00	0.00	-17.25					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.5 COMPARISON OF THE 3-D AND 2-D ANALYSES OF THE TRANSVERSE BEAMS

EARTHQUAKE IN THE LONGITUDINAL DIRECTION

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
14	5	3D	2.68	-1.69	-0.04	0.00	0.15	-5.98	15%	21%			20%
	5	2D	2.34	-1.40	0.00	0.00	0.00	-4.97					
	6	3D	-2.68	1.69	0.04	0.00	0.16	-6.15	15%	21%			21%
	6	2D	-2.34	1.40	0.00	0.00	0.00	-5.10					
15	7	3D	-0.94	-1.79	-0.05	0.00	0.17	-6.64	13%	15%			15%
	7	2D	-0.83	-1.56	0.00	0.00	0.00	-5.78					
	8	3D	0.94	1.79	0.05	0.00	0.19	-6.60	13%	15%			15%
	8	2D	0.83	1.56	0.00	0.00	0.00	-5.75					
16	9	3D	-1.93	-2.18	-0.10	0.00	0.35	-7.00	16%	18%			19%
	9	2D	-1.66	-1.84	0.00	0.00	0.00	-5.88					
	10	3D	1.93	2.18	0.10	0.00	0.35	-8.65	16%	18%			18%
	10	2D	1.66	1.84	0.00	0.00	0.00	-7.32					
17	11	3D	-3.10	-2.73	-0.11	0.00	0.37	-10.11	17%	15%			15%
	11	2D	-2.66	-2.37	0.00	0.00	0.00	-8.76					
	12	3D	3.10	2.73	0.11	0.00	0.43	-10.04	17%	15%			16%
	12	2D	2.66	2.37	0.00	0.00	0.00	-8.69					
18	14	3D	1.54	-2.87	-0.16	0.00	0.54	-10.85	15%	16%			16%
	14	2D	1.34	-2.47	0.00	0.00	0.00	-9.34					
	15	3D	-1.54	2.87	0.16	0.00	0.63	-10.33	15%	16%			16%
	15	2D	-1.34	2.47	0.00	0.00	0.00	-8.89					
50	22	3D	3.13	-1.93	0.00	0.00	0.00	-6.81	-8%	-8%			-8%
	22	2D	3.39	-2.09	0.00	0.00	0.00	-7.40					
	23	3D	-3.13	1.93	0.00	0.00	0.00	-7.03	-8%	-8%			-8%
	23	2D	-3.39	2.09	0.00	0.00	0.00	-7.61					
51	24	3D	-1.18	-2.08	0.00	0.00	0.00	-7.68	-5%	-8%			-8%
	24	2D	-1.24	-2.25	0.00	0.00	0.00	-8.30					
	25	3D	1.18	2.08	0.00	0.00	0.00	-7.64	-5%	-8%			-8%
	25	2D	1.24	2.25	0.00	0.00	0.00	-8.26					
52	26	3D	-2.28	-2.47	0.00	0.00	0.00	-7.92	-1%	-8%			-8%
	26	2D	-2.30	-2.69	0.00	0.00	0.00	-8.63					
	27	3D	2.28	2.47	0.00	0.00	0.00	-9.82	-1%	-8%			-8%
	27	2D	2.30	2.69	0.00	0.00	0.00	-10.68					
53	28	3D	-3.64	-3.13	0.00	0.00	0.00	-11.58	-9%	-8%			-8%
	28	2D	-3.98	-3.40	0.00	0.00	0.00	-12.57					
	29	3D	3.64	3.13	0.00	0.00	0.00	-11.49	-9%	-8%			-8%
	29	2D	3.98	3.40	0.00	0.00	0.00	-12.48					
54	31	3D	1.69	-3.25	0.00	0.00	0.00	-12.26	3%	-8%			-8%
	31	2D	1.64	-3.55	0.00	0.00	0.00	-13.39					
	32	3D	-1.69	3.25	0.00	0.00	0.00	-11.68	3%	-8%			-8%
	32	2D	-1.64	3.55	0.00	0.00	0.00	-12.76					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.5 COMPARISON OF THE 3-D AND 2-D ANALYSES OF THE TRANSVERSE BEAMS

WIND BLOWING FROM U/S TO D/S

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
14	5	3D	1.94	-0.53	-0.03	0.00	0.10	-1.88	9%	23%			22%
	5	2D	1.78	-0.43	0.00	0.00	0.00	-1.54					
	6	3D	-1.94	0.53	0.03	0.00	0.10	-1.91	9%	23%			22%
	6	2D	-1.78	0.43	0.00	0.00	0.00	-1.56					
15	7	3D	-0.56	-0.44	-0.02	0.00	0.06	-1.64	8%	22%			25%
	7	2D	-0.52	-0.36	0.00	0.00	0.00	-1.31					
	8	3D	0.56	0.44	0.02	0.00	0.07	-1.64	8%	22%			25%
	8	2D	0.52	0.36	0.00	0.00	0.00	-1.31					
16	9	3D	-0.26	-0.61	-0.06	0.00	0.20	-1.91	24%	24%			25%
	9	2D	-0.21	-0.49	0.00	0.00	0.00	-1.53					
	10	3D	0.26	0.61	0.06	0.00	0.20	-2.48	24%	24%			24%
	10	2D	0.21	0.49	0.00	0.00	0.00	-2.00					
17	11	3D	-1.25	-0.71	-0.04	0.00	0.13	-2.61	16%	27%			25%
	11	2D	-1.08	-0.56	0.00	0.00	0.00	-2.08					
	12	3D	1.25	0.71	0.04	0.00	0.15	-2.59	16%	27%			25%
	12	2D	1.08	0.56	0.00	0.00	0.00	-2.07					
18	14	3D	0.87	-0.77	-0.06	0.00	0.20	-2.96	13%	24%			25%
	14	2D	0.77	-0.62	0.00	0.00	0.00	-2.37					
	15	3D	-0.87	0.77	0.06	0.00	0.22	-2.76	13%	24%			25%
	15	2D	-0.77	0.62	0.00	0.00	0.00	-2.20					
50	22	3D	3.23	-0.67	0.00	0.00	0.00	-2.40	-9%	-22%			-22%
	22	2D	3.55	-0.86	0.00	0.00	0.00	-3.07					
	23	3D	-3.23	0.67	0.00	0.00	0.00	-2.44	-9%	-22%			-22%
	23	2D	-3.55	0.86	0.00	0.00	0.00	-3.13					
51	24	3D	-0.97	-0.53	0.00	0.00	0.00	-1.97	-8%	-25%			-25%
	24	2D	-1.05	-0.71	0.00	0.00	0.00	-2.62					
	25	3D	0.97	0.53	0.00	0.00	0.00	-1.96	-8%	-25%			-25%
	25	2D	1.05	0.71	0.00	0.00	0.00	-2.61					
52	26	3D	-0.32	-0.74	0.00	0.00	0.00	-2.28	-22%	-24%			-25%
	26	2D	-0.41	-0.98	0.00	0.00	0.00	-3.05					
	27	3D	0.32	0.74	0.00	0.00	0.00	-3.05	-22%	-24%			-24%
	27	2D	0.41	0.98	0.00	0.00	0.00	-4.00					
53	28	3D	-1.82	-0.84	0.00	0.00	0.00	-3.12	-16%	-26%			-25%
	28	2D	-2.16	-1.13	0.00	0.00	0.00	-4.16					
	29	3D	1.82	0.84	0.00	0.00	0.00	-3.10	-16%	-26%			-25%
	29	2D	2.16	1.13	0.00	0.00	0.00	-4.14					
54	31	3D	1.36	-0.92	0.00	0.00	0.00	-3.54	-12%	-26%			-25%
	31	2D	1.55	-1.24	0.00	0.00	0.00	-4.73					
	32	3D	-1.36	0.92	0.00	0.00	0.00	-3.27	-12%	-26%			-26%
	32	2D	-1.55	1.24	0.00	0.00	0.00	-4.39					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.5 COMPARISON OF THE 3-D AND 2-D ANALYSES OF THE TRANSVERSE BEAMS

WIND BLOWING FROM D/S TO U/S

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
14	5	3D	-1.19	0.45	0.02	0.00	-0.06	1.61	14%	22%			24%
	5	2D	-1.04	0.37	0.00	0.00	0.00	1.30					
	6	3D	1.19	-0.45	-0.02	0.00	-0.07	1.64	14%	22%			24%
	6	2D	1.04	-0.37	0.00	0.00	0.00	1.32					
15	7	3D	1.12	0.51	0.02	0.00	-0.08	1.88	5%	24%			23%
	7	2D	1.07	0.41	0.00	0.00	0.00	1.53					
	8	3D	-1.12	-0.51	-0.02	0.00	-0.09	1.88	5%	24%			23%
	8	2D	-1.07	-0.41	0.00	0.00	0.00	1.53					
16	9	3D	0.52	0.57	0.04	0.00	-0.14	1.81	16%	24%			26%
	9	2D	0.45	0.46	0.00	0.00	0.00	1.44					
	10	3D	-0.52	-0.57	-0.04	0.00	-0.15	2.31	16%	24%			26%
	10	2D	-0.45	-0.46	0.00	0.00	0.00	1.84					
17	11	3D	1.96	0.76	0.05	0.00	-0.17	2.81	11%	25%			24%
	11	2D	1.77	0.61	0.00	0.00	0.00	2.26					
	12	3D	-1.96	-0.76	-0.05	0.00	-0.20	2.79	11%	25%			24%
	12	2D	-1.77	-0.61	0.00	0.00	0.00	2.25					
18	14	3D	-0.45	0.79	0.07	0.00	-0.25	3.02	15%	25%			25%
	14	2D	-0.39	0.63	0.00	0.00	0.00	2.42					
	15	3D	0.45	-0.79	-0.07	0.00	-0.28	2.81	15%	25%			25%
	15	2D	0.39	-0.63	0.00	0.00	0.00	2.24					
50	22	3D	-1.80	0.55	0.00	0.00	0.00	1.96	-14%	-25%			-24%
	22	2D	-2.09	0.73	0.00	0.00	0.00	2.59					
	23	3D	1.80	-0.55	0.00	0.00	0.00	2.00	-14%	-25%			-24%
	23	2D	2.09	-0.73	0.00	0.00	0.00	2.64					
51	24	3D	2.05	0.64	0.00	0.00	0.00	2.35	-5%	-23%			-23%
	24	2D	2.15	0.83	0.00	0.00	0.00	3.05					
	25	3D	-2.05	-0.64	0.00	0.00	0.00	2.36	-5%	-23%			-23%
	25	2D	-2.15	-0.83	0.00	0.00	0.00	3.05					
52	26	3D	0.73	0.68	0.00	0.00	0.00	2.12	-18%	-25%			-26%
	26	2D	0.89	0.91	0.00	0.00	0.00	2.87					
	27	3D	-0.73	-0.68	0.00	0.00	0.00	2.76	-18%	-25%			-25%
	27	2D	-0.89	-0.91	0.00	0.00	0.00	3.68					
53	28	3D	3.17	0.93	0.00	0.00	0.00	3.44	-10%	-24%			-24%
	28	2D	3.54	1.22	0.00	0.00	0.00	4.52					
	29	3D	-3.17	-0.93	0.00	0.00	0.00	3.42	-10%	-24%			-24%
	29	2D	-3.54	-1.22	0.00	0.00	0.00	4.50					
54	31	3D	-0.69	0.95	0.00	0.00	0.00	3.64	-13%	-25%			-25%
	31	2D	-0.79	1.26	0.00	0.00	0.00	4.83					
	32	3D	0.69	-0.95	0.00	0.00	0.00	3.35	-13%	-25%			-25%
	32	2D	0.79	-1.26	0.00	0.00	0.00	4.48					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.5 COMPARISON OF THE 3-D AND 2-D ANALYSES OF THE TRANSVERSE BEAMS

CRANE AT U/S MOVING TOWARDS D/S

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
14	5	3D	1.15	-0.66	-0.02	0.00	0.08	-2.33	13%	18%			17%
	5	2D	1.02	-0.56	0.00	0.00	0.00	-2.00					
	6	3D	-1.15	0.66	0.02	0.00	0.09	-2.37	13%	18%			17%
	6	2D	-1.02	0.56	0.00	0.00	0.00	-2.03					
15	7	3D	-0.21	-0.56	-0.01	0.00	0.05	-2.06	24%	17%			17%
	7	2D	-0.17	-0.48	0.00	0.00	0.00	-1.76					
	8	3D	0.21	0.56	0.01	0.00	0.05	-2.04	24%	17%			17%
	8	2D	0.17	0.48	0.00	0.00	0.00	-1.75					
16	9	3D	-1.24	-0.93	-0.06	0.00	0.19	-2.94	4%	15%			16%
	9	2D	-1.19	-0.81	0.00	0.00	0.00	-2.54					
	10	3D	1.24	0.93	0.06	0.00	0.21	-3.75	4%	15%			15%
	10	2D	1.19	0.81	0.00	0.00	0.00	-3.27					
17	11	3D	-0.60	-0.88	-0.03	0.00	0.10	-3.27	33%	17%			17%
	11	2D	-0.45	-0.75	0.00	0.00	0.00	-2.79					
	12	3D	0.60	0.88	0.03	0.00	0.10	-3.24	33%	17%			17%
	12	2D	0.45	0.75	0.00	0.00	0.00	-2.76					
18	14	3D	1.45	-0.95	-0.04	0.00	0.15	-3.61	11%	17%			18%
	14	2D	1.31	-0.81	0.00	0.00	0.00	-3.05					
	15	3D	-1.45	0.95	0.04	0.00	0.15	-3.43	11%	17%			18%
	15	2D	-1.31	0.81	0.00	0.00	0.00	-2.91					
50	22	3D	1.42	-0.75	0.00	0.00	0.00	-2.66	-16%	-20%			-20%
	22	2D	1.69	-0.94	0.00	0.00	0.00	-3.33					
	23	3D	-1.42	0.75	0.00	0.00	0.00	-2.70	-16%	-20%			-20%
	23	2D	-1.69	0.94	0.00	0.00	0.00	-3.38					
51	24	3D	-0.22	-0.63	0.00	0.00	0.00	-2.33	-24%	-20%			-20%
	24	2D	-0.29	-0.79	0.00	0.00	0.00	-2.93					
	25	3D	0.22	0.63	0.00	0.00	0.00	-2.31	-24%	-20%			-21%
	25	2D	0.29	0.79	0.00	0.00	0.00	-2.91					
52	26	3D	-1.88	-1.10	0.00	0.00	0.00	-3.43	-5%	-19%			-19%
	26	2D	-1.98	-1.35	0.00	0.00	0.00	-4.23					
	27	3D	1.88	1.10	0.00	0.00	0.00	-4.48	-5%	-19%			-18%
	27	2D	1.98	1.35	0.00	0.00	0.00	-5.44					
53	28	3D	-0.43	-0.99	0.00	0.00	0.00	-3.67	-42%	-21%			-21%
	28	2D	-0.74	-1.25	0.00	0.00	0.00	-4.64					
	29	3D	0.43	0.99	0.00	0.00	0.00	-3.63	-42%	-21%			-21%
	29	2D	0.74	1.25	0.00	0.00	0.00	-4.60					
54	31	3D	1.91	-1.05	0.00	0.00	0.00	-3.97	-12%	-22%			-22%
	31	2D	2.18	-1.35	0.00	0.00	0.00	-5.08					
	32	3D	-1.91	1.05	0.00	0.00	0.00	-3.79	-12%	-22%			-22%
	32	2D	-2.18	1.35	0.00	0.00	0.00	-4.84					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.5 COMPARISON OF THE 3-D AND 2-D ANALYSES OF THE TRANSVERSE BEAMS

CRANE AT D/S MOVING TOWARDS U/S

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
14	5	3D	-0.76	0.54	0.01	0.00	-0.04	1.91	19%	17%			17%
	5	2D	-0.64	0.46	0.00	0.00	0.00	1.63					
	6	3D	0.76	-0.54	-0.01	0.00	-0.05	1.96	19%	17%			17%
	6	2D	0.64	-0.46	0.00	0.00	0.00	1.68					
15	7	3D	0.20	0.61	0.02	0.00	-0.08	2.28	11%	17%			18%
	7	2D	0.18	0.52	0.00	0.00	0.00	1.93					
	8	3D	-0.20	-0.61	-0.02	0.00	-0.08	2.26	11%	17%			18%
	8	2D	-0.18	-0.52	0.00	0.00	0.00	1.91					
16	9	3D	0.96	0.71	0.03	0.00	-0.09	2.27	10%	18%			18%
	9	2D	0.87	0.60	0.00	0.00	0.00	1.93					
	10	3D	-0.96	-0.71	-0.03	0.00	-0.10	2.81	10%	18%			18%
	10	2D	-0.87	-0.60	0.00	0.00	0.00	2.39					
17	11	3D	1.70	1.10	0.05	0.00	-0.18	4.06	9%	15%			15%
	11	2D	1.56	0.96	0.00	0.00	0.00	3.53					
	12	3D	-1.70	-1.10	-0.05	0.00	-0.20	4.06	9%	15%			15%
	12	2D	-1.56	-0.96	0.00	0.00	0.00	3.53					
18	14	3D	-2.20	1.34	0.09	0.00	-0.29	5.17	-2%	13%			13%
	14	2D	-2.24	1.19	0.00	0.00	0.00	4.59					
	15	3D	2.20	-1.34	-0.09	0.00	-0.34	4.73	-2%	13%			13%
	15	2D	2.24	-1.19	0.00	0.00	0.00	4.17					
50	22	3D	-0.81	0.61	0.00	0.00	0.00	2.16	-24%	-21%			-20%
	22	2D	-1.06	0.77	0.00	0.00	0.00	2.71					
	23	3D	0.81	-0.61	0.00	0.00	0.00	2.23	-24%	-21%			-20%
	23	2D	1.06	-0.77	0.00	0.00	0.00	2.80					
51	24	3D	0.24	0.68	0.00	0.00	0.00	2.53	-17%	-22%			-21%
	24	2D	0.29	0.87	0.00	0.00	0.00	3.22					
	25	3D	-0.24	-0.68	0.00	0.00	0.00	2.50	-17%	-22%			-22%
	25	2D	-0.29	-0.87	0.00	0.00	0.00	3.19					
52	26	3D	1.27	0.79	0.00	0.00	0.00	2.55	-12%	-21%			-21%
	26	2D	1.45	1.00	0.00	0.00	0.00	3.22					
	27	3D	-1.27	-0.79	0.00	0.00	0.00	3.15	-12%	-21%			-21%
	27	2D	-1.45	-1.00	0.00	0.00	0.00	3.99					
53	28	3D	2.32	1.30	0.00	0.00	0.00	4.80	-11%	-18%			-18%
	28	2D	2.60	1.59	0.00	0.00	0.00	5.87					
	29	3D	-2.32	-1.30	0.00	0.00	0.00	4.81	-11%	-18%			-18%
	29	2D	-2.60	-1.59	0.00	0.00	0.00	5.88					
54	31	3D	-3.82	1.66	0.00	0.00	0.00	6.47	2%	-16%			-15%
	31	2D	-3.74	1.98	0.00	0.00	0.00	7.64					
	32	3D	3.82	-1.66	0.00	0.00	0.00	5.81	2%	-16%			-16%
	32	2D	3.74	-1.98	0.00	0.00	0.00	6.94					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.5 COMPARISON OF THE 3-D AND 2-D ANALYSES OF THE TRANSVERSE BEAMS

CRANE STRIKING U/S SIDE

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
14	5	3D	-0.69	0.53	0.02	0.00	-0.08	1.88	17%	13%			13%
	5	2D	-0.59	0.47	0.00	0.00	0.00	1.66					
	6	3D	0.69	-0.53	-0.02	0.00	-0.08	1.94	17%	13%			13%
	6	2D	0.59	-0.47	0.00	0.00	0.00	1.71					
15	7	3D	0.12	0.32	0.01	0.00	-0.03	1.20	20%	19%			19%
	7	2D	0.10	0.27	0.00	0.00	0.00	1.01					
	8	3D	-0.12	-0.32	-0.01	0.00	-0.03	1.19	20%	19%			19%
	8	2D	-0.10	-0.27	0.00	0.00	0.00	1.00					
16	9	3D	0.85	0.67	0.05	0.00	-0.17	2.15	-1%	14%			13%
	9	2D	0.86	0.59	0.00	0.00	0.00	1.90					
	10	3D	-0.85	-0.67	-0.05	0.00	-0.16	2.63	-1%	14%			13%
	10	2D	-0.86	-0.59	0.00	0.00	0.00	2.33					
17	11	3D	0.58	0.54	0.02	0.00	-0.06	2.01	18%	17%			18%
	11	2D	0.49	0.46	0.00	0.00	0.00	1.71					
	12	3D	-0.58	-0.54	-0.02	0.00	-0.06	2.00	18%	17%			18%
	12	2D	-0.49	-0.46	0.00	0.00	0.00	1.70					
18	14	3D	-1.01	0.62	0.03	0.00	-0.09	2.38	9%	17%			17%
	14	2D	-0.93	0.53	0.00	0.00	0.00	2.04					
	15	3D	1.01	-0.62	-0.03	0.00	-0.09	2.22	9%	17%			17%
	15	2D	0.93	-0.53	0.00	0.00	0.00	1.90					
50	22	3D	-0.79	0.66	0.00	0.00	0.00	2.31	-19%	-15%			-16%
	22	2D	-0.98	0.78	0.00	0.00	0.00	2.76					
	23	3D	0.79	-0.66	0.00	0.00	0.00	2.40	-19%	-15%			-16%
	23	2D	0.98	-0.78	0.00	0.00	0.00	2.85					
51	24	3D	0.12	0.35	0.00	0.00	0.00	1.31	-25%	-22%			-22%
	24	2D	0.16	0.45	0.00	0.00	0.00	1.68					
	25	3D	-0.12	-0.35	0.00	0.00	0.00	1.30	-25%	-22%			-22%
	25	2D	-0.16	-0.45	0.00	0.00	0.00	1.67					
52	26	3D	1.44	0.82	0.00	0.00	0.00	2.64	1%	-16%			-16%
	26	2D	1.43	0.98	0.00	0.00	0.00	3.15					
	27	3D	-1.44	-0.82	0.00	0.00	0.00	3.25	1%	-16%			-16%
	27	2D	-1.43	-0.98	0.00	0.00	0.00	3.87					
53	28	3D	0.64	0.61	0.00	0.00	0.00	2.24	-22%	-21%			-21%
	28	2D	0.82	0.77	0.00	0.00	0.00	2.84					
	29	3D	-0.64	-0.61	0.00	0.00	0.00	2.23	-22%	-21%			-21%
	29	2D	-0.82	-0.77	0.00	0.00	0.00	2.83					
54	31	3D	-1.38	0.70	0.00	0.00	0.00	2.69	-10%	-21%			-21%
	31	2D	-1.54	0.89	0.00	0.00	0.00	3.39					
	32	3D	1.38	-0.70	0.00	0.00	0.00	2.50	-10%	-21%			-21%
	32	2D	1.54	-0.89	0.00	0.00	0.00	3.16					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.5 COMPARISON OF THE 3-D AND 2-D ANALYSES OF THE TRANSVERSE BEAMS

CRANE STRIKING D/S SIDE

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
14	5	3D	0.50	-0.32	-0.01	0.00	0.02	-1.13	19%	19%			18%
	5	2D	0.42	-0.27	0.00	0.00	0.00	-0.96					
	6	3D	-0.50	0.32	0.01	0.00	0.03	-1.16	19%	19%			18%
	6	2D	-0.42	0.27	0.00	0.00	0.00	-0.98					
15	7	3D	-0.19	-0.51	-0.02	0.00	0.06	-1.89	19%	13%			14%
	7	2D	-0.16	-0.45	0.00	0.00	0.00	-1.66					
	8	3D	0.19	0.51	0.02	0.00	0.07	-1.87	19%	13%			14%
	8	2D	0.16	0.45	0.00	0.00	0.00	-1.64					
16	9	3D	-0.60	-0.44	-0.02	0.00	0.05	-1.39	11%	19%			18%
	9	2D	-0.54	-0.37	0.00	0.00	0.00	-1.18					
	10	3D	0.60	0.44	0.02	0.00	0.06	-1.75	11%	19%			18%
	10	2D	0.54	0.37	0.00	0.00	0.00	-1.48					
17	11	3D	-0.23	-0.76	-0.04	0.00	0.14	-2.82	92%	13%			14%
	11	2D	-0.12	-0.67	0.00	0.00	0.00	-2.47					
	12	3D	0.23	0.76	0.04	0.00	0.16	-2.78	92%	13%			14%
	12	2D	0.12	0.67	0.00	0.00	0.00	-2.44					
18	14	3D	0.99	-0.75	-0.06	0.00	0.20	-2.82	-3%	14%			15%
	14	2D	1.02	-0.66	0.00	0.00	0.00	-2.45					
	15	3D	-0.99	0.75	0.06	0.00	0.24	-2.74	-3%	14%			15%
	15	2D	-1.02	0.66	0.00	0.00	0.00	-2.39					
50	22	3D	0.55	-0.35	0.00	0.00	0.00	-1.24	-23%	-22%			-22%
	22	2D	0.71	-0.45	0.00	0.00	0.00	-1.59					
	23	3D	-0.55	0.35	0.00	0.00	0.00	-1.27	-23%	-22%			-22%
	23	2D	-0.71	0.45	0.00	0.00	0.00	-1.63					
51	24	3D	-0.21	-0.62	0.00	0.00	0.00	-2.29	-22%	-16%			-17%
	24	2D	-0.27	-0.74	0.00	0.00	0.00	-2.76					
	25	3D	0.21	0.62	0.00	0.00	0.00	-2.27	-22%	-16%			-17%
	25	2D	0.27	0.74	0.00	0.00	0.00	-2.74					
52	26	3D	-0.77	-0.48	0.00	0.00	0.00	-1.53	-13%	-23%			-22%
	26	2D	-0.89	-0.62	0.00	0.00	0.00	-1.96					
	27	3D	0.77	0.48	0.00	0.00	0.00	-1.94	-13%	-23%			-21%
	27	2D	0.89	0.62	0.00	0.00	0.00	-2.47					
53	28	3D	0.02	-0.92	0.00	0.00	0.00	-3.42	-110%	-17%			-17%
	28	2D	-0.20	-1.11	0.00	0.00	0.00	-4.11					
	29	3D	-0.02	0.92	0.00	0.00	0.00	-3.36	-110%	-17%			-17%
	29	2D	0.20	1.11	0.00	0.00	0.00	-4.05					
54	31	3D	1.76	-0.90	0.00	0.00	0.00	-3.35	4%	-17%			-18%
	31	2D	1.70	-1.09	0.00	0.00	0.00	-4.08					
	32	3D	-1.76	0.90	0.00	0.00	0.00	-3.27	4%	-17%			-18%
	32	2D	-1.70	1.09	0.00	0.00	0.00	-3.97					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO. – 6.6 THE RANGE OF PERCENTAGE DIFFRENCE OF MEMBER FORCES OF TRANSVERSE BEAMS IN 3-D ANALYSIS AS COMPARED WITH 2-D ANALYSIS (MAIN FRAME)

LOADING CONDITION(↓)	AXIAL FORCE	SHEAR FORCE (y)	(z)	BENDING MOMENT (Y)	(Z)
DEAD LOAD + LIVE LOAD	-4% (50,53) to 4% (17)	NO CHANGE			-1% (16) to 1% (52)
EARTHQUAKE (TRANSVERSE)	-9% (53) to 17% (17)	-8% (50 to 54) to 21% (14)			-8% (50 to 54) to 21% (14)
WIND FROM US TO DS	-22% (52) to 24% (16)	-26% (53,54) to 27% (17)			-26% (54) to 25% (15 to 18)
WIND FROM DS TO US	-18% (52) to 16% (16)	-25% (50,52,54) to 25% (17,18)			-26% (52) to 26% (16)
CRANE MOVING US TO DS	-42% (53) to 33% (17)	-22% (54) to 18% (14)			-22% (54) to 18% (18)
CRANE MOVING DS TO US	-24% (50) to 19% (14)	-22% (51) to 18% (16)			-22% (51) to 18% (15,16)
CRANE STRIKING US	-25% (51) to 20% (15)	-22% (51) to 19% (15)			-22% (51) to 19% (15)
CRANE STRIKING DS	-110% (53) to 92% (17)	-23% (52) to 19% (14,16)			-22% (50,52) to 18% (14,16)

Negative sign indicates reduction of member force in the 3-D analysis.
The number in ( ) indicates the member number.

TABLE NO.~ 6.7 COMPARISON OF 3-D AND 2-D ANALYSES OF THE LONGITUDINAL BEAMS

DEAD LOAD + LIVE LOAD

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
24	5	3D	-0.39	18.39	-0.01	0.17	0.03	14.61	3%	0%			1%
	5	2D	-0.38	18.35	0.00	0.00	0.00	14.53					
	22	3D	0.39	19.85	0.01	-0.17	0.04	-18.61	3%	0%			0%
	22	2D	0.38	19.82	0.00	0.00	0.00	-18.59					
25	6	3D	-0.95	19.12	0.00	-0.03	0.00	17.46	-19%	0%			0%
	6	2D	-1.17	19.10	0.00	0.00	0.00	17.45					
	23	3D	0.95	19.11	0.00	0.03	0.01	-17.43	-19%	0%			0%
	23	2D	1.17	19.08	0.00	0.00	0.00	-17.39					
26	7	3D	-1.20	19.15	0.00	0.03	-0.01	17.52	0%	0%			0%
	7	2D	-1.20	19.11	0.00	0.00	0.00	17.50					
	24	3D	1.20	19.09	0.00	-0.03	-0.01	-17.38	0%	0%			0%
	24	2D	1.20	19.06	0.00	0.00	0.00	-17.34					
27	8	3D	-1.85	18.81	0.00	-0.03	-0.01	16.16	-1%	0%			0%
	8	2D	-1.86	18.80	0.00	0.00	0.00	16.13					
	25	3D	1.85	19.43	0.00	0.03	-0.02	-17.85	-1%	0%			0%
	25	2D	1.86	19.42	0.00	0.00	0.00	-17.84					
28	9	3D	2.82	5.46	-0.03	0.21	0.07	4.86	-2%	0%			0%
	9	2D	2.87	5.45	0.00	0.00	0.00	4.85					
	26	3D	-2.82	5.36	0.03	-0.21	0.08	-4.58	-2%	0%			1%
	26	2D	-2.87	5.34	0.00	0.00	0.00	-4.55					
29	10	3D	0.64	17.58	-0.04	-0.05	0.10	16.18	7%	-9%			-9%
	10	2D	0.60	19.42	0.00	0.00	0.00	17.84					
	27	3D	-0.64	17.44	0.04	0.05	0.12	-15.78	7%	-10%			-10%
	27	2D	-0.60	19.30	0.00	0.00	0.00	-17.49					
30	11	3D	0.10	19.49	0.04	0.05	-0.11	17.97	0%	0%			0%
	11	2D	0.10	19.46	0.00	0.00	0.00	17.95					
	28	3D	-0.10	19.29	-0.04	-0.05	-0.12	-17.43	0%	0%			0%
	28	2D	-0.10	19.26	0.00	0.00	0.00	-17.39					
31	12	3D	1.37	19.22	0.04	0.00	-0.09	16.78	-3%	0%			0%
	12	2D	1.41	19.21	0.00	0.00	0.00	16.75					
	29	3D	-1.37	19.56	-0.04	0.00	-0.12	-17.71	-3%	0%			0%
	29	2D	-1.41	19.56	0.00	0.00	0.00	-17.71					
32	13	3D	1.93	11.63	-0.11	-0.05	0.28	10.80	-9%	0%			0%
	13	2D	2.13	11.63	0.00	0.00	0.00	10.82					
	30	3D	-1.93	11.40	0.11	0.05	0.31	-10.19	-9%	0%			0%
	30	2D	-2.13	11.40	0.00	0.00	0.00	-10.17					
33	14	3D	2.31	15.43	0.10	0.06	-0.27	14.28	2%	0%			0%
	14	2D	2.26	15.41	0.00	0.00	0.00	14.26					
	31	3D	-2.31	15.19	-0.10	-0.06	-0.30	-13.60	2%	0%			0%
	31	2D	-2.26	15.15	0.00	0.00	0.00	-13.56					
34	15	3D	2.87	5.63	0.07	-0.07	-0.17	5.36	-1%	0%			0%
	15	2D	2.91	5.61	0.00	0.00	0.00	5.35					
	32	3D	-2.87	5.19	-0.07	0.07	-0.22	-4.15	-1%	0%			0%
	32	2D	-2.91	5.17	0.00	0.00	0.00	-4.13					
35	16	3D	1.51	1.80	-0.02	0.10	0.04	1.99	0%	-1%			-1%
	16	2D	1.51	1.81	0.00	0.00	0.00	2.01					
	33	3D	-1.51	1.43	0.02	-0.10	0.08	-0.95	0%	1%			1%
	33	2D	-1.51	1.42	0.00	0.00	0.00	-0.94					
36	17	3D	1.91	1.86	0.03	-0.10	-0.06	2.15	0%	0%			0%
	17	2D	1.91	1.86	0.00	0.00	0.00	2.16					
	34	3D	-1.91	1.37	-0.03	0.10	-0.10	-0.81	0%	0%			1%
	34	2D	-1.91	1.37	0.00	0.00	0.00	-0.80					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.7 COMPARISON OF 3-D AND 2-D ANALYSES OF THE LONGITUDINAL BEAMS

EARTHQUAKE IN THE LONGITUDINAL DIRECTION

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
24	5	3D	-0.29	-1.67	0.10	-0.01	-0.33	-4.79	-48%	-47%			-47%
	5	2D	-0.56	-3.15	0.00	0.00	0.00	-9.07					
	22	3D	0.29	1.67	-0.10	0.01	-0.23	-4.39	-48%	-47%			-47%
	22	2D	0.56	3.15	0.00	0.00	0.00	-8.27					
25	6	3D	-0.55	-4.05	0.04	-0.01	-0.10	-11.17	6%	7%			7%
	6	2D	-0.52	-3.79	0.00	0.00	0.00	-10.47					
	23	3D	0.55	4.05	-0.04	0.01	-0.09	-11.08	6%	7%			7%
	23	2D	0.52	3.79	0.00	0.00	0.00	-10.39					
26	7	3D	-0.63	-4.69	0.00	0.00	0.01	-12.95	19%	19%			19%
	7	2D	-0.53	-3.95	0.00	0.00	0.00	-10.91					
	24	3D	0.63	4.69	0.00	0.00	0.01	-12.85	19%	19%			19%
	24	2D	0.53	3.95	0.00	0.00	0.00	-10.82					
27	8	3D	-0.43	-4.14	0.02	0.00	-0.05	-11.72	-12%	-13%			-14%
	8	2D	-0.49	-4.78	0.00	0.00	0.00	-13.55					
	25	3D	0.43	4.14	-0.02	0.00	-0.05	-11.03	-12%	-13%			-13%
	25	2D	0.49	4.78	0.00	0.00	0.00	-12.73					
28	9	3D	0.12	-1.23	0.32	0.00	-0.99	-3.62	20%	-41%			-41%
	9	2D	0.10	-2.08	0.00	0.00	0.00	-6.15					
	26	3D	-0.12	1.23	-0.32	0.00	-0.77	-3.12	20%	-41%			-41%
	26	2D	-0.10	2.08	0.00	0.00	0.00	-5.31					
29	10	3D	-0.51	-5.57	0.06	0.00	-0.18	-15.38	6%	8%			7%
	10	2D	-0.48	-5.18	0.00	0.00	0.00	-14.31					
	27	3D	0.51	5.57	-0.06	0.00	-0.17	-15.26	6%	8%			7%
	27	2D	0.48	5.18	0.00	0.00	0.00	-14.20					
30	11	3D	-0.60	-6.38	-0.02	0.00	0.05	-17.61	18%	18%			18%
	11	2D	-0.51	-5.40	0.00	0.00	0.00	-14.90					
	28	3D	0.60	6.38	0.02	0.00	0.05	-17.48	18%	18%			18%
	28	2D	0.51	5.40	0.00	0.00	0.00	-14.79					
31	12	3D	-0.35	-4.18	-0.03	0.00	0.09	-11.78	0%	-11%			-11%
	12	2D	-0.35	-4.68	0.00	0.00	0.00	-13.17					
	29	3D	0.35	4.18	0.03	0.00	0.06	-11.24	0%	-11%			-11%
	29	2D	0.35	4.68	0.00	0.00	0.00	-12.57					
32	13	3D	-1.18	-5.28	0.05	0.00	-0.14	-14.59	11%	8%			9%
	13	2D	-1.06	-4.87	0.00	0.00	0.00	-13.44					
	30	3D	1.18	5.28	-0.05	0.00	-0.12	-14.47	11%	8%			9%
	30	2D	1.06	4.87	0.00	0.00	0.00	-13.33					
33	14	3D	-1.44	-5.94	-0.04	0.00	0.12	-16.39	20%	18%			18%
	14	2D	-1.20	-5.03	0.00	0.00	0.00	-13.90					
	31	3D	1.44	5.94	0.04	0.00	0.11	-16.26	20%	18%			18%
	31	2D	1.20	5.03	0.00	0.00	0.00	-13.79					
34	15	3D	0.30	-2.60	-0.14	0.00	0.41	-7.53	7%	-7%			-7%
	15	2D	0.28	-2.79	0.00	0.00	0.00	-8.06					
	32	3D	-0.30	2.60	0.14	0.00	0.34	-6.79	7%	-7%			-6%
	32	2D	-0.28	2.79	0.00	0.00	0.00	-7.26					
35	16	3D	1.12	-3.88	0.04	0.01	-0.12	-10.87	8%	9%			9%
	16	2D	1.04	-3.56	0.00	0.00	0.00	-9.98					
	33	3D	-1.12	3.88	-0.04	-0.01	-0.09	-10.45	8%	9%			9%
	33	2D	-1.04	3.56	0.00	0.00	0.00	-9.61					
36	17	3D	1.28	-4.29	-0.03	-0.01	0.10	-12.04	17%	18%			18%
	17	2D	1.09	-3.63	0.00	0.00	0.00	-10.18					
	34	3D	-1.28	4.29	0.03	0.01	0.09	-11.58	17%	18%			18%
	34	2D	-1.09	3.63	0.00	0.00	0.00	-9.79					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.7 COMPARISON OF 3-D AND 2-D ANALYSES OF THE LONGITUDINAL BEAMS

CRANE MOVING IN LONGITUDINAL DIRECTION

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
24	5	3D	-0.04	-0.21	0.04	0.00	-0.14	-0.59					
		2D											
	22	3D	0.04	0.21	-0.04	0.00	-0.08	-0.54					
		2D											
25	6	3D	-0.12	-0.98	0.00	-0.01	0.00	-2.71	-8%	-6%			-6%
	6	2D	-0.13	-1.04	0.00	0.00	0.00	-2.89					
	23	3D	0.12	0.98	0.00	0.01	0.00	-2.68	-8%	-6%			-6%
	23	2D	0.13	1.04	0.00	0.00	0.00	-2.86					
26	7	3D	-0.11	-0.91	-0.01	0.02	0.03	-2.52	-15%	-13%			-13%
	7	2D	-0.13	-1.04	0.00	0.00	0.00	-2.89					
	24	3D	0.11	0.91	0.01	-0.02	0.02	-2.50	-15%	-13%			-13%
	24	2D	0.13	1.04	0.00	0.00	0.00	-2.86					
27	8	3D	-0.03	-0.32	-0.03	0.02	0.10	-0.89					
		2D											
	25	3D	0.03	0.32	0.03	-0.02	0.06	-0.84					
		2D											
28	9	3D	0.04	-0.17	0.12	0.00	-0.39	-0.50					
		2D											
	26	3D	-0.04	0.17	-0.12	0.00	-0.28	-0.43					
		2D											
29	10	3D	-0.13	-1.36	0.01	0.02	-0.02	-3.77	-7%	-5%			-5%
	10	2D	-0.14	-1.43	0.00	0.00	0.00	-3.96					
	27	3D	0.13	1.36	-0.01	-0.02	-0.02	-3.74	-7%	-5%			-5%
	27	2D	0.14	1.43	0.00	0.00	0.00	-3.93					
30	11	3D	-0.13	-1.26	-0.02	0.00	0.06	-3.47	-7%	-12%			-12%
	11	2D	-0.14	-1.43	0.00	0.00	0.00	-3.96					
	28	3D	0.13	1.26	0.02	0.00	0.05	-3.45	-7%	-12%			-12%
	28	2D	0.14	1.43	0.00	0.00	0.00	-3.93					
31	12	3D	-0.01	-0.34	-0.08	-0.01	0.27	-0.95					
		2D											
	29	3D	0.01	0.34	0.08	0.01	0.19	-0.91					
		2D											
32	13	3D	-0.73	-1.19	0.08	0.09	-0.21	-3.30	0%	-4%			-4%
	13	2D	-0.73	-1.24	0.00	0.00	0.00	-3.43					
	30	3D	0.73	1.19	-0.08	-0.09	-0.21	-3.27	0%	-4%			-4%
	30	2D	0.73	1.24	0.00	0.00	0.00	-3.39					
33	14	3D	-0.72	-1.08	-0.08	-0.06	0.23	-3.00	-1%	-13%			-13%
	14	2D	-0.73	-1.24	0.00	0.00	0.00	-3.43					
	31	3D	0.72	1.08	0.08	0.06	0.23	-2.97	-1%	-13%			-12%
	31	2D	0.73	1.24	0.00	0.00	0.00	-3.39					
34	15	3D	0.07	-0.23	-0.19	-0.03	0.56	-0.66					
		2D											
	32	3D	-0.07	0.23	0.19	0.03	0.46	-0.59					
		2D											
35	16	3D	0.44	-0.73	0.06	-0.03	-0.17	-2.05	-2%	-3%			-4%
	16	2D	0.45	-0.75	0.00	0.00	0.00	-2.13					
	33	3D	-0.44	0.73	-0.06	0.03	-0.18	-1.94	-2%	-3%			-4%
	33	2D	-0.45	0.75	0.00	0.00	0.00	-2.02					
36	17	3D	0.41	-0.66	-0.05	0.05	0.13	-1.86	-9%	-12%			-13%
	17	2D	0.45	-0.75	0.00	0.00	0.00	-2.13					
	34	3D	-0.41	0.66	0.05	-0.05	0.12	-1.75	-9%	-12%			-13%
	34	2D	-0.45	0.75	0.00	0.00	0.00	-2.02					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO. – 6.8 THE RANGE OF PERCENTAGE DIFFRENCE OF MEMBER FORCES OF LONGITUDINAL BEAMS IN 3-D ANALYSIS AS COMPARED WITH 2-D ANALYSIS

LOADING CONDITION(↓)	AXIAL FORCE	SHEAR FORCE (y)	(z)	BENDING MOMENT (Y)	(Z)
DEAD LOAD + LIVE LOAD	-19% (25) to 7% (29)	-10% (29) to 1% (35)			-10% (29) to 1% (35)
EARTHQUAKE (LONGITUDINAL)	-48% (24) to 20% (33)	-47% (24) to 19% (26)			-47% (24) to 19% (26)
CRANE MOVING LEFT TO RIGHT	-15% (26) to 0% (32)	-13% (26,33) to -3% (35)			-13% (26,36) to -4% (32,35)

Negative sign indicates reduction of member force in the 3-D analysis.
The number in ( ) indicates the member number.

6.3 COMPARATIVE STUDY OF THE SYMMETRICAL FRAME

The comparative studies of the symmetrical frame (Fig.no.-6.2) are organized as follows.

6.3.1 COMPARATIVE STUDY OF THE END BENT OF THE SYMMETRICAL FRAME

1) Comparison of the 3-D and 2-D analyses of column members of the transverse end frame (Table no.- 6.9)
2) The range of percentage difference of member forces of end frame columns in 3-D analysis as compared with 2-D analysis (Table no.- 6.10).

From Table.-6.9 and Table-6.10, it is seen that for the columns of the end frame, in general for lateral loads in the transverse direction there is increase of member forces in the 3-D analysis as compared with the 2-D analysis and in the longitudinal direction there is no change at all. In the vertical loads (Dead + Live) the difference is very small. Here, for the earthquake loads also the difference is small. In the earthquake in the transverse direction there is some increase in the member forces but for the earthquake in the longitudinal direction there is no change at all.

In the case of lateral loads other than the earthquake loads there is, in general an increase of member forces in the 3-D analysis. The range of percentage difference is shown in Table-6.10 for all the loads.

6.3.2 COMPARATIVE STUDY OF THE CENTRAL BENT OF THE SYMMETRICAL FRAME

1) Comparison of the 3-D and 2-D analyses of column members of the transverse central frame (Table no.- 6.11)
2) The range of percentage difference of member forces of central frame columns in 3-D analysis as compared with 2-D analysis (Table no.- 6.12).

From Table.-6.11 and Table-6.12 it can be seen that in the columns of the central bent for the lateral loads in the transverse direction, in general there is reduction of

member forces in the 3-D analysis as compared with the 2-D analysis and in the longitudinal direction there is no change at all. In the case of vertical loads the change is negligible and in the case of earthquake loads also there is no significant change seen. In the earthquake in the transverse direction there is some reduction of member forces in the columns but in the case of earthquake in the longitudinal direction there is no change at all.

In the case of lateral loads other than the earthquake in the transverse direction there is, in general reduction of member forces in the 3-D analysis. The range of percentage difference is shown in the above given table for all the loads.

6.3.3 COMPARATIVE STUDY OF THE LONGITUDINAL BEAMS OF THE SYMMETRICAL FRAME

1) Comparison of the 3-D and 2-D analyses of the longitudinal beams (Table no.-6.13)

The longitudinal beams cannot be analyzed for the loads in the transverse direction by the 2-D approach. From Table no.-6.13 it is seen that for dead load +live load, crane moving in the longitudinal direction and the earthquake in the longitudinal direction there is no difference in the member forces of the longitudinal beams in the 3-D analysis as compared to the 2-D analysis.

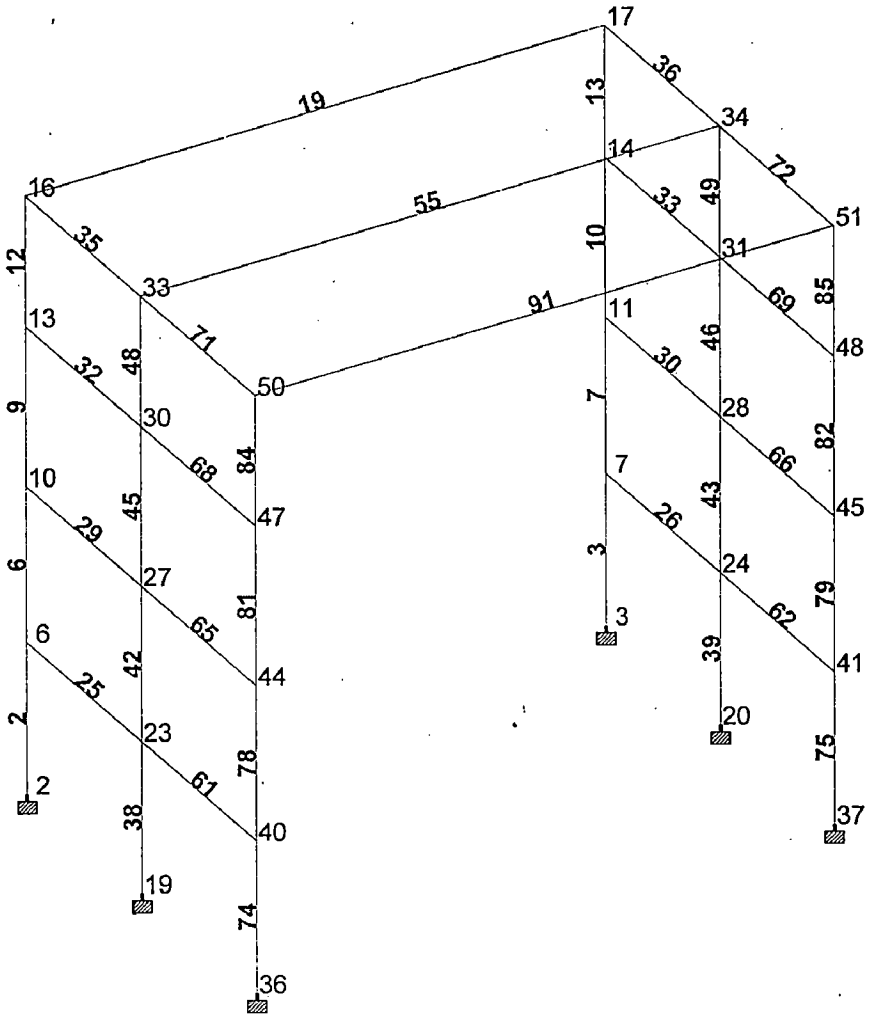

FIG. NO.- 6.2 THE NODE AND BEAM NUMBERS OF THE SYMMETRICAL FRAME

TABLE NO.~ 6.9 COMPARISON OF THE 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE END FRAME

DEAD LOAD + LIVE LOAD

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	113.76	1.99	2.13	0.33	-3.07	-0.29	0%	-3%	0%	0%	2%
	2	2D	113.64	2.05	2.13	0.00	-3.07	0.17					
	6	3D	-95.77	-1.99	-2.13	-0.33	-5.88	8.63	0%	-3%	0%	0%	2%
	6	2D	-95.65	-2.05	-2.13	0.00	-5.88	8.44					
6	6	3D	82.33	1.99	2.98	0.33	-6.40	0.48	0%	-3%	0%	0%	-27%
	6	2D	82.17	2.05	2.98	0.00	-6.40	0.66					
	10	3D	-63.91	-1.99	-2.98	-0.33	-6.40	8.07	0%	-3%	0%	0%	-1%
	10	2D	-63.76	-2.05	-2.98	0.00	-6.40	8.15					
9	10	3D	50.15	2.02	3.03	0.26	-6.26	1.25	0%	-1%	0%	0%	11%
	10	2D	50.01	2.05	3.03	0.00	-6.26	1.13					
	13	3D	-31.30	-2.02	-3.03	-0.26	-7.08	7.64	0%	-1%	0%	0%	-3%
	13	2D	-31.16	-2.05	-3.03	0.00	-7.08	7.88					
12	13	3D	18.90	2.11	1.52	0.04	-3.58	7.66	1%	3%	0%	0%	4%
	13	2D	18.79	2.05	1.52	0.00	-3.58	7.38					
	16	3D	-11.85	-2.11	-1.52	-0.04	-1.88	-0.08	1%	3%	0%	0%	neligible
	16	2D	-11.74	-2.05	-1.52	0.00	-1.88	0.00					

EARTHQUAKE IN THE TRANSVERSE DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	0.00	9.37	0.00	-2.04	0.00	120.19		1%			2%
	2	2D	0.00	9.26	0.00	0.00	0.00	117.69					
	6	3D	0.00	-9.37	0.00	2.04	0.00	-80.83		1%			3%
	6	2D	0.00	-9.26	0.00	0.00	0.00	-78.81					
6	6	3D	0.00	9.03	0.00	-1.99	0.00	80.76		1%			2%
	6	2D	0.00	8.92	0.00	0.00	0.00	78.81					
	10	3D	0.00	-9.03	0.00	1.99	0.00	-41.93		1%			4%
	10	2D	0.00	-8.92	0.00	0.00	0.00	-40.47					
9	10	3D	0.00	7.36	0.00	-1.67	0.00	41.83		1%			3%
	10	2D	0.00	7.26	0.00	0.00	0.00	40.47					
	13	3D	0.00	-7.36	0.00	1.67	0.00	-9.43		1%			10%
	13	2D	0.00	-7.26	0.00	0.00	0.00	-8.54					
12	13	3D	0.00	2.56	0.00	-0.91	0.00	9.31		8%			9%
	13	2D	0.00	2.37	0.00	0.00	0.00	8.54					
	16	3D	0.00	-2.56	0.00	0.91	0.00	-0.08		8%			neligible
	16	2D	0.00	-2.37	0.00	0.00	0.00	0.00					

EARTHQUAKE IN THE LONGITUDINAL DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	-15.55	0.00	-8.85	0.00	61.36	0.00	0%		0%	0%	
	2	2D	-15.55	0.00	-8.85	0.00	61.36	0.00					
	6	3D	15.55	0.00	8.85	0.00	-24.17	0.00	0%		0%	0%	
	6	2D	15.55	0.00	8.85	0.00	-24.17	0.00					
6	6	3D	-12.20	0.00	-8.13	0.00	33.42	0.00	0%		0%	0%	
	6	2D	-12.20	0.00	-8.13	0.00	33.42	0.00					
	10	3D	12.20	0.00	8.13	0.00	1.56	0.00	0%		0%	0%	
	10	2D	12.20	0.00	8.13	0.00	1.56	0.00					
9	10	3D	-7.58	0.00	-6.39	0.00	11.20	0.00	0%		0%	0%	
	10	2D	-7.58	0.00	-6.39	0.00	11.20	0.00					
	13	3D	7.58	0.00	6.39	0.00	16.91	0.00	0%		0%	0%	
	13	2D	7.58	0.00	6.39	0.00	16.91	0.00					
12	13	3D	-3.20	0.00	-1.15	0.00	-4.84	0.00	0%		0%	0%	
	13	2D	-3.20	0.00	-1.15	0.00	-4.84	0.00					
	16	3D	3.20	0.00	1.15	0.00	8.98	0.00	0%		0%	0%	
	16	2D	3.20	0.00	1.15	0.00	8.98	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.9 COMPARISON OF THE 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE END FRAME

WIND BLOWING FROM U/S TO D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	0.00	6.30	0.00	-1.95	0.00	61.02		14%			21%
	2	2D	0.00	5.51	0.00	0.00	0.00	50.36					
	6	3D	0.00	-5.08	0.00	1.95	0.00	-37.12		18%			25%
	6	2D	0.00	-4.30	0.00	0.00	0.00	-29.76					
6	6	3D	0.00	5.05	0.00	-1.88	0.00	37.05		17%			24%
	6	2D	0.00	4.30	0.00	0.00	0.00	29.76					
	10	3D	0.00	-3.81	0.00	1.88	0.00	-18.01		25%			29%
	10	2D	0.00	-3.06	0.00	0.00	0.00	-13.95					
9	10	3D	0.00	3.66	0.00	-1.54	0.00	17.92		20%			28%
	10	2D	0.00	3.06	0.00	0.00	0.00	13.95					
	13	3D	0.00	-2.22	0.00	1.54	0.00	-4.99		38%			36%
	13	2D	0.00	-1.61	0.00	0.00	0.00	-3.68					
12	13	3D	0.00	1.93	0.00	-0.84	0.00	4.90		20%			33%
	13	2D	0.00	1.61	0.00	0.00	0.00	3.68					
	16	3D	0.00	-0.75	0.00	0.84	0.00	-0.07		74%			neligible
	16	2D	0.00	-0.43	0.00	0.00	0.00	0.00					

WIND BLOWING FROM D/S TO U/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	0.00	-4.33	0.00	1.60	0.00	-52.55		20%			24%
	2	2D	0.00	-3.62	0.00	0.00	0.00	-42.34					
	6	3D	0.00	3.81	0.00	-1.60	0.00	35.44		23%			26%
	6	2D	0.00	3.10	0.00	0.00	0.00	28.22					
6	6	3D	0.00	-3.79	0.00	1.57	0.00	-35.40		22%			25%
	6	2D	0.00	-3.10	0.00	0.00	0.00	-28.22					
	10	3D	0.00	3.26	0.00	-1.57	0.00	20.23		27%			26%
	10	2D	0.00	2.57	0.00	0.00	0.00	16.03					
9	10	3D	0.00	-3.16	0.00	1.34	0.00	-20.16		23%			26%
	10	2D	0.00	-2.57	0.00	0.00	0.00	-16.03					
	13	3D	0.00	2.54	0.00	-1.34	0.00	7.63		30%			25%
	13	2D	0.00	1.95	0.00	0.00	0.00	6.10					
12	13	3D	0.00	-2.32	0.00	0.80	0.00	-7.54		19%			24%
	13	2D	0.00	-1.95	0.00	0.00	0.00	-6.10					
	16	3D	0.00	1.81	0.00	-0.80	0.00	0.12		26%			neligible
	16	2D	0.00	1.44	0.00	0.00	0.00	0.00					

CRANE AT U/S MOVING TOWARDS D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	79.37	3.09	0.03	-2.08	-0.04	70.52	1%	33%			18%
	2	2D	78.82	2.32	0.00	0.00	0.00	60.00					
	6	3D	-79.37	-3.09	-0.03	2.08	-0.06	-57.56	1%	33%			15%
	6	2D	-78.82	-2.32	0.00	0.00	0.00	-50.26					
6	6	3D	79.31	3.08	0.05	-2.09	-0.10	57.50	1%	33%			14%
	6	2D	78.82	2.32	0.00	0.00	0.00	50.26					
	10	3D	-79.31	-3.08	-0.05	2.09	-0.13	-44.26	1%	33%			10%
	10	2D	-78.82	-2.32	0.00	0.00	0.00	-40.29					
9	10	3D	79.18	2.96	0.11	-1.82	-0.21	44.13	0%	28%			10%
	10	2D	78.82	2.32	0.00	0.00	0.00	40.29					
	13	3D	-79.18	-2.96	-0.11	1.82	-0.29	-31.12	0%	28%			3%
	13	2D	-78.82	-2.32	0.00	0.00	0.00	-30.09					
12	13	3D	0.18	-3.98	0.19	-0.84	-0.22	-14.42		-6%			-5%
	13	2D	0.00	-4.23	0.00	0.00	0.00	-15.23					
	16	3D	-0.18	3.98	-0.19	0.84	-0.47	0.08		-6%			neligible
	16	2D	0.00	4.23	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.9 COMPARISON OF THE 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE END FRAME

CRANE AT D/S MOVING TOWARDS D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	24.99	-4.86	0.01	1.23	-0.01	-64.95	1%	15%			17%
	2	2D	24.82	-4.23	0.00	0.00	0.00	-55.54					
	6	3D	-24.99	4.86	-0.01	-1.23	-0.02	44.53	1%	15%			18%
	6	2D	-24.82	4.23	0.00	0.00	0.00	37.77					
6	6	3D	24.97	-4.85	0.02	1.21	-0.03	-44.49	1%	15%			18%
	6	2D	24.82	-4.23	0.00	0.00	0.00	-37.77					
	10	3D	-24.97	4.85	-0.02	-1.21	-0.04	23.65	1%	15%			21%
	10	2D	-24.82	4.23	0.00	0.00	0.00	19.58					
9	10	3D	24.93	-4.77	0.04	1.04	-0.07	-23.60	0%	13%			21%
	10	2D	24.82	-4.23	0.00	0.00	0.00	-19.58					
	13	3D	-24.93	4.77	-0.04	-1.04	-0.09	2.59	0%	13%			170%
	13	2D	-24.82	4.23	0.00	0.00	0.00	0.96					
12	13	3D	0.06	-4.63	0.06	0.70	-0.07	-16.82		9%			10%
	13	2D	0.00	-4.23	0.00	0.00	0.00	-15.23					
	16	3D	-0.06	4.63	-0.06	-0.70	-0.15	0.16		9%			neligible
	16	2D	0.00	4.23	0.00	0.00	0.00	0.00					

CRANE STRIKING U/S SIDE

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	0.00	-5.14	0.00	1.50	0.00	-59.04		12%			13%
	2	2D	0.00	-4.58	0.00	0.00	0.00	-52.05					
	6	3D	0.00	5.14	0.00	-1.50	0.00	37.44		12%			14%
	6	2D	0.00	4.58	0.00	0.00	0.00	32.80					
6	6	3D	0.00	-5.11	0.00	1.44	0.00	-37.38		12%			14%
	6	2D	0.00	-4.58	0.00	0.00	0.00	-32.80					
	10	3D	0.00	5.11	0.00	-1.44	0.00	15.40		12%			18%
	10	2D	0.00	4.58	0.00	0.00	0.00	13.09					
9	10	3D	0.00	-4.98	0.00	1.12	0.00	-15.31		9%			17%
	10	2D	0.00	-4.58	0.00	0.00	0.00	-13.09					
	13	3D	0.00	4.98	0.00	-1.12	0.00	-6.59		9%			-7%
	13	2D	0.00	4.58	0.00	0.00	0.00	-7.08					
12	13	3D	0.00	1.83	0.00	0.46	0.00	6.67		-7%			-6%
	13	2D	0.00	1.97	0.00	0.00	0.00	7.08					
	16	3D	0.00	-1.83	0.00	-0.46	0.00	-0.07		-7%			neligible
	16	2D	0.00	-1.97	0.00	0.00	0.00	0.00					

CRANE STRIKING D/S SIDE

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	0.00	2.36	0.00	-0.76	0.00	38.36		21%			19%
	2	2D	0.00	1.95	0.00	0.00	0.00	32.20					
	6	3D	0.00	-2.36	0.00	0.76	0.00	-28.47		21%			19%
	6	2D	0.00	-1.95	0.00	0.00	0.00	-24.00					
6	6	3D	0.00	2.35	0.00	-0.76	0.00	28.45		21%			19%
	6	2D	0.00	1.95	0.00	0.00	0.00	24.00					
	10	3D	0.00	-2.35	0.00	0.76	0.00	-18.33		21%			17%
	10	2D	0.00	-1.95	0.00	0.00	0.00	-15.61					
9	10	3D	0.00	2.31	0.00	-0.68	0.00	18.29		18%			17%
	10	2D	0.00	1.95	0.00	0.00	0.00	15.61					
	13	3D	0.00	-2.31	0.00	0.68	0.00	-8.11		18%			16%
	13	2D	0.00	-1.95	0.00	0.00	0.00	-7.02					
12	13	3D	0.00	2.21	0.00	-0.44	0.00	8.06		13%			15%
	13	2D	0.00	1.95	0.00	0.00	0.00	7.02					
	16	3D	0.00	-2.21	0.00	0.44	0.00	-0.09		13%			neligible
	16	2D	0.00	-1.95	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.– 6.9 COMPARISON OF THE 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE END FRAME

CRANE MOVING IN THE LONGITUDINAL DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	48.03	-2.31	-2.75	-0.05	19.64	-7.65	0%		0%	0%	
	2	2D	48.03	0.00	-2.75	0.00	19.64	0.00					
	6	3D	-48.03	2.31	2.75	0.05	-8.10	-2.05	0%		0%	0%	
	6	2D	-48.03	0.00	2.75	0.00	-8.10	0.00					
6	6	3D	49.07	-2.29	-2.61	-0.10	10.98	2.06	0%		0%	0%	
	6	2D	49.07	0.00	-2.61	0.00	10.98	0.00					
	10	3D	-49.07	2.29	2.61	0.10	0.26	-11.93	0%		0%	0%	
	10	2D	-49.07	0.00	2.61	0.00	0.26	0.00					
9	10	3D	50.51	-2.27	-2.47	-0.17	3.70	11.91	0%		0%	0%	
	10	2D	50.51	0.00	-2.47	0.00	3.70	0.00					
	13	3D	-50.51	2.27	2.47	0.17	7.18	-21.90	0%		0%	0%	
	13	2D	-50.51	0.00	2.47	0.00	7.18	0.00					
12	13	3D	-0.75	-2.31	0.45	-0.06	-3.75	-8.37	0%		0%	0%	
	13	2D	-0.75	0.00	0.45	0.00	-3.75	0.00					
	16	3D	0.75	2.31	-0.45	0.06	2.13	0.05	0%		0%	0%	
	16	2D	0.75	0.00	-0.45	0.00	2.13	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO. – 6.10 THE RANGE OF PERCENTAGE DIFFRENCE OF MEMBER FORCES OF END FRAME COLUMNS IN 3-D ANALYSIS AS COMPARED WITH 2-D ANALYSIS (SYMMETRICAL FRAME)

LOADING CONDITION(↓)	AXIAL FORCE	SHEAR FORCE (y)	(z)	BENDING MOMENT (Y)	(Z)
DEAD LOAD + LIVE LOAD	0% TO 1%(12)	-3% (2, 6) TO 3% (12)	NO CHANGE	NO CHANGE	-27% (6) TO 11% (9)
EARTHQUAKE (TRANSVERSE)		1% (2,6,9) TO 8% (12)			2% (2,6) TO 10% (9)
EARTHQUAKE (LONGITUDINAL)	NO CHANGE		NO CHANGE	NO CHANGE	
WIND FROM US TO DS		14% (2) TO 74% (12)			21% (2) TO 36% (9)
WIND FROM DS TO US		19% (12) TO 30% (9)			24% (12) TO 26% (6,9)
CRANE MOVING US TO DS	0% (9) TO 1% (2,6)	-6% (12) TO 33% (2,6)			-5% (12) TO 18% (2)
CRANE MOVING DS TO US	0% (9) TO 1% (2,6)	9% (12) TO 15% (2, 6)			10% (12) TO 170% (9)
CRANE STRIKING US		-7% (12) TO 12% (2, 6)			-7% (9) TO 18% (6)
CRANE STRIKING DS		13% (12) TO 21% (2, 6)			15% (12) TO 19% (2, 6)
CRANE MOVING LEFT TO RIGHT	NO CHANGE		NO CHANGE	NO CHANGE	

Negative sign indicates reduction of member force in the 3-D analysis.
The number in ( ) indicates the member number.

TABLE NO.~ 6.11 COMPARISON OF THE 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE CENTRAL FRAME

DEAD LOAD + LIVE LOAD

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	163.58	3.96	0.00	0.00	0.00	0.38	0%	3%			negligible
	19	2D	164.39	3.84	0.00	0.00	0.00	-0.53					
	23	3D	-145.59	-3.96	0.00	0.00	0.00	16.25	-1%	3%			-2%
	23	2D	-146.40	-3.84	0.00	0.00	0.00	16.65					
42	23	3D	118.72	3.96	0.00	0.00	0.00	1.90	-1%	3%			23%
	23	2D	119.45	3.84	0.00	0.00	0.00	1.54					
	27	3D	-100.31	-3.96	0.00	0.00	0.00	15.11	-1%	3%			1%
	27	2D	-101.03	-3.84	0.00	0.00	0.00	14.95					
45	27	3D	72.98	3.90	0.00	0.00	0.00	3.38	-1%	2%			-6%
	27	2D	73.53	3.84	0.00	0.00	0.00	3.61					
	30	3D	-54.13	-3.90	0.00	0.00	0.00	13.76	-1%	2%			4%
	30	2D	-54.69	-3.84	0.00	0.00	0.00	13.27					
48	30	3D	29.57	3.72	0.00	0.00	0.00	13.23	-1%	-3%			-4%
	30	2D	29.94	3.84	0.00	0.00	0.00	13.81					
	33	3D	-22.52	-3.72	0.00	0.00	0.00	0.17	-2%	-3%			negligible
	33	2D	-22.89	-3.84	0.00	0.00	0.00	0.00					

EARTHQUAKE IN THE TRANSVERSE DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	0.00	10.63	0.00	0.00	0.00	134.79		-3%			-4%
	19	2D	0.00	10.95	0.00	0.00	0.00	140.74					
	23	3D	0.00	-10.63	0.00	0.00	0.00	-90.15		-3%			-5%
	23	2D	0.00	-10.95	0.00	0.00	0.00	-94.76					
42	23	3D	0.00	10.25	0.00	0.00	0.00	90.28		-3%			-5%
	23	2D	0.00	10.56	0.00	0.00	0.00	94.76					
	27	3D	0.00	-10.25	0.00	0.00	0.00	-46.21		-3%			-6%
	27	2D	0.00	-10.56	0.00	0.00	0.00	-49.34					
45	27	3D	0.00	8.72	0.00	0.00	0.00	46.42		-3%			-6%
	27	2D	0.00	8.96	0.00	0.00	0.00	49.34					
	30	3D	0.00	-8.72	0.00	0.00	0.00	-8.04		-3%			-19%
	30	2D	0.00	-8.96	0.00	0.00	0.00	-9.93					
48	30	3D	0.00	2.34	0.00	0.00	0.00	8.27		-15%			-17%
	30	2D	0.00	2.76	0.00	0.00	0.00	9.93					
	33	3D	0.00	-2.34	0.00	0.00	0.00	0.16		-15%			negligible
	33	2D	0.00	-2.76	0.00	0.00	0.00	0.00					

EARTHQUAKE IN THE LONGITUDINAL DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	0.00	0.00	-10.25	0.00	63.32	0.00			0%	0%	
	19	2D	0.00	0.00	-10.25	0.00	63.32	0.00					
	23	3D	0.00	0.00	10.25	0.00	-20.29	0.00			0%	0%	
	23	2D	0.00	0.00	10.25	0.00	-20.29	0.00					
42	23	3D	0.00	0.00	-10.68	0.00	38.63	0.00			0%	0%	
	23	2D	0.00	0.00	-10.68	0.00	38.63	0.00					
	27	3D	0.00	0.00	10.68	0.00	7.27	0.00			0%	0%	
	27	2D	0.00	0.00	10.68	0.00	7.27	0.00					
45	27	3D	0.00	0.00	-9.54	0.00	18.06	0.00			0%	0%	
	27	2D	0.00	0.00	-9.54	0.00	18.06	0.00					
	30	3D	0.00	0.00	9.54	0.00	23.92	0.00			0%	0%	
	30	2D	0.00	0.00	9.54	0.00	23.92	0.00					
48	30	3D	0.00	0.00	-4.81	0.00	0.03	0.00			0%	0%	
	30	2D	0.00	0.00	-4.81	0.00	0.03	0.00					
	33	3D	0.00	0.00	4.81	0.00	17.28	0.00			0%	0%	
	33	2D	0.00	0.00	4.81	0.00	17.28	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.11 COMPARISON OF THE 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE CENTRAL FRAME

WIND BLOWING FROM U/S TO D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	0.00	9.44	0.00	0.00	0.00	79.30		-14%			-21%
	19	2D	0.00	11.02	0.00	0.00	0.00	100.62					
	23	3D	0.00	-7.02	0.00	0.00	0.00	-44.73		-18%			-25%
	23	2D	0.00	-8.59	0.00	0.00	0.00	-59.45					
42	23	3D	0.00	7.09	0.00	0.00	0.00	44.87		-17%			-25%
	23	2D	0.00	8.59	0.00	0.00	0.00	59.45					
	27	3D	0.00	-4.60	0.00	0.00	0.00	-19.74		-25%			-29%
	27	2D	0.00	-6.10	0.00	0.00	0.00	-27.86					
45	27	3D	0.00	4.90	0.00	0.00	0.00	19.92		-20%			-28%
	27	2D	0.00	6.10	0.00	0.00	0.00	27.86					
	30	3D	0.00	-2.01	0.00	0.00	0.00	-4.72		-38%			-36%
	30	2D	0.00	-3.22	0.00	0.00	0.00	-7.35					
48	30	3D	0.00	2.58	0.00	0.00	0.00	4.91		-20%			-33%
	30	2D	0.00	3.22	0.00	0.00	0.00	7.35					
	33	3D	0.00	-0.23	0.00	0.00	0.00	0.15		-73%			negligible
	33	2D	0.00	-0.86	0.00	0.00	0.00	0.00					

WIND BLOWING FROM D/S TO U/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	0.00	-5.82	0.00	0.00	0.00	-64.18		-20%			-24%
	19	2D	0.00	-7.24	0.00	0.00	0.00	-84.59					
	23	3D	0.00	4.77	0.00	0.00	0.00	41.94		-23%			-26%
	23	2D	0.00	6.20	0.00	0.00	0.00	56.38					
42	23	3D	0.00	-4.81	0.00	0.00	0.00	-42.04		-22%			-25%
	23	2D	0.00	-6.20	0.00	0.00	0.00	-56.38					
	27	3D	0.00	3.75	0.00	0.00	0.00	23.64		-27%			-26%
	27	2D	0.00	5.13	0.00	0.00	0.00	32.04					
45	27	3D	0.00	-3.95	0.00	0.00	0.00	-23.79		-23%			-26%
	27	2D	0.00	-5.13	0.00	0.00	0.00	-32.04					
	30	3D	0.00	2.71	0.00	0.00	0.00	9.13		-30%			-25%
	30	2D	0.00	3.89	0.00	0.00	0.00	12.19					
48	30	3D	0.00	-3.16	0.00	0.00	0.00	-9.31		-19%			-24%
	30	2D	0.00	-3.89	0.00	0.00	0.00	-12.19					
	33	3D	0.00	2.15	0.00	0.00	0.00	-0.23		-25%			negligible
	33	2D	0.00	2.88	0.00	0.00	0.00	0.00					

CRANE AT U/S MOVING TOWARDS D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	130.27	2.32	0.00	0.00	0.00	78.85	-1%	-40%			-21%
	19	2D	131.36	3.85	0.00	0.00	0.00	99.89					
	23	3D	-130.27	-2.32	0.00	0.00	0.00	-69.11	-1%	-40%			-17%
	23	2D	-131.36	-3.85	0.00	0.00	0.00	-83.70					
42	23	3D	130.39	2.33	0.00	0.00	0.00	69.22	-1%	-39%			-17%
	23	2D	131.36	3.85	0.00	0.00	0.00	83.70					
	27	3D	-130.39	-2.33	0.00	0.00	0.00	-59.18	-1%	-39%			-12%
	27	2D	-131.36	-3.85	0.00	0.00	0.00	-67.13					
45	27	3D	130.63	2.58	0.00	0.00	0.00	59.44	-1%	-33%			-11%
	27	2D	131.36	3.85	0.00	0.00	0.00	67.13					
	30	3D	-130.63	-2.58	0.00	0.00	0.00	-48.10	-1%	-33%			-4%
	30	2D	-131.36	-3.85	0.00	0.00	0.00	-50.17					
48	30	3D	-0.35	-7.54	0.00	0.00	0.00	-26.98		7%			6%
	30	2D	0.00	-7.05	0.00	0.00	0.00	-25.36					
	33	3D	0.35	7.54	0.00	0.00	0.00	-0.16		7%			negligible
	33	2D	0.00	7.05	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.11 COMPARISON OF THE 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE CENTRAL FRAME

CRANE AT D/S MOVING TOWARDS U/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	41.02	-5.78	0.00	0.00	0.00	-73.65	-1%	-18%			-20%
	19	2D	41.36	-7.05	0.00	0.00	0.00	-92.48					
	23	3D	-41.02	5.78	0.00	0.00	0.00	49.36	-1%	-18%			-22%
	23	2D	-41.36	7.05	0.00	0.00	0.00	62.89					
42	23	3D	41.05	-5.81	0.00	0.00	0.00	-49.43	-1%	-18%			-21%
	23	2D	41.36	-7.05	0.00	0.00	0.00	-62.89					
	27	3D	-41.05	5.81	0.00	0.00	0.00	24.44	-1%	-18%			-25%
	27	2D	-41.36	7.05	0.00	0.00	0.00	32.60					
45	27	3D	41.13	-5.96	0.00	0.00	0.00	-24.55	-1%	-15%			-25%
	27	2D	41.36	-7.05	0.00	0.00	0.00	-32.60					
	30	3D	-41.13	5.96	0.00	0.00	0.00	-1.68	-1%	-15%			negligible
	30	2D	-41.36	7.05	0.00	0.00	0.00	1.60					
48	30	3D	-0.11	-6.25	0.00	0.00	0.00	-22.18		-11%			-13%
	30	2D	0.00	-7.05	0.00	0.00	0.00	-25.36					
	33	3D	0.11	6.25	0.00	0.00	0.00	-0.33		-11%			negligible
	33	2D	0.00	7.05	0.00	0.00	0.00	0.00					

CRANE STRIKING U/S SIDE

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	0.00	-6.51	0.00	0.00	0.00	-72.63		-15%			-16%
	19	2D	0.00	-7.63	0.00	0.00	0.00	-86.62					
	23	3D	0.00	6.51	0.00	0.00	0.00	45.29		-15%			-17%
	23	2D	0.00	7.63	0.00	0.00	0.00	54.58					
42	23	3D	0.00	-6.57	0.00	0.00	0.00	-45.41		-14%			-17%
	23	2D	0.00	-7.63	0.00	0.00	0.00	-54.58					
	27	3D	0.00	6.57	0.00	0.00	0.00	17.16		-14%			-21%
	27	2D	0.00	7.63	0.00	0.00	0.00	21.78					
45	27	3D	0.00	-6.84	0.00	0.00	0.00	-17.34		-10%			-20%
	27	2D	0.00	-7.63	0.00	0.00	0.00	-21.78					
	30	3D	0.00	6.84	0.00	0.00	0.00	-12.75		-10%			8%
	30	2D	0.00	7.63	0.00	0.00	0.00	-11.78					
48	30	3D	0.00	3.54	0.00	0.00	0.00	12.60		8%			7%
	30	2D	0.00	3.27	0.00	0.00	0.00	11.78					
	33	3D	0.00	-3.54	0.00	0.00	0.00	0.13		8%			negligible
	33	2D	0.00	-3.27	0.00	0.00	0.00	0.00					

CRANE STRIKING D/S SIDE

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	0.00	2.49	0.00	0.00	0.00	42.15		-24%			-22%
	19	2D	0.00	3.27	0.00	0.00	0.00	53.99					
	23	3D	0.00	-2.49	0.00	0.00	0.00	-31.68		-24%			-21%
	23	2D	0.00	-3.27	0.00	0.00	0.00	-40.25					
42	23	3D	0.00	2.50	0.00	0.00	0.00	31.72		-24%			-21%
	23	2D	0.00	3.27	0.00	0.00	0.00	40.25					
	27	3D	0.00	-2.50	0.00	0.00	0.00	-20.98		-24%			-20%
	27	2D	0.00	-3.27	0.00	0.00	0.00	-26.18					
45	27	3D	0.00	2.57	0.00	0.00	0.00	21.05		-21%			-20%
	27	2D	0.00	3.27	0.00	0.00	0.00	26.18					
	30	3D	0.00	-2.57	0.00	0.00	0.00	-9.72		-21%			-17%
	30	2D	0.00	-3.27	0.00	0.00	0.00	-11.78					
48	30	3D	0.00	2.77	0.00	0.00	0.00	9.82		-15%			-17%
	30	2D	0.00	3.27	0.00	0.00	0.00	11.78					
	33	3D	0.00	-2.77	0.00	0.00	0.00	0.17		-15%			negligible
	33	2D	0.00	-3.27	0.00	0.00	0.00	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.~ 6.11 COMPARISON OF THE 3-D AND 2-D ANALYSES OF COLUMN MEMBERS OF THE TRANSVERSE CENTRAL FRAME

CRANE MOVING IN THE LONGITUDINAL DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	86.77	-3.79	-3.22	0.00	20.30	-12.81	0%		0%	0%	
	19	2D	86.77	0.00	-3.22	0.00	20.30	0.00					
	23	3D	-86.77	3.79	3.22	0.00	-6.79	-3.11	0%		0%	0%	
	23	2D	-86.77	0.00	3.22	0.00	-6.79	0.00					
42	23	3D	86.85	-3.82	-3.45	0.00	12.73	3.09	0%		0%	0%	
	23	2D	86.85	0.00	-3.45	0.00	12.73	0.00					
	27	3D	-86.85	3.82	3.45	0.00	2.09	-19.53	0%		0%	0%	
	27	2D	-86.85	0.00	3.45	0.00	2.09	0.00					
45	27	3D	87.02	-3.87	-3.65	0.00	6.22	19.56	0%		0%	0%	
	27	2D	87.02	0.00	-3.65	0.00	6.22	0.00					
	30	3D	-87.02	3.87	3.65	0.00	9.85	-36.60	0%		0%	0%	
	30	2D	-87.02	0.00	3.65	0.00	9.85	0.00					
48	30	3D	-0.23	-3.79	-0.64	0.00	-2.38	-13.55	0%		0%	0%	
	30	2D	-0.23	0.00	-0.64	0.00	-2.38	0.00					
	33	3D	0.23	3.79	0.64	0.00	4.69	-0.09	0%		0%	0%	
	33	2D	0.23	0.00	0.64	0.00	4.69	0.00					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO. – 6.12 THE RANGE OF PERCENTAGE DIFFRENCE OF MEMBER FORCES OF CENTRAL FRAME COLUMNS IN 3-D ANALYSIS AS COMPARED WITH 2-D ANALYSIS.

LOADING CONDITION(↓)	AXIAL FORCE	SHEAR FORCE (y)	(z)	BENDING MOMENT (Y)	(Z)
DEAD LOAD + LIVE LOAD	-2% (48) TO 0% (38)	-3% (48) TO 3% (38,42)			-6% (45) TO 23% (42)
EARTHQUAKE (TRANSVERSE)		-15% (48) TO -3% (38,42,45)			-19% (45) TO -4% (38)
EARTHQUAKE (LONGITUDINAL)			NO CHANGE	NO CHANGE	
WIND FROM US TO DS		-73% (48) TO -14% (38)			-36% (45) TO -21% (38)
WIND FROM DS TO US		-30% (45) TO 19% (48)			-26% (42,45) TO -24% (38,48)
CRANE MOVING US TO DS	-1% (38,42,45)	-40% (38) TO 7% (48)			-21% (38) TO 6% (48)
CRANE MOVING DS TO US	-1% (38,42,45)	-18% (38,42) TO -11% (48)			-25% (42) TO -13% (48)
CRANE STRIKING US		-15% (38) TO 8% (48)			-21% (42) TO 8% (45)
CRANE STRIKING DS		-24% (38,42) TO -15% (48)			-22% (38) TO -17% (48)
CRANE MOVING LEFT TO RIGHT	NO CHANGE		NO CHANGE	NO CHANGE	

Negative sign indicates reduction of member force in the 3-D analysis.
The number in ( ) indicates the member number.

TABLE NO.~ 6.13 COMPARISON OF THE 3-D AND 2-D ANALYSES OF THE LONGITUDINAL BEAMS

DEAD LOAD + LIVE LOAD

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
25	6	3D	-0.85	13.44	0.00	-0.02	0.00	12.28	0%	0%			0%
	6	2D	-0.85	13.44	0.00	0.00	0.00	12.28					
	23	3D	0.85	13.44	0.00	0.02	0.01	-12.26	0%	0%			0%
	23	2D	0.85	13.44	0.00	0.00	0.00	-12.26					
29	10	3D	-0.05	13.76	-0.03	-0.03	0.07	12.65	0%	0%			0%
	10	2D	-0.05	13.76	0.00	0.00	0.00	12.65					
	27	3D	0.05	13.67	0.03	0.03	0.10	-12.38	0%	0%			0%
	27	2D	0.05	13.67	0.00	0.00	0.00	-12.38					
32	13	3D	1.52	11.58	-0.09	-0.05	0.22	10.65	0%	0%			0%
	13	2D	1.52	11.58	0.00	0.00	0.00	10.65					
	30	3D	-1.52	11.45	0.09	0.05	0.25	-10.32	0%	0%			0%
	30	2D	-1.52	11.45	0.00	0.00	0.00	-10.32					
35	16	3D	1.52	1.76	-0.02	0.08	0.04	1.88	0%	0%			0%
	16	2D	1.52	1.76	0.00	0.00	0.00	1.88					
	33	3D	-1.52	1.47	0.02	-0.08	0.07	-1.06	0%	0%			0%
	33	2D	-1.52	1.47	0.00	0.00	0.00	-1.06					

EARTHQUAKE IN THE LONGITUDINAL DIRECTION

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
25	6	3D	-0.42	-3.35	0.00	0.00	0.00	-9.25	0%	0%			0%
	6	2D	-0.42	-3.35	0.00	0.00	0.00	-9.25					
	23	3D	0.42	3.35	0.00	0.00	0.00	-9.17	0%	0%			0%
	23	2D	0.42	3.35	0.00	0.00	0.00	-9.17					
29	10	3D	-0.29	-4.62	0.00	0.00	0.00	-12.76	0%	0%			0%
	10	2D	-0.29	-4.62	0.00	0.00	0.00	-12.76					
	27	3D	0.29	4.62	0.00	0.00	0.00	-12.67	0%	0%			0%
	27	2D	0.29	4.62	0.00	0.00	0.00	-12.67					
32	13	3D	-0.96	-4.37	0.00	0.00	0.00	-12.07	0%	0%			0%
	13	2D	-0.96	-4.37	0.00	0.00	0.00	-12.07					
	30	3D	0.96	4.37	0.00	0.00	0.00	-11.97	0%	0%			0%
	30	2D	0.96	4.37	0.00	0.00	0.00	-11.97					
35	16	3D	0.92	-3.20	0.00	0.00	0.00	-8.98	0%	0%			0%
	16	2D	0.92	-3.20	0.00	0.00	0.00	-8.98					
	33	3D	-0.92	3.20	0.00	0.00	0.00	-8.64	0%	0%			0%
	33	2D	-0.92	3.20	0.00	0.00	0.00	-8.64					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

TABLE NO.- 6.13 COMPARISON OF THE 3-D AND 2-D ANALYSES OF THE LONGITUDINAL BEAMS

CRANE MOVING IN THE LONGITUDINAL DIRECTION

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
25	6	3D	-0.13	-1.04	-0.02	-0.01	0.05	-2.89	0%	0%			0%
	6	2D	-0.13	-1.04	0.00	0.00	0.00	-2.89					
	23	3D	0.13	1.04	0.02	0.01	0.05	-2.86	0%	0%			0%
	23	2D	0.13	1.04	0.00	0.00	0.00	-2.86					
29	10	3D	-0.14	-1.43	-0.02	0.01	0.07	-3.96	0%	0%			0%
	10	2D	-0.14	-1.43	0.00	0.00	0.00	-3.96					
	27	3D	0.14	1.43	0.02	-0.01	0.07	-3.93	0%	0%			0%
	27	2D	0.14	1.43	0.00	0.00	0.00	-3.93					
32	13	3D	-0.73	-1.24	0.04	0.08	-0.11	-3.43	0%	0%			0%
	13	2D	-0.73	-1.24	0.00	0.00	0.00	-3.43					
	30	3D	0.73	1.24	-0.04	-0.08	-0.12	-3.39	0%	0%			0%
	30	2D	0.73	1.24	0.00	0.00	0.00	-3.39					
35	16	3D	0.45	-0.75	0.02	-0.05	-0.06	-2.13	0%	0%			0%
	16	2D	0.45	-0.75	0.00	0.00	0.00	-2.13					
	33	3D	-0.45	0.75	-0.02	0.05	-0.08	-2.02	0%	0%			0%
	33	2D	-0.45	0.75	0.00	0.00	0.00	-2.02					

The % denotes the percentage difference of 3-D analysis as compared with 2-D analysis.
The (-) sign denotes the reduction of member forces in the 3-D analysis.

6.4 COMPARATIVE STUDY OF THE BEAMS AT THE CRANE LEVEL AND THE BASE COLUMNS

The columns at the base are the most critical members as they are subjected to the maximum forces and are also the most heavily reinforced members. The beams at the crane level are subjected to stresses due to the crane forces acting at that level. Therefore, it is now deemed necessary to compare and study the difference in the 3-D and 2-D analyses for the above said members. The comparisons for these members are now done separately.

The comparative studies are organized in the following manner.

6.4.1 COMPARATIVE STUDY OF THE MAIN FRAME

1) Comparison of the 3-D and 2-D analyses of the base columns of the main frame (Table no.- 6.14).
2) Comparison of the 3-D and 2-D analyses of the beams at the crane level of the main frame (Table no.- 6.15).

6.4.2 COMPARATIVE STUDY OF THE SYMMETRICAL FRAME

3) Comparison of the 3-D and 2-D analyses of the base columns of the symmetrical frame (Table no.- 6.16)
4) Comparison of the 3-D and 2-D analyses of the beams at the crane level of the symmetrical frame (Table no.- 6.17)

The discussion of results of the above comparison is done in the next chapter (chapter-7).

TABLE NO.~6.14 COMPARISON OF 3-D AND 2-D ANALYSES OF BASE COLUMNS OF THE MAIN FRAME

TRANSVERSE END FRAME

TRANSVERSE CENTRAL FRAME

DEAD LOAD + LIVE LOAD

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
1	1	3D	50.08	-1.50	2.45	0.01	-3.34	-2.16	-1%	3%	-2%	-1%	2%
	1	2D	50.76	-1.46	2.49	0.00	-3.39	-2.11					
	5	3D	-46.37	1.50	-2.45	-0.01	-6.94	-4.12	-1%	3%	-2%	-2%	2%
	5	2D	-47.06	1.46	-2.49	0.00	-7.05	-4.04					
2	2	3D	143.64	3.89	3.11	0.33	-4.38	1.78	0%	-2%	1%	0%	-13%
	2	2D	143.32	3.96	3.07	0.00	-4.40	2.05					
	6	3D	-125.65	-3.89	-3.11	-0.33	-8.70	14.56	0%	-2%	1%	3%	0%
	6	2D	-125.33	-3.96	-3.07	0.00	-8.48	14.58					
D/S													
3	3	3D	162.35	-3.89	3.07	-0.29	-4.42	0.76	1%	-4%	1%	1%	
	3	2D	160.83	-4.04	3.04	0.00	-4.38	-0.39					
	7	3D	-144.36	3.89	-3.07	0.29	-8.49	-17.08	1%	-4%	1%	1%	3%
	7	2D	-142.84	4.04	-3.04	0.00	-8.40	-16.58					
4	4	3D	94.48	1.57	2.44	-0.06	-3.40	2.74	0%	2%	-1%	-1%	6%
	4	2D	94.78	1.54	2.46	0.00	-3.43	2.59					
	8	3D	-88.31	-1.57	-2.44	0.06	-6.83	3.87	0%	2%	-1%	-1%	-1%
	8	2D	-88.62	-1.54	-2.46	0.00	-6.88	3.90					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
37	18	3D	91.28	-2.61	0.00	0.00	0.00	-3.76	1%	-1%			-2%
	18	2D	90.04	-2.64	0.00	0.00	0.00	-3.82					
	22	3D	-87.58	2.61	0.00	0.00	0.00	-7.20	1%	-1%			-1%
	22	2D	-86.34	2.64	0.00	0.00	0.00	-7.27					
38	19	3D	218.38	7.50	0.00	0.00	0.00	3.73	0%	2%			17%
	19	2D	219.43	7.33	0.00	0.00	0.00	3.19					
	23	3D	-200.39	-7.50	0.00	0.00	0.00	27.76	-1%	2%			1%
	23	2D	-201.44	-7.33	0.00	0.00	0.00	27.57					
D/S													
39	20	3D	251.05	-7.71	0.00	0.00	0.00	-1.49	-1%	4%			negl
	20	2D	252.33	-7.40	0.00	0.00	0.00	0.84					
	24	3D	-233.06	7.71	0.00	0.00	0.00	-30.88	-1%	4%			-3%
	24	2D	-234.34	7.40	0.00	0.00	0.00	-31.92					
40	21	3D	164.45	2.66	0.00	0.00	0.00	4.46	0%	-2%			-6%
	21	2D	164.32	2.72	0.00	0.00	0.00	4.76					
	25	3D	-158.29	-2.66	0.00	0.00	0.00	6.70	0%	-2%			1%
	25	2D	-158.15	-2.72	0.00	0.00	0.00	6.65					

EARTHQUAKE IN TRANSVERSE DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
1	1	3D	-3.88	0.89	0.00	-0.10	0.00	4.41	20%	27%			23%
	1	2D	-3.24	0.70	0.00	0.00	0.00	3.60					
	5	3D	3.88	-0.89	0.00	0.10	0.00	-0.69	20%	27%			8%
	5	2D	3.24	-0.70	0.00	0.00	0.00	-0.64					
2	2	3D	3.87	13.61	0.01	-2.44	-0.03	143.00	19%	30%			22%
	2	2D	3.24	10.49	0.00	0.00	0.00	116.88					
	6	3D	-3.87	-13.61	-0.01	2.44	0.00	-85.85	19%	30%			18%
	6	2D	-3.24	-10.49	0.00	0.00	0.00	-72.82					
D/S													
3	3	3D	-7.41	16.57	-0.01	-2.30	0.03	159.21	16%	13%			14%
	3	2D	-6.40	14.67	0.00	0.00	0.00	139.17					
	7	3D	7.41	-16.57	0.01	2.30	0.00	-89.60	16%	13%			16%
	7	2D	6.40	-14.67	0.00	0.00	0.00	-77.56					
4	4	3D	7.41	2.87	0.00	-0.38	-0.01	19.71	16%	13%			14%
	4	2D	6.40	2.54	0.00	0.00	0.00	17.26					
	8	3D	-7.41	-2.87	0.00	0.38	0.00	-7.67	16%	13%			16%
	8	2D	-6.40	-2.54	0.00	0.00	0.00	-6.59					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
37	18	3D	-4.39	1.07	0.00	0.00	0.00	5.14	-8%	-4%			-7%
	18	2D	-4.78	1.12	0.00	0.00	0.00	5.51					
	22	3D	4.39	-1.07	0.00	0.00	0.00	-0.66	-8%	-4%			-18%
	22	2D	4.78	-1.12	0.00	0.00	0.00	-0.80					
38	19	3D	4.40	16.06	0.00	0.00	0.00	164.82	-8%	-6%			-7%
	19	2D	4.78	17.11	0.00	0.00	0.00	177.74					
	23	3D	-4.40	-16.06	0.00	0.00	0.00	-97.36	-8%	-6%			-8%
	23	2D	-4.78	-17.11	0.00	0.00	0.00	-105.89					
D/S													
39	20	3D	-8.44	19.79	0.00	0.00	0.00	185.58	-8%	-6%			-7%
	20	2D	-9.19	21.09	0.00	0.00	0.00	199.90					
	24	3D	8.44	-19.79	0.00	0.00	0.00	-102.47	-8%	-6%			-8%
	24	2D	9.19	-21.09	0.00	0.00	0.00	-111.34					
40	21	3D	8.42	3.44	0.00	0.00	0.00	23.06	-8%	-6%			-7%
	21	2D	9.19	3.65	0.00	0.00	0.00	24.79					
	25	3D	-8.42	-3.44	0.00	0.00	0.00	-8.61	-8%	-6%			-9%
	25	2D	-9.19	-3.65	0.00	0.00	0.00	-9.46					

TABLE NO.~6.14 COMPARISON OF 3-D AND 2-D ANALYSES OF BASE COLUMNS OF THE MAIN FRAME

TRANSVERSE END FRAME

TRANSVERSE CENTRAL FRAME

EARTHQUAKE IN THE LONGITUDINAL DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
1	1	3D	-2.93	0.02	-1.88	0.24	5.72	0.07	-44%		-52%	-50%	
	1	2D	-5.24	0.00	-3.89	0.00	11.52	0.00					
	5	3D	2.93	-0.02	1.88	-0.24	2.19	0.02	-44%		-52%	-54%	
	5	2D	5.24	0.00	3.89	0.00	4.81	0.00					
2	2	3D	-18.74	0.42	-10.89	1.37	74.52	2.00	8%		6%	7%	
	2	2D	-17.41	0.00	-10.25	0.00	69.94	0.00					
	6	3D	18.74	-0.42	10.89	-1.37	-28.79	-0.24	8%		6%	7%	
	6	2D	17.41	0.00	10.25	0.00	-26.88	0.00					
D/S													
3	3	3D	-21.31	-0.07	-12.79	-0.22	86.74	-0.46	18%		20%	19%	
	3	2D	-18.01	0.00	-10.65	0.00	72.80	0.00					
	7	3D	21.31	0.07	12.79	0.22	-33.02	0.16	18%		20%	18%	
	7	2D	18.01	0.00	10.65	0.00	-28.06	0.00					
4	4	3D	-10.92	-0.01	-4.77	0.05	17.05	-0.05	-11%		-15%	-15%	
	4	2D	-12.24	0.00	-5.64	0.00	19.97	0.00					
	8	3D	10.92	0.01	4.77	-0.05	2.98	0.02	-11%		-15%	-19%	
	8	2D	12.24	0.00	5.64	0.00	3.70	0.00					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
37	18	3D	0.00	0.00	-2.44	0.08	6.48	0.00			-51%	-50%	
	18	2D	0.00	0.00	-4.98	0.00	13.02	0.00					
	22	3D	0.00	0.00	2.44	-0.08	3.75	0.00			-51%	-52%	
	22	2D	0.00	0.00	4.98	0.00	7.88	0.00					
38	19	3D	0.00	0.00	-12.57	1.21	76.90	0.00			6%	7%	
	19	2D	0.00	0.00	-11.82	0.00	72.16	0.00					
	23	3D	0.00	0.00	12.57	-1.21	-24.10	0.00			6%	7%	
	23	2D	0.00	0.00	11.82	0.00	-22.50	0.00					
D/S													
39	20	3D	0.00	0.00	-14.75	-0.13	89.51	0.00			20%	19%	
	20	2D	0.00	0.00	-12.29	0.00	75.11	0.00					
	24	3D	0.00	0.00	14.75	0.13	-27.56	0.00			20%	17%	
	24	2D	0.00	0.00	12.29	0.00	-23.50	0.00					
40	21	3D	0.00	0.00	-6.33	0.07	19.19	0.00			-15%	-15%	
	21	2D	0.00	0.00	-7.47	0.00	22.48	0.00					
	25	3D	0.00	0.00	6.33	-0.07	7.39	0.00			-15%	-17%	
	25	2D	0.00	0.00	7.47	0.00	8.87	0.00					

WIND BLOWING FROM U/S TO D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
1	1	3D	-1.14	0.93	0.00	-0.07	0.00	1.91	24%	4%			14%
	1	2D	-0.92	0.89	0.00	0.00	0.00	1.68					
	5	3D	1.14	0.28	0.00	0.07	0.00	-0.56	24%	-15%			12%
	5	2D	0.92	0.33	0.00	0.00	0.00	-0.50					
2	2	3D	1.14	5.12	0.00	-1.37	-0.02	45.85	24%	17%			21%
	2	2D	0.92	4.38	0.00	0.00	0.00	37.99					
	6	3D	-1.14	-5.12	0.00	1.37	0.00	-24.33	24%	17%			24%
	6	2D	-0.92	-4.38	0.00	0.00	0.00	-19.60					
D/S													
3	3	3D	-1.93	3.73	0.00	-0.90	0.01	38.58	25%	23%			25%
	3	2D	-1.54	3.03	0.00	0.00	0.00	30.93					
	7	3D	1.93	-3.73	0.00	0.90	0.00	-22.90	25%	23%			26%
	7	2D	1.54	-3.03	0.00	0.00	0.00	-18.22					
4	4	3D	1.93	0.97	0.00	-0.12	0.00	5.07	25%	15%			23%
	4	2D	1.54	0.84	0.00	0.00	0.00	4.13					
	8	3D	-1.93	-0.45	0.00	0.12	0.00	-2.10	25%	41%			25%
	8	2D	-1.54	-0.32	0.00	0.00	0.00	-1.68					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
37	18	3D	-1.41	1.69	0.00	0.00	0.00	2.88	-24%	-5%			-14%
	18	2D	-1.85	1.77	0.00	0.00	0.00	3.35					
	22	3D	1.41	0.74	0.00	0.00	0.00	-0.88	-24%	14%			-12%
	22	2D	1.85	0.65	0.00	0.00	0.00	-1.00					
38	19	3D	1.41	7.26	0.00	0.00	0.00	60.20	-24%	-17%			-21%
	19	2D	1.85	8.75	0.00	0.00	0.00	75.91					
	23	3D	-1.41	-7.26	0.00	0.00	0.00	-29.69	-24%	-17%			-24%
	23	2D	-1.85	-8.75	0.00	0.00	0.00	-39.16					
D/S													
39	20	3D	-2.29	4.62	0.00	0.00	0.00	46.48	-25%	-24%			-25%
	20	2D	-3.07	6.04	0.00	0.00	0.00	61.78					
	24	3D	2.29	-4.62	0.00	0.00	0.00	-27.07	-25%	-24%			-26%
	24	2D	3.07	-6.04	0.00	0.00	0.00	-36.41					
40	21	3D	2.29	1.44	0.00	0.00	0.00	6.37	-25%	-15%			-23%
	21	2D	3.07	1.69	0.00	0.00	0.00	8.25					
	25	3D	-2.29	-0.40	0.00	0.00	0.00	-2.52	-25%	-38%			-25%
	25	2D	-3.07	-0.64	0.00	0.00	0.00	-3.36					

TABLE NO.~6.14 COMPARISON OF 3-D AND 2-D ANALYSES OF BASE COLUMNS OF THE MAIN FRAME

TRANSVERSE END FRAME

TRANSVERSE CENTRAL FRAME

WIND BLOWING FROM D/S TO U/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
1	1	3D	1.03	-0.49	0.00	0.04	0.00	-1.37	26%	7%			19%
	1	2D	0.82	-0.46	0.00	0.00	0.00	-1.15					
	5	3D	-1.03	-0.03	0.00	-0.04	0.00	0.39	26%				18%
	5	2D	-0.82	-0.07	0.00	0.00	0.00	0.33					
2	2	3D	-1.03	-3.51	0.00	1.08	0.01	-37.74	26%	22%			24%
	2	2D	-0.82	-2.88	0.00	0.00	0.00	-30.48					
	6	3D	1.03	3.51	0.00	-1.08	0.00	23.01	26%	22%			25%
	6	2D	0.82	2.88	0.00	0.00	0.00	18.41					
D/S													
3	3	3D	2.06	-5.17	0.00	1.09	-0.01	-45.79	24%	19%			22%
	3	2D	1.66	-4.35	0.00	0.00	0.00	-37.56					
	7	3D	-2.06	5.17	0.00	-1.09	0.00	24.09	24%	19%			25%
	7	2D	-1.66	4.35	0.00	0.00	0.00	19.27					
4	4	3D	-2.07	-1.59	0.00	0.18	0.00	-6.40	25%	10%			19%
	4	2D	-1.66	-1.45	0.00	0.00	0.00	-5.38					
	8	3D	2.07	0.37	0.00	-0.18	0.00	2.28	25%	54%			23%
	8	2D	1.66	0.24	0.00	0.00	0.00	1.85					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
37	18	3D	1.23	-0.83	0.00	0.00	0.00	-1.86	-25%	-9%			-19%
	18	2D	1.64	-0.91	0.00	0.00	0.00	-2.29					
	22	3D	-1.23	-0.21	0.00	0.00	0.00	0.55	-25%				-17%
	22	2D	-1.64	-0.13	0.00	0.00	0.00	0.66					
38	19	3D	-1.23	-4.48	0.00	0.00	0.00	-46.37	-25%	-22%			-24%
	19	2D	-1.64	-5.74	0.00	0.00	0.00	-60.89					
	23	3D	1.23	4.48	0.00	0.00	0.00	27.55	-25%	-22%			-25%
	23	2D	1.64	5.74	0.00	0.00	0.00	36.77					
D/S													
39	20	3D	2.51	-7.08	0.00	0.00	0.00	-58.56	-24%	-19%			-22%
	20	2D	3.31	-8.70	0.00	0.00	0.00	-75.04					
	24	3D	-2.51	7.08	0.00	0.00	0.00	28.84	-24%	-19%			-25%
	24	2D	-3.31	8.70	0.00	0.00	0.00	38.49					
40	21	3D	-2.50	-2.62	0.00	0.00	0.00	-8.73	-24%	-10%			-19%
	21	2D	-3.31	-2.90	0.00	0.00	0.00	-10.76					
	25	3D	2.50	0.19	0.00	0.00	0.00	2.82	-24%	-60%			-24%
	25	2D	3.31	0.47	0.00	0.00	0.00	3.69					

CRANE AT U/S MOVING TOWARDS D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
1	1	3D	-1.59	0.21	0.00	-0.04	0.00	1.53	16%	24%			19%
	1	2D	-1.37	0.17	0.00	0.00	0.00	1.29					
	5	3D	1.59	-0.21	0.00	0.04	0.00	-0.62	16%	24%			9%
	5	2D	1.37	-0.17	0.00	0.00	0.00	-0.57					
2	2	3D	80.96	2.58	0.03	-1.56	-0.06	52.00	1%	39%			18%
	2	2D	80.19	1.86	0.00	0.00	0.00	44.19					
	6	3D	-80.96	-2.58	-0.03	1.56	-0.07	-41.17	1%	39%			13%
	6	2D	-80.19	-1.86	0.00	0.00	0.00	-36.36					
D/S													
3	3	3D	22.60	4.44	0.01	-0.71	-0.01	47.14	-1%	16%			17%
	3	2D	22.78	3.82	0.00	0.00	0.00	40.24					
	7	3D	-22.60	-4.44	-0.01	0.71	-0.02	-28.50	-1%	16%			18%
	7	2D	-22.78	-3.82	0.00	0.00	0.00	-24.18					
4	4	3D	2.40	0.80	0.00	-0.08	0.00	5.82	18%	16%			17%
	4	2D	2.04	0.69	0.00	0.00	0.00	4.97					
	8	3D	-2.40	-0.80	0.00	0.08	0.00	-2.45	18%	16%			18%
	8	2D	-2.04	-0.69	0.00	0.00	0.00	-2.07					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
37	18	3D	-1.84	0.20	0.00	0.00	0.00	1.68	-19%	-31%			-22%
	18	2D	-2.28	0.29	0.00	0.00	0.00	2.15					
	22	3D	1.84	-0.20	0.00	0.00	0.00	-0.84	-19%	-31%			-12%
	22	2D	2.28	-0.29	0.00	0.00	0.00	-0.95					
38	19	3D	132.11	1.66	0.00	0.00	0.00	57.91	-1%	-46%			-21%
	19	2D	133.64	3.10	0.00	0.00	0.00	73.55					
	23	3D	-132.11	-1.66	0.00	0.00	0.00	-50.92	-1%	-46%			-16%
	23	2D	-133.64	-3.10	0.00	0.00	0.00	-60.54					
D/S													
39	20	3D	38.35	5.14	0.00	0.00	0.00	53.21	1%	-19%			-21%
	20	2D	37.97	6.37	0.00	0.00	0.00	67.01					
	24	3D	-38.35	-5.14	0.00	0.00	0.00	-31.63	1%	-19%			-21%
	24	2D	-37.97	-6.37	0.00	0.00	0.00	-40.27					
40	21	3D	2.66	0.93	0.00	0.00	0.00	6.59	-22%	-19%			-20%
	21	2D	3.39	1.15	0.00	0.00	0.00	8.28					
	25	3D	-2.66	-0.93	0.00	0.00	0.00	-2.67	-22%	-19%			-22%
	25	2D	-3.39	-1.15	0.00	0.00	0.00	-3.44					

TABLE NO.~6.14 COMPARISON OF 3-D AND 2-D ANALYSES OF BASE COLUMNS OF THE MAIN FRAME

TRANSVERSE END FRAME

TRANSVERSE CENTRAL FRAME

CRANE AT D/S MOVING TOWARDS U/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
1	1	3D	1.25	-0.27	0.00	0.03	0.00	-1.35	18%	17%			16%
	1	2D	1.06	-0.23	0.00	0.00	0.00	-1.16					
	5	3D	-1.25	0.27	0.00	-0.03	0.00	0.23	18%	17%			28%
	5	2D	-1.06	0.23	0.00	0.00	0.00	0.18					
2	2	3D	23.74	-3.97	0.01	0.73	-0.01	-44.00	0%	15%			17%
	2	2D	23.76	-3.45	0.00	0.00	0.00	-37.67					
	6	3D	-23.74	3.97	-0.01	-0.73	-0.02	27.35	0%	15%			18%
	6	2D	-23.76	3.45	0.00	0.00	0.00	23.19					
D/S													
3	3	3D	82.43	-3.14	0.03	1.13	-0.06	-52.17	1%	33%			18%
	3	2D	81.49	-2.36	0.00	0.00	0.00	-44.07					
	7	3D	-82.43	3.14	-0.03	-1.13	-0.06	38.98	1%	33%			14%
	7	2D	-81.49	2.36	0.00	0.00	0.00	34.16					
4	4	3D	-3.07	-0.64	0.00	0.16	0.00	-6.33	15%	25%			19%
	4	2D	-2.67	-0.51	0.00	0.00	0.00	-5.34					
	8	3D	3.07	0.64	0.00	-0.16	0.00	3.63	15%	25%			13%
	8	2D	2.67	0.51	0.00	0.00	0.00	3.20					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
37	18	3D	1.40	-0.32	0.00	0.00	0.00	-1.56	-21%	-18%			-20%
	18	2D	1.77	-0.39	0.00	0.00	0.00	-1.94					
	22	3D	-1.40	0.32	0.00	0.00	0.00	0.21	-21%	-18%			
	22	2D	-1.77	0.39	0.00	0.00	0.00	0.30					
38	19	3D	39.61	-4.71	0.00	0.00	0.00	-50.07	0%	-18%			-20%
	19	2D	39.59	-5.74	0.00	0.00	0.00	-62.74					
	23	3D	-39.61	4.71	0.00	0.00	0.00	30.31	0%	-18%			-22%
	23	2D	-39.59	5.74	0.00	0.00	0.00	38.63					
D/S													
39	20	3D	133.91	-2.36	0.00	0.00	0.00	-57.17	-1%	-40%			-22%
	20	2D	135.80	-3.92	0.00	0.00	0.00	-73.37					
	24	3D	-133.91	2.36	0.00	0.00	0.00	47.24	-1%	-40%			-17%
	24	2D	-135.80	3.92	0.00	0.00	0.00	56.89					
40	21	3D	-3.63	-0.58	0.00	0.00	0.00	-6.91	-18%	-32%			-22%
	21	2D	-4.44	-0.85	0.00	0.00	0.00	-8.89					
	25	3D	3.63	0.58	0.00	0.00	0.00	4.48	-18%	-32%			-16%
	25	2D	4.44	0.85	0.00	0.00	0.00	5.34					

CRANE STRIKING U/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
1	1	3D	1.20	-0.30	0.00	0.05	0.00	-1.42	13%	11%			13%
	1	2D	1.06	-0.27	0.00	0.00	0.00	-1.26					
	5	3D	-1.20	0.30	0.00	-0.05	0.00	0.17	13%	11%			21%
	5	2D	-1.06	0.27	0.00	0.00	0.00	0.14					
2	2	3D	-1.20	-4.72	0.00	1.08	0.01	-46.10	13%	13%			13%
	2	2D	-1.06	-4.17	0.00	0.00	0.00	-40.78					
	6	3D	1.20	4.72	0.00	-1.08	0.00	26.28	13%	13%			13%
	6	2D	1.06	4.17	0.00	0.00	0.00	23.27					
D/S													
3	3	3D	1.49	-2.14	0.00	0.42	0.00	-26.97	17%	21%			19%
	3	2D	1.27	-1.77	0.00	0.00	0.00	-22.72					
	7	3D	-1.49	2.14	0.00	-0.42	0.00	17.97	17%	21%			18%
	7	2D	-1.27	1.77	0.00	0.00	0.00	15.28					
4	4	3D	-1.49	-0.41	0.00	0.04	0.00	-3.31	17%	21%			19%
	4	2D	-1.27	-0.34	0.00	0.00	0.00	-2.79					
	8	3D	1.49	0.41	0.00	-0.04	0.00	1.60	17%	21%			18%
	8	2D	1.27	0.34	0.00	0.00	0.00	1.36					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
37	18	3D	1.47	-0.39	0.00	0.00	0.00	-1.79	-16%	-13%			-15%
	18	2D	1.76	-0.45	0.00	0.00	0.00	-2.10					
	22	3D	-1.47	0.39	0.00	0.00	0.00	0.17	-16%	-13%			-26%
	22	2D	-1.76	0.45	0.00	0.00	0.00	0.23					
38	19	3D	-1.47	-5.84	0.00	0.00	0.00	-57.22	-16%	-16%			-16%
	19	2D	-1.76	-6.94	0.00	0.00	0.00	-67.86					
	23	3D	1.47	5.84	0.00	0.00	0.00	32.69	-16%	-16%			-16%
	23	2D	1.76	6.94	0.00	0.00	0.00	38.72					
D/S													
39	20	3D	1.66	-2.21	0.00	0.00	0.00	-29.32	-21%	-25%			-22%
	20	2D	2.11	-2.95	0.00	0.00	0.00	-37.82					
	24	3D	-1.66	2.21	0.00	0.00	0.00	20.04	-21%	-25%			-21%
	24	2D	-2.11	2.95	0.00	0.00	0.00	25.42					
40	21	3D	-1.66	-0.43	0.00	0.00	0.00	-3.60	-21%	-25%			-22%
	21	2D	-2.11	-0.57	0.00	0.00	0.00	-4.64					
	25	3D	1.66	0.43	0.00	0.00	0.00	1.78	-21%	-25%			-22%
	25	2D	2.11	0.57	0.00	0.00	0.00	2.27					

TABLE NO.-6.14 COMPARISON OF 3-D AND 2-D ANALYSES OF BASE COLUMNS OF THE MAIN FRAME

TRANSVERSE END FRAME

TRANSVERSE CENTRAL FRAME

CRANE STRIKING D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
1	1	3D	-0.76	0.13	0.00	-0.01	0.00	0.77	19%	18%			18%
	1	2D	-0.64	0.11	0.00	0.00	0.00	0.65					
	5	3D	0.76	-0.13	0.00	0.01	0.00	-0.21	19%	18%			24%
	5	2D	0.64	-0.11	0.00	0.00	0.00	-0.17					
2	2	3D	0.76	1.81	0.00	-0.45	0.00	25.32	19%	21%			19%
	2	2D	0.64	1.50	0.00	0.00	0.00	21.34					
	6	3D	-0.76	-1.81	0.00	0.45	0.00	-17.70	19%	21%			18%
	6	2D	-0.64	-1.50	0.00	0.00	0.00	-15.05					
D/S													
3	3	3D	-2.03	4.79	0.00	-0.81	0.01	45.47	15%	14%			14%
	3	2D	-1.77	4.21	0.00	0.00	0.00	39.92					
	7	3D	2.03	-4.79	0.00	0.81	0.00	-25.34	15%	14%			14%
	7	2D	1.77	-4.21	0.00	0.00	0.00	-22.25					
4	4	3D	2.03	0.83	0.00	-0.15	0.00	5.62	15%	14%			14%
	4	2D	1.77	0.73	0.00	0.00	0.00	4.94					
	8	3D	-2.03	-0.83	0.00	0.15	0.00	-2.14	15%	14%			15%
	8	2D	-1.77	-0.73	0.00	0.00	0.00	-1.86					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
37	18	3D	-0.83	0.14	0.00	0.00	0.00	0.84	-22%	-26%			-21%
	18	2D	-1.07	0.19	0.00	0.00	0.00	1.07					
	22	3D	0.83	-0.14	0.00	0.00	0.00	-0.23	-22%	-26%			-21%
	22	2D	1.07	-0.19	0.00	0.00	0.00	-0.29					
38	19	3D	0.83	1.86	0.00	0.00	0.00	27.57	-22%	-25%			-22%
	19	2D	1.07	2.49	0.00	0.00	0.00	35.52					
	23	3D	-0.83	-1.86	0.00	0.00	0.00	-19.74	-22%	-25%			-21%
	23	2D	-1.07	-2.49	0.00	0.00	0.00	-25.04					
D/S													
39	20	3D	-2.43	5.83	0.00	0.00	0.00	55.32	-17%	-17%			-17%
	20	2D	-2.94	7.00	0.00	0.00	0.00	66.43					
	24	3D	2.43	-5.83	0.00	0.00	0.00	-30.86	-17%	-17%			-17%
	24	2D	2.94	-7.00	0.00	0.00	0.00	-37.03					
40	21	3D	2.42	1.03	0.00	0.00	0.00	6.86	-18%	-16%			-17%
	21	2D	2.94	1.22	0.00	0.00	0.00	8.22					
	25	3D	-2.42	-1.03	0.00	0.00	0.00	-2.55	-18%	-16%			-18%
	25	2D	-2.94	-1.22	0.00	0.00	0.00	-3.10					

CRANE MOVING IN THE LONGITUDINAL DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
1	1	3D	-0.33	-0.10	-0.20	0.12	0.64	-0.23					
		2D											
	5	3D	0.33	0.10	0.20	-0.12	0.20	-0.20					
		2D											
2	2	3D	48.18	-2.03	-2.54	0.42	18.37	-6.19	0%		-8%	-6%	
	2	2D	48.03	0.00	-2.75	0.00	19.64	0.00					
	6	3D	-48.18	2.03	2.54	-0.42	-7.72	-2.35	0%		-8%	-5%	
	6	2D	-48.03	0.00	2.75	0.00	-8.10	0.00					
D/S													
3	3	3D	48.72	1.74	-2.40	-0.95	17.21	5.11	1%		-13%	-12%	
	3	2D	48.03	0.00	-2.75	0.00	19.64	0.00					
	7	3D	-48.72	-1.74	2.40	0.95	-7.14	2.19	1%		-13%	-12%	
	7	2D	-48.03	0.00	2.75	0.00	-8.10	0.00					
4	4	3D	-1.01	0.25	-0.33	-0.26	1.23	0.69					
		2D											
	8	3D	1.01	-0.25	0.33	0.26	0.16	0.36					
		2D											

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
37	18	3D	0.10	-0.18	-0.27	0.04	0.73	-0.42					
		2D											
	22	3D	-0.10	0.18	0.27	-0.04	0.39	-0.35					
		2D											
38	19	3D	86.67	-3.56	-2.98	0.41	18.99	-11.05	0%		-7%	-6%	
	19	2D	86.77	0.00	-3.22	0.00	20.30	0.00					
	23	3D	-86.67	3.56	2.98	-0.41	-6.49	-3.88	0%		-7%	-4%	
	23	2D	-86.77	0.00	3.22	0.00	-6.79	0.00					
D/S													
39	20	3D	86.87	3.24	-2.81	-0.83	17.79	11.16	0%		-13%	-12%	
	20	2D	86.77	0.00	-3.22	0.00	20.30	0.00					
	24	3D	-86.87	-3.24	2.81	0.83	-5.99	2.43	0%		-13%	-12%	
	24	2D	-86.77	0.00	3.22	0.00	-6.79	0.00					
40	21	3D	-0.10	0.48	-0.45	-0.10	1.40	1.49					
		2D											
	25	3D	0.10	-0.48	0.45	0.10	0.49	0.53					
		2D											

S OF 3-D AND 2-D ANALYSES OF BEAMS AT THE CRANE LEVEL OF THE MAIN FRAME

DEAD LOAD + LIVE LOAD

BEAM	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
32	13	3D	1.93	11.63	-0.11	-0.05	0.28	10.80	-9%	0%			0%
	13	2D	2.13	11.63	0.00	0.00	0.00	10.82					
	30	3D	-1.93	11.40	0.11	0.05	0.31	-10.19	-9%	0%			0%
	30	2D	-2.13	11.40	0.00	0.00	0.00	-10.17					
D/S													
33	14	3D	2.31	15.43	0.10	0.06	-0.27	14.28	2%	0%			0%
	14	2D	2.26	15.41	0.00	0.00	0.00	14.26					
	31	3D	-2.31	15.19	-0.10	-0.06	-0.30	-13.60	2%	0%			0%
	31	2D	-2.26	15.15	0.00	0.00	0.00	-13.56					

EARTHQUAKE IN THE TRANSVERSE DIRECTION

BEAM	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
32	13	3D	-0.01	0	0.43	0.15	-1.06	0					
		2D											
	30	3D	0.01	0	-0.43	-0.15	-1.29	0					
		2D											
D/S													
33	14	3D	0.14	0	0.49	0.15	-1.25	-0.01					
		2D											
	31	3D	-0.14	0	-0.49	-0.15	-1.46	-0.01					
		2D											

EARTHQUAKE IN THE LONGITUDINAL DIRECTION

BEAM	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
32	13	3D	-1.18	-5.28	0.05	0.00	-0.14	-14.59	11%	8%			9%
	13	2D	-1.06	-4.87	0.00	0.00	0.00	-13.44					
	30	3D	1.18	5.28	-0.05	0.00	-0.12	-14.47	11%	8%			9%
	30	2D	1.06	4.87	0.00	0.00	0.00	-13.33					
D/S													
33	14	3D	-1.44	-5.94	-0.04	0.00	0.12	-16.39	20%	18%			18%
	14	2D	-1.20	-5.03	0.00	0.00	0.00	-13.90					
	31	3D	1.44	5.94	0.04	0.00	0.11	-16.26	20%	18%			18%
	31	2D	1.20	5.03	0.00	0.00	0.00	-13.79					

WIND BLOWING FROM U/S TO D/S

BEAM	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
32	13	3D	-0.01	0	0.24	0.08	-0.59	0					
		2D											
	30	3D	0.01	0	-0.24	-0.08	-0.72	0					
		2D											
D/S	14		0.05	0	0.16	0.07	-0.41	0					
33		3D											
	31	2D	-0.05	0	-0.16	-0.07	-0.49	0					
		3D											
		2D											

TABLE 6.15 COMPARISONS OF 3-D AND 2-D ANALYSES OF BEAMS AT THE CRANE LEVEL OF THE MAIN FRAME

WIND BLOWING FROM D/S TO U/S

BEAM	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
32	13	3D	0.01	0	-0.18	-0.07	0.44	0					
		2D											
	30	3D	-0.01	0	0.18	0.07	0.54	0					
		2D											
D/S													
33	14	3D	-0.06	0	-0.21	-0.07	0.54	0					
		2D											
	31	3D	0.06	0	0.21	0.07	0.64	0					
		2D											

CRANE AT U/S MOVING TOWARDS D/S

BEAM	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
32	13	3D	-0.08	0.19	0.35	0.21	-0.89	0.51					
		2D											
	30	3D	0.08	-0.19	-0.35	-0.21	-1.05	0.52					
		2D											
D/S													
33	14	3D	0.01	0.06	0.1	0.03	-0.25	0.16					
		2D											
	31	3D	-0.01	-0.06	-0.1	-0.03	-0.32	0.16					
		2D											

CRANE AT D/S MOVING TOWARDS U/S

BEAM	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
32	13	3D	-0.02	0.06	-0.09	-0.02	0.23	0.16					
		2D											
	30	3D	0.02	-0.06	0.09	0.02	0.3	0.16					
		2D											
D/S													
33	14	3D	-0.15	0.19	-0.31	-0.18	0.79	0.52					
		2D											
	31	3D	0.15	-0.19	0.31	0.18	0.9	0.52					
		2D											

CRANE STRIKING U/S SIDE

BEAM	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
32	13	3D	0.01	0	-0.23	-0.07	0.58	0					
		2D											
	30	3D	-0.01	0	0.23	0.07	0.68	0					
		2D											
D/S													
33	14	3D	-0.02	0	-0.07	-0.04	0.17	0					
		2D											
	31	3D	0.02	0	0.07	0.04	0.21	0					
		2D											

TABLE 6.15 COMPARISONS OF 3-D AND 2-D ANALYSES OF BEAMS AT THE CRANE LEVEL OF THE MAIN FRAME

CRANE STRIKING D/S SIDE

BEAM	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
32	13	3D	0	0	0.07	0.03	-0.16	0					
		2D											
	30	3D	0	0	-0.07	-0.03	-0.21	0					
		2D											
D/S													
33	14	3D	0.05	0	0.2	0.05	-0.52	0					
		2D											
	31	3D	-0.05	0	-0.2	-0.05	-0.6	0					
		2D											

CRANE MOVING IN THE LONGITUDINAL DIRECTION

BEAM	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
U/S													
32	13	3D	-0.73	-1.19	0.08	0.09	-0.21	-3.30	0%	-4%			-4%
	13	2D	-0.73	-1.24	0.00	0.00	0.00	-3.43					
	30	3D	0.73	1.19	-0.08	-0.09	-0.21	-3.27	0%	-4%			-4%
	30	2D	0.73	1.24	0.00	0.00	0.00	-3.39					
D/S													
33	14	3D	-0.72	-1.08	-0.08	-0.06	0.23	-3.00	-1%	-13%			-13%
	14	2D	-0.73	-1.24	0.00	0.00	0.00	-3.43					
	31	3D	0.72	1.08	0.08	0.06	0.23	-2.97	-1%	-13%			-12%
	31	2D	0.73	1.24	0.00	0.00	0.00	-3.39					

TABLE NO.~6.16 COMPARISONS OF 3-D AND 2-D ANALYSES OF BASE COLUMNS OF THE SYMMETRICAL FRAME

TRANSVERSE END FRAME

TRANSVERSE CENTRAL FRAME

DEAD LOAD + LIVE LOAD

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	113.76	1.99	2.13	0.33	-3.07	-0.29	0%	-3%	0%	0%	negl
	2	2D	113.64	2.05	2.13	0.00	-3.07	0.17					
	6	3D	-95.77	-1.99	-2.13	-0.33	-5.88	8.63	0%	-3%	0%	0%	2%
	6	2D	-95.65	-2.05	-2.13	0.00	-5.88	8.44					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	163.58	3.96	0.00	0.00	0.00	0.38	0%	3%			negl
	19	2D	164.39	3.84	0.00	0.00	0.00	-0.53					
	23	3D	-145.59	-3.96	0.00	0.00	0.00	16.25	-1%	3%			-2%
	23	2D	-146.40	-3.84	0.00	0.00	0.00	16.65					

EARTHQUAKE IN THE TRANSVERSE DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	0.00	9.37	0.00	-2.04	0.00	120.19		1%			2%
	2	2D	0.00	9.26	0.00	0.00	0.00	117.69					
	6	3D	0.00	-9.37	0.00	2.04	0.00	-80.83		1%			3%
	6	2D	0.00	-9.26	0.00	0.00	0.00	-78.81					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	0.00	10.63	0.00	0.00	0.00	134.79		-3%			-4%
	19	2D	0.00	10.95	0.00	0.00	0.00	140.74					
	23	3D	0.00	-10.63	0.00	0.00	0.00	-90.15		-3%			-5%
	23	2D	0.00	-10.95	0.00	0.00	0.00	-94.76					

EARTHQUAKE IN THE LONGITUDINAL DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	-15.55	0.00	-8.85	0.00	61.36	0.00	0%		0%	0%	
	2	2D	-15.55	0.00	-8.85	0.00	61.36	0.00					
	6	3D	15.55	0.00	8.85	0.00	-24.17	0.00	0%		0%	0%	
	6	2D	15.55	0.00	8.85	0.00	-24.17	0.00					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	0.00	0.00	-10.25	0.00	63.32	0.00			0%	0%	
	19	2D	0.00	0.00	-10.25	0.00	63.32	0.00					
	23	3D	0.00	0.00	10.25	0.00	-20.29	0.00			0%	0%	
	23	2D	0.00	0.00	10.25	0.00	-20.29	0.00					

WIND BLOWING FROM U/S TO D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	0.00	6.30	0.00	-1.95	0.00	61.02		14%			21%
	2	2D	0.00	5.51	0.00	0.00	0.00	50.36					
	6	3D	0.00	-5.08	0.00	1.95	0.00	-37.12		18%			25%
	6	2D	0.00	-4.30	0.00	0.00	0.00	-29.76					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	0.00	9.44	0.00	0.00	0.00	79.30		-14%			-21%
	19	2D	0.00	11.02	0.00	0.00	0.00	100.62					
	23	3D	0.00	-7.02	0.00	0.00	0.00	-44.73		-18%			-25%
	23	2D	0.00	-8.59	0.00	0.00	0.00	-59.45					

WIND BLOWING FROM D/S TO U/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	0.00	-4.33	0.00	1.60	0.00	-52.55		20%			24%
	2	2D	0.00	-3.62	0.00	0.00	0.00	-42.34					
	6	3D	0.00	3.81	0.00	-1.60	0.00	35.44		23%			26%
	6	2D	0.00	3.10	0.00	0.00	0.00	28.22					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	0.00	-5.82	0.00	0.00	0.00	-64.18		-20%			-24%
	19	2D	0.00	-7.24	0.00	0.00	0.00	-84.59					
	23	3D	0.00	4.77	0.00	0.00	0.00	41.94		-23%			-26%
	23	2D	0.00	6.20	0.00	0.00	0.00	56.38					

CRANE AT U/S MOVING TOWARDS D/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	79.37	3.09	0.03	-2.08	-0.04	70.52	1%	33%			18%
	2	2D	78.82	2.32	0.00	0.00	0.00	60.00					
	6	3D	-79.37	-3.09	-0.03	2.08	-0.06	-57.56	1%	33%			15%
	6	2D	-78.82	-2.32	0.00	0.00	0.00	-50.26					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	130.27	2.32	0.00	0.00	0.00	78.85	-1%	-40%			-21%
	19	2D	131.36	3.85	0.00	0.00	0.00	99.89					
	23	3D	-130.27	-2.32	0.00	0.00	0.00	-69.11	-1%	-40%			-17%
	23	2D	-131.36	-3.85	0.00	0.00	0.00	-83.70					

TABLE NO.~6.16 COMPARISONS OF 3-D AND 2-D ANALYSES OF BASE COLUMNS OF THE SYMMETRICAL FRAME

TRANSVERSE END FRAME

TRANSVERSE CENTRAL FRAME

CRANE AT D/S MOVING TOWARDS U/S

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	24.99	-4.86	0.01	1.23	-0.01	-64.95	1%	15%			17%
	2	2D	24.82	-4.23	0.00	0.00	0.00	-55.54					
	6	3D	-24.99	4.86	-0.01	-1.23	-0.02	44.53	1%	15%			18%
	6	2D	-24.82	4.23	0.00	0.00	0.00	37.77					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	41.02	-5.78	0.00	0.00	0.00	-73.65	-1%	-18%			-20%
	19	2D	41.36	-7.05	0.00	0.00	0.00	-92.48					
	23	3D	-41.02	5.78	0.00	0.00	0.00	49.36	-1%	-18%			-22%
	23	2D	-41.36	7.05	0.00	0.00	0.00	62.89					

CRANE STRIKING U/S SIDE

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	0.00	-5.14	0.00	1.50	0.00	-59.04		12%			13%
	2	2D	0.00	-4.58	0.00	0.00	0.00	-52.05					
	6	3D	0.00	5.14	0.00	-1.50	0.00	37.44		12%			14%
	6	2D	0.00	4.58	0.00	0.00	0.00	32.80					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	0.00	-6.51	0.00	0.00	0.00	-72.63		-15%			-16%
	19	2D	0.00	-7.63	0.00	0.00	0.00	-86.62					
	23	3D	0.00	6.51	0.00	0.00	0.00	45.29		-15%			-17%
	23	2D	0.00	7.63	0.00	0.00	0.00	54.58					

CRANE STRIKING D/S SIDE

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	0.00	2.36	0.00	-0.76	0.00	38.36		21%			19%
	2	2D	0.00	1.95	0.00	0.00	0.00	32.20					
	6	3D	0.00	-2.36	0.00	0.76	0.00	-28.47		21%			19%
	6	2D	0.00	-1.95	0.00	0.00	0.00	-24.00					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	0.00	2.49	0.00	0.00	0.00	42.15		-24%			-22%
	19	2D	0.00	3.27	0.00	0.00	0.00	53.99					
	23	3D	0.00	-2.49	0.00	0.00	0.00	-31.68		-24%			-21%
	23	2D	0.00	-3.27	0.00	0.00	0.00	-40.25					

CRANE MOVING IN THE LONGITUDINAL DIRECTION

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
2	2	3D	48.03	-2.31	-2.75	-0.05	19.64	-7.65	0%		0%	0%	
	2	2D	48.03	0.00	-2.75	0.00	19.64	0.00					
	6	3D	-48.03	2.31	2.75	0.05	-8.10	-2.05	0%		0%	0%	
	6	2D	-48.03	0.00	2.75	0.00	-8.10	0.00					

Column	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
38	19	3D	86.77	-3.79	-3.22	0.00	20.30	-12.81	0%		0%	0%	
	19	2D	86.77	0.00	-3.22	0.00	20.30	0.00					
	23	3D	-86.77	3.79	3.22	0.00	-6.79	-3.11	0%		0%	0%	
	23	2D	-86.77	0.00	3.22	0.00	-6.79	0.00					

TABLE NO.~6.17 COMPARISON OF 3-D AND 2-D ANALYSES OF BEAMS AT THE CRANE LEVEL OF THE SYMMETRICAL FRAME

DEAD LOAD + LIVE LOAD

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
32	13	3D	1.52	11.58	-0.09	-0.05	0.22	10.65	0%	0%			0%
	13	2D	1.52	11.58	0.00	0.00	0.00	10.65					
	30	3D	-1.52	11.45	0.09	0.05	0.25	-10.32	0%	0%			0%
	30	2D	-1.52	11.45	0.00	0.00	0.00	-10.32					

EARTHQUAKE IN THE TRANSVERSE DIRECTION

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
32	13	3D	0	0	0.31	0.11	-0.75	0					
		2D											
	30	3D	0	0	-0.31	-0.11	-0.93	0					
		2D											

EARTHQUAKE IN THE LONGITUDINAL DIRECTION

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
32	13	3D	-0.96	-4.37	0.00	0.00	0.00	-12.07	0%	0%			0%
	13	2D	-0.96	-4.37	0.00	0.00	0.00	-12.07					
	30	3D	0.96	4.37	0.00	0.00	0.00	-11.97	0%	0%			0%
	30	2D	0.96	4.37	0.00	0.00	0.00	-11.97					

WIND BLOWING FROM U/S TO D/S

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
32	13	3D	0	0	0.28	0.1	-0.7	0					
		2D											
	30	3D	0	0	-0.28	-0.1	-0.87	0					
		2D											

WIND BLOWING FROM D/S TO U/S

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
32	13	3D	0	0	-0.22	-0.09	0.54	0					
		2D											
	30	3D	0	0	0.22	0.09	0.68	0					
		2D											

CRANE AT U/S MOVING TOWARDS D/S

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
32	13	3D	-0.08	0.19	0.39	0.22	-0.98	0.51					
		2D											
	30	3D	0.08	-0.19	-0.39	-0.22	-1.17	0.52					
		2D											

CRANE AT D/S MOVING TOWARDS D/S

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
32	13	3D	-0.02	0.06	-0.15	-0.04	0.35	0.16					
		2D											
	30	3D	0.02	-0.06	0.15	0.04	0.46	0.16					
		2D											

AND 2-D ANALYSES OF BEAMS AT THE CRANE
LEVEL OF THE SYMMETRICAL FRAME

CRANE STRIKING U/S SIDE

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
32	13	3D	0	0	-0.26	-0.07	0.66	0					
		2D											
	30	3D	0	0	0.26	0.07	0.79	0					
		2D											

CRANE STRIKING D/S SIDE

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
32	13	3D	0	0	0.1	0.05	-0.24	0					
		2D											
	30	3D	0	0	-0.1	-0.05	-0.31	0					
		2D											

CRANE MOVING IN THE LONGITUDINAL DIRECTION

Beam	Node		Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z	Axial%	Shear-Y%	Shear-Z%	Mom-Y%	Mom-Z%
32	13	3D	-0.73	-1.24	0.04	0.08	-0.11	-3.43	0%	0%			0%
	13	2D	-0.73	-1.24	0.00	0.00	0.00	-3.43					
	30	3D	0.73	1.24	-0.04	-0.08	-0.12	-3.39	0%	0%			0%
	30	2D	0.73	1.24	0.00	0.00	0.00	-3.39					

CHAPTER-7

DISCUSSION OF RESULTS AND CONCLUSIONS

7.1 GENERAL

In this chapter, the results of comparisons of the main and the symmetrical frames are discussed in order to come to conclusions of the study carried out. In any frame, the columns at the base are the most critical members because these are subjected to maximum vertical loads and biaxial bending moments.. Further, in the powerhouse frame where crane loads are acting, the beams at the crane level are the critical members. These have been already been compared in the previous chapter, but the beams being in the longitudinal direction cannot be analyzed for the transverse loads by 2-D approach hence the full effect cannot be studied. In this chapter the results of the above said comparisons are mainly considered in the discussion and conclusions are drawn out of it.

7.2 DISCUSSION OF RESULTS OF THE MAIN FRAME

It can be seen from the comparisons given in chapter-6 that in general the difference in member forces in the 3-D analysis as compared with the 2-D analysis is small in case of vertical loads but is quite appreciable in case of lateral loads and seismic loads. Further, there is reduction of the member forces in the 3-D analysis in the transverse central frame and increase in the member forces in the transverse end frame. Further, in the transverse beams there is reduction of the member forces in the beams of the transverse central frame and increase in the beams of the transverse end frame. In the longitudinal beams, it is seen that there is reduction of member forces in outer beams (U/S and D/S control bay frames) and increase in the inner beams (U/S and D/S gantry column frames).

From the comparison (Table- 7.1) of the design forces of the columns at the base, which are the most critical members of the structure, the trend in the change can be seen. For the dead and live load, the difference is small but for lateral loads there is a significant difference. In the lateral loads in the transverse direction there is reduction in the columns of the central bent and increase in the end bent. This is

because in the 3-D analysis the stiffness of the whole structure is taken into account. In the crane moving in the longitudinal direction the U/S and D/S control bay columns cannot be analyzed by the 2-D analysis therefore they cannot be compared but in the gantry columns, there is reduction of forces. For the earthquake in the longitudinal direction it is seen in the 3-D analysis that the outer columns i.e. columns of the control bays have reduction of forces and the inner columns i.e. the gantry columns have increase of forces. In the beams at the crane level (Table- 6.14) there is not much difference, but since the beams at the crane level are longitudinal beams they cannot be analyzed by the 2-D approach for transverse loads such as the loads of the cranes in the transverse direction. The effects on the various forces as seen in Table- 7.1 are as follows.

1) AXIAL FORCES: There is very less difference of axial forces due to the vertical loads but is quite prominent due to the lateral loads. It can be seen that the difference of axial force is ranging from about a reduction of 44% to an increase of 25%. In general there is reduction in central bent columns and increase in end bent columns.
2) SHEAR FORCES: There is very less difference of shear forces due to the vertical loads but is quite prominent due to lateral loads more in the column members than the beam members. It is seen that the difference in shear force is ranging from a reduction of 60% to an increase of 54%. In general there is reduction in central bent columns and increase in end bent columns.
3) BENDING MOMENTS: Here also like above the difference due to vertical loads is small but is prominent due to lateral forces. It is seen that the difference in bending moments is ranging from a reduction of 54% to an increase of 28%. In general, there is reduction in central bent columns and increase in end bent columns.
4) TORSION: It can be seen from the results of analysis of the three-dimensional frame of the main frame (Table no.-A-7) that there is torsion in all the members. The torsion is maximum in the column members for earthquake loads in the end columns and negligible in the central columns. The torsion in the beam members is negligible and is maximum in case of earthquake loads.

In general the torsional moments are small. These are not compared as these don't exist in 2-D analysis.

TABLE NO.-7.1: THE RANGE OF THE PERCENTAGE DIFFERENCE OF THE 3-D ANALYSIS AS COMPARED WITH 2-D ANALYSIS FOR THE COLUMNS AT BASE OF END BENT AND CENTRAL BENT FOR MAIN FRAME.

FORCES →	AXIAL FORCE		SHEAR FORCE (y)		(z)		BENDING MOMENT (Y)		(Z)	
LOADING CONDITION(↓)	END	CENTRAL	END	CENTRAL	END	CENTRAL	END	CENTRAL	END	CENTRAL
DEAD LOAD + LIVE LOAD	-1% (1) to1% (3)	-1% (38,39) to 1% (37)	-4% (3) to 3% (1)	-2% (40) to 2% (38)	-2% (1) to 1% (2,3)		-2% (1) to 3% (2)		-13% (2) to 6% (4)	-6% (40) to 17% (38)
EARTHQUAKE (TRANSVERSE)	16% (3,4) to 20% (1)	-8% (1 TO 4)	13% (3,4) to 30% (2)	-4% (1) to -6% (38,39,40)					8% (1) to 23% (1)	-7% (38,39, 40) to -18% (37)
EARTHQUAKE (LONGITUDINAL)	-44% (1) to 18% (3)				-52% (1) to 20% (3)	-51% (37) to 20% (39)	-54% (1) to 19% (3)	-52% (37) to 19% (39)		
WIND FROM U/S TO D/S	24% (1,2) to 25% (3,4)	-24% (37,38) to -25% (39,40)	-15% (1) to 41% (4)	-38% (40) to 14% (37)					12% (1) to 26% (3)	-26% (39) to -12% (37)
WIND FROM D/S TO U/S	24% (3) to 26% (1,2)	-25% (37,38) to -24% (39,40)	7% (1) to 54% (4)	-60% (40) to -9% (37)					18% (1) to 25% (2,3)	-17% (37) to -25% (38,39)
CRANE MOVING U/S TO D/S	-1% (3) to 18% (4)	-22% (40) to 1% (39)	16% (3,4) to 39% (2)	-46% (38) to -19% (39,40)					9% (1) to 18% (3,4)	-22% (40) to -12% (37)
CRANE MOVING D/S TO U/S	0% (2) to 18% (1)	-21% (37) to 0% (38)	15% (2) to 33% (3)	-40% (39) to 18% (37,38)					13% (4) to 28% (1)	-22% (38,39,) to -16% (40)
CRANE STRIKING U/S	13% (1,2) TO 17% (3,4)	-21% (39,40) TO -16% (37,38)	11% (1) TO 21% (2,3)	-25% (39,40) TO -13% (37)					13% (2) TO 21% (1)	-26% (37 node 22) TO -15% (37 node 18)
CRANE STRIKING D/S	15% (3,4) TO 19% (1,2)	-26% (37) TO -17% (39)	14% (3,4) TO 21% (2)	-26% (37) TO 16% (40)					14% (3,4) TO 19% (2)	-22% (38) TO -17% (39,40)
CRANE MOVING LEFT TO RIGHT	0% (2) TO 1% (3)	0%			-13% (3) TO -8% (2)	-13% (39) TO -7% (38)			-12% (3) TO -5% (2)	-12% (39) TO -4% (38)

Hence, from the above it can be inferred that for asymmetrical frame the difference in the member forces in the columns at the base by 3-D and 2-D analyses are quite appreciable. There is a reduction up to 50% in the bending moments by 3-D analysis as compared to 2-D analysis.

7.3 DISCUSSION OF RESULTS OF THE SYMMETRICAL FRAME

It can be seen from the comparisons (Chapter-6) that in general there is reduction of member forces in the 3-D analysis for the transverse central frame and increase of member forces in the 3-D analysis for the transverse end frame. In the longitudinal beams there is no change, but it may be noted here that in 2-D analysis the longitudinal beams cannot be analyzed for loads in the transverse direction in which there is expected to be some difference in forces. Further, it is seen that the difference is less in the case of vertical loads (Dead load + Live load) but is quite appreciable for lateral loads in the transverse direction. In the longitudinal direction, the change is negligible.

Further from comparison of the member forces for base columns (Table 7.2) it can be seen that for vertical loads the difference is negligible, for lateral loads the difference is more prominent. For the loads in the transverse direction there is a general increase in the 3-D analysis in the end bent and reduction in the central bent. In the longitudinal direction there is no change at all. The effect on different forces as seen in Table 7.2 are as follows.

1) AXIAL FORCES: It is seen that there is little difference in axial forces in the members, the difference being within, $\pm 1\%$.
2) SHEAR FORCES: The difference in shear forces is less for the vertical loads but is quite prominent in case of lateral loads in the transverse direction, in the longitudinal direction there is no difference. It is seen that the difference in shear force is ranging from a reduction of 40% to an increase of 33%. The reduction is in central columns and increase in end columns.
3) BENDING MOMENTS: The difference in bending moments is in general more appreciable in the lateral loads. It is seen that the difference in the

bending moments is ranging from a reduction of 26% to an increase of 26%. There is reduction in central columns and increase in end columns.

4) TORSION: It is seen that in the 3-D analysis there is torsion in almost all the members. The maximum torsion occurs in the columns due to the crane moving from the US to DS. In the beams also there is torsion but is quite small in magnitude. The comparison is not possible as torsional moments do not figure in 2-D analysis.

TABLE NO.~ 7.2: THE RANGE OF THE PERCENTAGE DIFFERENCE OF THE 3-D ANALYSIS AS COMPARED WITH 2-D ANALYSIS FOR THE COLUMNS AT THE BASE FOR END BENT AND CENTRAL BENT FOR SYMMETRICAL FRAME

LOADING CONDITION(↓)	AXIAL FORCE		SHEAR FORCE (y)		SHEAR FORCE (z)		BENDING MOMENT (Y)		BENDING MOMENT (Z)	
SYMMETRICAL	END	CENTRAL	END	CENTRAL	END	CENTRAL	END	CENTRAL	END	CENTRAL
DEAD LOAD + LIVE LOAD	0%	-1% (38)	-3% (2)	3% (38)	0%		0%		2% (2)	-2% (38)
EARTHQUAKE (TRANSVERSE)			1% (2)	-3% (38)					3% (2)	-5% (38)
EARTHQUAKE (LONGITUDINAL)	0%	0%			0%	0%	0%	0%		
WIND FROM US TO DS			18% (2)	-18% (38)					25% (2)	-25% (38)
WIND FROM DS TO US			23% (2)	-23% (38)					26% (2)	-26% (38)
CRANE MOVING US TO DS	1% (2)	-1% (38)	33% (2)	-40% (38)					18% (2)	-21% (38)
CRANE MOVING DS TO US	1% (2)	-1% (38)	15% (2)	-18% (38)					18% (2)	-22% (38)
CRANE STRIKING US			12% (2)	-15% (38)					14% (2)	-17% (38)
CRANE STRIKING DS			21% (2)	-22% (38)					19% (2)	-22% (38)
CRANE MOVING LEFT TO RIGHT	0%	0%			0%	0%	0%	0%		

Hence, from the above discussions it can be inferred that for symmetrical frame the difference in the 3-D and 2-D analyses is not as appreciable as for the main frame with the difference in the member forces being less than 50%.

7.4 CONCLUSIONS

From the above the analysis of results and discussions following conclusions are drawn.

- The difference in 2-D and 3-D analyses in both the frames for vertical loads (dead load + live load) is marginal.
- The design forces in the members of end bent of both the frames have shown an increase under lateral loads in 3-D analysis.
- The design forces in the members of central bent of both the frames have shown reduction under lateral loads in 3-D analysis.
- 3-D analysis has shown torsional moments in the frame members but their magnitude is small. These do not figure in 2-D analysis.
- The difference in the bending moments in the columns at the base for asymmetrical frame ranges from -54% to +28%, whereas the difference in symmetrical frame is $\pm$ 26% only.

The results of this study have been compared with the results of such a study (Chandpuri [8]) in Table-7.3. It reveals that the reduction in the design forces due to 3-D analysis in the three types of frames is practically of the same order. The reduction in the bending moments in gantry columns at base due to lateral loads is in the range of 20 to 30%. This is a substantial reduction which would result in saving of reinforcement. Therefore wherever possible 3-D analysis of powerhouse frames shall be carried out.

TABLE NO.-7.3 PERCENTAGE REDUCTION IN THE GANTRY COLUMNS AT THE BASE DUE TO THE THREE-DIMENSIONAL ANALYSIS.

	CHANDPURI'S FINDINGS [8]			SYMMETRICAL FRAME			MAIN FRAME		
LOAD CASE	AXIAL FORCE	SHEAR FORCE	BENDING MOMENT	AXIAL FORCE	SHEAR FORCE	BENDING MOMENT	AXIAL FORCE	SHEAR FORCE	BENDING MOMENT
DEAD LOAD + LIVE LOAD	2 TO 4	2 TO 3	3 TO 5	0 TO 1	0 TO 3	0 TO 3	0 TO 1	2 TO 4	0 TO 13
EARTHQUAKE (TRANSVERSE)					3	4 TO 5	8	6	7 TO 8
EARTHQUAKE (LONGITUDINAL)				0	0	0	-8 to -18%	-6 to -20%	-7 to -19%
WIND BLOWING U/S TO D/S	UPTO 30	UPTO 30	20 TO 30		14 TO 18	21 TO 25	24 TO 25	17 TO 24	21 TO 26
WIND BLOWING D/S TO U/S					20 TO 23	24 TO 26	24 TO 25	19 TO 22	22 TO 25
CRANE MOVING U/S TO D/S	5 TO 50	30 TO 50	20 TO 30	UPTO 1	40	17 TO 21	1	19 TO 46	16 TO 21
CRANE MOVING D/S TO U/S				UPTO 1	18	20 TO 22	0 TO 1	18 TO 40	17 TO 22
CRANE STRIKING U/S					15	16 TO 17	16 TO 21	16 TO 25	16 TO 22
CRANE STRIKING D/S					24	21 TO 22	17 TO 22	17 TO 25	17 TO 22
CRANE MOVING (LONGITUDINAL)	2 TO 3	1 TO 3	1 TO 2	0	0	0	0	7 TO 13	4 TO 12

7.5 SCOPE FOR FURTHER WORK

1) The structures subjected to lateral loads experience secondary forces due to the movement of the point of application of vertical loads. By taking the effect of these secondary forces into account a more realistic analysis of the powerhouse frames is possible.
2) As the earthquake in reality is a dynamic load, there is a need for dynamic analysis to be done for the powerhouse frames in order to study the dynamic effect of the seismic loads.
3) The super structure is exposed to the atmosphere hence there is temperature variation along the height of the structure which in turn induces stress. This is not considered in this study, there is a need to study the effect of temperature stress on the structure.

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APPENDIX A

RESULTS OF ANALYSIS OF THE MAIN FRAME

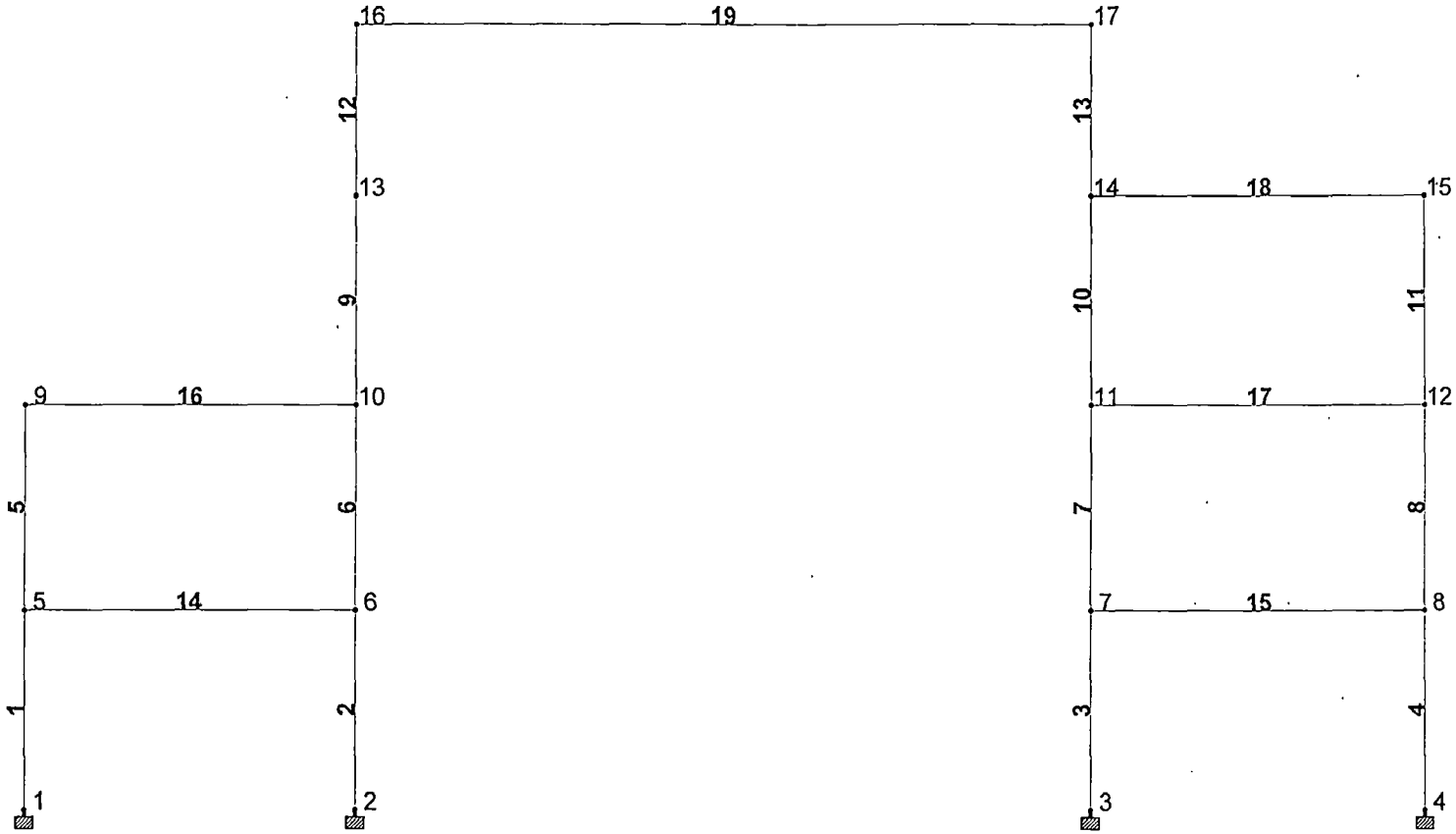

FIG. NO.- A1 THE TRANSVERSE END FRAME (MAIN FRAME)

Y
Z--X

TABLE NO.~ A-1 RESULTS OF ANALYSIS OF THE TRANSVERSE END FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	1	1	50.76	-1.46	0.00	0.00	0.00	-2.11
		5	-47.06	1.46	0.00	0.00	0.00	-4.04
EARTHQUAKE (TRANSVERSE)		1	-3.24	0.70	0.00	0.00	0.00	3.60
		5	3.24	-0.70	0.00	0.00	0.00	-0.64
CRANE MOVING U/S TO D/S		1	-1.37	0.17	0.00	0.00	0.00	1.29
		5	1.37	-0.17	0.00	0.00	0.00	-0.57
CRANE MOVING D/S TO U/S		1	1.06	-0.23	0.00	0.00	0.00	-1.16
		5	-1.06	0.23	0.00	0.00	0.00	0.18
CRANE STRIKING U/S SIDE		1	1.06	-0.27	0.00	0.00	0.00	-1.26
		5	-1.06	0.27	0.00	0.00	0.00	0.14
CRANE STRIKING D/S SIDE		1	-0.64	0.11	0.00	0.00	0.00	0.65
		5	0.64	-0.11	0.00	0.00	0.00	-0.17
WIND BLOWING U/S TO D/S		1	-0.92	0.89	0.00	0.00	0.00	1.68
		5	0.92	0.33	0.00	0.00	0.00	-0.50
WIND BLOWING D/S TO U/S		1	0.82	-0.46	0.00	0.00	0.00	-1.15
		5	-0.82	-0.07	0.00	0.00	0.00	0.33
DEAD LOAD + LIVE LOAD	2	2	143.32	3.96	0.00	0.00	0.00	2.05
		6	-125.33	-3.96	0.00	0.00	0.00	14.58
EARTHQUAKE (TRANSVERSE)		2	3.24	10.49	0.00	0.00	0.00	116.88
		6	-3.24	-10.49	0.00	0.00	0.00	-72.82
CRANE MOVING U/S TO D/S		2	80.19	1.86	0.00	0.00	0.00	44.19
		6	-80.19	-1.86	0.00	0.00	0.00	-36.36
CRANE MOVING D/S TO U/S		2	23.76	-3.45	0.00	0.00	0.00	-37.67
		6	-23.76	3.45	0.00	0.00	0.00	23.19
CRANE STRIKING U/S SIDE		2	-1.06	-4.17	0.00	0.00	0.00	-40.78
		6	1.06	4.17	0.00	0.00	0.00	23.27
CRANE STRIKING D/S SIDE		2	0.64	1.50	0.00	0.00	0.00	21.34
		6	-0.64	-1.50	0.00	0.00	0.00	-15.05
WIND BLOWING U/S TO D/S		2	0.92	4.38	0.00	0.00	0.00	37.99
		6	-0.92	-4.38	0.00	0.00	0.00	-19.60
WIND BLOWING D/S TO U/S		2	-0.82	-2.88	0.00	0.00	0.00	-30.48
		6	0.82	2.88	0.00	0.00	0.00	18.41
DEAD LOAD + LIVE LOAD	3	3	160.83	-4.04	0.00	0.00	0.00	-0.39
		7	-142.84	4.04	0.00	0.00	0.00	-16.58
EARTHQUAKE (TRANSVERSE)		3	-6.40	14.67	0.00	0.00	0.00	139.17
		7	6.40	-14.67	0.00	0.00	0.00	-77.56
CRANE MOVING U/S TO D/S		3	22.78	3.82	0.00	0.00	0.00	40.24
		7	-22.78	-3.82	0.00	0.00	0.00	-24.18
CRANE MOVING D/S TO U/S		3	81.49	-2.36	0.00	0.00	0.00	-44.07
		7	-81.49	2.36	0.00	0.00	0.00	34.16
CRANE STRIKING U/S SIDE		3	1.27	-1.77	0.00	0.00	0.00	-22.72
		7	-1.27	1.77	0.00	0.00	0.00	15.28
CRANE STRIKING D/S SIDE		3	-1.77	4.21	0.00	0.00	0.00	39.92
		7	1.77	-4.21	0.00	0.00	0.00	-22.25
WIND BLOWING U/S TO D/S		3	-1.54	3.03	0.00	0.00	0.00	30.93
		7	1.54	-3.03	0.00	0.00	0.00	-18.22
WIND BLOWING D/S TO U/S		3	1.66	-4.35	0.00	0.00	0.00	-37.56
		7	-1.66	4.35	0.00	0.00	0.00	19.27
DEAD LOAD + LIVE LOAD	4	4	94.78	1.54	0.00	0.00	0.00	2.59
		8	-88.62	-1.54	0.00	0.00	0.00	3.90
EARTHQUAKE (TRANSVERSE)		4	6.40	2.54	0.00	0.00	0.00	17.26
		8	-6.40	-2.54	0.00	0.00	0.00	-6.59
CRANE MOVING U/S TO D/S		4	2.04	0.69	0.00	0.00	0.00	4.97
		8	-2.04	-0.69	0.00	0.00	0.00	-2.07
CRANE MOVING D/S TO U/S		4	-2.67	-0.51	0.00	0.00	0.00	-5.34
		8	2.67	0.51	0.00	0.00	0.00	3.20
CRANE STRIKING U/S SIDE		4	-1.27	-0.34	0.00	0.00	0.00	-2.79
		8	1.27	0.34	0.00	0.00	0.00	1.36
CRANE STRIKING D/S SIDE		4	1.77	0.73	0.00	0.00	0.00	4.94

TABLE NO.~ A-1 RESULTS OF ANALYSIS OF THE TRANSVERSE END FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		8	-1.77	-0.73	0.00	0.00	0.00	-1.86
WIND BLOWING U/S TO D/S		4	1.54	0.84	0.00	0.00	0.00	4.13
		8	-1.54	-0.32	0.00	0.00	0.00	-1.68
WIND BLOWING D/S TO U/S		4	-1.66	-1.45	0.00	0.00	0.00	-5.38
		8	1.66	0.24	0.00	0.00	0.00	1.85
DEAD LOAD + LIVE LOAD	5	5	16.98	-3.26	0.00	0.00	0.00	-6.49
		9	-13.19	3.26	0.00	0.00	0.00	-7.52
EARTHQUAKE (TRANSVERSE)		5	-1.84	2.67	0.00	0.00	0.00	5.61
		9	1.84	-2.67	0.00	0.00	0.00	5.88
CRANE MOVING U/S TO D/S		5	-0.81	1.19	0.00	0.00	0.00	2.57
		9	0.81	-1.19	0.00	0.00	0.00	2.54
CRANE MOVING D/S TO U/S		5	0.60	-0.87	0.00	0.00	0.00	-1.81
		9	-0.60	0.87	0.00	0.00	0.00	-1.93
CRANE STRIKING U/S SIDE		5	0.59	-0.86	0.00	0.00	0.00	-1.80
		9	-0.59	0.86	0.00	0.00	0.00	-1.90
CRANE STRIKING D/S SIDE		5	-0.37	0.54	0.00	0.00	0.00	1.13
		9	0.37	-0.54	0.00	0.00	0.00	1.18
WIND BLOWING U/S TO D/S		5	-0.49	1.45	0.00	0.00	0.00	2.04
		9	0.49	-0.21	0.00	0.00	0.00	1.53
WIND BLOWING D/S TO U/S		5	0.46	-0.98	0.00	0.00	0.00	-1.63
		9	-0.46	0.45	0.00	0.00	0.00	-1.44
DEAD LOAD + LIVE LOAD	6	6	94.61	5.75	0.00	0.00	0.00	8.67
		10	-76.19	-5.75	0.00	0.00	0.00	16.07
EARTHQUAKE (TRANSVERSE)		6	1.84	7.57	0.00	0.00	0.00	77.92
		10	-1.84	-7.57	0.00	0.00	0.00	-45.36
CRANE MOVING U/S TO D/S		6	79.63	0.85	0.00	0.00	0.00	38.39
		10	-79.63	-0.85	0.00	0.00	0.00	-34.75
CRANE MOVING D/S TO U/S		6	24.22	-2.81	0.00	0.00	0.00	-24.87
		10	-24.22	2.81	0.00	0.00	0.00	12.79
CRANE STRIKING U/S SIDE		6	-0.59	-3.58	0.00	0.00	0.00	-24.98
		10	0.59	3.58	0.00	0.00	0.00	9.59
CRANE STRIKING D/S SIDE		6	0.37	1.07	0.00	0.00	0.00	16.03
		10	-0.37	-1.07	0.00	0.00	0.00	-11.41
WIND BLOWING U/S TO D/S		6	0.49	2.60	0.00	0.00	0.00	21.17
		10	-0.49	-2.60	0.00	0.00	0.00	-9.98
WIND BLOWING D/S TO U/S		6	-0.46	-1.83	0.00	0.00	0.00	-19.73
		10	0.46	1.83	0.00	0.00	0.00	11.86
DEAD LOAD + LIVE LOAD	7	7	111.94	-4.94	0.00	0.00	0.00	-6.94
		11	-93.52	4.94	0.00	0.00	0.00	-14.31
EARTHQUAKE (TRANSVERSE)		7	-4.84	13.26	0.00	0.00	0.00	83.34
		11	4.84	-13.26	0.00	0.00	0.00	-26.34
CRANE MOVING U/S TO D/S		7	23.26	3.65	0.00	0.00	0.00	25.94
		11	-23.26	-3.65	0.00	0.00	0.00	-10.25
CRANE MOVING D/S TO U/S		7	80.96	-2.18	0.00	0.00	0.00	-36.09
		11	-80.96	2.18	0.00	0.00	0.00	26.70
CRANE STRIKING U/S SIDE		7	0.99	-1.68	0.00	0.00	0.00	-16.29
		11	-0.99	1.68	0.00	0.00	0.00	9.08
CRANE STRIKING D/S SIDE		7	-1.32	4.04	0.00	0.00	0.00	23.91
		11	1.32	-4.04	0.00	0.00	0.00	-6.52
WIND BLOWING U/S TO D/S		7	-1.18	2.50	0.00	0.00	0.00	19.54
		11	1.18	-2.50	0.00	0.00	0.00	-8.79
WIND BLOWING D/S TO U/S		7	1.24	-3.28	0.00	0.00	0.00	-20.79
		11	-1.24	3.28	0.00	0.00	0.00	6.69
DEAD LOAD + LIVE LOAD	8	8	57.80	2.45	0.00	0.00	0.00	6.17
		12	-51.49	-2.45	0.00	0.00	0.00	4.35
EARTHQUAKE (TRANSVERSE)		8	4.84	2.96	0.00	0.00	0.00	12.33
		12	-4.84	-2.96	0.00	0.00	0.00	0.39
CRANE MOVING U/S TO D/S		8	1.56	0.86	0.00	0.00	0.00	3.81

TABLE NO.~ A-1 RESULTS OF ANALYSIS OF THE TRANSVERSE END FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		12	-1.56	-0.86	0.00	0.00	0.00	-0.10
CRANE MOVING D/S TO U/S		8	-2.14	-0.68	0.00	0.00	0.00	-5.12
		12	2.14	0.68	0.00	0.00	0.00	2.18
CRANE STRIKING U/S SIDE		8	-0.99	-0.44	0.00	0.00	0.00	-2.36
		12	0.99	0.44	0.00	0.00	0.00	0.49
CRANE STRIKING D/S SIDE		8	1.32	0.90	0.00	0.00	0.00	3.51
		12	-1.32	-0.90	0.00	0.00	0.00	0.34
WIND BLOWING U/S TO D/S		8	1.18	0.85	0.00	0.00	0.00	2.99
		12	-1.18	-0.31	0.00	0.00	0.00	-0.50
WIND BLOWING D/S TO U/S		8	-1.24	-1.31	0.00	0.00	0.00	-3.38
		12	1.24	0.07	0.00	0.00	0.00	0.42
DEAD LOAD + LIVE LOAD	9	10	50.01	2.50	0.00	0.00	0.00	3.95
		13	-31.16	-2.50	0.00	0.00	0.00	7.02
EARTHQUAKE (TRANSVERSE)		10	0.00	9.23	0.00	0.00	0.00	52.67
		13	0.00	-9.23	0.00	0.00	0.00	-12.07
CRANE MOVING U/S TO D/S		10	78.82	2.04	0.00	0.00	0.00	38.02
		13	-78.82	-2.04	0.00	0.00	0.00	-29.07
CRANE MOVING D/S TO U/S		10	24.82	-3.68	0.00	0.00	0.00	-15.18
		13	-24.82	3.68	0.00	0.00	0.00	-1.02
CRANE STRIKING U/S SIDE		10	0.00	-4.44	0.00	0.00	0.00	-11.92
		13	0.00	4.44	0.00	0.00	0.00	-7.61
CRANE STRIKING D/S SIDE		10	0.00	1.61	0.00	0.00	0.00	12.89
		13	0.00	-1.61	0.00	0.00	0.00	-5.80
WIND BLOWING U/S TO D/S		10	0.00	2.81	0.00	0.00	0.00	11.98
		13	0.00	-1.37	0.00	0.00	0.00	-2.79
WIND BLOWING D/S TO U/S		10	0.00	-2.28	0.00	0.00	0.00	-13.70
		13	0.00	1.66	0.00	0.00	0.00	5.05
DEAD LOAD + LIVE LOAD	10	11	62.41	-6.08	0.00	0.00	0.00	-9.21
		14	-43.56	6.08	0.00	0.00	0.00	-17.52
EARTHQUAKE (TRANSVERSE)		11	-2.47	8.17	0.00	0.00	0.00	35.10
		14	2.47	-8.17	0.00	0.00	0.00	0.86
CRANE MOVING U/S TO D/S		11	24.01	3.20	0.00	0.00	0.00	13.03
		14	-24.01	-3.20	0.00	0.00	0.00	1.07
CRANE MOVING D/S TO U/S		11	80.01	-0.62	0.00	0.00	0.00	-30.23
		14	-80.01	0.62	0.00	0.00	0.00	27.48
CRANE STRIKING U/S SIDE		11	0.53	-1.19	0.00	0.00	0.00	-10.78
		14	-0.53	1.19	0.00	0.00	0.00	5.57
CRANE STRIKING D/S SIDE		11	-0.66	3.92	0.00	0.00	0.00	8.99
		14	0.66	-3.92	0.00	0.00	0.00	8.25
WIND BLOWING U/S TO D/S		11	-0.62	1.42	0.00	0.00	0.00	10.87
		14	0.62	-1.42	0.00	0.00	0.00	-4.62
WIND BLOWING D/S TO U/S		11	0.63	-1.51	0.00	0.00	0.00	-8.95
		14	-0.63	1.51	0.00	0.00	0.00	2.31
DEAD LOAD + LIVE LOAD	11	12	20.34	3.58	0.00	0.00	0.00	5.89
		15	-13.87	-3.58	0.00	0.00	0.00	9.86
EARTHQUAKE (TRANSVERSE)		12	2.47	3.91	0.00	0.00	0.00	8.30
		15	-2.47	-3.91	0.00	0.00	0.00	8.89
CRANE MOVING U/S TO D/S		12	0.81	1.31	0.00	0.00	0.00	2.86
		15	-0.81	-1.31	0.00	0.00	0.00	2.91
CRANE MOVING D/S TO U/S		12	-1.19	-2.24	0.00	0.00	0.00	-5.71
		15	1.19	2.24	0.00	0.00	0.00	-4.17
CRANE STRIKING U/S SIDE		12	-0.53	-0.93	0.00	0.00	0.00	-2.18
		15	0.53	0.93	0.00	0.00	0.00	-1.90
CRANE STRIKING D/S SIDE		12	0.66	1.02	0.00	0.00	0.00	2.09
		15	-0.66	-1.02	0.00	0.00	0.00	2.39
WIND BLOWING U/S TO D/S		12	0.62	1.39	0.00	0.00	0.00	2.57
		15	-0.62	-0.77	0.00	0.00	0.00	2.20
WIND BLOWING D/S TO U/S		12	-0.63	-1.84	0.00	0.00	0.00	-2.67
		15	0.63	0.39	0.00	0.00	0.00	-2.24

TABLE NO.~ A-1 RESULTS OF ANALYSIS OF THE TRANSVERSE END FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	12	13	18.79	2.50	0.00	0.00	0.00	8.98
		16	-11.74	-2.50	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		13	0.00	3.35	0.00	0.00	0.00	12.07
		16	0.00	-3.35	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		13	0.00	-4.51	0.00	0.00	0.00	-16.25
		16	0.00	4.51	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		13	0.00	-3.68	0.00	0.00	0.00	-13.25
		16	0.00	3.68	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		13	0.00	2.11	0.00	0.00	0.00	7.61
		16	0.00	-2.11	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		13	0.00	1.61	0.00	0.00	0.00	5.80
		16	0.00	-1.61	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		13	0.00	1.37	0.00	0.00	0.00	2.79
		16	0.00	-0.19	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		13	0.00	-1.66	0.00	0.00	0.00	-5.05
		16	0.00	1.15	0.00	0.00	0.00	0.00
DEAD LOAD + LIVE LOAD	13	14	18.79	-2.50	0.00	0.00	0.00	-8.98
		17	-11.74	2.50	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		14	0.00	2.36	0.00	0.00	0.00	8.48
		17	0.00	-2.36	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		14	0.00	4.51	0.00	0.00	0.00	16.25
		17	0.00	-4.51	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		14	0.00	3.68	0.00	0.00	0.00	13.25
		17	0.00	-3.68	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		14	0.00	-2.11	0.00	0.00	0.00	-7.61
		17	0.00	2.11	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		14	0.00	-1.61	0.00	0.00	0.00	-5.80
		17	0.00	1.61	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		14	0.00	2.19	0.00	0.00	0.00	6.98
		17	0.00	-1.69	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		14	0.00	-1.90	0.00	0.00	0.00	-4.73
		17	0.00	0.72	0.00	0.00	0.00	0.00
DEAD LOAD + LIVE LOAD	14	5	-1.79	10.93	0.00	0.00	0.00	11.88
		6	1.79	11.57	0.00	0.00	0.00	-14.15
EARTHQUAKE (TRANSVERSE)		5	2.34	-1.40	0.00	0.00	0.00	-4.97
		6	-2.34	1.40	0.00	0.00	0.00	-5.10
CRANE MOVING U/S TO D/S		5	1.02	-0.56	0.00	0.00	0.00	-2.00
		6	-1.02	0.56	0.00	0.00	0.00	-2.03
CRANE MOVING D/S TO U/S		5	-0.64	0.46	0.00	0.00	0.00	1.63
		6	0.64	-0.46	0.00	0.00	0.00	1.68
CRANE STRIKING U/S SIDE		5	-0.59	0.47	0.00	0.00	0.00	1.66
		6	0.59	-0.47	0.00	0.00	0.00	1.71
CRANE STRIKING D/S SIDE		5	0.42	-0.27	0.00	0.00	0.00	-0.96
		6	-0.42	0.27	0.00	0.00	0.00	-0.98
WIND BLOWING U/S TO D/S		5	1.78	-0.43	0.00	0.00	0.00	-1.54
		6	-1.78	0.43	0.00	0.00	0.00	-1.56
WIND BLOWING D/S TO U/S		5	-1.04	0.37	0.00	0.00	0.00	1.30
		6	1.04	-0.37	0.00	0.00	0.00	1.32
DEAD LOAD + LIVE LOAD	15	7	-0.90	11.75	0.00	0.00	0.00	14.41
		8	0.90	11.66	0.00	0.00	0.00	-14.10
EARTHQUAKE (TRANSVERSE)		7	-0.83	-1.56	0.00	0.00	0.00	-5.78
		8	0.83	1.56	0.00	0.00	0.00	-5.75
CRANE MOVING U/S TO D/S		7	-0.17	-0.48	0.00	0.00	0.00	-1.76
		8	0.17	0.48	0.00	0.00	0.00	-1.75
CRANE MOVING D/S TO U/S		7	0.18	0.52	0.00	0.00	0.00	1.93
		8	-0.18	-0.52	0.00	0.00	0.00	1.91
CRANE STRIKING U/S SIDE		7	0.10	0.27	0.00	0.00	0.00	1.01
		8	-0.10	-0.27	0.00	0.00	0.00	1.00

TABLE NO.~ A-1 RESULTS OF ANALYSIS OF THE TRANSVERSE END FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
CRANE STRIKING D/S SIDE		7	-0.16	-0.45	0.00	0.00	0.00	-1.66
		8	0.16	0.45	0.00	0.00	0.00	-1.64
WIND BLOWING U/S TO D/S		7	-0.52	-0.36	0.00	0.00	0.00	-1.31
		8	0.52	0.36	0.00	0.00	0.00	-1.31
WIND BLOWING D/S TO U/S		7	1.07	0.41	0.00	0.00	0.00	1.53
		8	-1.07	-0.41	0.00	0.00	0.00	1.53
DEAD LOAD + LIVE LOAD	16	9	3.26	7.75	0.00	0.00	0.00	7.52
		10	-3.26	8.65	0.00	0.00	0.00	-10.74
EARTHQUAKE (TRANSVERSE)		9	-1.66	-1.84	0.00	0.00	0.00	-5.88
		10	1.66	1.84	0.00	0.00	0.00	-7.32
CRANE MOVING U/S TO D/S		9	-1.19	-0.81	0.00	0.00	0.00	-2.54
		10	1.19	0.81	0.00	0.00	0.00	-3.27
CRANE MOVING D/S TO U/S		9	0.87	0.60	0.00	0.00	0.00	1.93
		10	-0.87	-0.60	0.00	0.00	0.00	2.39
CRANE STRIKING U/S SIDE		9	0.86	0.59	0.00	0.00	0.00	1.90
		10	-0.86	-0.59	0.00	0.00	0.00	2.33
CRANE STRIKING D/S SIDE		9	-0.54	-0.37	0.00	0.00	0.00	-1.18
		10	0.54	0.37	0.00	0.00	0.00	-1.48
WIND BLOWING U/S TO D/S		9	-0.21	-0.49	0.00	0.00	0.00	-1.53
		10	0.21	0.49	0.00	0.00	0.00	-2.00
WIND BLOWING D/S TO U/S		9	0.45	0.46	0.00	0.00	0.00	1.44
		10	-0.45	-0.46	0.00	0.00	0.00	1.84
DEAD LOAD + LIVE LOAD	17	11	-1.13	11.69	0.00	0.00	0.00	14.24
		12	1.13	11.72	0.00	0.00	0.00	-14.36
EARTHQUAKE (TRANSVERSE)		11	-2.66	-2.37	0.00	0.00	0.00	-8.76
		12	2.66	2.37	0.00	0.00	0.00	-8.69
CRANE MOVING U/S TO D/S		11	-0.45	-0.75	0.00	0.00	0.00	-2.79
		12	0.45	0.75	0.00	0.00	0.00	-2.76
CRANE MOVING D/S TO U/S		11	1.56	0.96	0.00	0.00	0.00	3.53
		12	-1.56	-0.96	0.00	0.00	0.00	3.53
CRANE STRIKING U/S SIDE		11	0.49	0.46	0.00	0.00	0.00	1.71
		12	-0.49	-0.46	0.00	0.00	0.00	1.70
CRANE STRIKING D/S SIDE		11	-0.12	-0.67	0.00	0.00	0.00	-2.47
		12	0.12	0.67	0.00	0.00	0.00	-2.44
WIND BLOWING U/S TO D/S		11	-1.08	-0.56	0.00	0.00	0.00	-2.08
		12	1.08	0.56	0.00	0.00	0.00	-2.07
WIND BLOWING D/S TO U/S		11	1.77	0.61	0.00	0.00	0.00	2.26
		12	-1.77	-0.61	0.00	0.00	0.00	2.25
DEAD LOAD + LIVE LOAD	18	14	3.58	8.61	0.00	0.00	0.00	10.50
		15	-3.58	8.44	0.00	0.00	0.00	-9.86
EARTHQUAKE (TRANSVERSE)		14	1.34	-2.47	0.00	0.00	0.00	-9.34
		15	-1.34	2.47	0.00	0.00	0.00	-8.89
CRANE MOVING U/S TO D/S		14	1.31	-0.81	0.00	0.00	0.00	-3.05
		15	-1.31	0.81	0.00	0.00	0.00	-2.91
CRANE MOVING D/S TO U/S		14	-2.24	1.19	0.00	0.00	0.00	4.59
		15	2.24	-1.19	0.00	0.00	0.00	4.17
CRANE STRIKING U/S SIDE		14	-0.93	0.53	0.00	0.00	0.00	2.04
		15	0.93	-0.53	0.00	0.00	0.00	1.90
CRANE STRIKING D/S SIDE		14	1.02	-0.66	0.00	0.00	0.00	-2.45
		15	-1.02	0.66	0.00	0.00	0.00	-2.39
WIND BLOWING U/S TO D/S		14	0.77	-0.62	0.00	0.00	0.00	-2.37
		15	-0.77	0.62	0.00	0.00	0.00	-2.20
WIND BLOWING D/S TO U/S		14	-0.39	0.63	0.00	0.00	0.00	2.42
		15	0.39	-0.63	0.00	0.00	0.00	2.24
DEAD LOAD + LIVE LOAD	19	16	-2.50	0.00	0.00	0.00	0.00	0.00
		17	2.50	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		16	-0.50	0.00	0.00	0.00	0.00	0.00
		17	0.50	0.00	0.00	0.00	0.00	0.00

TABLE NO.~ A-1 RESULTS OF ANALYSIS OF THE TRANSVERSE END FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
CRANE MOVING U/S TO D/S		16	4.51	0.00	0.00	0.00	0.00	0.00
		17	-4.51	0.00	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		16	3.68	0.00	0.00	0.00	0.00	0.00
		17	-3.68	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		16	-2.11	0.00	0.00	0.00	0.00	0.00
		17	2.11	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		16	-1.61	0.00	0.00	0.00	0.00	0.00
		17	1.61	0.00	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		16	1.12	0.00	0.00	0.00	0.00	0.00
		17	-1.12	0.00	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		16	0.59	0.00	0.00	0.00	0.00	0.00
		17	-0.59	0.00	0.00	0.00	0.00	0.00

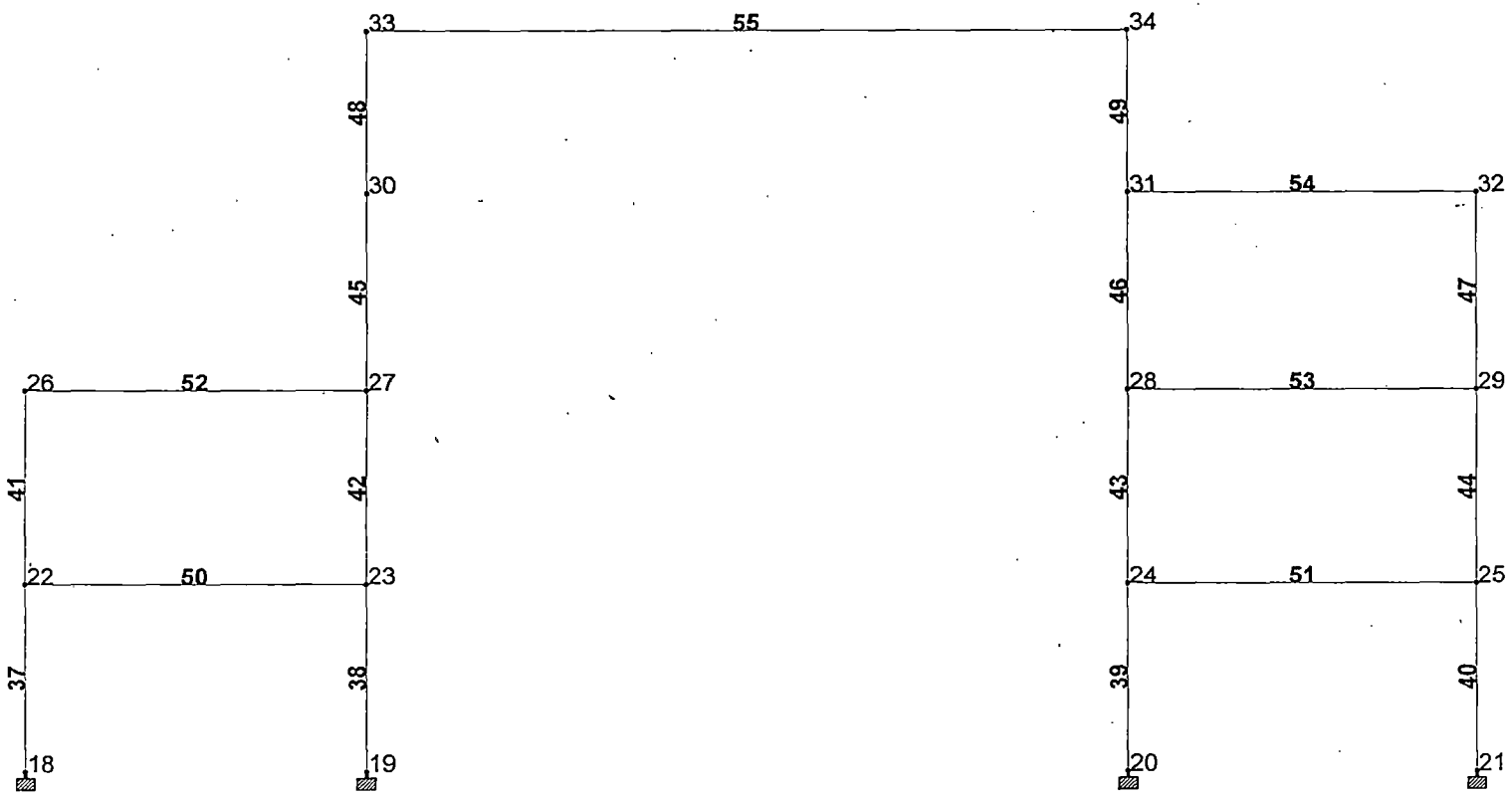

FIG. NO.- A2 THE TRANSVERSE CENTRAL FRAME (MAIN FRAME)

Y
Z—X

TABLE NO.~ A-2 RESULTS OF ANALYSIS OF THE TRANSVERSE CENTRAL FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	37	18	90.04	-2.64	0.00	0.00	0.00	-3.82
		22	-86.34	2.64	0.00	0.00	0.00	-7.27
EARTHQUAKE (TRANSVERSE)		18	-4.78	1.12	0.00	0.00	0.00	5.51
		22	4.78	-1.12	0.00	0.00	0.00	-0.80
CRANE MOVING U/S TO D/S		18	-2.28	0.29	0.00	0.00	0.00	2.15
		22	2.28	-0.29	0.00	0.00	0.00	-0.95
CRANE MOVING D/S TO U/S		18	1.77	-0.39	0.00	0.00	0.00	-1.94
		22	-1.77	0.39	0.00	0.00	0.00	0.30
CRANE STRIKING U/S SIDE		18	1.76	-0.45	0.00	0.00	0.00	-2.10
		22	-1.76	0.45	0.00	0.00	0.00	0.23
CRANE STRIKING D/S SIDE		18	-1.07	0.19	0.00	0.00	0.00	1.07
		22	1.07	-0.19	0.00	0.00	0.00	-0.29
WIND BLOWING U/S TO D/S		18	-1.85	1.77	0.00	0.00	0.00	3.35
		22	1.85	0.65	0.00	0.00	0.00	-1.00
WIND BLOWING D/S TO U/S		18	1.64	-0.91	0.00	0.00	0.00	-2.29
		22	-1.64	-0.13	0.00	0.00	0.00	0.66
DEAD LOAD + LIVE LOAD	38	19	219.43	7.33	0.00	0.00	0.00	3.19
		23	-201.44	-7.33	0.00	0.00	0.00	27.57
EARTHQUAKE (TRANSVERSE)		19	4.78	17.11	0.00	0.00	0.00	177.74
		23	-4.78	-17.11	0.00	0.00	0.00	-105.89
CRANE MOVING U/S TO D/S		19	133.64	3.10	0.00	0.00	0.00	73.55
		23	-133.64	-3.10	0.00	0.00	0.00	-60.54
CRANE MOVING D/S TO U/S		19	39.59	-5.74	0.00	0.00	0.00	-62.74
		23	-39.59	5.74	0.00	0.00	0.00	38.63
CRANE STRIKING U/S SIDE		19	-1.76	-6.94	0.00	0.00	0.00	-67.86
		23	1.76	6.94	0.00	0.00	0.00	38.72
CRANE STRIKING D/S SIDE		19	1.07	2.49	0.00	0.00	0.00	35.52
		23	-1.07	-2.49	0.00	0.00	0.00	-25.04
WIND BLOWING U/S TO D/S		19	1.85	8.75	0.00	0.00	0.00	75.91
		23	-1.85	-8.75	0.00	0.00	0.00	-39.16
WIND BLOWING D/S TO U/S		19	-1.64	-5.74	0.00	0.00	0.00	-60.89
		23	1.64	5.74	0.00	0.00	0.00	36.77
DEAD LOAD + LIVE LOAD	39	20	252.33	-7.40	0.00	0.00	0.00	0.84
		24	-234.34	7.40	0.00	0.00	0.00	-31.92
EARTHQUAKE (TRANSVERSE)		20	-9.19	21.09	0.00	0.00	0.00	199.90
		24	9.19	-21.09	0.00	0.00	0.00	-111.34
CRANE MOVING U/S TO D/S		20	37.97	6.37	0.00	0.00	0.00	67.01
		24	-37.97	-6.37	0.00	0.00	0.00	-40.27
CRANE MOVING D/S TO U/S		20	135.80	-3.92	0.00	0.00	0.00	-73.37
		24	-135.80	3.92	0.00	0.00	0.00	56.89
CRANE STRIKING U/S SIDE		20	2.11	-2.95	0.00	0.00	0.00	-37.82
		24	-2.11	2.95	0.00	0.00	0.00	25.42
CRANE STRIKING D/S SIDE		20	-2.94	7.00	0.00	0.00	0.00	66.43
		24	2.94	-7.00	0.00	0.00	0.00	-37.03
WIND BLOWING U/S TO D/S		20	-3.07	6.04	0.00	0.00	0.00	61.78
		24	3.07	-6.04	0.00	0.00	0.00	-36.41
WIND BLOWING D/S TO U/S		20	3.31	-8.70	0.00	0.00	0.00	-75.04
		24	-3.31	8.70	0.00	0.00	0.00	38.49
DEAD LOAD + LIVE LOAD	40	21	164.32	2.72	0.00	0.00	0.00	4.76
		25	-158.15	-2.72	0.00	0.00	0.00	6.65
EARTHQUAKE (TRANSVERSE)		21	9.19	3.65	0.00	0.00	0.00	24.79
		25	-9.19	-3.65	0.00	0.00	0.00	-9.46
CRANE MOVING U/S TO D/S		21	3.39	1.15	0.00	0.00	0.00	8.28
		25	-3.39	-1.15	0.00	0.00	0.00	-3.44
CRANE MOVING D/S TO U/S		21	-4.44	-0.85	0.00	0.00	0.00	-8.89
		25	4.44	0.85	0.00	0.00	0.00	5.34
CRANE STRIKING U/S SIDE		21	-2.11	-0.57	0.00	0.00	0.00	-4.64
		25	2.11	0.57	0.00	0.00	0.00	2.27
CRANE STRIKING D/S SIDE		21	2.94	1.22	0.00	0.00	0.00	8.22

TABLE NO.~ A-2 RESULTS OF ANALYSIS OF THE TRANSVERSE CENTRAL FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		25	-2.94	-1.22	0.00	0.00	0.00	-3.10
WIND BLOWING U/S TO D/S		21	3.07	1.69	0.00	0.00	0.00	8.25
		25	-3.07	-0.64	0.00	0.00	0.00	-3.36
WIND BLOWING D/S TO U/S		21	-3.31	-2.90	0.00	0.00	0.00	-10.76
		25	3.31	0.47	0.00	0.00	0.00	3.69
DEAD LOAD + LIVE LOAD	41	22	28.20	-5.73	0.00	0.00	0.00	-11.52
		26	-24.42	5.73	0.00	0.00	0.00	-13.11
EARTHQUAKE (TRANSVERSE)		22	-2.69	3.91	0.00	0.00	0.00	8.20
		26	2.69	-3.91	0.00	0.00	0.00	8.63
CRANE MOVING U/S TO D/S		22	-1.35	1.98	0.00	0.00	0.00	4.28
		26	1.35	-1.98	0.00	0.00	0.00	4.23
CRANE MOVING D/S TO U/S		22	1.00	-1.45	0.00	0.00	0.00	-3.02
		26	-1.00	1.45	0.00	0.00	0.00	-3.22
CRANE STRIKING U/S SIDE		22	0.98	-1.43	0.00	0.00	0.00	-2.99
		26	-0.98	1.43	0.00	0.00	0.00	-3.15
CRANE STRIKING D/S SIDE		22	-0.62	0.89	0.00	0.00	0.00	1.88
		26	0.62	-0.89	0.00	0.00	0.00	1.96
WIND BLOWING U/S TO D/S		22	-0.98	2.90	0.00	0.00	0.00	4.07
		26	0.98	-0.41	0.00	0.00	0.00	3.05
WIND BLOWING D/S TO U/S		22	0.91	-1.96	0.00	0.00	0.00	-3.25
		26	-0.91	0.89	0.00	0.00	0.00	-2.87
DEAD LOAD + LIVE LOAD	42	23	142.14	10.41	0.00	0.00	0.00	16.26
		27	-123.73	-10.41	0.00	0.00	0.00	28.51
EARTHQUAKE (TRANSVERSE)		23	2.69	12.94	0.00	0.00	0.00	113.50
		27	-2.69	-12.94	0.00	0.00	0.00	-57.87
CRANE MOVING U/S TO D/S		23	132.71	1.40	0.00	0.00	0.00	63.93
		27	-132.71	-1.40	0.00	0.00	0.00	-57.90
CRANE MOVING D/S TO U/S		23	40.36	-4.68	0.00	0.00	0.00	-41.42
		27	-40.36	4.68	0.00	0.00	0.00	21.30
CRANE STRIKING U/S SIDE		23	-0.98	-5.96	0.00	0.00	0.00	-41.57
		27	0.98	5.96	0.00	0.00	0.00	15.96
CRANE STRIKING D/S SIDE		23	0.62	1.79	0.00	0.00	0.00	26.67
		27	-0.62	-1.79	0.00	0.00	0.00	-18.98
WIND BLOWING U/S TO D/S		23	0.98	5.20	0.00	0.00	0.00	42.28
		27	-0.98	-5.20	0.00	0.00	0.00	-19.93
WIND BLOWING D/S TO U/S		23	-0.91	-3.66	0.00	0.00	0.00	-39.41
		27	0.91	3.66	0.00	0.00	0.00	23.69
DEAD LOAD + LIVE LOAD	43	24	174.68	-9.01	0.00	0.00	0.00	-12.37
		28	-156.27	9.01	0.00	0.00	0.00	-26.38
EARTHQUAKE (TRANSVERSE)		24	-6.94	19.06	0.00	0.00	0.00	119.65
		28	6.94	-19.06	0.00	0.00	0.00	-37.69
CRANE MOVING U/S TO D/S		24	38.76	6.08	0.00	0.00	0.00	43.20
		28	-38.76	-6.08	0.00	0.00	0.00	-17.06
CRANE MOVING D/S TO U/S		24	134.93	-3.63	0.00	0.00	0.00	-60.10
		28	-134.93	3.63	0.00	0.00	0.00	44.49
CRANE STRIKING U/S SIDE		24	1.66	-2.79	0.00	0.00	0.00	-27.10
		28	-1.66	2.79	0.00	0.00	0.00	15.11
CRANE STRIKING D/S SIDE		24	-2.20	6.73	0.00	0.00	0.00	39.79
		28	2.20	-6.73	0.00	0.00	0.00	-10.86
WIND BLOWING U/S TO D/S		24	-2.36	4.99	0.00	0.00	0.00	39.03
		28	2.36	-4.99	0.00	0.00	0.00	-17.55
WIND BLOWING D/S TO U/S		24	2.49	-6.55	0.00	0.00	0.00	-41.54
		28	-2.49	6.55	0.00	0.00	0.00	13.36
DEAD LOAD + LIVE LOAD	44	25	98.61	4.33	0.00	0.00	0.00	10.95
		29	-92.30	-4.33	0.00	0.00	0.00	7.66
EARTHQUAKE (TRANSVERSE)		25	6.94	4.26	0.00	0.00	0.00	17.71
		29	-6.94	-4.26	0.00	0.00	0.00	0.59
CRANE MOVING U/S TO D/S		25	2.60	1.44	0.00	0.00	0.00	6.35

TABLE NO.~ A-2 RESULTS OF ANALYSIS OF THE TRANSVERSE CENTRAL FRAME

LOADS.	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		29	-2.60	-1.44	0.00	0.00	0.00	-0.16
CRANE MOVING D/S TO U/S		25	-3.57	-1.14	0.00	0.00	0.00	-8.52
		29	3.57	1.14	0.00	0.00	0.00	3.63
CRANE STRIKING U/S SIDE		25	-1.66	-0.73	0.00	0.00	0.00	-3.93
		29	1.66	0.73	0.00	0.00	0.00	0.81
CRANE STRIKING D/S SIDE		25	2.20	1.49	0.00	0.00	0.00	5.84
		29	-2.20	-1.49	0.00	0.00	0.00	0.57
WIND BLOWING U/S TO D/S		25	2.36	1.69	0.00	0.00	0.00	5.97
		29	-2.36	-0.63	0.00	0.00	0.00	-0.99
WIND BLOWING D/S TO U/S		25	-2.49	-2.62	0.00	0.00	0.00	-6.74
		29	2.49	0.13	0.00	0.00	0.00	0.83
DEAD LOAD + LIVE LOAD	**45**	27	73.53	4.68	0.00	0.00	0.00	8.82
		30	-54.69	-4.68	0.00	0.00	0.00	11.79
EARTHQUAKE (TRANSVERSE)		27	0.00	12.26	0.00	0.00	0.00	68.54
		30	0.00	-12.26	0.00	0.00	0.00	-14.61
CRANE MOVING U/S TO D/S		27	131.36	3.38	0.00	0.00	0.00	63.34
		30	-131.36	-3.38	0.00	0.00	0.00	-48.46
CRANE MOVING D/S TO U/S		27	41.36	-6.13	0.00	0.00	0.00	-25.28
		30	-41.36	6.13	0.00	0.00	0.00	-1.69
CRANE STRIKING U/S SIDE		27	0.00	-7.38	0.00	0.00	0.00	-19.83
		30	0.00	7.38	0.00	0.00	0.00	-12.66
CRANE STRIKING D/S SIDE		27	0.00	2.68	0.00	0.00	0.00	21.45
		30	0.00	-2.68	0.00	0.00	0.00	-9.65
WIND BLOWING U/S TO D/S		27	0.00	5.61	0.00	0.00	0.00	23.94
		30	0.00	-2.73	0.00	0.00	0.00	-5.58
WIND BLOWING D/S TO U/S		27	0.00	-4.55	0.00	0.00	0.00	-27.38
		30	0.00	3.31	0.00	0.00	0.00	10.09
DEAD LOAD + LIVE LOAD	**46**	28	96.17	-10.93	0.00	0.00	0.00	-17.97
		31	-77.32	10.93	0.00	0.00	0.00	-30.11
EARTHQUAKE (TRANSVERSE)		28	-3.55	11.82	0.00	0.00	0.00	50.26
		31	3.55	-11.82	0.00	0.00	0.00	1.75
CRANE MOVING U/S TO D/S		28	40.02	5.34	0.00	0.00	0.00	21.70
		31	-40.02	-5.34	0.00	0.00	0.00	1.78
CRANE MOVING D/S TO U/S		28	133.34	-1.03	0.00	0.00	0.00	-50.36
		31	-133.34	1.03	0.00	0.00	0.00	45.82
CRANE STRIKING U/S SIDE		28	0.89	-1.97	0.00	0.00	0.00	-17.95
		31	-0.89	1.97	0.00	0.00	0.00	9.27
CRANE STRIKING D/S SIDE		28	-1.09	6.52	0.00	0.00	0.00	14.97
		31	1.09	-6.52	0.00	0.00	0.00	13.74
WIND BLOWING U/S TO D/S		28	-1.24	2.84	0.00	0.00	0.00	21.72
		31	1.24	-2.84	0.00	0.00	0.00	-9.23
WIND BLOWING D/S TO U/S		28	1.26	-3.02	0.00	0.00	0.00	-17.88
		31	-1.26	3.02	0.00	0.00	0.00	4.62
DEAD LOAD + LIVE LOAD	**47**	29	32.10	6.24	0.00	0.00	0.00	10.23
		32	-25.64	-6.24	0.00	0.00	0.00	17.25
EARTHQUAKE (TRANSVERSE)		29	3.55	5.60	0.00	0.00	0.00	11.89
		32	-3.55	-5.60	0.00	0.00	0.00	12.76
CRANE MOVING U/S TO D/S		29	1.35	2.18	0.00	0.00	0.00	4.76
		32	-1.35	-2.18	0.00	0.00	0.00	4.84
CRANE MOVING D/S TO U/S		29	-1.98	-3.74	0.00	0.00	0.00	-9.50
		32	1.98	3.74	0.00	0.00	0.00	-6.94
CRANE STRIKING U/S SIDE		29	-0.89	-1.54	0.00	0.00	0.00	-3.64
		32	0.89	1.54	0.00	0.00	0.00	-3.16
CRANE STRIKING D/S SIDE		29	1.09	1.70	0.00	0.00	0.00	3.48
		32	-1.09	-1.70	0.00	0.00	0.00	3.97
WIND BLOWING U/S TO D/S		29	1.24	2.78	0.00	0.00	0.00	5.13
		32	-1.24	-1.55	0.00	0.00	0.00	4.39
WIND BLOWING D/S TO U/S		29	-1.26	-3.67	0.00	0.00	0.00	-5.33
		32	1.26	0.79	0.00	0.00	0.00	-4.48

TABLE NO.~ A-2 RESULTS OF ANALYSIS OF THE TRANSVERSE CENTRAL FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	48	30	29.94	4.68	0.00	0.00	0.00	16.86
		33	-22.89	-4.68	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		30	0.00	4.06	0.00	0.00	0.00	14.61
		33	0.00	-4.06	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		30	0.00	-7.52	0.00	0.00	0.00	-27.07
		33	0.00	7.52	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		30	0.00	-6.13	0.00	0.00	0.00	-22.07
		33	0.00	6.13	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		30	0.00	3.52	0.00	0.00	0.00	12.66
		33	0.00	-3.52	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		30	0.00	2.68	0.00	0.00	0.00	9.65
		33	0.00	-2.68	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		30	0.00	2.73	0.00	0.00	0.00	5.58
		33	0.00	-0.37	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		30	0.00	-3.31	0.00	0.00	0.00	-10.09
		33	0.00	2.30	0.00	0.00	0.00	0.00
DEAD LOAD + LIVE LOAD	49	31	29.94	-4.68	0.00	0.00	0.00	-16.86
		34	-22.89	4.68	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		31	0.00	3.23	0.00	0.00	0.00	11.64
		34	0.00	-3.23	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		31	0.00	7.52	0.00	0.00	0.00	27.07
		34	0.00	-7.52	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		31	0.00	6.13	0.00	0.00	0.00	22.07
		34	0.00	-6.13	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		31	0.00	-3.52	0.00	0.00	0.00	-12.66
		34	0.00	3.52	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		31	0.00	-2.68	0.00	0.00	0.00	-9.65
		34	0.00	2.68	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		31	0.00	4.38	0.00	0.00	0.00	13.96
		34	0.00	-3.37	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		31	0.00	-3.80	0.00	0.00	0.00	-9.45
		34	0.00	1.45	0.00	0.00	0.00	0.00
DEAD LOAD + LIVE LOAD	50	22	-3.09	19.79	0.00	0.00	0.00	21.49
		23	3.09	20.95	0.00	0.00	0.00	-25.64
EARTHQUAKE (TRANSVERSE)		22	3.39	-2.09	0.00	0.00	0.00	-7.40
		23	-3.39	2.09	0.00	0.00	0.00	-7.61
CRANE MOVING U/S TO D/S		22	1.69	-0.94	0.00	0.00	0.00	-3.33
		23	-1.69	0.94	0.00	0.00	0.00	-3.38
CRANE MOVING D/S TO U/S		22	-1.06	0.77	0.00	0.00	0.00	2.71
		23	1.06	-0.77	0.00	0.00	0.00	2.80
CRANE STRIKING U/S SIDE		22	-0.98	0.78	0.00	0.00	0.00	2.76
		23	0.98	-0.78	0.00	0.00	0.00	2.85
CRANE STRIKING D/S SIDE		22	0.71	-0.45	0.00	0.00	0.00	-1.59
		23	-0.71	0.45	0.00	0.00	0.00	-1.63
WIND BLOWING U/S TO D/S		22	3.55	-0.86	0.00	0.00	0.00	-3.07
		23	-3.55	0.86	0.00	0.00	0.00	-3.13
WIND BLOWING D/S TO U/S		22	-2.09	0.73	0.00	0.00	0.00	2.59
		23	2.09	-0.73	0.00	0.00	0.00	2.64
DEAD LOAD + LIVE LOAD	51	24	-1.61	21.31	0.00	0.00	0.00	26.10
		25	1.61	21.19	0.00	0.00	0.00	-25.68
EARTHQUAKE (TRANSVERSE)		24	-1.24	-2.25	0.00	0.00	0.00	-8.30
		25	1.24	2.25	0.00	0.00	0.00	-8.26
CRANE MOVING U/S TO D/S		24	-0.29	-0.79	0.00	0.00	0.00	-2.93
		25	0.29	0.79	0.00	0.00	0.00	-2.91
CRANE MOVING D/S TO U/S		24	0.29	0.87	0.00	0.00	0.00	3.22
		25	-0.29	-0.87	0.00	0.00	0.00	3.19
CRANE STRIKING U/S SIDE		24	0.16	0.45	0.00	0.00	0.00	1.68
		25	-0.16	-0.45	0.00	0.00	0.00	1.67

TABLE NO.~ A-2 RESULTS OF ANALYSIS OF THE TRANSVERSE CENTRAL FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
CRANE STRIKING D/S SIDE		24	-0.27	-0.74	0.00	0.00	0.00	-2.76
		25	0.27	0.74	0.00	0.00	0.00	-2.74
WIND BLOWING U/S TO D/S		24	-1.05	-0.71	0.00	0.00	0.00	-2.62
		25	1.05	0.71	0.00	0.00	0.00	-2.61
WIND BLOWING D/S TO U/S		24	2.15	0.83	0.00	0.00	0.00	3.05
		25	-2.15	-0.83	0.00	0.00	0.00	3.05
DEAD LOAD + LIVE LOAD	**52**	26	5.73	13.52	0.00	0.00	0.00	13.11
		27	-5.73	15.09	0.00	0.00	0.00	-18.77
EARTHQUAKE (TRANSVERSE)		26	-2.30	-2.69	0.00	0.00	0.00	-8.63
		27	2.30	2.69	0.00	0.00	0.00	-10.68
CRANE MOVING U/S TO D/S		26	-1.98	-1.35	0.00	0.00	0.00	-4.23
		27	1.98	1.35	0.00	0.00	0.00	-5.44
CRANE MOVING D/S TO U/S		26	1.45	1.00	0.00	0.00	0.00	3.22
		27	-1.45	-1.00	0.00	0.00	0.00	3.99
CRANE STRIKING U/S SIDE		26	1.43	0.98	0.00	0.00	0.00	3.15
		27	-1.43	-0.98	0.00	0.00	0.00	3.87
CRANE STRIKING D/S SIDE		26	-0.89	-0.62	0.00	0.00	0.00	-1.96
		27	0.89	0.62	0.00	0.00	0.00	-2.47
WIND BLOWING U/S TO D/S		26	-0.41	-0.98	0.00	0.00	0.00	-3.05
		27	0.41	0.98	0.00	0.00	0.00	-4.00
WIND BLOWING D/S TO U/S		26	0.89	0.91	0.00	0.00	0.00	2.87
		27	-0.89	-0.91	0.00	0.00	0.00	3.68
DEAD LOAD + LIVE LOAD	**53**	28	-1.92	21.20	0.00	0.00	0.00	25.79
		29	1.92	21.30	0.00	0.00	0.00	-26.14
EARTHQUAKE (TRANSVERSE)		28	-3.98	-3.40	0.00	0.00	0.00	-12.57
		29	3.98	3.40	0.00	0.00	0.00	-12.48
CRANE MOVING U/S TO D/S		28	-0.74	-1.25	0.00	0.00	0.00	-4.64
		29	0.74	1.25	0.00	0.00	0.00	-4.60
CRANE MOVING D/S TO U/S		28	2.60	1.59	0.00	0.00	0.00	5.87
		29	-2.60	-1.59	0.00	0.00	0.00	5.88
CRANE STRIKING U/S SIDE		28	0.82	0.77	0.00	0.00	0.00	2.84
		29	-0.82	-0.77	0.00	0.00	0.00	2.83
CRANE STRIKING D/S SIDE		28	-0.20	-1.11	0.00	0.00	0.00	-4.11
		29	0.20	1.11	0.00	0.00	0.00	-4.05
WIND BLOWING U/S TO D/S		28	-2.16	-1.13	0.00	0.00	0.00	-4.16
		29	2.16	1.13	0.00	0.00	0.00	-4.14
WIND BLOWING D/S TO U/S		28	3.54	1.22	0.00	0.00	0.00	4.52
		29	-3.54	-1.22	0.00	0.00	0.00	4.50
DEAD LOAD + LIVE LOAD	**54**	31	6.24	15.03	0.00	0.00	0.00	18.32
		32	-6.24	14.74	0.00	0.00	0.00	-17.25
EARTHQUAKE (TRANSVERSE)		31	1.64	-3.55	0.00	0.00	0.00	-13.39
		32	-1.64	3.55	0.00	0.00	0.00	-12.76
CRANE MOVING U/S TO D/S		31	2.18	-1.35	0.00	0.00	0.00	-5.08
		32	-2.18	1.35	0.00	0.00	0.00	-4.84
CRANE MOVING D/S TO U/S		31	-3.74	1.98	0.00	0.00	0.00	7.64
		32	3.74	-1.98	0.00	0.00	0.00	6.94
CRANE STRIKING U/S SIDE		31	-1.54	0.89	0.00	0.00	0.00	3.39
		32	1.54	-0.89	0.00	0.00	0.00	3.16
CRANE STRIKING D/S SIDE		31	1.70	-1.09	0.00	0.00	0.00	-4.08
		32	-1.70	1.09	0.00	0.00	0.00	-3.97
WIND BLOWING U/S TO D/S		31	1.55	-1.24	0.00	0.00	0.00	-4.73
		32	-1.55	1.24	0.00	0.00	0.00	-4.39
WIND BLOWING D/S TO U/S		31	-0.79	1.26	0.00	0.00	0.00	4.83
		32	0.79	-1.26	0.00	0.00	0.00	4.48
DEAD LOAD + LIVE LOAD	**55**	33	-4.68	0.00	0.00	0.00	0.00	0.00
		34	4.68	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		33	-0.41	0.00	0.00	0.00	0.00	0.00
		34	0.41	0.00	0.00	0.00	0.00	0.00

TABLE NO.~ A-2 RESULTS OF ANALYSIS OF THE TRANSVERSE CENTRAL FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
CRANE MOVING U/S TO D/S		33	7.52	0.00	0.00	0.00	0.00	0.00
		34	-7.52	0.00	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		33	6.13	0.00	0.00	0.00	0.00	0.00
		34	-6.13	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		33	-3.52	0.00	0.00	0.00	0.00	0.00
		34	3.52	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		33	-2.68	0.00	0.00	0.00	0.00	0.00
		34	2.68	0.00	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		33	2.25	0.00	0.00	0.00	0.00	0.00
		34	-2.25	0.00	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		33	1.17	0.00	0.00	0.00	0.00	0.00
		34	-1.17	0.00	0.00	0.00	0.00	0.00

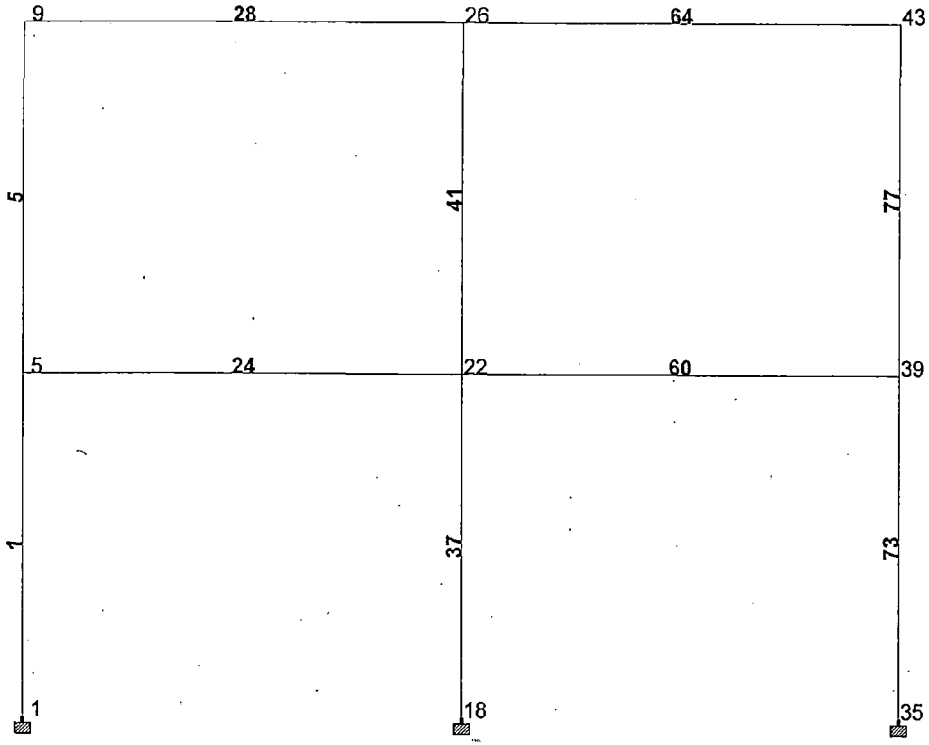

FIG. NO.- A3 THE U/S CONTROL BAY FRAME (MAIN FRAME)

Y
Z—X

TABLE NO.~ A- 3 RESULTS OF ANALYSIS OF U/S CONTROL BAY FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	1	1	50.79	-2.49	0.00	0.00	0.00	-3.39
		5	-47.09	2.49	0.00	0.00	0.00	-7.05
EARTHQUAKE (LONGITUDINAL)		1	-5.24	3.89	0.00	0.00	0.00	11.52
		5	5.24	-3.89	0.00	0.00	0.00	4.81
DEAD LOAD + LIVE LOAD	5	5	17.47	-2.87	0.00	0.00	0.00	-7.49
		9	-13.68	2.87	0.00	0.00	0.00	-4.85
EARTHQUAKE (LONGITUDINAL)		5	-2.08	2.42	0.00	0.00	0.00	4.26
		9	2.08	-2.42	0.00	0.00	0.00	6.15
DEAD LOAD + LIVE LOAD	24	5	-0.38	18.35	0.00	0.00	0.00	14.53
		22	0.38	19.82	0.00	0.00	0.00	-18.59
EARTHQUAKE (LONGITUDINAL)		5	-0.56	-3.15	0.00	0.00	0.00	-9.07
		22	0.56	3.15	0.00	0.00	0.00	-8.27
DEAD LOAD + LIVE LOAD	28	9	2.87	5.45	0.00	0.00	0.00	4.85
		26	-2.87	5.34	0.00	0.00	0.00	-4.55
EARTHQUAKE (LONGITUDINAL)		9	0.05	-2.08	0.00	0.00	0.00	-6.15
		26	-0.05	2.08	0.00	0.00	0.00	-5.31
DEAD LOAD + LIVE LOAD	37	18	92.53	0.00	0.00	0.00	0.00	0.00
		22	-88.83	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		18	0.00	4.98	0.00	0.00	0.00	13.02
		22	0.00	-4.98	0.00	0.00	0.00	7.88
DEAD LOAD + LIVE LOAD	41	22	28.78	0.00	0.00	0.00	0.00	0.00
		26	-24.99	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		22	0.00	4.48	0.00	0.00	0.00	8.66
		26	0.00	-4.48	0.00	0.00	0.00	10.62
DEAD LOAD + LIVE LOAD	60	22	-0.38	19.82	0.00	0.00	0.00	18.59
		39	0.38	18.35	0.00	0.00	0.00	-14.53
EARTHQUAKE (LONGITUDINAL)		22	0.56	-3.15	0.00	0.00	0.00	-8.27
		39	-0.56	3.15	0.00	0.00	0.00	-9.07
DEAD LOAD + LIVE LOAD	64	26	2.87	5.34	0.00	0.00	0.00	4.55
		43	-2.87	5.45	0.00	0.00	0.00	-4.85
EARTHQUAKE (LONGITUDINAL)		26	-0.05	-2.08	0.00	0.00	0.00	-5.31
		43	0.05	2.08	0.00	0.00	0.00	-6.15
DEAD LOAD + LIVE LOAD	73	35	50.79	2.49	0.00	0.00	0.00	3.39
		39	-47.09	-2.49	0.00	0.00	0.00	7.05
EARTHQUAKE (LONGITUDINAL)		35	5.24	3.89	0.00	0.00	0.00	11.52
		39	-5.24	-3.89	0.00	0.00	0.00	4.81
DEAD LOAD + LIVE LOAD	77	39	17.47	2.87	0.00	0.00	0.00	7.49
		43	-13.68	-2.87	0.00	0.00	0.00	4.85
EARTHQUAKE (LONGITUDINAL)		39	2.08	2.42	0.00	0.00	0.00	4.26
		43	-2.08	-2.42	0.00	0.00	0.00	6.15

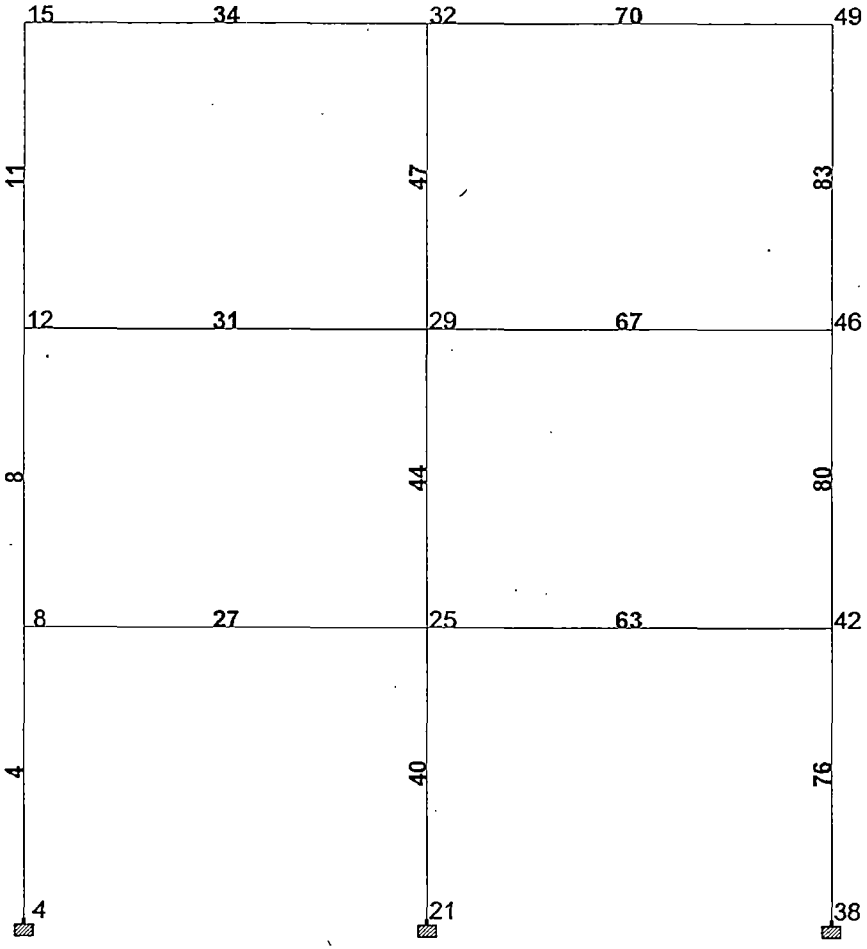

FIG. NO.- A-4 THE D/S CONTROL BAY FRAME (MAIN FRAME)

Y
Z X

TABLE NO.~ A- 4 RESULTS OF ANALYSIS OF D/S CONTROL BAY FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	4	4	94.64	-2.46	0.00	0.00	0.00	-3.43
		8	-88.47	2.46	0.00	0.00	0.00	-6.88
EARTHQUAKE (LONGITUDINAL)		4	-12.24	5.64	0.00	0.00	0.00	19.97
		8	12.24	-5.64	0.00	0.00	0.00	3.70
DEAD LOAD + LIVE LOAD	8	8	57.92	-4.32	0.00	0.00	0.00	-9.25
		12	-51.61	4.32	0.00	0.00	0.00	-9.31
EARTHQUAKE (LONGITUDINAL)		8	-7.47	4.70	0.00	0.00	0.00	9.84
		12	7.47	-4.70	0.00	0.00	0.00	10.39
DEAD LOAD + LIVE LOAD	11	12	20.65	-2.91	0.00	0.00	0.00	-7.45
		15	-14.18	2.91	0.00	0.00	0.00	-5.35
EARTHQUAKE (LONGITUDINAL)		12	-2.79	2.46	0.00	0.00	0.00	2.78
		15	2.79	-2.46	0.00	0.00	0.00	8.06
DEAD LOAD + LIVE LOAD	27	8	-1.86	18.80	0.00	0.00	0.00	16.13
		25	1.86	19.42	0.00	0.00	0.00	-17.84
EARTHQUAKE (LONGITUDINAL)		8	-0.49	-4.78	0.00	0.00	0.00	-13.55
		25	0.49	4.78	0.00	0.00	0.00	-12.73
DEAD LOAD + LIVE LOAD	31	12	1.41	19.21	0.00	0.00	0.00	16.75
		29	-1.41	19.56	0.00	0.00	0.00	-17.71
EARTHQUAKE (LONGITUDINAL)		12	-0.35	-4.68	0.00	0.00	0.00	-13.17
		29	0.35	4.68	0.00	0.00	0.00	-12.57
DEAD LOAD + LIVE LOAD	34	15	2.91	5.61	0.00	0.00	0.00	5.35
		32	-2.91	5.17	0.00	0.00	0.00	-4.13
EARTHQUAKE (LONGITUDINAL)		15	0.28	-2.79	0.00	0.00	0.00	-8.06
		32	-0.28	2.79	0.00	0.00	0.00	-7.26
DEAD LOAD + LIVE LOAD	40	21	164.76	0.00	0.00	0.00	0.00	0.00
		25	-158.59	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		21	0.00	7.47	0.00	0.00	0.00	22.48
		25	0.00	-7.47	0.00	0.00	0.00	8.87
DEAD LOAD + LIVE LOAD	44	25	98.46	0.00	0.00	0.00	0.00	0.00
		29	-92.15	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		25	0.00	7.69	0.00	0.00	0.00	16.60
		29	0.00	-7.69	0.00	0.00	0.00	16.48
DEAD LOAD + LIVE LOAD	47	29	31.74	0.00	0.00	0.00	0.00	0.00
		32	-25.28	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		29	0.00	5.27	0.00	0.00	0.00	8.65
		32	0.00	-5.27	0.00	0.00	0.00	14.52
DEAD LOAD + LIVE LOAD	63	25	-1.86	19.42	0.00	0.00	0.00	17.84
		42	1.86	18.80	0.00	0.00	0.00	-16.13
EARTHQUAKE (LONGITUDINAL)		25	0.49	-4.78	0.00	0.00	0.00	-12.73
		42	-0.49	4.78	0.00	0.00	0.00	-13.55
DEAD LOAD + LIVE LOAD	67	29	1.41	19.56	0.00	0.00	0.00	17.71
		46	-1.41	19.21	0.00	0.00	0.00	-16.75
EARTHQUAKE (LONGITUDINAL)		29	0.35	-4.68	0.00	0.00	0.00	-12.57
		46	-0.35	4.68	0.00	0.00	0.00	-13.17
DEAD LOAD + LIVE LOAD	70	32	2.91	5.17	0.00	0.00	0.00	4.13
		49	-2.91	5.61	0.00	0.00	0.00	-5.35
EARTHQUAKE (LONGITUDINAL)		32	-0.28	-2.79	0.00	0.00	0.00	-7.26
		49	0.28	2.79	0.00	0.00	0.00	-8.06
DEAD LOAD + LIVE LOAD	76	38	94.64	2.46	0.00	0.00	0.00	3.43
		42	-88.47	-2.46	0.00	0.00	0.00	6.88

TABLE NO.~ A- 4 RESULTS OF ANALYSIS OF D/S CONTROL BAY FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
EARTHQUAKE (LONGITUDINAL)		38	12.24	5.64	0.00	0.00	0.00	19.97
		42	-12.24	-5.64	0.00	0.00	0.00	3.70
DEAD LOAD + LIVE LOAD	**80**	42	57.92	4.32	0.00	0.00	0.00	9.25
		46	-51.61	-4.32	0.00	0.00	0.00	9.31
EARTHQUAKE (LONGITUDINAL)		42	7.47	4.70	0.00	0.00	0.00	9.84
		46	-7.47	-4.70	0.00	0.00	0.00	10.39
DEAD LOAD + LIVE LOAD	**83**	46	20.65	2.91	0.00	0.00	0.00	7.45
		49	-14.18	-2.91	0.00	0.00	0.00	5.35
EARTHQUAKE (LONGITUDINAL)		46	2.79	2.46	0.00	0.00	0.00	2.78
		49	-2.79	-2.46	0.00	0.00	0.00	8.06

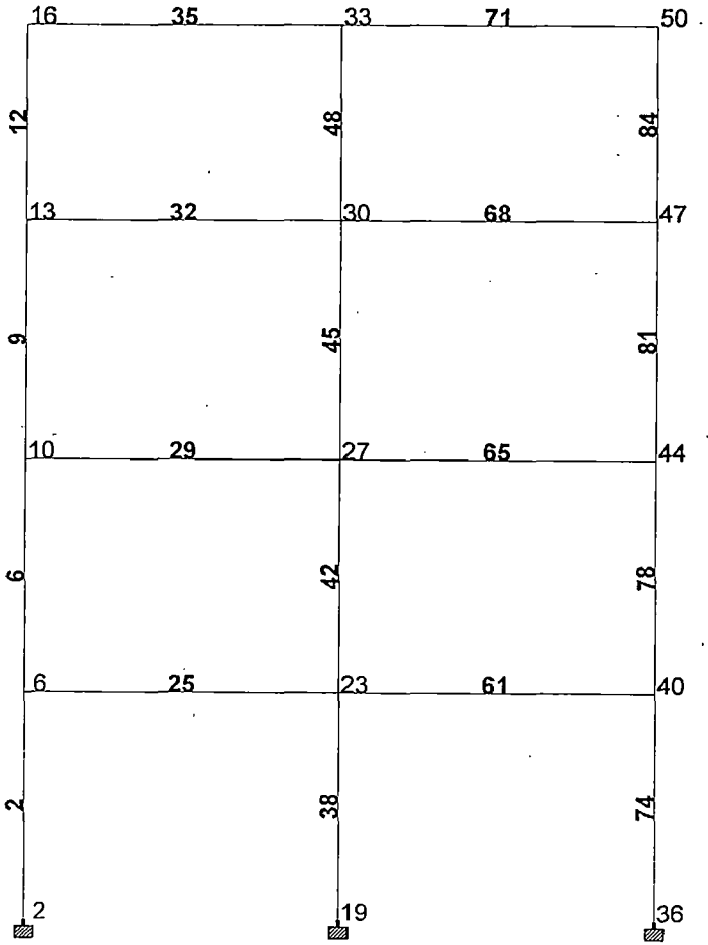

FIG. NO.-A5 THE U/S GANTRY COLUMN FRAME (MAIN FRAME)

Y
Z—X

TABLE NO.~ A- 5 RESULTS OF ANALYSIS OF U/S GANTRY COLUMN FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	2	2	144.08	-3.07	0.00	0.00	0.00	-4.40
		6	-126.10	3.07	0.00	0.00	0.00	-8.48
EARTHQUAKE (LONGITUDINAL)		2	-17.41	10.25	0.00	0.00	0.00	69.94
		6	17.41	-10.25	0.00	0.00	0.00	-26.88
CRANE MOVING (LONGITUDINAL)		2	48.03	2.75	0.00	0.00	0.00	19.64
		6	-48.03	-2.75	0.00	0.00	0.00	-8.10
DEAD LOAD + LIVE LOAD	6	6	95.73	-4.24	0.00	0.00	0.00	-8.96
		10	-77.31	4.24	0.00	0.00	0.00	-9.25
EARTHQUAKE (LONGITUDINAL)		6	-13.61	9.27	0.00	0.00	0.00	37.35
		10	13.61	-9.27	0.00	0.00	0.00	2.52
CRANE MOVING (LONGITUDINAL)		6	49.07	2.61	0.00	0.00	0.00	10.98
		10	-49.07	-2.61	0.00	0.00	0.00	0.26
DEAD LOAD + LIVE LOAD	9	10	49.66	-3.63	0.00	0.00	0.00	-8.59
		13	-30.81	3.63	0.00	0.00	0.00	-7.40
EARTHQUAKE (LONGITUDINAL)		10	-8.43	6.99	0.00	0.00	0.00	11.78
		13	8.43	-6.99	0.00	0.00	0.00	18.97
CRANE MOVING (LONGITUDINAL)		10	50.51	2.47	0.00	0.00	0.00	3.70
		13	-50.51	-2.47	0.00	0.00	0.00	7.18
DEAD LOAD + LIVE LOAD	12	13	18.36	-1.51	0.00	0.00	0.00	-3.42
		16	-11.31	1.51	0.00	0.00	0.00	-2.01
EARTHQUAKE (LONGITUDINAL)		13	-3.56	1.24	0.00	0.00	0.00	-5.52
		16	3.56	-1.24	0.00	0.00	0.00	9.98
CRANE MOVING (LONGITUDINAL)		13	-0.75	-0.45	0.00	0.00	0.00	-3.75
		16	0.75	0.45	0.00	0.00	0.00	2.13
DEAD LOAD + LIVE LOAD	25	6	-1.17	19.10	0.00	0.00	0.00	17.45
		23	1.17	19.08	0.00	0.00	0.00	-17.39
EARTHQUAKE (LONGITUDINAL)		6	-0.52	-3.79	0.00	0.00	0.00	-10.47
		23	0.52	3.79	0.00	0.00	0.00	-10.39
CRANE MOVING (LONGITUDINAL)		6	-0.13	-1.04	0.00	0.00	0.00	-2.89
		23	0.13	1.04	0.00	0.00	0.00	-2.86
DEAD LOAD + LIVE LOAD	29	10	0.60	19.42	0.00	0.00	0.00	17.84
		27	-0.60	19.30	0.00	0.00	0.00	-17.49
EARTHQUAKE (LONGITUDINAL)		10	-0.48	-5.18	0.00	0.00	0.00	-14.31
		27	0.48	5.18	0.00	0.00	0.00	-14.20
CRANE MOVING (LONGITUDINAL)		10	-0.14	-1.43	0.00	0.00	0.00	-3.96
		27	0.14	1.43	0.00	0.00	0.00	-3.93
DEAD LOAD + LIVE LOAD	32	13	2.13	11.63	0.00	0.00	0.00	10.82
		30	-2.13	11.40	0.00	0.00	0.00	-10.17
EARTHQUAKE (LONGITUDINAL)		13	-1.06	-4.87	0.00	0.00	0.00	-13.44
		30	1.06	4.87	0.00	0.00	0.00	-13.33
CRANE MOVING (LONGITUDINAL)		13	-0.73	-1.24	0.00	0.00	0.00	-3.43
		30	0.73	1.24	0.00	0.00	0.00	-3.39
DEAD LOAD + LIVE LOAD	35	16	1.51	1.81	0.00	0.00	0.00	2.01
		33	-1.51	1.42	0.00	0.00	0.00	-0.94
EARTHQUAKE (LONGITUDINAL)		16	1.04	-3.56	0.00	0.00	0.00	-9.98
		33	-1.04	3.56	0.00	0.00	0.00	-9.61
CRANE MOVING (LONGITUDINAL)		16	0.45	-0.75	0.00	0.00	0.00	-2.13
		33	-0.45	0.75	0.00	0.00	0.00	-2.02
DEAD LOAD + LIVE LOAD	38	19	220.05	0.00	0.00	0.00	0.00	0.00
		23	-202.06	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		19	0.00	11.82	0.00	0.00	0.00	72.16
		23	0.00	-11.82	0.00	0.00	0.00	-22.50
CRANE MOVING (LONGITUDINAL)		19	86.77	3.22	0.00	0.00	0.00	20.30
		23	-86.77	-3.22	0.00	0.00	0.00	-6.79

TABLE NO.~ A- 5 RESULTS OF ANALYSIS OF U/S GANTRY COLUMN FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	42	23	143.51	0.00	0.00	0.00	0.00	0.00
		27	-125.09	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		23	0.00	12.17	0.00	0.00	0.00	43.28
		27	0.00	-12.17	0.00	0.00	0.00	9.04
CRANE MOVING (LONGITUDINAL)		23	86.85	3.45	0.00	0.00	0.00	12.73
		27	-86.85	-3.45	0.00	0.00	0.00	2.09
DEAD LOAD + LIVE LOAD	45	27	72.18	0.00	0.00	0.00	0.00	0.00
		30	-53.34	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		27	0.00	10.48	0.00	0.00	0.00	19.36
		30	0.00	-10.48	0.00	0.00	0.00	26.74
CRANE MOVING (LONGITUDINAL)		27	87.02	3.65	0.00	0.00	0.00	6.22
		30	-87.02	-3.65	0.00	0.00	0.00	9.85
DEAD LOAD + LIVE LOAD	48	30	28.89	0.00	0.00	0.00	0.00	0.00
		33	-21.84	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		30	0.00	5.32	0.00	0.00	0.00	-0.07
		33	0.00	-5.32	0.00	0.00	0.00	19.21
CRANE MOVING (LONGITUDINAL)		30	-0.23	0.64	0.00	0.00	0.00	-2.38
		33	0.23	-0.64	0.00	0.00	0.00	4.69
DEAD LOAD + LIVE LOAD	61	23	-1.17	19.08	0.00	0.00	0.00	17.39
		40	1.17	19.10	0.00	0.00	0.00	-17.45
EARTHQUAKE (LONGITUDINAL)		23	0.52	-3.79	0.00	0.00	0.00	-10.39
		40	-0.52	3.79	0.00	0.00	0.00	-10.47
CRANE MOVING (LONGITUDINAL)		23	0.10	-1.13	0.00	0.00	0.00	-3.09
		40	-0.10	1.13	0.00	0.00	0.00	-3.11
DEAD LOAD + LIVE LOAD	65	27	0.60	19.30	0.00	0.00	0.00	17.49
		44	-0.60	19.42	0.00	0.00	0.00	-17.84
EARTHQUAKE (LONGITUDINAL)		27	0.48	-5.18	0.00	0.00	0.00	-14.20
		44	-0.48	5.18	0.00	0.00	0.00	-14.31
CRANE MOVING (LONGITUDINAL)		27	0.06	-1.60	0.00	0.00	0.00	-4.38
		44	-0.06	1.60	0.00	0.00	0.00	-4.41
DEAD LOAD + LIVE LOAD	68	30	2.13	11.40	0.00	0.00	0.00	10.17
		47	-2.13	11.63	0.00	0.00	0.00	-10.82
EARTHQUAKE (LONGITUDINAL)		30	1.06	-4.87	0.00	0.00	0.00	-13.33
		47	-1.06	4.87	0.00	0.00	0.00	-13.44
CRANE MOVING (LONGITUDINAL)		30	0.63	-1.49	0.00	0.00	0.00	-4.08
		47	-0.63	1.49	0.00	0.00	0.00	-4.11
DEAD LOAD + LIVE LOAD	71	33	1.51	1.42	0.00	0.00	0.00	0.94
		50	-1.51	1.81	0.00	0.00	0.00	-2.01
EARTHQUAKE (LONGITUDINAL)		33	-1.04	-3.56	0.00	0.00	0.00	-9.61
		50	1.04	3.56	0.00	0.00	0.00	-9.98
CRANE MOVING (LONGITUDINAL)		33	-0.19	-0.99	0.00	0.00	0.00	-2.68
		50	0.19	0.99	0.00	0.00	0.00	-2.76
DEAD LOAD + LIVE LOAD	74	36	144.08	3.07	0.00	0.00	0.00	4.40
		40	-126.10	-3.07	0.00	0.00	0.00	8.48
EARTHQUAKE (LONGITUDINAL)		36	17.41	10.25	0.00	0.00	0.00	69.94
		40	-17.41	-10.25	0.00	0.00	0.00	-26.88
CRANE MOVING (LONGITUDINAL)		36	57.70	2.78	0.00	0.00	0.00	19.70
		40	-57.70	-2.78	0.00	0.00	0.00	-8.01
DEAD LOAD + LIVE LOAD	78	40	95.73	4.24	0.00	0.00	0.00	8.96
		44	-77.31	-4.24	0.00	0.00	0.00	9.25
EARTHQUAKE (LONGITUDINAL)		40	13.61	9.27	0.00	0.00	0.00	37.35
		44	-13.61	-9.27	0.00	0.00	0.00	2.52
CRANE MOVING (LONGITUDINAL)		40	56.58	2.69	0.00	0.00	0.00	11.12
		44	-56.58	-2.69	0.00	0.00	0.00	0.43

TABLE NO.~ A- 5 RESULTS OF ANALYSIS OF U/S GANTRY COLUMN FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	81	44	49.66	3.63	0.00	0.00	0.00	8.59
		47	-30.81	-3.63	0.00	0.00	0.00	7.40
EARTHQUAKE (LONGITUDINAL)		44	8.43	6.99	0.00	0.00	0.00	11.78
		47	-8.43	-6.99	0.00	0.00	0.00	18.97
CRANE MOVING (LONGITUDINAL)		44	54.98	2.62	0.00	0.00	0.00	3.98
		47	-54.98	-2.62	0.00	0.00	0.00	7.57
DEAD LOAD + LIVE LOAD	84	47	18.36	1.51	0.00	0.00	0.00	3.42
		50	-11.31	-1.51	0.00	0.00	0.00	2.01
EARTHQUAKE (LONGITUDINAL)		47	3.56	1.24	0.00	0.00	0.00	-5.52
		50	-3.56	-1.24	0.00	0.00	0.00	9.98
CRANE MOVING (LONGITUDINAL)		47	0.99	-0.19	0.00	0.00	0.00	-3.46
		50	-0.99	0.19	0.00	0.00	0.00	2.76

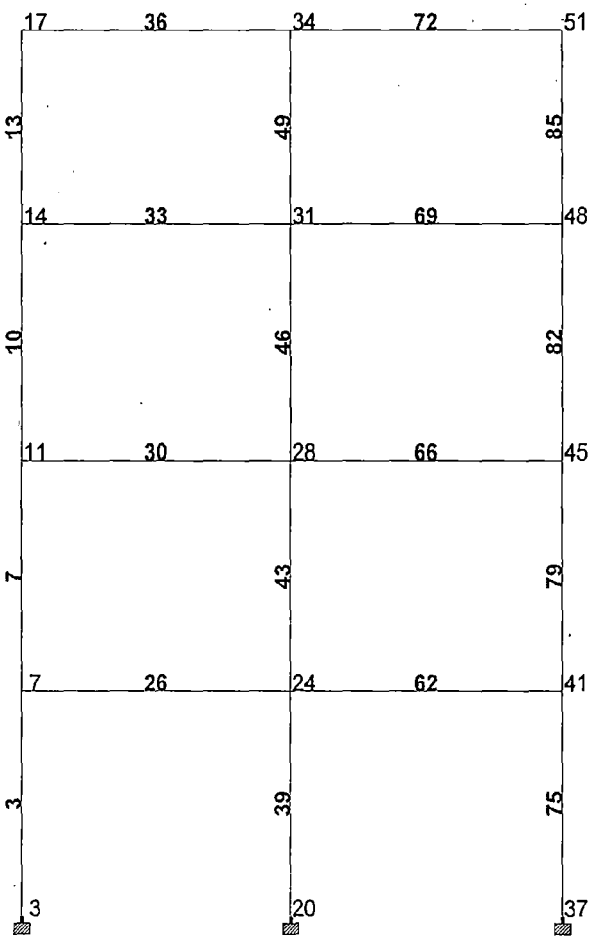

FIG. NO- THE D/S GANTRY COLUMN FRAME (MAIN FRAME)

TABLE NO.~ A- 6 RESULTS OF ANALYSIS OF D/S GANTRY COLUMN FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	3	3	160.54	-3.04	0.00	0.00	0.00	-4.38
		7	-142.55	3.04	0.00	0.00	0.00	-8.40
EARTHQUAKE (LONGITUDINAL)		3	-18.01	10.65	0.00	0.00	0.00	72.80
		7	18.01	-10.65	0.00	0.00	0.00	-28.06
CRANE MOVING (LONGITUDINAL)		3	48.03	2.75	0.00	0.00	0.00	19.64
		7	-48.03	-2.75	0.00	0.00	0.00	-8.10
DEAD LOAD + LIVE LOAD	7	7	111.68	-4.24	0.00	0.00	0.00	-9.09
		11	-93.27	4.24	0.00	0.00	0.00	-9.14
EARTHQUAKE (LONGITUDINAL)		7	-14.06	9.70	0.00	0.00	0.00	38.96
		11	14.06	-9.70	0.00	0.00	0.00	2.74
CRANE MOVING (LONGITUDINAL)		7	49.07	2.61	0.00	0.00	0.00	10.98
		11	-49.07	-2.61	0.00	0.00	0.00	0.26
DEAD LOAD + LIVE LOAD	10	11	62.05	-4.17	0.00	0.00	0.00	-8.81
		14	-43.21	4.17	0.00	0.00	0.00	-9.55
EARTHQUAKE (LONGITUDINAL)		11	-8.67	7.42	0.00	0.00	0.00	12.16
		14	8.67	-7.42	0.00	0.00	0.00	20.50
CRANE MOVING (LONGITUDINAL)		11	50.51	2.47	0.00	0.00	0.00	3.70
		14	-50.51	-2.47	0.00	0.00	0.00	7.18
DEAD LOAD + LIVE LOAD	13	14	18.41	-1.91	0.00	0.00	0.00	-4.71
		17	-11.36	1.91	0.00	0.00	0.00	-2.16
EARTHQUAKE (LONGITUDINAL)		14	-3.63	0.99	0.00	0.00	0.00	-6.60
		17	3.63	-0.99	0.00	0.00	0.00	10.18
CRANE MOVING (LONGITUDINAL)		14	-0.75	-0.45	0.00	0.00	0.00	-3.75
		17	0.75	0.45	0.00	0.00	0.00	2.13
DEAD LOAD + LIVE LOAD	26	7	-1.20	19.11	0.00	0.00	0.00	17.50
		24	1.20	19.06	0.00	0.00	0.00	-17.34
EARTHQUAKE (LONGITUDINAL)		7	-0.53	-3.95	0.00	0.00	0.00	-10.91
		24	0.53	3.95	0.00	0.00	0.00	-10.82
CRANE MOVING (LONGITUDINAL)		7	-0.13	-1.04	0.00	0.00	0.00	-2.89
		24	0.13	1.04	0.00	0.00	0.00	-2.86
DEAD LOAD + LIVE LOAD	30	11	0.07	19.46	0.00	0.00	0.00	17.95
		28	-0.07	19.26	0.00	0.00	0.00	-17.39
EARTHQUAKE (LONGITUDINAL)		11	-0.51	-5.40	0.00	0.00	0.00	-14.90
		28	0.51	5.40	0.00	0.00	0.00	-14.79
CRANE MOVING (LONGITUDINAL)		11	-0.14	-1.43	0.00	0.00	0.00	-3.96
		28	0.14	1.43	0.00	0.00	0.00	-3.93
DEAD LOAD + LIVE LOAD	33	14	2.26	15.41	0.00	0.00	0.00	14.26
		31	-2.26	15.15	0.00	0.00	0.00	-13.56
EARTHQUAKE (LONGITUDINAL)		14	-1.20	-5.03	0.00	0.00	0.00	-13.90
		31	1.20	5.03	0.00	0.00	0.00	-13.79
CRANE MOVING (LONGITUDINAL)		14	-0.73	-1.24	0.00	0.00	0.00	-3.43
		31	0.73	1.24	0.00	0.00	0.00	-3.39
DEAD LOAD + LIVE LOAD	36	17	1.91	1.86	0.00	0.00	0.00	2.16
		34	-1.91	1.37	0.00	0.00	0.00	-0.80
EARTHQUAKE (LONGITUDINAL)		17	1.09	-3.63	0.00	0.00	0.00	-10.18
		34	-1.09	3.63	0.00	0.00	0.00	-9.79
CRANE MOVING (LONGITUDINAL)		17	0.45	-0.75	0.00	0.00	0.00	-2.13
		34	-0.45	0.75	0.00	0.00	0.00	-2.02
DEAD LOAD + LIVE LOAD	39	20	250.06	0.00	0.00	0.00	0.00	0.00
		24	-232.08	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		20	0.00	12.29	0.00	0.00	0.00	75.11
		24	0.00	-12.29	0.00	0.00	0.00	-23.50
CRANE MOVING (LONGITUDINAL)		20	86.77	3.22	0.00	0.00	0.00	20.30
		24	-86.77	-3.22	0.00	0.00	0.00	-6.79

TABLE NO.~ A- 6 RESULTS OF ANALYSIS OF D/S GANTRY COLUMN FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	43	24	172.69	0.00	0.00	0.00	0.00	0.00
		28	-154.27	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		24	0.00	12.71	0.00	0.00	0.00	45.14
		28	0.00	-12.71	0.00	0.00	0.00	9.50
CRANE MOVING (LONGITUDINAL)		24	86.85	3.45	0.00	0.00	0.00	12.73
		28	-86.85	-3.45	0.00	0.00	0.00	2.09
DEAD LOAD + LIVE LOAD	46	28	94.49	0.00	0.00	0.00	0.00	0.00
		31	-75.64	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		28	0.00	11.07	0.00	0.00	0.00	20.08
		31	0.00	-11.07	0.00	0.00	0.00	28.63
CRANE MOVING (LONGITUDINAL)		28	87.02	3.65	0.00	0.00	0.00	6.22
		31	-87.02	-3.65	0.00	0.00	0.00	9.85
DEAD LOAD + LIVE LOAD	49	31	28.78	0.00	0.00	0.00	0.00	0.00
		34	-21.74	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		31	0.00	5.15	0.00	0.00	0.00	-1.05
		34	0.00	-5.15	0.00	0.00	0.00	19.58
CRANE MOVING (LONGITUDINAL)		31	-0.23	0.64	0.00	0.00	0.00	-2.38
		34	0.23	-0.64	0.00	0.00	0.00	4.69
DEAD LOAD + LIVE LOAD	62	24	-1.20	19.06	0.00	0.00	0.00	17.34
		41	1.20	19.11	0.00	0.00	0.00	-17.50
EARTHQUAKE (LONGITUDINAL)		24	0.53	-3.95	0.00	0.00	0.00	-10.82
		41	-0.53	3.95	0.00	0.00	0.00	-10.91
CRANE MOVING (LONGITUDINAL)		24	0.10	-1.13	0.00	0.00	0.00	-3.09
		41	-0.10	1.13	0.00	0.00	0.00	-3.11
DEAD LOAD + LIVE LOAD	66	28	0.07	19.26	0.00	0.00	0.00	17.39
		45	-0.07	19.46	0.00	0.00	0.00	-17.95
EARTHQUAKE (LONGITUDINAL)		28	0.51	-5.40	0.00	0.00	0.00	-14.79
		45	-0.51	5.40	0.00	0.00	0.00	-14.90
CRANE MOVING (LONGITUDINAL)		28	0.06	-1.60	0.00	0.00	0.00	-4.38
		45	-0.06	1.60	0.00	0.00	0.00	-4.41
DEAD LOAD + LIVE LOAD	69	31	2.26	15.15	0.00	0.00	0.00	13.56
		48	-2.26	15.41	0.00	0.00	0.00	-14.26
EARTHQUAKE (LONGITUDINAL)		31	1.20	-5.03	0.00	0.00	0.00	-13.79
		48	-1.20	5.03	0.00	0.00	0.00	-13.90
CRANE MOVING (LONGITUDINAL)		31	0.63	-1.49	0.00	0.00	0.00	-4.08
		48	-0.63	1.49	0.00	0.00	0.00	-4.11
DEAD LOAD + LIVE LOAD	72	34	1.91	1.37	0.00	0.00	0.00	0.80
		51	-1.91	1.86	0.00	0.00	0.00	-2.16
EARTHQUAKE (LONGITUDINAL)		34	-1.09	-3.63	0.00	0.00	0.00	-9.79
		51	1.09	3.63	0.00	0.00	0.00	-10.18
CRANE MOVING (LONGITUDINAL)		34	-0.19	-0.99	0.00	0.00	0.00	-2.68
		51	0.19	0.99	0.00	0.00	0.00	-2.76
DEAD LOAD + LIVE LOAD	75	37	160.54	3.04	0.00	0.00	0.00	4.38
		41	-142.55	-3.04	0.00	0.00	0.00	8.40
EARTHQUAKE (LONGITUDINAL)		37	18.01	10.65	0.00	0.00	0.00	72.80
		41	-18.01	-10.65	0.00	0.00	0.00	-28.06
CRANE MOVING (LONGITUDINAL)		37	57.70	2.78	0.00	0.00	0.00	19.70
		41	-57.70	-2.78	0.00	0.00	0.00	-8.01
DEAD LOAD + LIVE LOAD	79	41	111.68	4.24	0.00	0.00	0.00	9.09
		45	-93.27	-4.24	0.00	0.00	0.00	9.14
EARTHQUAKE (LONGITUDINAL)		41	14.06	9.70	0.00	0.00	0.00	38.96
		45	-14.06	-9.70	0.00	0.00	0.00	2.74
CRANE MOVING (LONGITUDINAL)		41	56.58	2.69	0.00	0.00	0.00	11.12
		45	-56.58	-2.69	0.00	0.00	0.00	0.43

TABLE NO.~ A- 6 RESULTS OF ANALYSIS OF D/S GANTRY COLUMN FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	82	45	62.05	4.17	0.00	0.00	0.00	8.81
		48	-43.21	-4.17	0.00	0.00	0.00	9.55
EARTHQUAKE (LONGITUDINAL)		45	8.67	7.42	0.00	0.00	0.00	12.16
		48	-8.67	-7.42	0.00	0.00	0.00	20.50
CRANE MOVING (LONGITUDINAL)		45	54.98	2.62	0.00	0.00	0.00	3.98
		48	-54.98	-2.62	0.00	0.00	0.00	7.57
DEAD LOAD + LIVE LOAD	85	48	18.41	1.91	0.00	0.00	0.00	4.71
		51	-11.36	-1.91	0.00	0.00	0.00	2.16
EARTHQUAKE (LONGITUDINAL)		48	3.63	0.99	0.00	0.00	0.00	-6.60
		51	-3.63	-0.99	0.00	0.00	0.00	10.18
CRANE MOVING (LONGITUDINAL)		48	0.99	-0.19	0.00	0.00	0.00	-3.46
		51	-0.99	0.19	0.00	0.00	0.00	2.76

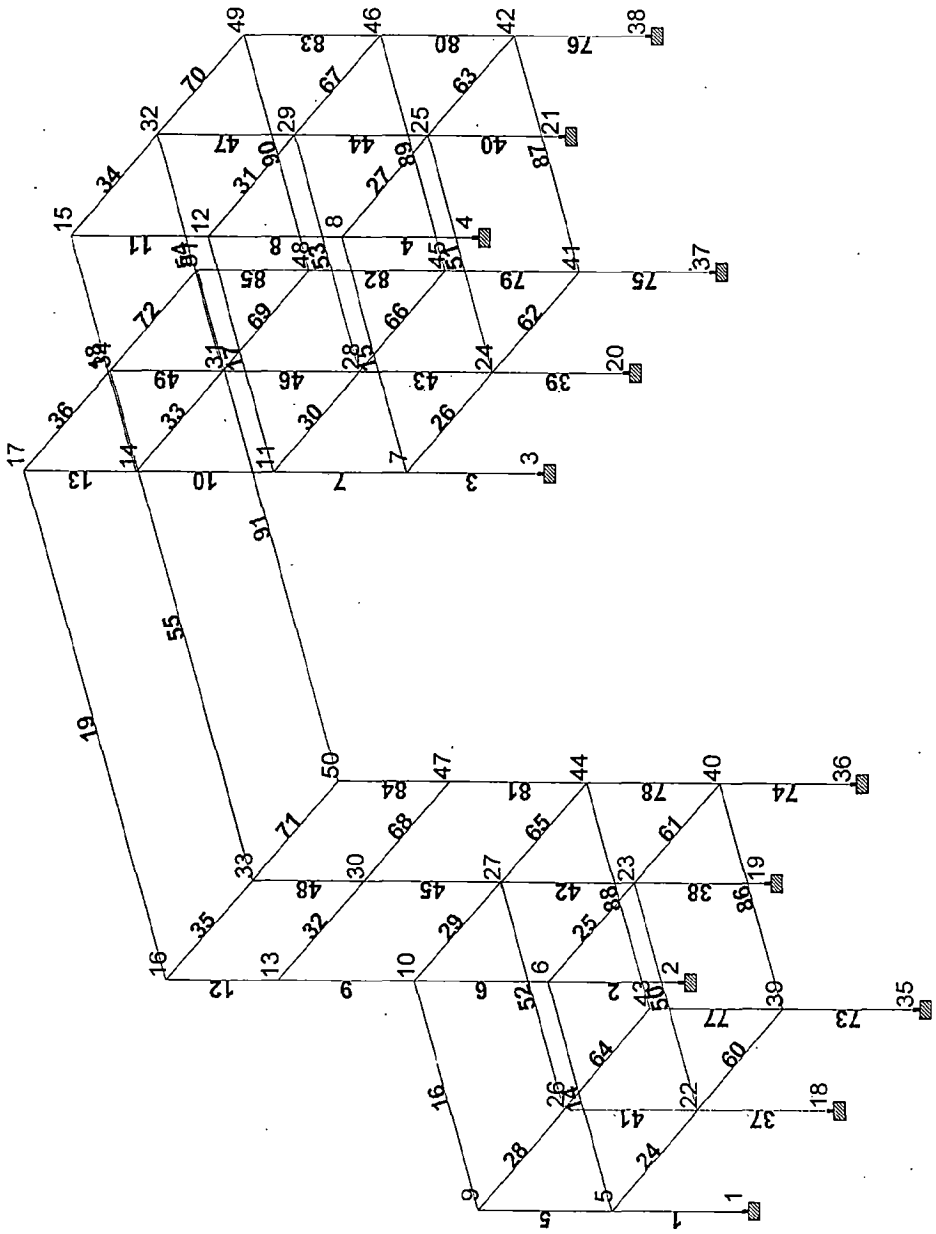

FIG. NO.- A7 THE THREE-DIMENSIONAL (SPACE) FRAME (MAIN FRAME)

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	1	1	50.08	-1.50	2.45	0.01	-3.34	-2.16
		5	-46.37	1.50	-2.45	-0.01	-6.94	-4.12
EARTHQUAKE (TRANSVERSE)		1	-3.88	0.89	0.00	-0.10	0.00	4.41
		5	3.88	-0.89	0.00	0.10	0.00	-0.69
EARTHQUAKE (LONGITUDINAL)		1	-2.93	0.02	-1.88	0.24	5.72	0.07
		5	2.93	-0.02	1.88	-0.24	2.19	0.02
WIND BLOWING U/S TO D/S		1	-1.14	0.93	0.00	-0.07	0.00	1.91
		5	1.14	0.28	0.00	0.07	0.00	-0.56
WIND BLOWING D/S TO U/S		1	1.03	-0.49	0.00	0.04	0.00	-1.37
		5	-1.03	-0.03	0.00	-0.04	0.00	0.39
CRANE MOVING U/S TO D/S		1	-1.59	0.21	0.00	-0.04	0.00	1.53
		5	1.59	-0.21	0.00	0.04	0.00	-0.62
CRANE MOVING D/S TO U/S		1	1.25	-0.27	0.00	0.03	0.00	-1.35
		5	-1.25	0.27	0.00	-0.03	0.00	0.23
CRANE STRIKING U/S SIDE		1	1.20	-0.30	0.00	0.05	0.00	-1.42
		5	-1.20	0.30	0.00	-0.05	0.00	0.17
CRANE STRIKING D/S SIDE		1	-0.76	0.13	0.00	-0.01	0.00	0.77
		5	0.76	-0.13	0.00	0.01	0.00	-0.21
CRANE MOVING (LONGITUDINAL)		1	-0.33	-0.10	-0.20	0.12	0.64	-0.23
		5	0.33	0.10	0.20	-0.12	0.20	-0.20
DEAD LOAD + LIVE LOAD	2	2	143.64	3.89	3.11	0.33	-4.38	1.78
		6	-125.65	-3.89	-3.11	-0.33	-8.70	14.56
EARTHQUAKE (TRANSVERSE)		2	3.87	13.61	0.01	-2.44	-0.03	143.00
		6	-3.87	-13.61	-0.01	2.44	0.00	-85.85
EARTHQUAKE (LONGITUDINAL)		2	-18.74	0.42	-10.89	1.37	74.52	2.00
		6	18.74	-0.42	10.89	-1.37	-28.79	-0.24
WIND BLOWING U/S TO D/S		2	1.14	5.12	0.00	-1.37	-0.02	45.85
		6	-1.14	-5.12	0.00	1.37	0.00	-24.33
WIND BLOWING D/S TO U/S		2	-1.03	-3.51	0.00	1.08	0.01	-37.74
		6	1.03	3.51	0.00	-1.08	0.00	23.01
CRANE MOVING U/S TO D/S		2	80.96	2.58	0.03	-1.56	-0.06	52.00
		6	-80.96	-2.58	-0.03	1.56	-0.07	-41.17
CRANE MOVING D/S TO U/S		2	23.74	-3.97	0.01	0.73	-0.01	-44.00
		6	-23.74	3.97	-0.01	-0.73	-0.02	27.35
CRANE STRIKING U/S SIDE		2	-1.20	-4.72	0.00	1.08	0.01	-46.10
		6	1.20	4.72	0.00	-1.08	0.00	26.28
CRANE STRIKING D/S SIDE		2	0.76	1.81	0.00	-0.45	0.00	25.32
		6	-0.76	-1.81	0.00	0.45	0.00	-17.70
CRANE MOVING (LONGITUDINAL)		2	48.18	-2.03	-2.54	0.42	18.37	-6.19
		6	-48.18	2.03	2.54	-0.42	-7.72	-2.35
DEAD LOAD + LIVE LOAD	3	3	162.35	-3.89	3.07	-0.29	-4.42	0.76
		7	-144.36	3.89	-3.07	0.29	-8.49	-17.08
EARTHQUAKE (TRANSVERSE)		3	-7.41	16.57	-0.01	-2.30	0.03	159.21
		7	7.41	-16.57	0.01	2.30	0.00	-89.60
EARTHQUAKE (LONGITUDINAL)		3	-21.31	-0.07	-12.79	-0.22	86.74	-0.46
		7	21.31	0.07	12.79	0.22	-33.02	0.16
WIND BLOWING U/S TO D/S		3	-1.93	3.73	0.00	-0.90	0.01	38.58
		7	1.93	-3.73	0.00	0.90	0.00	-22.90
WIND BLOWING D/S TO U/S		3	2.06	-5.17	0.00	1.09	-0.01	-45.79
		7	-2.06	5.17	0.00	-1.09	0.00	24.09
CRANE MOVING U/S TO D/S		3	22.60	4.44	0.01	-0.71	-0.01	47.14
		7	-22.60	-4.44	-0.01	0.71	-0.02	-28.50
CRANE MOVING D/S TO U/S		3	82.43	-3.14	0.03	1.13	-0.06	-52.17
		7	-82.43	3.14	-0.03	-1.13	-0.06	38.98
CRANE STRIKING U/S SIDE		3	1.49	-2.14	0.00	0.42	0.00	-26.97
		7	-1.49	2.14	0.00	-0.42	0.00	17.97
CRANE STRIKING D/S SIDE		3	-2.03	4.79	0.00	-0.81	0.01	45.47
		7	2.03	-4.79	0.00	0.81	0.00	-25.34
CRANE MOVING (LONGITUDINAL)		3	48.72	1.74	-2.40	-0.95	17.21	5.11
		7	-48.72	-1.74	2.40	0.95	-7.14	2.19

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	4	4	94.48	1.57	2.44	-0.06	-3.40	2.74
		8	-88.31	-1.57	-2.44	0.06	-6.83	3.87
EARTHQUAKE (TRANSVERSE)		4	7.41	2.87	0.00	-0.38	-0.01	19.71
		8	-7.41	-2.87	0.00	0.38	0.00	-7.67
EARTHQUAKE (LONGITUDINAL)		4	-10.92	-0.01	-4.77	0.05	17.05	-0.05
		8	10.92	0.01	4.77	-0.05	2.98	0.02
WIND BLOWING U/S TO D/S		4	1.93	0.97	0.00	-0.12	0.00	5.07
		8	-1.93	-0.45	0.00	0.12	0.00	-2.10
WIND BLOWING D/S TO U/S		4	-2.07	-1.59	0.00	0.18	0.00	-6.40
		8	2.07	0.37	0.00	-0.18	0.00	2.28
CRANE MOVING U/S TO D/S		4	2.40	0.80	0.00	-0.08	0.00	5.82
		8	-2.40	-0.80	0.00	0.08	0.00	-2.45
CRANE MOVING D/S TO U/S		4	-3.07	-0.64	0.00	0.16	0.00	-6.33
		8	3.07	0.64	0.00	-0.16	0.00	3.63
CRANE STRIKING U/S SIDE		4	-1.49	-0.41	0.00	0.04	0.00	-3.31
		8	1.49	0.41	0.00	-0.04	0.00	1.60
CRANE STRIKING D/S SIDE		4	2.03	0.83	0.00	-0.15	0.00	5.62
		8	-2.03	-0.83	0.00	0.15	0.00	-2.14
CRANE MOVING (LONGITUDINAL)		4	-1.01	0.25	-0.33	-0.26	1.23	0.69
		8	1.01	-0.25	0.33	0.26	0.16	0.36
DEAD LOAD + LIVE LOAD	5	5	17.00	-3.33	2.83	0.01	-7.38	-6.62
		9	-13.21	3.33	-2.83	-0.01	-4.80	-7.69
EARTHQUAKE (TRANSVERSE)		5	-2.18	3.15	0.00	-0.14	0.01	6.59
		9	2.18	-3.15	0.00	0.14	0.01	6.93
EARTHQUAKE (LONGITUDINAL)		5	-1.24	0.03	-1.21	0.43	2.25	0.05
		9	1.24	-0.03	1.21	-0.43	2.95	0.07
WIND BLOWING U/S TO D/S		5	-0.61	1.62	0.00	-0.08	0.00	2.38
		9	0.61	-0.37	0.00	0.08	0.00	1.90
WIND BLOWING D/S TO U/S		5	0.58	-1.14	0.00	0.05	0.00	-1.96
		9	-0.58	0.61	0.00	-0.05	0.00	-1.79
CRANE MOVING U/S TO D/S		5	-0.93	1.35	0.00	-0.08	0.00	2.92
		9	0.93	-1.35	0.00	0.08	0.00	2.89
CRANE MOVING D/S TO U/S		5	0.71	-1.02	0.00	0.03	0.00	-2.12
		9	-0.71	1.02	0.00	-0.03	0.00	-2.25
CRANE STRIKING U/S SIDE		5	0.67	-0.96	0.00	0.07	0.00	-2.01
		9	-0.67	0.96	0.00	-0.07	0.00	-2.12
CRANE STRIKING D/S SIDE		5	-0.44	0.63	0.00	-0.02	0.00	1.33
		9	0.44	-0.63	0.00	0.02	0.00	1.38
CRANE MOVING (LONGITUDINAL)		5	-0.17	0.00	-0.13	0.16	0.26	0.05
		9	0.17	0.00	0.13	-0.16	0.30	-0.05
DEAD LOAD + LIVE LOAD	6	6	94.91	5.74	4.07	0.35	-9.04	8.78
		10	-76.49	-5.74	-4.07	-0.35	-8.45	15.89
EARTHQUAKE (TRANSVERSE)		6	2.18	10.31	0.01	-2.51	0.00	91.90
		10	-2.18	-10.31	-0.01	2.51	-0.03	-47.59
EARTHQUAKE (LONGITUDINAL)		6	-14.71	0.28	-9.88	1.25	40.32	0.32
		10	14.71	-0.28	9.88	-1.25	2.15	0.87
WIND BLOWING U/S TO D/S		6	0.61	3.15	0.00	-1.40	0.00	26.19
		10	-0.61	-3.15	0.00	1.40	-0.02	-12.64
WIND BLOWING D/S TO U/S		6	-0.57	-2.30	0.00	1.12	0.00	-24.62
		10	0.57	2.30	0.00	-1.12	0.01	14.73
CRANE MOVING U/S TO D/S		6	80.24	1.42	0.06	-1.66	-0.10	43.50
		10	-80.24	-1.42	-0.06	1.66	-0.15	-37.39
CRANE MOVING D/S TO U/S		6	24.27	-3.19	0.02	0.76	-0.03	-29.29
		10	-24.27	3.19	-0.02	-0.76	-0.03	15.57
CRANE STRIKING U/S SIDE		6	-0.67	-4.00	0.00	1.10	0.00	-28.17
		10	0.67	4.00	0.00	-1.10	0.01	10.96
CRANE STRIKING D/S SIDE		6	0.44	1.31	0.00	-0.48	0.00	18.85
		10	-0.44	-1.31	0.00	0.48	0.00	-13.22
CRANE MOVING (LONGITUDINAL)		6	49.21	-2.17	-2.45	0.27	10.56	2.17
		10	-49.21	2.17	2.45	-0.27	-0.04	-11.52

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	7	7	113.48	-4.80	4.28	-0.30	-9.18	-6.41
		11	-95.06	4.80	-4.28	0.30	-9.23	-14.22
EARTHQUAKE (TRANSVERSE)		7	-5.61	15.00	0.00	-2.33	0.00	96.13
		11	5.61	-15.00	0.00	2.33	0.01	-31.65
EARTHQUAKE (LONGITUDINAL)		7	-16.62	-0.08	-11.56	-0.56	46.00	-0.16
		11	16.62	0.08	11.56	0.56	3.72	-0.19
WIND BLOWING U/S TO D/S		7	-1.48	3.15	0.00	-0.93	0.00	24.50
		11	1.48	-3.15	0.00	0.93	0.00	-10.94
WIND BLOWING D/S TO U/S		7	1.55	-4.01	0.00	1.10	0.00	-25.92
		11	-1.55	4.01	0.00	-1.10	0.00	8.66
CRANE MOVING U/S TO D/S		7	23.13	4.22	0.02	-0.73	-0.03	30.53
		11	-23.13	-4.22	-0.02	0.73	-0.04	-12.40
CRANE MOVING D/S TO U/S		7	81.75	-2.93	0.06	1.21	-0.11	-41.22
		11	-81.75	2.93	-0.06	-1.21	-0.13	28.63
CRANE STRIKING U/S SIDE		7	1.17	-2.02	0.00	0.44	0.00	-19.15
		11	-1.17	2.02	0.00	-0.44	0.00	10.45
CRANE STRIKING D/S SIDE		7	-1.52	4.57	0.00	-0.81	0.00	27.18
		11	1.52	-4.57	0.00	0.81	0.00	-7.52
CRANE MOVING (LONGITUDINAL)		7	49.68	1.74	-2.30	-0.90	9.76	-2.04
		11	-49.68	-1.74	2.30	0.90	0.12	9.53
DEAD LOAD + LIVE LOAD	8	8	57.82	2.48	4.28	-0.08	-9.18	6.26
		12	-51.51	-2.48	-4.28	0.08	-9.23	4.39
EARTHQUAKE (TRANSVERSE)		8	5.62	3.34	0.00	-0.47	-0.01	14.16
		12	-5.62	-3.34	0.00	0.47	-0.01	0.21
EARTHQUAKE (LONGITUDINAL)		8	-6.78	-0.01	-4.06	-0.22	8.71	-0.02
		12	6.78	0.01	4.06	0.22	8.73	-0.02
WIND BLOWING U/S TO D/S		8	1.48	0.99	0.00	-0.15	0.00	3.70
		12	-1.48	-0.46	0.00	0.15	0.00	-0.58
WIND BLOWING D/S TO U/S		8	-1.56	-1.47	0.00	0.21	0.00	-4.11
		12	1.56	0.22	0.00	-0.21	0.00	0.47
CRANE MOVING U/S TO D/S		8	1.84	1.00	0.00	-0.10	0.00	4.47
		12	-1.84	-1.00	0.00	0.10	0.00	-0.19
CRANE MOVING D/S TO U/S		8	-2.45	-0.84	0.00	0.24	0.00	-5.85
		12	2.45	0.84	0.00	-0.24	0.00	2.24
CRANE STRIKING U/S SIDE		8	-1.17	-0.52	0.00	0.06	0.00	-2.78
		12	1.17	0.52	0.00	-0.06	0.00	0.55
CRANE STRIKING D/S SIDE		8	1.52	1.00	0.00	-0.19	0.00	3.97
		12	-1.52	-1.00	0.00	0.19	0.00	0.34
CRANE MOVING (LONGITUDINAL)		8	-0.74	0.28	-0.28	-0.32	0.64	-0.20
		12	0.74	-0.28	0.28	0.32	0.58	1.42
DEAD LOAD + LIVE LOAD	9	10	50.24	2.48	3.44	0.32	-7.79	4.21
		13	-31.40	-2.48	-3.44	-0.32	-7.35	6.69
EARTHQUAKE (TRANSVERSE)		10	0.00	9.79	-0.01	-2.36	0.03	56.10
		13	0.00	-9.79	0.01	2.36	0.01	-13.02
EARTHQUAKE (LONGITUDINAL)		10	-9.16	-0.08	-7.79	-0.26	13.90	-0.80
		13	9.16	0.08	7.79	0.26	20.39	0.45
WIND BLOWING U/S TO D/S		10	0.00	3.28	-0.01	-1.31	0.02	15.05
		13	0.00	-1.84	0.01	1.31	0.01	-3.78
WIND BLOWING D/S TO U/S		10	0.00	-2.74	0.00	1.09	-0.01	-16.98
		13	0.00	2.12	0.00	-1.09	-0.01	6.27
CRANE MOVING U/S TO D/S		10	79.18	2.56	0.11	-1.64	-0.19	41.03
		13	-79.18	-2.56	-0.11	1.64	-0.29	-29.79
CRANE MOVING D/S TO U/S		10	24.93	-4.10	0.04	0.74	-0.07	-18.35
		13	-24.93	4.10	-0.04	-0.74	-0.10	0.31
CRANE STRIKING U/S SIDE		10	0.00	-4.74	0.00	0.97	-0.01	-13.52
		13	0.00	4.74	0.00	-0.97	-0.01	-7.34
CRANE STRIKING D/S SIDE		10	0.00	1.89	0.00	-0.48	0.00	14.94
		13	0.00	-1.89	0.00	0.48	0.00	-6.64
CRANE MOVING (LONGITUDINAL)		10	50.58	-2.31	-2.48	-0.38	4.01	11.52
		13	-50.58	2.31	2.48	0.38	6.92	-21.67

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	10	11	63.90	-6.01	4.20	-0.25	-8.89	-9.28
		14	-45.05	6.01	-4.20	0.25	-9.59	-17.18
EARTHQUAKE (TRANSVERSE)		11	-2.87	9.24	-0.01	-2.06	0.00	41.60
		14	2.87	-9.24	0.01	2.06	0.04	-0.92
EARTHQUAKE (LONGITUDINAL)		11	-10.23	-0.06	-8.78	-0.75	14.20	0.20
		14	10.23	0.06	8.78	0.75	24.41	-0.44
WIND BLOWING U/S TO D/S		11	-0.78	1.83	0.00	-0.89	0.00	13.50
		14	0.78	-1.83	0.00	0.89	0.01	-5.44
WIND BLOWING D/S TO U/S		11	0.79	-1.94	0.00	1.00	0.00	-11.40
		14	-0.79	1.94	0.00	-1.00	-0.02	2.85
CRANE MOVING U/S TO D/S		11	23.98	3.56	0.03	-0.70	-0.07	15.64
		14	-23.98	-3.56	-0.03	0.70	-0.08	0.03
CRANE MOVING D/S TO U/S		11	80.53	-1.14	0.12	1.17	-0.21	-32.60
		14	-80.53	1.14	-0.12	-1.17	-0.32	27.60
CRANE STRIKING U/S SIDE		11	0.63	-1.42	0.00	0.44	0.00	-12.44
		14	-0.63	1.42	0.00	-0.44	-0.01	6.21
CRANE STRIKING D/S SIDE		11	-0.76	4.23	0.00	-0.68	0.00	10.27
		14	0.76	-4.23	0.00	0.68	0.01	8.35
CRANE MOVING (LONGITUDINAL)		11	50.91	2.58	-2.27	-0.54	3.51	-9.60
		14	-50.91	-2.58	2.27	0.54	6.48	20.93
DEAD LOAD + LIVE LOAD	11	12	20.54	3.61	2.89	-0.07	-7.39	5.91
		15	-14.08	-3.61	-2.89	0.07	-5.33	9.98
EARTHQUAKE (TRANSVERSE)		12	2.88	4.52	0.01	-0.39	-0.01	9.69
		15	-2.88	-4.52	-0.01	0.39	-0.02	10.19
EARTHQUAKE (LONGITUDINAL)		12	-2.60	0.01	-2.23	-0.46	2.73	0.03
		15	2.60	-0.01	2.23	0.46	7.06	0.01
WIND BLOWING U/S TO D/S		12	0.78	1.64	0.00	-0.14	0.00	3.12
		15	-0.78	-1.02	0.00	0.14	-0.01	2.71
WIND BLOWING D/S TO U/S		12	-0.79	-2.08	0.00	0.16	0.00	-3.20
		15	0.79	0.63	0.00	-0.16	0.01	-2.77
CRANE MOVING U/S TO D/S		12	0.96	1.55	0.00	-0.08	0.00	3.40
		15	-0.96	-1.55	0.00	0.08	0.00	3.40
CRANE MOVING D/S TO U/S		12	-1.35	-2.46	0.00	0.28	0.01	-6.20
		15	1.35	2.46	0.00	-0.28	0.01	-4.61
CRANE STRIKING U/S SIDE		12	-0.63	-1.07	0.00	0.06	0.00	-2.52
		15	0.63	1.07	0.00	-0.06	0.00	-2.20
CRANE STRIKING D/S SIDE		12	0.76	1.15	0.00	-0.16	0.00	2.38
		15	-0.76	-1.15	0.00	0.16	-0.01	2.69
CRANE MOVING (LONGITUDINAL)		12	-0.38	-0.44	-0.17	-0.25	0.22	-1.52
		15	0.38	0.44	0.17	0.25	0.51	-0.44
DEAD LOAD + LIVE LOAD	12	13	18.94	2.58	1.51	0.04	-3.45	9.40
		16	-11.90	-2.58	-1.51	-0.04	-1.99	-0.10
EARTHQUAKE (TRANSVERSE)		13	0.00	3.54	0.00	-1.29	-0.01	12.87
		16	0.00	-3.54	0.00	1.29	0.00	-0.12
EARTHQUAKE (LONGITUDINAL)		13	-3.88	-0.13	-1.41	-0.12	-5.80	-0.45
		16	3.88	0.13	1.41	0.12	10.87	-0.01
WIND BLOWING U/S TO D/S		13	0.00	1.60	0.00	-0.71	-0.01	3.70
		16	0.00	-0.42	0.00	0.71	0.00	-0.06
WIND BLOWING D/S TO U/S		13	0.00	-1.95	0.00	0.65	0.01	-6.19
		16	0.00	1.44	0.00	-0.65	0.00	0.10
CRANE MOVING U/S TO D/S		13	0.18	-4.35	0.19	-0.74	-0.22	-15.74
		16	-0.18	4.35	-0.19	0.74	-0.47	0.09
CRANE MOVING D/S TO U/S		13	0.06	-4.01	0.06	0.51	-0.06	-14.55
		16	-0.06	4.01	-0.06	-0.51	-0.15	0.13
CRANE STRIKING U/S SIDE		13	0.00	2.04	0.00	0.39	0.01	7.41
		16	0.00	-2.04	0.00	-0.39	0.00	-0.07
CRANE STRIKING D/S SIDE		13	0.00	1.82	0.00	-0.32	0.00	6.61
		16	0.00	-1.82	0.00	0.32	0.00	-0.07
CRANE MOVING (LONGITUDINAL)		13	-0.73	-2.38	0.44	-0.17	-3.62	-8.61
		16	0.73	2.38	-0.44	0.17	2.05	0.03

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	13	14	19.00	-2.58	1.91	-0.06	-4.73	-9.37
		17	-11.95	2.58	-1.91	0.06	-2.15	0.10
EARTHQUAKE (TRANSVERSE)		14	0.00	3.21	0.01	-1.35	-0.03	11.62
		17	0.00	-3.21	-0.01	1.35	0.00	-0.08
EARTHQUAKE (LONGITUDINAL)		14	-4.29	0.13	-1.25	0.10	-7.55	0.46
		17	4.29	-0.13	1.25	-0.10	12.04	0.01
WIND BLOWING U/S TO D/S		14	0.00	2.53	0.00	-0.68	-0.01	8.33
		17	0.00	-2.03	0.00	0.68	0.00	-0.12
WIND BLOWING D/S TO U/S		14	0.00	-2.18	0.00	0.72	0.01	-5.79
		17	0.00	0.99	0.00	-0.72	0.00	0.09
CRANE MOVING U/S TO D/S		14	0.06	4.91	0.06	-0.61	-0.08	17.82
		17	-0.06	-4.91	-0.06	0.61	-0.15	-0.17
CRANE MOVING D/S TO U/S		14	0.18	3.52	0.19	0.67	-0.20	12.73
		17	-0.18	-3.52	-0.19	-0.67	-0.47	-0.07
CRANE STRIKING U/S SIDE		14	0.00	-2.35	0.00	0.36	0.01	-8.56
		17	0.00	2.35	0.00	-0.36	0.00	0.08
CRANE STRIKING D/S SIDE		14	0.00	-1.54	0.00	-0.36	-0.01	-5.58
		17	0.00	1.54	0.00	0.36	0.00	0.05
CRANE MOVING (LONGITUDINAL)		14	-0.66	2.40	0.41	0.13	-3.33	8.68
		17	0.66	-2.40	-0.41	-0.13	1.86	-0.05
DEAD LOAD + LIVE LOAD	14	5	-1.84	10.98	0.01	0.29	-0.02	11.92
		6	1.84	11.62	-0.01	-0.29	-0.03	-14.22
EARTHQUAKE (TRANSVERSE)		5	2.68	-1.69	-0.04	0.00	0.15	-5.98
		6	-2.68	1.69	0.04	0.00	0.16	-6.15
EARTHQUAKE (LONGITUDINAL)		5	0.11	-0.02	-0.05	-0.36	0.14	-0.07
		6	-0.11	0.02	0.05	0.36	0.22	-0.07
WIND BLOWING U/S TO D/S		5	1.94	-0.53	-0.03	0.00	0.10	-1.88
		6	-1.94	0.53	0.03	0.00	0.10	-1.91
WIND BLOWING D/S TO U/S		5	-1.19	0.45	0.02	0.00	-0.06	1.61
		6	1.19	-0.45	-0.02	0.00	-0.07	1.64
CRANE MOVING U/S TO D/S		5	1.15	-0.66	-0.02	0.00	0.08	-2.33
		6	-1.15	0.66	0.02	0.00	0.09	-2.37
CRANE MOVING D/S TO U/S		5	-0.76	0.54	0.01	0.00	-0.04	1.91
		6	0.76	-0.54	-0.01	0.00	-0.05	1.96
CRANE STRIKING U/S SIDE		5	-0.69	0.53	0.02	0.00	-0.08	1.88
		6	0.69	-0.53	-0.02	0.00	-0.08	1.94
CRANE STRIKING D/S SIDE		5	0.50	-0.32	-0.01	0.00	0.02	-1.13
		6	-0.50	0.32	0.01	0.00	0.03	-1.16
CRANE MOVING (LONGITUDINAL)		5	0.14	0.05	-0.03	-0.13	0.10	0.16
		6	-0.14	-0.05	0.03	0.13	0.15	0.18
DEAD LOAD + LIVE LOAD	15	7	-0.91	11.73	-0.01	-0.15	0.02	14.37
		8	0.91	11.68	0.01	0.15	0.02	-14.15
EARTHQUAKE (TRANSVERSE)		7	-0.94	-1.79	-0.05	0.00	0.17	-6.64
		8	0.94	1.79	0.05	0.00	0.19	-6.60
EARTHQUAKE (LONGITUDINAL)		7	-0.01	0.00	-0.09	0.04	0.33	0.00
		8	0.01	0.00	0.09	-0.04	0.31	0.00
WIND BLOWING U/S TO D/S		7	-0.56	-0.44	-0.02	0.00	0.06	-1.64
		8	0.56	0.44	0.02	0.00	0.07	-1.64
WIND BLOWING D/S TO U/S		7	1.12	0.51	0.02	0.00	-0.08	1.88
		8	-1.12	-0.51	-0.02	0.00	-0.09	1.88
CRANE MOVING U/S TO D/S		7	-0.21	-0.56	-0.01	0.00	0.05	-2.06
		8	0.21	0.56	0.01	0.00	0.05	-2.04
CRANE MOVING D/S TO U/S		7	0.20	0.61	0.02	0.00	-0.08	2.28
		8	-0.20	-0.61	-0.02	0.00	-0.08	2.26
CRANE STRIKING U/S SIDE		7	0.12	0.32	0.01	0.00	-0.03	1.20
		8	-0.12	-0.32	-0.01	0.00	-0.03	1.19
CRANE STRIKING D/S SIDE		7	-0.19	-0.51	-0.02	0.00	0.06	-1.89
		8	0.19	0.51	0.02	0.00	0.07	-1.87
CRANE MOVING (LONGITUDINAL)		7	0.00	-0.05	0.02	0.10	-0.07	-0.18
		8	0.00	0.05	-0.02	-0.10	-0.04	-0.18

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	16	9	3.30	7.75	0.02	0.06	-0.06	7.48
		10	-3.30	8.67	-0.02	-0.06	-0.06	-10.77
EARTHQUAKE (TRANSVERSE)		9	-1.93	-2.18	-0.10	0.00	0.35	-7.00
		10	1.93	2.18	0.10	0.00	0.35	-8.65
EARTHQUAKE (LONGITUDINAL)		9	0.29	-0.02	-0.43	-0.67	1.42	-0.07
		10	-0.29	0.02	0.43	0.67	1.69	-0.07
WIND BLOWING U/S TO D/S		9	-0.26	-0.61	-0.06	0.00	0.20	-1.91
		10	0.26	0.61	0.06	0.00	0.20	-2.48
WIND BLOWING D/S TO U/S		9	0.52	0.57	0.04	0.00	-0.14	1.81
		10	-0.52	-0.57	-0.04	0.00	-0.15	2.31
CRANE MOVING U/S TO D/S		9	-1.24	-0.93	-0.06	0.00	0.19	-2.94
		10	1.24	0.93	0.06	0.00	0.21	-3.75
CRANE MOVING D/S TO U/S		9	0.96	0.71	0.03	0.00	-0.09	2.27
		10	-0.96	-0.71	-0.03	0.00	-0.10	2.81
CRANE STRIKING U/S SIDE		9	0.85	0.67	0.05	0.00	-0.17	2.15
		10	-0.85	-0.67	-0.05	0.00	-0.16	2.63
CRANE STRIKING D/S SIDE		9	-0.60	-0.44	-0.02	0.00	0.05	-1.39
		10	0.60	0.44	0.02	0.00	0.06	-1.75
CRANE MOVING (LONGITUDINAL)		9	0.12	0.00	-0.17	-0.20	0.55	0.05
		10	-0.12	0.00	0.17	0.20	0.67	-0.02
DEAD LOAD + LIVE LOAD	17	11	-1.17	11.67	-0.02	-0.15	0.06	14.17
		12	1.17	11.74	0.02	0.15	0.08	-14.43
EARTHQUAKE (TRANSVERSE)		11	-3.10	-2.73	-0.11	0.00	0.37	-10.11
		12	3.10	2.73	0.11	0.00	0.43	-10.04
EARTHQUAKE (LONGITUDINAL)		11	0.01	0.00	-0.04	0.31	0.14	-0.01
		12	-0.01	0.00	0.04	-0.31	0.15	-0.01
WIND BLOWING U/S TO D/S		11	-1.25	-0.71	-0.04	0.00	0.13	-2.61
		12	1.25	0.71	0.04	0.00	0.15	-2.59
WIND BLOWING D/S TO U/S		11	1.96	0.76	0.05	0.00	-0.17	2.81
		12	-1.96	-0.76	-0.05	0.00	-0.20	2.79
CRANE MOVING U/S TO D/S		11	-0.60	-0.88	-0.03	0.00	0.10	-3.27
		12	0.60	0.88	0.03	0.00	0.10	-3.24
CRANE MOVING D/S TO U/S		11	1.70	1.10	0.05	0.00	-0.18	4.06
		12	-1.70	-1.10	-0.05	0.00	-0.20	4.06
CRANE STRIKING U/S SIDE		11	0.58	0.54	0.02	0.00	-0.06	2.01
		12	-0.58	-0.54	-0.02	0.00	-0.06	2.00
CRANE STRIKING D/S SIDE		11	-0.23	-0.76	-0.04	0.00	0.14	-2.82
		12	0.23	0.76	0.04	0.00	0.16	-2.78
CRANE MOVING (LONGITUDINAL)		11	0.81	0.02	0.10	0.16	-0.41	0.07
		12	-0.81	-0.02	-0.10	-0.16	-0.34	0.10
DEAD LOAD + LIVE LOAD	18	14	3.54	8.60	-0.02	-0.04	0.08	10.44
		15	-3.54	8.45	0.02	0.04	0.10	-9.91
EARTHQUAKE (TRANSVERSE)		14	1.54	-2.87	-0.16	0.00	0.54	-10.85
		15	-1.54	2.87	0.16	0.00	0.63	-10.33
EARTHQUAKE (LONGITUDINAL)		14	0.15	0.00	0.25	0.47	-0.97	-0.02
		15	-0.15	0.00	-0.25	-0.47	-0.88	-0.01
WIND BLOWING U/S TO D/S		14	0.87	-0.77	-0.06	0.00	0.20	-2.96
		15	-0.87	0.77	0.06	0.00	0.22	-2.76
WIND BLOWING D/S TO U/S		14	-0.45	0.79	0.07	0.00	-0.25	3.02
		15	0.45	-0.79	-0.07	0.00	-0.28	2.81
CRANE MOVING U/S TO D/S		14	1.45	-0.95	-0.04	0.00	0.15	-3.61
		15	-1.45	0.95	0.04	0.00	0.15	-3.43
CRANE MOVING D/S TO U/S		14	-2.20	1.34	0.09	0.00	-0.29	5.17
		15	2.20	-1.34	-0.09	0.00	-0.34	4.73
CRANE STRIKING U/S SIDE		14	-1.01	0.62	0.03	0.00	-0.09	2.38
		15	1.01	-0.62	-0.03	0.00	-0.09	2.22
CRANE STRIKING D/S SIDE		14	0.99	-0.75	-0.06	0.00	0.20	-2.82
		15	-0.99	0.75	0.06	0.00	0.24	-2.74
CRANE MOVING (LONGITUDINAL)		14	-0.26	0.15	0.23	0.15	-0.91	0.64
		15	0.26	-0.15	-0.23	-0.15	-0.80	0.47

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	19	16	-2.60	0.00	0.00	0.00	0.00	0.00
		17	2.60	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		16	-0.18	0.00	0.00	0.00	0.00	0.00
		17	0.18	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		16	0.17	0.00	0.00	0.00	0.00	0.00
		17	-0.17	0.00	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		16	1.19	0.00	0.00	0.00	0.00	0.00
		17	-1.19	0.00	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		16	0.61	0.00	0.00	0.00	0.00	0.00
		17	-0.61	0.00	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		16	4.66	0.00	0.00	0.00	0.00	0.00
		17	-4.66	0.00	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		16	3.80	0.00	0.00	0.00	0.00	0.00
		17	-3.80	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		16	-2.21	0.00	0.00	0.00	0.00	0.00
		17	2.21	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		16	-1.69	0.00	0.00	0.00	0.00	0.00
		17	1.69	0.00	0.00	0.00	0.00	0.00
CRANE MOVING (LONGITUDINAL)		16	2.45	0.00	0.00	0.00	0.00	0.00
		17	-2.45	0.00	0.00	0.00	0.00	0.00
DEAD LOAD + LIVE LOAD	24	5	-0.39	18.39	-0.01	0.17	0.03	14.61
		22	0.39	19.85	0.01	-0.17	0.04	-18.61
EARTHQUAKE (TRANSVERSE)		5	0.05	0.00	0.05	0.08	-0.12	-0.01
		22	-0.05	0.00	-0.05	-0.08	-0.18	-0.01
EARTHQUAKE (LONGITUDINAL)		5	-0.29	-1.67	0.10	-0.01	-0.33	-4.79
		22	0.29	1.67	-0.10	0.01	-0.23	-4.39
WIND BLOWING U/S TO D/S		5	0.03	0.00	0.04	0.05	-0.09	0.00
		22	-0.03	0.00	-0.04	-0.05	-0.13	0.00
WIND BLOWING D/S TO U/S		5	-0.02	0.00	-0.02	-0.03	0.05	0.00
		22	0.02	0.00	0.02	0.03	0.08	0.00
CRANE MOVING U/S TO D/S		5	0.02	0.00	0.02	0.04	-0.04	0.00
		22	-0.02	0.00	-0.02	-0.04	-0.06	0.00
CRANE MOVING D/S TO U/S		5	-0.01	0.00	-0.02	-0.02	0.03	0.00
		22	0.01	0.00	0.02	0.02	0.05	0.00
CRANE STRIKING U/S SIDE		5	-0.02	0.00	-0.03	-0.04	0.06	0.00
		22	0.02	0.00	0.03	0.04	0.09	0.00
CRANE STRIKING D/S SIDE		5	0.01	0.00	0.01	0.01	-0.01	0.00
		22	-0.01	0.00	-0.01	-0.01	-0.02	0.00
CRANE MOVING (LONGITUDINAL)		5	-0.04	-0.21	0.04	0.00	-0.14	-0.59
		22	0.04	0.21	-0.04	0.00	-0.08	-0.54
DEAD LOAD + LIVE LOAD	25	6	-0.95	19.12	0.00	-0.03	0.00	17.46
		23	0.95	19.11	0.00	0.03	0.01	-17.43
EARTHQUAKE (TRANSVERSE)		6	-0.04	0.00	0.05	0.09	-0.09	0.00
		23	0.04	0.00	-0.05	-0.09	-0.16	0.00
EARTHQUAKE (LONGITUDINAL)		6	-0.55	-4.05	0.04	-0.01	-0.10	-11.17
		23	0.55	4.05	-0.04	0.01	-0.09	-11.08
WIND BLOWING U/S TO D/S		6	-0.03	0.00	0.03	0.05	-0.07	0.00
		23	0.03	0.00	-0.03	-0.05	-0.11	0.00
WIND BLOWING D/S TO U/S		6	0.02	0.00	-0.02	-0.04	0.03	0.00
		23	-0.02	0.00	0.02	0.04	0.06	0.00
CRANE MOVING U/S TO D/S		6	-0.05	0.06	0.01	0.04	0.01	0.17
		23	0.05	-0.06	-0.01	-0.04	-0.04	0.17
CRANE MOVING D/S TO U/S		6	0.00	0.02	-0.01	-0.02	0.02	0.05
		23	0.00	-0.02	0.01	0.02	0.04	0.05
CRANE STRIKING U/S SIDE		6	0.02	0.00	-0.03	-0.05	0.06	0.00
		23	-0.02	0.00	0.03	0.05	0.09	0.00
CRANE STRIKING D/S SIDE		6	-0.01	0.00	0.00	0.01	0.00	0.00
		23	0.01	0.00	0.00	-0.01	-0.01	0.00
CRANE MOVING (LONGITUDINAL)		6	-0.12	-0.98	0.00	-0.01	0.00	-2.71
		23	0.12	0.98	0.00	0.01	0.00	-2.68

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	**26**	7	-1.20	19.15	0.00	0.03	-0.01	17.52
		24	1.20	19.09	0.00	-0.03	-0.01	-17.38
EARTHQUAKE (TRANSVERSE)		7	0.05	0.00	0.07	0.11	-0.14	-0.01
		24	-0.05	0.00	-0.07	-0.11	-0.21	0.00
EARTHQUAKE (LONGITUDINAL)		7	-0.63	-4.69	0.00	0.00	0.01	-12.95
		24	0.63	4.69	0.00	0.00	0.01	-12.85
WIND BLOWING U/S TO D/S		7	0.02	0.00	0.02	0.03	-0.03	0.00
		24	-0.02	0.00	-0.02	-0.03	-0.06	0.00
WIND BLOWING D/S TO U/S		7	-0.02	0.00	-0.03	-0.05	0.07	0.00
		24	0.02	0.00	0.03	0.05	0.10	0.00
CRANE MOVING U/S TO D/S		7	0.00	0.02	0.01	0.03	-0.02	0.05
		24	0.00	-0.02	-0.01	-0.03	-0.04	0.05
CRANE MOVING D/S TO U/S		7	-0.05	0.06	-0.01	-0.04	0.00	0.17
		24	0.05	-0.06	0.01	0.04	0.04	0.17
CRANE STRIKING U/S SIDE		7	-0.01	0.00	0.00	-0.01	0.00	0.00
		24	0.01	0.00	0.00	0.01	0.02	0.00
CRANE STRIKING D/S SIDE		7	0.02	0.00	0.03	0.04	-0.06	0.00
		24	-0.02	0.00	-0.03	-0.04	-0.08	0.00
CRANE MOVING (LONGITUDINAL)		7	-0.11	-0.91	-0.01	0.02	0.03	-2.52
		24	0.11	0.91	0.01	-0.02	0.02	-2.50
DEAD LOAD + LIVE LOAD	**27**	8	-1.85	18.81	0.00	-0.03	-0.01	16.16
		25	1.85	19.43	0.00	0.03	-0.02	-17.85
EARTHQUAKE (TRANSVERSE)		8	-0.05	0.00	0.05	0.11	-0.10	0.01
		25	0.05	0.00	-0.05	-0.11	-0.19	0.01
EARTHQUAKE (LONGITUDINAL)		8	-0.43	-4.14	0.02	0.00	-0.05	-11.72
		25	0.43	4.14	-0.02	0.00	-0.05	-11.03
WIND BLOWING U/S TO D/S		8	-0.02	0.00	0.02	0.03	-0.03	0.00
		25	0.02	0.00	-0.02	-0.03	-0.06	0.00
WIND BLOWING D/S TO U/S		8	0.02	0.00	-0.03	-0.05	0.06	0.00
		25	-0.02	0.00	0.03	0.05	0.11	0.00
CRANE MOVING U/S TO D/S		8	-0.01	0.00	0.01	0.02	-0.03	0.00
		25	0.01	0.00	-0.01	-0.02	-0.05	0.00
CRANE MOVING D/S TO U/S		8	0.02	0.00	-0.01	-0.03	-0.01	-0.01
		25	-0.02	0.00	0.01	0.03	0.03	-0.01
CRANE STRIKING U/S SIDE		8	0.01	0.00	0.00	-0.01	0.01	0.00
		25	-0.01	0.00	0.00	0.01	0.02	0.00
CRANE STRIKING D/S SIDE		8	-0.02	0.00	0.02	0.04	-0.03	0.00
		25	0.02	0.00	-0.02	-0.04	-0.07	0.00
CRANE MOVING (LONGITUDINAL)		8	-0.03	-0.32	-0.03	0.02	0.10	-0.89
		25	0.03	0.32	0.03	-0.02	0.06	-0.84
DEAD LOAD + LIVE LOAD	**28**	9	2.82	5.46	-0.03	0.21	0.07	4.86
		26	-2.82	5.36	0.03	-0.21	0.08	-4.58
EARTHQUAKE (TRANSVERSE)		9	0.09	0.00	0.20	0.07	-0.49	-0.01
		26	-0.09	0.00	-0.20	-0.07	-0.64	-0.01
EARTHQUAKE (LONGITUDINAL)		9	0.12	-1.23	0.32	0.00	-0.99	-3.62
		26	-0.12	1.23	-0.32	0.00	-0.77	-3.12
WIND BLOWING U/S TO D/S		9	0.05	0.00	0.12	0.02	-0.28	0.00
		26	-0.05	0.00	-0.12	-0.02	-0.37	-0.01
WIND BLOWING D/S TO U/S		9	-0.04	0.00	-0.08	-0.02	0.20	0.00
		26	0.04	0.00	0.08	0.02	0.26	0.00
CRANE MOVING U/S TO D/S		9	-0.05	0.00	0.11	0.05	-0.27	-0.01
		26	-0.05	0.00	-0.11	-0.05	-0.35	-0.01
CRANE MOVING D/S TO U/S		9	-0.03	0.00	-0.05	-0.02	0.13	0.00
		26	0.03	0.00	0.05	0.02	0.17	0.00
CRANE STRIKING U/S SIDE		9	-0.05	0.00	-0.10	-0.04	0.25	0.01
		26	0.05	0.00	0.10	0.04	0.33	0.01
CRANE STRIKING D/S SIDE		9	0.01	0.00	0.03	0.01	-0.07	0.00
		26	-0.01	0.00	-0.03	-0.01	-0.09	0.00
CRANE MOVING (LONGITUDINAL)		9	0.04	-0.17	0.12	0.00	-0.39	-0.50
		26	-0.04	0.17	-0.12	0.00	-0.28	-0.43

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	29	10	0.64	17.58	-0.04	-0.05	0.10	16.18
		27	-0.64	17.44	0.04	0.05	0.12	-15.78
EARTHQUAKE (TRANSVERSE)		10	-0.08	0.00	0.21	0.14	-0.49	0.00
		27	0.08	0.00	-0.21	-0.14	-0.65	0.00
EARTHQUAKE (LONGITUDINAL)		10	-0.51	-5.57	0.06	0.00	-0.18	-15.38
		27	0.51	5.57	-0.06	0.00	-0.17	-15.26
WIND BLOWING U/S TO D/S		10	-0.05	0.00	0.12	0.08	-0.29	0.00
		27	0.05	0.00	-0.12	-0.08	-0.38	0.00
WIND BLOWING D/S TO U/S		10	0.03	0.00	-0.08	-0.06	0.18	0.00
		27	-0.03	0.00	0.08	0.06	0.25	0.00
CRANE MOVING U/S TO D/S		10	-0.11	0.12	0.10	0.11	-0.23	0.34
		27	0.11	-0.12	-0.10	-0.11	-0.33	0.34
CRANE MOVING D/S TO U/S		10	0.00	0.04	-0.05	-0.03	0.12	0.11
		27	0.00	-0.04	0.05	0.03	0.17	0.11
CRANE STRIKING U/S SIDE		10	0.04	0.00	-0.12	-0.07	0.29	0.00
		27	-0.04	0.00	0.12	0.07	0.35	0.00
CRANE STRIKING D/S SIDE		10	-0.01	0.00	0.02	0.02	-0.05	0.00
		27	0.01	0.00	-0.02	-0.02	-0.08	0.00
CRANE MOVING (LONGITUDINAL)		10	-0.13	-1.36	0.01	0.02	-0.02	-3.77
		27	0.13	1.36	-0.01	-0.02	-0.02	-3.74
DEAD LOAD + LIVE LOAD	30	11	0.10	19.49	0.04	0.05	-0.11	17.97
		28	-0.10	19.29	-0.04	-0.05	-0.12	-17.43
EARTHQUAKE (TRANSVERSE)		11	0.11	0.00	0.26	0.15	-0.64	-0.01
		28	-0.11	0.00	-0.26	-0.15	-0.78	-0.01
EARTHQUAKE (LONGITUDINAL)		11	-0.60	-6.38	-0.02	0.00	0.05	-17.61
		28	0.60	6.38	0.02	0.00	0.05	-17.48
WIND BLOWING U/S TO D/S		11	0.04	0.00	0.08	0.05	-0.18	0.00
		28	-0.04	0.00	-0.08	-0.05	-0.24	0.00
WIND BLOWING D/S TO U/S		11	-0.05	0.00	-0.11	-0.07	0.27	0.00
		28	0.05	0.00	0.11	0.07	0.34	0.00
CRANE MOVING U/S TO D/S		11	0.01	0.04	0.05	0.04	-0.13	0.10
		28	-0.01	-0.04	-0.05	-0.04	-0.17	0.11
CRANE MOVING D/S TO U/S		11	-0.12	0.13	-0.09	-0.09	0.22	0.34
		28	0.12	-0.13	0.09	0.09	0.29	0.34
CRANE STRIKING U/S SIDE		11	-0.02	0.00	-0.03	-0.02	0.06	0.00
		28	0.02	0.00	0.03	0.02	0.09	0.00
CRANE STRIKING D/S SIDE		11	0.04	0.00	0.11	0.06	-0.27	0.00
		28	-0.04	0.00	-0.11	-0.06	-0.32	0.00
CRANE MOVING (LONGITUDINAL)		11	-0.13	-1.26	-0.02	0.00	0.06	-3.47
		28	0.13	1.26	0.02	0.00	0.05	-3.45
DEAD LOAD + LIVE LOAD	31	12	1.37	19.22	0.04	0.00	-0.09	16.78
		29	-1.37	19.56	-0.04	0.00	-0.12	-17.71
EARTHQUAKE (TRANSVERSE)		12	-0.11	0.01	0.22	0.15	-0.50	0.02
		29	0.11	-0.01	-0.22	-0.15	-0.72	0.02
EARTHQUAKE (LONGITUDINAL)		12	-0.35	-4.18	-0.03	0.00	0.09	-11.78
		29	0.35	4.18	0.03	0.00	0.06	-11.24
WIND BLOWING U/S TO D/S		12	-0.04	0.00	0.07	0.05	-0.16	0.01
		29	0.04	0.00	-0.07	-0.05	-0.23	0.01
WIND BLOWING D/S TO U/S		12	0.05	0.00	-0.10	-0.06	0.24	-0.01
		29	-0.05	0.00	0.10	0.06	0.34	-0.01
CRANE MOVING U/S TO D/S		12	-0.03	0.00	0.05	0.03	-0.12	0.00
		29	0.03	0.00	-0.05	-0.03	-0.17	0.00
CRANE MOVING D/S TO U/S		12	0.05	0.00	-0.08	-0.10	0.17	-0.01
		29	-0.05	0.00	0.08	0.10	0.27	-0.01
CRANE STRIKING U/S SIDE		12	0.02	0.00	-0.03	-0.02	0.06	0.00
		29	-0.02	0.00	0.03	0.02	0.09	0.00
CRANE STRIKING D/S SIDE		12	-0.04	0.00	0.09	0.06	-0.19	0.01
		29	0.04	0.00	-0.09	-0.06	-0.28	0.01
CRANE MOVING (LONGITUDINAL)		12	-0.01	-0.34	-0.08	-0.01	0.27	-0.95
		29	0.01	0.34	0.08	0.01	0.19	-0.91

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	32	13	1.93	11.63	-0.11	-0.05	0.28	10.80
		30	-1.93	11.40	0.11	0.05	0.31	-10.19
EARTHQUAKE (TRANSVERSE)		13	-0.01	0.00	0.43	0.15	-1.06	0.00
		30	0.01	0.00	-0.43	-0.15	-1.29	0.00
EARTHQUAKE (LONGITUDINAL)		13	-1.18	-5.28	0.05	0.00	-0.14	-14.59
		30	1.18	5.28	-0.05	0.00	-0.12	-14.47
WIND BLOWING U/S TO D/S		13	-0.01	0.00	0.24	0.08	-0.59	0.00
		30	0.01	0.00	-0.24	-0.08	-0.72	0.00
WIND BLOWING D/S TO U/S		13	0.01	0.00	-0.18	-0.07	0.44	0.00
		30	-0.01	0.00	0.18	0.07	0.54	0.00
CRANE MOVING U/S TO D/S		13	-0.08	0.19	0.35	0.21	-0.89	0.51
		30	0.08	-0.19	-0.35	-0.21	-1.05	0.52
CRANE MOVING D/S TO U/S		13	-0.02	0.06	-0.09	-0.02	0.23	0.16
		30	0.02	-0.06	0.09	0.02	0.30	0.16
CRANE STRIKING U/S SIDE		13	0.01	0.00	-0.23	-0.07	0.58	0.00
		30	-0.01	0.00	0.23	0.07	0.68	0.00
CRANE STRIKING D/S SIDE		13	0.00	0.00	0.07	0.03	-0.16	0.00
		30	0.00	0.00	-0.07	-0.03	-0.21	0.00
CRANE MOVING (LONGITUDINAL)		13	-0.73	-1.19	0.08	0.09	-0.21	-3.30
		30	0.73	1.19	-0.08	-0.09	-0.21	-3.27
DEAD LOAD + LIVE LOAD	33	14	2.31	15.43	0.10	0.06	-0.27	14.28
		31	-2.31	15.19	-0.10	-0.06	-0.30	-13.60
EARTHQUAKE (TRANSVERSE)		14	0.14	0.00	0.49	0.15	-1.25	-0.01
		31	-0.14	0.00	-0.49	-0.15	-1.46	-0.01
EARTHQUAKE (LONGITUDINAL)		14	-1.44	-5.94	-0.04	0.00	0.12	-16.39
		31	1.44	5.94	0.04	0.00	0.11	-16.26
WIND BLOWING U/S TO D/S		14	0.05	0.00	0.16	0.07	-0.41	0.00
		31	-0.05	0.00	-0.16	-0.07	-0.49	0.00
WIND BLOWING D/S TO U/S		14	-0.06	0.00	-0.21	-0.07	0.54	0.00
		31	0.06	0.00	0.21	0.07	0.64	0.00
CRANE MOVING U/S TO D/S		14	0.01	0.06	0.10	0.03	-0.25	0.16
		31	-0.01	-0.06	-0.10	-0.03	-0.32	0.16
CRANE MOVING D/S TO U/S		14	-0.15	0.19	-0.31	-0.18	0.79	0.52
		31	0.15	-0.19	0.31	0.18	0.90	0.52
CRANE STRIKING U/S SIDE		14	-0.02	0.00	-0.07	-0.04	0.17	0.00
		31	0.02	0.00	0.07	0.04	0.21	0.00
CRANE STRIKING D/S SIDE		14	0.05	0.00	0.20	0.05	-0.52	0.00
		31	-0.05	0.00	-0.20	-0.05	-0.60	0.00
CRANE MOVING (LONGITUDINAL)		14	-0.72	-1.08	-0.08	-0.06	0.23	-3.00
		31	0.72	1.08	0.08	0.06	0.23	-2.97
DEAD LOAD + LIVE LOAD	34	15	2.87	5.63	0.07	-0.07	-0.17	5.36
		32	-2.87	5.19	-0.07	0.07	-0.22	-4.15
EARTHQUAKE (TRANSVERSE)		15	-0.15	0.01	0.43	0.13	-1.02	0.02
		32	0.15	-0.01	-0.43	-0.13	-1.35	0.02
EARTHQUAKE (LONGITUDINAL)		15	0.30	-2.60	-0.14	0.00	0.41	-7.53
		32	-0.30	2.60	0.14	0.00	0.34	-6.79
WIND BLOWING U/S TO D/S		15	-0.06	0.00	0.15	0.05	-0.36	0.01
		32	0.06	0.00	-0.15	-0.05	-0.46	0.01
WIND BLOWING D/S TO U/S		15	0.07	0.00	-0.19	-0.05	0.45	-0.01
		32	-0.07	0.00	0.19	0.05	0.59	-0.01
CRANE MOVING U/S TO D/S		15	-0.04	0.00	0.10	0.03	-0.24	0.00
		32	0.04	0.00	-0.10	-0.03	-0.30	0.00
CRANE MOVING D/S TO U/S		15	0.08	0.00	-0.26	-0.12	0.62	-0.01
		32	-0.08	0.00	0.26	0.12	0.80	-0.01
CRANE STRIKING U/S SIDE		15	0.02	0.00	-0.07	-0.03	0.16	0.00
		32	-0.02	0.00	0.07	0.03	0.20	0.00
CRANE STRIKING D/S SIDE		15	-0.06	0.00	0.17	0.05	-0.40	0.01
		32	0.06	0.00	-0.17	-0.05	-0.53	0.01
CRANE MOVING (LONGITUDINAL)		15	0.07	-0.23	-0.19	-0.03	0.56	-0.66
		32	-0.07	0.23	0.19	0.03	0.46	-0.59

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	35	16	1.51	1.80	-0.02	0.10	0.04	1.99
		33	-1.51	1.43	0.02	-0.10	0.08	-0.95
EARTHQUAKE (TRANSVERSE)		16	0.00	0.00	0.54	0.12	-1.29	0.00
		33	0.00	0.00	-0.54	-0.12	-1.67	0.00
EARTHQUAKE (LONGITUDINAL)		16	1.12	-3.88	0.04	0.01	-0.12	-10.87
		33	-1.12	3.88	-0.04	-0.01	-0.09	-10.45
WIND BLOWING U/S TO D/S		16	0.00	0.00	0.30	0.06	-0.71	0.00
		33	0.00	0.00	-0.30	-0.06	-0.92	0.00
WIND BLOWING D/S TO U/S		16	0.00	0.00	-0.27	-0.10	0.65	0.00
		33	0.00	0.00	0.27	0.10	0.83	0.00
CRANE MOVING U/S TO D/S		16	0.19	0.18	0.31	-0.09	-0.74	0.47
		33	-0.19	-0.18	-0.31	0.09	-0.98	0.50
CRANE MOVING D/S TO U/S		16	0.06	0.06	-0.21	-0.13	0.51	0.15
		33	-0.06	-0.06	0.21	0.13	0.64	0.16
CRANE STRIKING U/S SIDE		16	0.00	0.00	-0.17	0.07	0.39	0.00
		33	0.00	0.00	0.17	-0.07	0.53	0.00
CRANE STRIKING D/S SIDE		16	0.00	0.00	0.13	0.07	-0.32	0.00
		33	0.00	0.00	-0.13	-0.07	-0.40	0.00
CRANE MOVING (LONGITUDINAL)		16	0.44	-0.73	0.06	-0.03	-0.17	-2.05
		33	-0.44	0.73	-0.06	0.03	-0.18	-1.94
DEAD LOAD + LIVE LOAD	36	17	1.91	1.86	0.03	-0.10	-0.06	2.15
		34	-1.91	1.37	-0.03	0.10	-0.10	-0.81
EARTHQUAKE (TRANSVERSE)		17	0.01	0.00	0.56	0.08	-1.35	0.00
		34	-0.01	0.00	-0.56	-0.08	-1.71	0.00
EARTHQUAKE (LONGITUDINAL)		17	1.28	-4.29	-0.03	-0.01	0.10	-12.04
		34	-1.28	4.29	0.03	0.01	0.09	-11.58
WIND BLOWING U/S TO D/S		17	0.00	0.00	0.28	0.12	-0.68	0.00
		34	0.00	0.00	-0.28	-0.12	-0.84	0.00
WIND BLOWING D/S TO U/S		17	0.00	0.00	-0.29	-0.09	0.72	0.00
		34	0.00	0.00	0.29	0.09	0.90	0.00
CRANE MOVING U/S TO D/S		17	0.06	0.06	0.24	0.17	-0.61	0.15
		34	-0.06	-0.06	-0.24	-0.17	-0.74	0.15
CRANE MOVING D/S TO U/S		17	0.19	0.18	-0.28	0.07	0.67	0.47
		34	-0.19	-0.18	0.28	-0.07	0.86	0.50
CRANE STRIKING U/S SIDE		17	0.00	0.00	-0.15	-0.08	0.36	0.00
		34	0.00	0.00	0.15	0.08	0.44	0.00
CRANE STRIKING D/S SIDE		17	0.00	0.00	0.15	-0.05	-0.36	0.00
		34	0.00	0.00	-0.15	0.05	-0.47	0.00
CRANE MOVING (LONGITUDINAL)		17	0.41	-0.66	-0.05	0.05	0.13	-1.86
		34	-0.41	0.66	0.05	-0.05	0.12	-1.75
DEAD LOAD + LIVE LOAD	37	18	91.28	-2.61	0.00	0.00	0.00	-3.76
		22	-87.58	2.61	0.00	0.00	0.00	-7.20
EARTHQUAKE (TRANSVERSE)		18	-4.39	1.07	0.00	0.00	0.00	5.14
		22	4.39	-1.07	0.00	0.00	0.00	-0.66
EARTHQUAKE (LONGITUDINAL)		18	0.00	0.00	-2.44	0.08	6.48	0.00
		22	0.00	0.00	2.44	-0.08	3.75	0.00
WIND BLOWING U/S TO D/S		18	-1.41	1.69	0.00	0.00	0.00	2.88
		22	1.41	0.74	0.00	0.00	0.00	-0.88
WIND BLOWING D/S TO U/S		18	1.23	-0.83	0.00	0.00	0.00	-1.86
		22	-1.23	-0.21	0.00	0.00	0.00	0.55
CRANE MOVING U/S TO D/S		18	-1.84	0.20	0.00	0.00	0.00	1.68
		22	1.84	-0.20	0.00	0.00	0.00	-0.84
CRANE MOVING D/S TO U/S		18	1.40	-0.32	0.00	0.00	0.00	-1.56
		22	-1.40	0.32	0.00	0.00	0.00	0.21
CRANE STRIKING U/S SIDE		18	1.47	-0.39	0.00	0.00	0.00	-1.79
		22	-1.47	0.39	0.00	0.00	0.00	0.17
CRANE STRIKING D/S SIDE		18	-0.83	0.14	0.00	0.00	0.00	0.84
		22	0.83	-0.14	0.00	0.00	0.00	-0.23
CRANE MOVING (LONGITUDINAL)		18	0.10	-0.18	-0.27	0.04	0.73	-0.42
		22	-0.10	0.18	0.27	-0.04	0.39	-0.35

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	38	19	218.38	7.50	0.00	0.00	0.00	3.73
		23	-200.39	-7.50	0.00	0.00	0.00	27.76
EARTHQUAKE (TRANSVERSE)		19	4.40	16.06	0.00	0.00	0.00	164.82
		23	-4.40	-16.06	0.00	0.00	0.00	-97.36
EARTHQUAKE (LONGITUDINAL)		19	0.00	0.00	-12.57	1.21	76.90	0.00
		23	0.00	0.00	12.57	-1.21	-24.10	0.00
WIND BLOWING U/S TO D/S		19	1.41	7.26	0.00	0.00	0.00	60.20
		23	-1.41	-7.26	0.00	0.00	0.00	-29.69
WIND BLOWING D/S TO U/S		19	-1.23	-4.48	0.00	0.00	0.00	-46.37
		23	1.23	4.48	0.00	0.00	0.00	27.55
CRANE MOVING U/S TO D/S		19	132.11	1.66	0.00	0.00	0.00	57.91
		23	-132.11	-1.66	0.00	0.00	0.00	-50.92
CRANE MOVING D/S TO U/S		19	39.61	-4.71	0.00	0.00	0.00	-50.07
		23	-39.61	4.71	0.00	0.00	0.00	30.31
CRANE STRIKING U/S SIDE		19	-1.47	-5.84	0.00	0.00	0.00	-57.22
		23	1.47	5.84	0.00	0.00	0.00	32.69
CRANE STRIKING D/S SIDE		19	0.83	1.86	0.00	0.00	0.00	27.57
		23	-0.83	-1.86	0.00	0.00	0.00	-19.74
CRANE MOVING (LONGITUDINAL)		19	86.67	-3.56	-2.98	0.41	18.99	-11.05
		23	-86.67	3.56	2.98	-0.41	-6.49	-3.88
DEAD LOAD + LIVE LOAD	39	20	251.05	-7.71	0.00	0.00	0.00	-1.49
		24	-233.06	7.71	0.00	0.00	0.00	-30.88
EARTHQUAKE (TRANSVERSE)		20	-8.44	19.79	0.00	0.00	0.00	185.58
		24	8.44	-19.79	0.00	0.00	0.00	-102.47
EARTHQUAKE (LONGITUDINAL)		20	0.00	0.00	-14.75	-0.13	89.51	0.00
		24	0.00	0.00	14.75	0.13	-27.56	0.00
WIND BLOWING U/S TO D/S		20	-2.29	4.62	0.00	0.00	0.00	46.48
		24	2.29	-4.62	0.00	0.00	0.00	-27.07
WIND BLOWING D/S TO U/S		20	2.51	-7.08	0.00	0.00	0.00	-58.56
		24	-2.51	7.08	0.00	0.00	0.00	28.84
CRANE MOVING U/S TO D/S		20	38.35	5.14	0.00	0.00	0.00	53.21
		24	-38.35	-5.14	0.00	0.00	0.00	-31.63
CRANE MOVING D/S TO U/S		20	133.91	-2.36	0.00	0.00	0.00	-57.17
		24	-133.91	2.36	0.00	0.00	0.00	47.24
CRANE STRIKING U/S SIDE		20	1.66	-2.21	0.00	0.00	0.00	-29.32
		24	-1.66	2.21	0.00	0.00	0.00	20.04
CRANE STRIKING D/S SIDE		20	-2.43	5.83	0.00	0.00	0.00	55.32
		24	2.43	-5.83	0.00	0.00	0.00	-30.86
CRANE MOVING (LONGITUDINAL)		20	86.87	3.24	-2.81	-0.83	17.79	11.16
		24	-86.87	-3.24	2.81	0.83	-5.99	2.43
DEAD LOAD + LIVE LOAD	40	21	164.45	2.66	0.00	0.00	0.00	4.46
		25	-158.29	-2.66	0.00	0.00	0.00	6.70
EARTHQUAKE (TRANSVERSE)		21	8.42	3.44	0.00	0.00	0.00	23.06
		25	-8.42	-3.44	0.00	0.00	0.00	-8.61
EARTHQUAKE (LONGITUDINAL)		21	0.00	0.00	-6.33	0.07	19.19	0.00
		25	0.00	0.00	6.33	-0.07	7.39	0.00
WIND BLOWING U/S TO D/S		21	2.29	1.44	0.00	0.00	0.00	6.37
		25	-2.29	-0.40	0.00	0.00	0.00	-2.52
WIND BLOWING D/S TO U/S		21	-2.50	-2.62	0.00	0.00	0.00	-8.73
		25	2.50	0.19	0.00	0.00	0.00	2.82
CRANE MOVING U/S TO D/S		21	2.66	0.93	0.00	0.00	0.00	6.59
		25	-2.66	-0.93	0.00	0.00	0.00	-2.67
CRANE MOVING D/S TO U/S		21	-3.63	-0.58	0.00	0.00	0.00	-6.91
		25	3.63	0.58	0.00	0.00	0.00	4.48
CRANE STRIKING U/S SIDE		21	-1.66	-0.43	0.00	0.00	0.00	-3.60
		25	1.66	0.43	0.00	0.00	0.00	1.78
CRANE STRIKING D/S SIDE		21	2.42	1.03	0.00	0.00	0.00	6.86
		25	-2.42	-1.03	0.00	0.00	0.00	-2.55
CRANE MOVING (LONGITUDINAL)		21	-0.10	0.48	-0.45	-0.10	1.40	1.49
		25	0.10	-0.48	0.45	0.10	0.49	0.53

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	41	22	28.03	-5.61	0.00	0.00	0.00	-11.34
		26	-24.24	5.61	0.00	0.00	0.00	-12.79
EARTHQUAKE (TRANSVERSE)		22	-2.47	3.65	0.00	0.00	0.00	7.64
		26	2.47	-3.65	0.00	0.00	0.00	8.06
EARTHQUAKE (LONGITUDINAL)		22	0.00	0.00	-2.35	0.24	4.61	0.00
		26	0.00	0.00	2.35	-0.24	5.50	0.00
WIND BLOWING U/S TO D/S		22	-0.74	2.57	0.00	0.00	0.00	3.39
		26	0.74	-0.08	0.00	0.00	0.00	2.31
WIND BLOWING D/S TO U/S		22	0.68	-1.63	0.00	0.00	0.00	-2.58
		26	-0.68	0.57	0.00	0.00	0.00	-2.16
CRANE MOVING U/S TO D/S		22	-1.10	1.66	0.00	0.00	0.00	3.59
		26	1.10	-1.66	0.00	0.00	0.00	3.53
CRANE MOVING D/S TO U/S		22	0.79	-1.16	0.00	0.00	0.00	-2.40
		26	-0.79	1.16	0.00	0.00	0.00	-2.58
CRANE STRIKING U/S SIDE		22	0.82	-1.23	0.00	0.00	0.00	-2.56
		26	-0.82	1.23	0.00	0.00	0.00	-2.71
CRANE STRIKING D/S SIDE		22	-0.48	0.71	0.00	0.00	0.00	1.49
		26	0.48	-0.71	0.00	0.00	0.00	1.55
CRANE MOVING (LONGITUDINAL)		22	0.01	-0.01	-0.28	0.08	0.56	0.06
		26	-0.01	0.01	0.28	-0.08	0.65	-0.11
DEAD LOAD + LIVE LOAD	42	23	141.14	10.47	0.00	0.00	0.00	16.11
		27	-122.72	-10.47	0.00	0.00	0.00	28.89
EARTHQUAKE (TRANSVERSE)		23	2.47	12.16	0.00	0.00	0.00	104.57
		27	-2.47	-12.16	0.00	0.00	0.00	-52.28
EARTHQUAKE (LONGITUDINAL)		23	0.00	0.00	-12.99	1.09	46.68	0.00
		27	0.00	0.00	12.99	-1.09	9.16	0.00
WIND BLOWING U/S TO D/S		23	0.74	4.10	0.00	0.00	0.00	32.24
		27	-0.74	-4.10	0.00	0.00	0.00	-14.60
WIND BLOWING D/S TO U/S		23	-0.68	-2.72	0.00	0.00	0.00	-29.63
		27	0.68	2.72	0.00	0.00	0.00	17.94
CRANE MOVING U/S TO D/S		23	131.49	0.26	0.00	0.00	0.00	53.71
		27	-131.49	-0.26	0.00	0.00	0.00	-52.61
CRANE MOVING D/S TO U/S		23	40.26	-3.92	0.00	0.00	0.00	-32.59
		27	-40.26	3.92	0.00	0.00	0.00	15.72
CRANE STRIKING U/S SIDE		23	-0.82	-5.11	0.00	0.00	0.00	-35.18
		27	0.82	5.11	0.00	0.00	0.00	13.22
CRANE STRIKING D/S SIDE		23	0.48	1.32	0.00	0.00	0.00	21.04
		27	-0.48	-1.32	0.00	0.00	0.00	-15.37
CRANE MOVING (LONGITUDINAL)		23	86.84	-3.78	-3.24	0.30	12.22	3.53
		27	-86.84	3.78	3.24	-0.30	1.70	-19.78
DEAD LOAD + LIVE LOAD	43	24	173.54	-9.30	0.00	0.00	0.00	-13.44
		28	-155.13	9.30	0.00	0.00	0.00	-26.55
EARTHQUAKE (TRANSVERSE)		24	-6.36	17.88	0.00	0.00	0.00	110.36
		28	6.36	-17.88	0.00	0.00	0.00	-33.50
EARTHQUAKE (LONGITUDINAL)		24	0.00	0.00	-15.15	-0.46	53.38	0.00
		28	0.00	0.00	15.15	0.46	11.75	0.00
WIND BLOWING U/S TO D/S		24	-1.76	3.69	0.00	0.00	0.00	29.10
		28	1.76	-3.69	0.00	0.00	0.00	-13.24
WIND BLOWING D/S TO U/S		24	1.87	-5.09	0.00	0.00	0.00	-31.29
		28	-1.87	5.09	0.00	0.00	0.00	9.42
CRANE MOVING U/S TO D/S		24	39.01	4.95	0.00	0.00	0.00	34.01
		28	-39.01	-4.95	0.00	0.00	0.00	-12.74
CRANE MOVING D/S TO U/S		24	133.35	-2.14	0.00	0.00	0.00	-49.85
		28	-133.35	2.14	0.00	0.00	0.00	40.63
CRANE STRIKING U/S SIDE		24	1.31	-2.10	0.00	0.00	0.00	-21.37
		28	-1.31	2.10	0.00	0.00	0.00	12.36
CRANE STRIKING D/S SIDE		24	-1.81	5.67	0.00	0.00	0.00	33.24
		28	1.81	-5.67	0.00	0.00	0.00	-8.87
CRANE MOVING (LONGITUDINAL)		24	87.06	3.23	-3.03	-0.84	11.31	-2.01
		28	-87.06	-3.23	3.03	0.84	1.73	15.90

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	44	25	98.27	4.27	0.00	0.00	0.00	10.75
		29	-91.95	-4.27	0.00	0.00	0.00	7.59
EARTHQUAKE (TRANSVERSE)		25	6.35	4.02	0.00	0.00	0.00	16.45
		29	-6.35	-4.02	0.00	0.00	0.00	0.85
EARTHQUAKE (LONGITUDINAL)		25	0.00	0.00	-6.65	-0.12	14.54	0.00
		29	0.00	0.00	6.65	0.12	14.06	0.00
WIND BLOWING U/S TO D/S		25	1.76	1.40	0.00	0.00	0.00	4.55
		29	-1.76	-0.33	0.00	0.00	0.00	-0.82
WIND BLOWING D/S TO U/S		25	-1.87	-2.30	0.00	0.00	0.00	-5.28
		29	1.87	-0.18	0.00	0.00	0.00	0.72
CRANE MOVING U/S TO D/S		25	2.04	1.18	0.00	0.00	0.00	5.03
		29	-2.04	-1.18	0.00	0.00	0.00	0.03
CRANE MOVING D/S TO U/S		25	-2.95	-0.83	0.00	0.00	0.00	-7.05
		29	2.95	0.83	0.00	0.00	0.00	3.51
CRANE STRIKING U/S SIDE		25	-1.31	-0.56	0.00	0.00	0.00	-3.11
		29	1.31	0.56	0.00	0.00	0.00	0.68
CRANE STRIKING D/S SIDE		25	1.81	1.27	0.00	0.00	0.00	4.91
		29	-1.81	-1.27	0.00	0.00	0.00	0.58
CRANE MOVING (LONGITUDINAL)		25	-0.21	0.54	-0.48	-0.18	1.09	-0.12
		29	0.21	-0.54	0.48	0.18	0.99	2.43
DEAD LOAD + LIVE LOAD	45	27	72.79	4.72	0.00	0.00	0.00	8.27
		30	-53.95	-4.72	0.00	0.00	0.00	12.51
EARTHQUAKE (TRANSVERSE)		27	0.00	11.56	0.00	0.00	0.00	62.38
		30	0.00	-11.56	0.00	0.00	0.00	-11.53
EARTHQUAKE (LONGITUDINAL)		27	0.00	0.00	-11.58	-0.44	22.11	0.00
		30	0.00	0.00	11.58	0.44	28.82	0.00
WIND BLOWING U/S TO D/S		27	0.00	4.67	0.00	0.00	0.00	17.81
		30	0.00	-1.78	0.00	0.00	0.00	-3.61
WIND BLOWING D/S TO U/S		27	0.00	-3.61	0.00	0.00	0.00	-20.82
		30	0.00	2.37	0.00	0.00	0.00	7.66
CRANE MOVING U/S TO D/S		27	130.63	2.34	0.00	0.00	0.00	57.31
		30	-130.63	-2.34	0.00	0.00	0.00	-47.01
CRANE MOVING D/S TO U/S		27	41.13	-5.29	0.00	0.00	0.00	-18.94
		30	-41.13	5.29	0.00	0.00	0.00	-4.35
CRANE STRIKING U/S SIDE		27	0.00	-6.78	0.00	0.00	0.00	-16.62
		30	0.00	6.78	0.00	0.00	0.00	-13.19
CRANE STRIKING D/S SIDE		27	0.00	2.13	0.00	0.00	0.00	17.36
		30	0.00	-2.13	0.00	0.00	0.00	-7.97
CRANE MOVING (LONGITUDINAL)		27	87.02	-3.85	-3.63	-0.30	6.44	19.81
		30	-87.02	3.85	3.63	0.30	9.52	-36.74
DEAD LOAD + LIVE LOAD	46	28	95.30	-11.06	0.00	0.00	0.00	-17.82
		31	-76.46	11.06	0.00	0.00	0.00	-30.84
EARTHQUAKE (TRANSVERSE)		28	-3.24	11.15	0.00	0.00	0.00	45.39
		31	3.24	-11.15	0.00	0.00	0.00	3.66
EARTHQUAKE (LONGITUDINAL)		28	0.00	0.00	-13.11	-0.66	23.60	0.00
		31	0.00	0.00	13.11	0.66	34.07	0.00
WIND BLOWING U/S TO D/S		28	-0.92	2.02	0.00	0.00	0.00	16.46
		31	0.92	-2.02	0.00	0.00	0.00	-7.58
WIND BLOWING D/S TO U/S		28	0.94	-2.15	0.00	0.00	0.00	-12.99
		31	-0.94	2.15	0.00	0.00	0.00	3.54
CRANE MOVING U/S TO D/S		28	40.08	4.63	0.00	0.00	0.00	16.49
		31	-40.08	-4.63	0.00	0.00	0.00	3.88
CRANE MOVING D/S TO U/S		28	132.29	-0.01	0.00	0.00	0.00	-45.62
		31	-132.29	0.01	0.00	0.00	0.00	45.58
CRANE STRIKING U/S SIDE		28	0.70	-1.51	0.00	0.00	0.00	-14.65
		31	-0.70	1.51	0.00	0.00	0.00	7.99
CRANE STRIKING D/S SIDE		28	-0.89	5.90	0.00	0.00	0.00	12.41
		31	0.89	-5.90	0.00	0.00	0.00	13.55
CRANE MOVING (LONGITUDINAL)		28	87.23	4.56	-3.34	-0.57	5.78	-15.89
		31	-87.23	-4.56	3.34	0.57	8.91	35.97

TABLE NO.~A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	47	29	31.56	6.19	0.00	0.00	0.00	10.18
		32	-25.10	-6.19	0.00	0.00	0.00	17.03
EARTHQUAKE (TRANSVERSE)		29	3.23	5.20	0.00	0.00	0.00	10.93
		32	-3.23	-5.20	0.00	0.00	0.00	11.95
EARTHQUAKE (LONGITUDINAL)		29	0.00	0.00	-4.78	-0.32	8.04	0.00
		32	0.00	0.00	4.78	0.32	13.01	0.00
WIND BLOWING U/S TO D/S		29	0.92	2.30	0.00	0.00	0.00	4.02
		32	-0.92	-1.06	0.00	0.00	0.00	3.37
WIND BLOWING D/S TO U/S		29	-0.94	-3.19	0.00	0.00	0.00	-4.26
		32	0.94	0.31	0.00	0.00	0.00	-3.44
CRANE MOVING U/S TO D/S		29	1.05	1.71	0.00	0.00	0.00	3.67
		32	-1.05	-1.71	0.00	0.00	0.00	3.85
CRANE MOVING D/S TO U/S		29	-1.66	-3.31	0.00	0.00	0.00	-8.51
		32	1.66	3.31	0.00	0.00	0.00	-6.05
CRANE STRIKING U/S SIDE		29	-0.70	-1.25	0.00	0.00	0.00	-2.96
		32	0.70	1.25	0.00	0.00	0.00	-2.55
CRANE STRIKING D/S SIDE		29	0.89	1.43	0.00	0.00	0.00	2.90
		32	-0.89	-1.43	0.00	0.00	0.00	3.37
CRANE MOVING (LONGITUDINAL)		29	-0.21	-0.72	-0.38	-0.19	0.66	-2.48
		32	0.21	0.72	0.38	0.19	1.03	-0.70
DEAD LOAD + LIVE LOAD	48	30	29.49	4.51	0.00	0.00	0.00	16.03
		33	-22.44	-4.51	0.00	0.00	0.00	0.21
EARTHQUAKE (TRANSVERSE)		30	0.00	3.35	0.00	0.00	0.00	11.83
		33	0.00	-3.35	0.00	0.00	0.00	0.24
EARTHQUAKE (LONGITUDINAL)		30	0.00	0.00	-5.84	-0.19	0.12	0.00
		33	0.00	0.00	5.84	0.19	20.91	0.00
WIND BLOWING U/S TO D/S		30	0.00	2.26	0.00	0.00	0.00	3.78
		33	0.00	0.10	0.00	0.00	0.00	0.12
WIND BLOWING D/S TO U/S		30	0.00	-2.73	0.00	0.00	0.00	-7.80
		33	0.00	1.72	0.00	0.00	0.00	-0.20
CRANE MOVING U/S TO D/S		30	-0.35	-7.85	0.00	0.00	0.00	-28.09
		33	0.35	7.85	0.00	0.00	0.00	-0.17
CRANE MOVING D/S TO U/S		30	-0.11	-5.48	0.00	0.00	0.00	-19.47
		33	0.11	5.48	0.00	0.00	0.00	-0.27
CRANE STRIKING U/S SIDE		30	0.00	3.66	0.00	0.00	0.00	13.05
		33	0.00	-3.66	0.00	0.00	0.00	0.14
CRANE STRIKING D/S SIDE		30	0.00	2.27	0.00	0.00	0.00	8.04
		33	0.00	-2.27	0.00	0.00	0.00	0.13
CRANE MOVING (LONGITUDINAL)		30	-0.23	-3.75	-0.62	-0.15	-2.30	-13.41
		33	0.23	3.75	0.62	0.15	4.53	-0.09
DEAD LOAD + LIVE LOAD	49	31	29.38	-4.53	0.00	0.00	0.00	-16.10
		34	-22.33	4.53	0.00	0.00	0.00	-0.19
EARTHQUAKE (TRANSVERSE)		31	0.00	2.51	0.00	0.00	0.00	8.90
		34	0.00	-2.51	0.00	0.00	0.00	0.16
EARTHQUAKE (LONGITUDINAL)		31	0.00	0.00	-6.16	0.18	-0.98	0.00
		34	0.00	0.00	6.16	-0.18	23.16	0.00
WIND BLOWING U/S TO D/S		31	0.00	3.70	0.00	0.00	0.00	11.26
		34	0.00	-2.69	0.00	0.00	0.00	0.25
WIND BLOWING D/S TO U/S		31	0.00	-3.26	0.00	0.00	0.00	-7.32
		34	0.00	0.90	0.00	0.00	0.00	-0.17
CRANE MOVING U/S TO D/S		31	-0.11	6.74	0.00	0.00	0.00	23.93
		34	0.11	-6.74	0.00	0.00	0.00	0.33
CRANE MOVING D/S TO U/S		31	-0.35	6.46	0.00	0.00	0.00	23.11
		34	0.35	-6.46	0.00	0.00	0.00	0.13
CRANE STRIKING U/S SIDE		31	0.00	-3.03	0.00	0.00	0.00	-10.76
		34	0.00	3.03	0.00	0.00	0.00	-0.17
CRANE STRIKING D/S SIDE		31	0.00	-2.83	0.00	0.00	0.00	-10.09
		34	0.00	2.83	0.00	0.00	0.00	-0.11
CRANE MOVING (LONGITUDINAL)		31	-0.23	3.71	-0.56	0.16	-2.13	13.27
		34	0.23	-3.71	0.56	-0.16	4.16	0.10

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	50	22	-2.98	19.86	0.00	0.00	0.00	21.57
		23	2.98	21.02	0.00	0.00	0.00	-25.74
EARTHQUAKE (TRANSVERSE)		22	3.13	-1.93	0.00	0.00	0.00	-6.81
		23	-3.13	1.93	0.00	0.00	0.00	-7.03
EARTHQUAKE (LONGITUDINAL)		22	0.00	0.00	-0.08	-0.41	0.30	0.00
		23	0.00	0.00	0.08	0.41	0.31	0.00
WIND BLOWING U/S TO D/S		22	3.23	-0.67	0.00	0.00	0.00	-2.40
		23	-3.23	0.67	0.00	0.00	0.00	-2.44
WIND BLOWING D/S TO U/S		22	-1.80	0.55	0.00	0.00	0.00	1.96
		23	1.80	-0.55	0.00	0.00	0.00	2.00
CRANE MOVING U/S TO D/S		22	1.42	-0.75	0.00	0.00	0.00	-2.66
		23	-1.42	0.75	0.00	0.00	0.00	-2.70
CRANE MOVING D/S TO U/S		22	-0.81	0.61	0.00	0.00	0.00	2.16
		23	0.81	-0.61	0.00	0.00	0.00	2.23
CRANE STRIKING U/S SIDE		22	-0.79	0.66	0.00	0.00	0.00	2.31
		23	0.79	-0.66	0.00	0.00	0.00	2.40
CRANE STRIKING D/S SIDE		22	0.55	-0.35	0.00	0.00	0.00	-1.24
		23	-0.55	0.35	0.00	0.00	0.00	-1.27
CRANE MOVING (LONGITUDINAL)		22	0.19	0.09	-0.05	-0.13	0.18	0.29
		23	-0.19	-0.09	0.05	0.13	0.19	0.33
DEAD LOAD + LIVE LOAD	51	24	-1.60	21.33	0.00	0.00	0.00	26.19
		25	1.60	21.17	0.00	0.00	0.00	-25.59
EARTHQUAKE (TRANSVERSE)		24	-1.18	-2.08	0.00	0.00	0.00	-7.68
		25	1.18	2.08	0.00	0.00	0.00	-7.64
EARTHQUAKE (LONGITUDINAL)		24	0.00	0.00	-0.08	0.13	0.31	0.00
		25	0.00	0.00	0.08	-0.13	0.30	0.00
WIND BLOWING U/S TO D/S		24	-0.97	-0.53	0.00	0.00	0.00	-1.97
		25	0.97	0.53	0.00	0.00	0.00	-1.96
WIND BLOWING D/S TO U/S		24	2.05	0.64	0.00	0.00	0.00	2.35
		25	-2.05	-0.64	0.00	0.00	0.00	2.36
CRANE MOVING U/S TO D/S		24	-0.22	-0.63	0.00	0.00	0.00	-2.33
		25	0.22	0.63	0.00	0.00	0.00	-2.31
CRANE MOVING D/S TO U/S		24	0.24	0.68	0.00	0.00	0.00	2.53
		25	-0.24	-0.68	0.00	0.00	0.00	2.50
CRANE STRIKING U/S SIDE		24	0.12	0.35	0.00	0.00	0.00	1.31
		25	-0.12	-0.35	0.00	0.00	0.00	1.30
CRANE STRIKING D/S SIDE		24	-0.21	-0.62	0.00	0.00	0.00	-2.29
		25	0.21	0.62	0.00	0.00	0.00	-2.27
CRANE MOVING (LONGITUDINAL)		24	-0.03	-0.11	0.03	0.10	-0.11	-0.40
		25	0.03	0.11	-0.03	-0.10	-0.11	-0.40
DEAD LOAD + LIVE LOAD	52	26	5.66	13.53	0.00	0.00	0.00	13.21
		27	-5.66	15.06	0.00	0.00	0.00	-18.70
EARTHQUAKE (TRANSVERSE)		26	-2.28	-2.47	0.00	0.00	0.00	-7.92
		27	2.28	2.47	0.00	0.00	0.00	-9.82
EARTHQUAKE (LONGITUDINAL)		26	0.00	0.00	-0.51	-0.74	1.77	0.00
		27	0.00	0.00	0.51	0.74	1.87	0.00
WIND BLOWING U/S TO D/S		26	-0.32	-0.74	0.00	0.00	0.00	-2.28
		27	0.32	0.74	0.00	0.00	0.00	-3.05
WIND BLOWING D/S TO U/S		26	0.73	0.68	0.00	0.00	0.00	2.12
		27	-0.73	-0.68	0.00	0.00	0.00	2.76
CRANE MOVING U/S TO D/S		26	-1.88	-1.10	0.00	0.00	0.00	-3.43
		27	1.88	1.10	0.00	0.00	0.00	-4.48
CRANE MOVING D/S TO U/S		26	1.27	0.79	0.00	0.00	0.00	2.55
		27	-1.27	-0.79	0.00	0.00	0.00	3.15
CRANE STRIKING U/S SIDE		26	1.44	0.82	0.00	0.00	0.00	2.64
		27	-1.44	-0.82	0.00	0.00	0.00	3.25
CRANE STRIKING D/S SIDE		26	-0.77	-0.48	0.00	0.00	0.00	-1.53
		27	0.77	0.48	0.00	0.00	0.00	-1.94
CRANE MOVING (LONGITUDINAL)		26	0.03	0.01	-0.20	-0.21	0.71	0.11
		27	-0.03	-0.01	0.20	0.21	0.75	0.00

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	53	28	-1.84	21.23	0.00	0.00	0.00	25.91
		29	1.84	21.26	0.00	0.00	0.00	-26.02
EARTHQUAKE (TRANSVERSE)		28	-3.64	-3.13	0.00	0.00	0.00	-11.58
		29	3.64	3.13	0.00	0.00	0.00	-11.49
EARTHQUAKE (LONGITUDINAL)		28	0.00	0.00	-0.03	0.38	0.10	0.00
		29	0.00	0.00	0.03	-0.38	0.10	0.00
WIND BLOWING U/S TO D/S		28	-1.82	-0.84	0.00	0.00	0.00	-3.12
		29	1.82	0.84	0.00	0.00	0.00	-3.10
WIND BLOWING D/S TO U/S		28	3.17	0.93	0.00	0.00	0.00	3.44
		29	-3.17	-0.93	0.00	0.00	0.00	3.42
CRANE MOVING U/S TO D/S		28	-0.43	-0.99	0.00	0.00	0.00	-3.67
		29	0.43	0.99	0.00	0.00	0.00	-3.63
CRANE MOVING D/S TO U/S		28	2.32	1.30	0.00	0.00	0.00	4.80
		29	-2.32	-1.30	0.00	0.00	0.00	4.81
CRANE STRIKING U/S SIDE		28	0.64	0.61	0.00	0.00	0.00	2.24
		29	-0.64	-0.61	0.00	0.00	0.00	2.23
CRANE STRIKING D/S SIDE		28	0.02	-0.92	0.00	0.00	0.00	-3.42
		29	-0.02	0.92	0.00	0.00	0.00	-3.36
CRANE MOVING (LONGITUDINAL)		28	1.29	0.00	0.13	0.16	-0.48	-0.03
		29	-1.29	0.00	-0.13	-0.16	-0.46	0.02
DEAD LOAD + LIVE LOAD	54	31	6.33	15.06	0.00	0.00	0.00	18.41
		32	-6.33	14.72	0.00	0.00	0.00	-17.16
EARTHQUAKE (TRANSVERSE)		31	1.69	-3.25	0.00	0.00	0.00	-12.26
		32	-1.69	3.25	0.00	0.00	0.00	-11.68
EARTHQUAKE (LONGITUDINAL)		31	0.00	0.00	0.28	0.57	-1.05	0.00
		32	0.00	0.00	-0.28	-0.57	-1.00	0.00
WIND BLOWING U/S TO D/S		31	1.36	-0.92	0.00	0.00	0.00	-3.54
		32	-1.36	0.92	0.00	0.00	0.00	-3.27
WIND BLOWING D/S TO U/S		31	-0.69	0.95	0.00	0.00	0.00	3.64
		32	0.69	-0.95	0.00	0.00	0.00	3.35
CRANE MOVING U/S TO D/S		31	1.91	-1.05	0.00	0.00	0.00	-3.97
		32	-1.91	1.05	0.00	0.00	0.00	-3.79
CRANE MOVING D/S TO U/S		31	-3.82	1.66	0.00	0.00	0.00	6.47
		32	3.82	-1.66	0.00	0.00	0.00	5.81
CRANE STRIKING U/S SIDE		31	-1.38	0.70	0.00	0.00	0.00	2.69
		32	1.38	-0.70	0.00	0.00	0.00	2.50
CRANE STRIKING D/S SIDE		31	1.76	-0.90	0.00	0.00	0.00	-3.35
		32	-1.76	0.90	0.00	0.00	0.00	-3.27
CRANE MOVING (LONGITUDINAL)		31	-0.78	0.21	0.26	0.16	-0.99	0.93
		32	0.78	-0.21	-0.26	-0.16	-0.95	0.64
DEAD LOAD + LIVE LOAD	55	33	-4.47	0.00	0.00	0.00	0.00	0.00
		34	4.47	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		33	-0.40	0.00	0.00	0.00	0.00	0.00
		34	0.40	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		33	0.00	0.00	0.00	0.00	0.00	0.00
		34	0.00	0.00	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		33	2.12	0.00	0.00	0.00	0.00	0.00
		34	-2.12	0.00	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		33	1.13	0.00	0.00	0.00	0.00	0.00
		34	-1.13	0.00	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		33	7.23	0.00	0.00	0.00	0.00	0.00
		34	-7.23	0.00	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		33	5.90	0.00	0.00	0.00	0.00	0.00
		34	-5.90	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		33	-3.33	0.00	0.00	0.00	0.00	0.00
		34	3.33	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		33	-2.53	0.00	0.00	0.00	0.00	0.00
		34	2.53	0.00	0.00	0.00	0.00	0.00
CRANE MOVING (LONGITUDINAL)		33	3.68	0.00	0.00	0.00	0.00	0.00
		34	-3.68	0.00	0.00	0.00	0.00	0.00

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	60	22	-0.39	19.85	0.01	-0.17	-0.04	18.61
		39	0.39	18.39	-0.01	0.17	-0.03	-14.61
EARTHQUAKE (TRANSVERSE)		22	0.05	0.00	-0.05	-0.08	0.18	0.01
		39	-0.05	0.00	0.05	0.08	0.12	0.01
EARTHQUAKE (LONGITUDINAL)		22	0.29	-1.67	0.10	-0.01	-0.23	-4.39
		39	-0.29	1.67	-0.10	0.01	-0.33	-4.79
WIND BLOWING U/S TO D/S		22	0.03	0.00	-0.04	-0.05	0.13	0.00
		39	-0.03	0.00	0.04	0.05	0.09	0.00
WIND BLOWING D/S TO U/S		22	-0.02	0.00	0.02	0.03	-0.08	0.00
		39	0.02	0.00	-0.02	-0.03	-0.05	0.00
CRANE MOVING U/S TO D/S		22	0.02	0.00	-0.02	-0.04	0.06	0.00
		39	-0.02	0.00	0.02	0.04	0.04	0.00
CRANE MOVING D/S TO U/S		22	-0.01	0.00	0.02	0.02	-0.05	0.00
		39	0.01	0.00	-0.02	-0.02	-0.03	0.00
CRANE STRIKING U/S SIDE		22	-0.02	0.00	0.03	0.04	-0.09	0.00
		39	0.02	0.00	-0.03	-0.04	-0.06	0.00
CRANE STRIKING D/S SIDE		22	0.01	0.00	-0.01	-0.01	0.02	0.00
		39	-0.01	0.00	0.01	0.01	0.01	0.00
CRANE MOVING (LONGITUDINAL)		22	0.03	-0.21	0.06	0.00	-0.14	-0.55
		39	-0.03	0.21	-0.06	0.00	-0.18	-0.59
DEAD LOAD + LIVE LOAD	61	23	-0.95	19.11	0.00	0.03	-0.01	17.43
		40	0.95	19.12	0.00	-0.03	0.00	-17.46
EARTHQUAKE (TRANSVERSE)		23	-0.04	0.00	-0.05	-0.09	0.16	0.00
		40	0.04	0.00	0.05	0.09	0.09	0.00
EARTHQUAKE (LONGITUDINAL)		23	0.55	-4.05	0.04	-0.01	-0.09	-11.08
		40	-0.55	4.05	-0.04	0.01	-0.10	-11.17
WIND BLOWING U/S TO D/S		23	-0.03	0.00	-0.03	-0.05	0.11	0.00
		40	0.03	0.00	0.03	0.05	0.07	0.00
WIND BLOWING D/S TO U/S		23	0.02	0.00	0.02	0.04	-0.06	0.00
		40	-0.02	0.00	-0.02	-0.04	-0.03	0.00
CRANE MOVING U/S TO D/S		23	-0.05	-0.06	-0.01	-0.04	0.04	-0.17
		40	0.05	0.06	0.01	0.04	-0.01	-0.17
CRANE MOVING D/S TO U/S		23	0.00	-0.02	0.01	0.02	-0.04	-0.05
		40	0.00	0.02	-0.01	-0.02	-0.02	-0.05
CRANE STRIKING U/S SIDE		23	0.02	0.00	0.03	0.05	-0.09	0.00
		40	-0.02	0.00	-0.03	-0.05	-0.06	0.00
CRANE STRIKING D/S SIDE		23	-0.01	0.00	0.00	-0.01	0.01	0.00
		40	0.01	0.00	0.00	0.01	0.00	0.00
CRANE MOVING (LONGITUDINAL)		23	0.09	-1.06	0.03	0.01	-0.08	-2.91
		40	-0.09	1.06	-0.03	-0.01	-0.09	-2.93
DEAD LOAD + LIVE LOAD	62	24	-1.20	19.09	0.00	-0.03	0.01	17.38
		41	1.20	19.15	0.00	0.03	0.01	-17.52
EARTHQUAKE (TRANSVERSE)		24	0.05	0.00	-0.07	-0.11	0.21	0.00
		41	-0.05	0.00	0.07	0.11	0.14	0.01
EARTHQUAKE (LONGITUDINAL)		24	0.63	-4.69	0.00	0.00	0.01	-12.85
		41	-0.63	4.69	0.00	0.00	0.01	-12.95
WIND BLOWING U/S TO D/S		24	0.02	0.00	-0.02	-0.03	0.06	0.00
		41	-0.02	0.00	0.02	0.03	0.03	0.00
WIND BLOWING D/S TO U/S		24	-0.02	0.00	0.03	0.05	-0.10	0.00
		41	0.02	0.00	-0.03	-0.05	-0.07	0.00
CRANE MOVING U/S TO D/S		24	0.00	-0.02	-0.01	-0.03	0.04	-0.05
		41	0.00	0.02	0.01	0.03	0.02	-0.05
CRANE MOVING D/S TO U/S		24	-0.05	-0.06	0.01	0.04	-0.04	-0.17
		41	0.05	0.06	-0.01	-0.04	0.00	-0.17
CRANE STRIKING U/S SIDE		24	-0.01	0.00	0.00	0.01	-0.02	0.00
		41	0.01	0.00	0.00	-0.01	0.00	0.00
CRANE STRIKING D/S SIDE		24	0.02	0.00	-0.03	-0.04	0.08	0.00
		41	-0.02	0.00	0.03	0.04	0.06	0.00
CRANE MOVING (LONGITUDINAL)		24	0.08	-0.99	-0.04	0.00	0.10	-2.72
		41	-0.08	0.99	0.04	0.00	0.10	-2.74

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	63	25	-1.85	19.43	0.00	0.03	0.02	17.85
		42	1.85	18.81	0.00	-0.03	0.01	-16.16
EARTHQUAKE (TRANSVERSE)		25	-0.05	0.00	-0.05	-0.11	0.19	-0.01
		42	0.05	0.00	0.05	0.11	0.10	-0.01
EARTHQUAKE (LONGITUDINAL)		25	0.43	-4.14	0.02	0.00	-0.05	-11.03
		42	-0.43	4.14	-0.02	0.00	-0.05	-11.72
WIND BLOWING U/S TO D/S		25	-0.02	0.00	-0.02	-0.03	0.06	0.00
		42	0.02	0.00	0.02	0.03	0.03	0.00
WIND BLOWING D/S TO U/S		25	0.02	0.00	0.03	0.05	-0.11	0.00
		42	-0.02	0.00	-0.03	-0.05	-0.06	0.00
CRANE MOVING U/S TO D/S		25	-0.01	0.00	-0.01	-0.02	0.05	0.00
		42	0.01	0.00	0.01	0.02	0.03	0.00
CRANE MOVING D/S TO U/S		25	0.02	0.00	0.01	0.03	-0.03	0.01
		42	-0.02	0.00	-0.01	-0.03	0.01	0.01
CRANE STRIKING U/S SIDE		25	0.01	0.00	0.00	0.01	-0.02	0.00
		42	-0.01	0.00	0.00	-0.01	-0.01	0.00
CRANE STRIKING D/S SIDE		25	-0.02	0.00	-0.02	-0.04	0.07	0.00
		42	0.02	0.00	0.02	0.04	0.03	0.00
CRANE MOVING (LONGITUDINAL)		25	0.03	-0.32	-0.05	0.00	0.13	-0.84
		42	-0.03	0.32	0.05	0.00	0.16	-0.89
DEAD LOAD + LIVE LOAD	64	26	2.82	5.36	0.03	-0.21	-0.08	4.58
		43	-2.82	5.46	-0.03	0.21	-0.07	-4.86
EARTHQUAKE (TRANSVERSE)		26	0.09	0.00	-0.20	-0.07	0.64	0.01
		43	-0.09	0.00	0.20	0.07	0.49	0.01
EARTHQUAKE (LONGITUDINAL)		26	-0.12	-1.23	0.32	0.00	-0.77	-3.12
		43	0.12	1.23	-0.32	0.00	-0.99	-3.62
WIND BLOWING U/S TO D/S		26	0.05	0.00	-0.12	-0.02	0.37	0.01
		43	-0.05	0.00	0.12	0.02	0.28	0.00
WIND BLOWING D/S TO U/S		26	-0.04	0.00	0.08	0.02	-0.26	0.00
		43	0.04	0.00	-0.08	-0.02	-0.20	0.00
CRANE MOVING U/S TO D/S		26	0.05	0.00	-0.11	-0.05	0.35	0.01
		43	-0.05	0.00	0.11	0.05	0.27	0.01
CRANE MOVING D/S TO U/S		26	-0.03	0.00	0.05	0.02	-0.17	0.00
		43	0.03	0.00	-0.05	-0.02	-0.13	0.00
CRANE STRIKING U/S SIDE		26	-0.05	0.00	0.10	0.04	-0.33	-0.01
		43	0.05	0.00	-0.10	-0.04	-0.25	-0.01
CRANE STRIKING D/S SIDE		26	0.01	0.00	-0.03	-0.01	0.09	0.00
		43	-0.01	0.00	0.03	0.01	0.07	0.00
CRANE MOVING (LONGITUDINAL)		26	-0.04	-0.17	0.14	0.00	-0.35	-0.43
		43	0.04	0.17	-0.14	0.00	-0.43	-0.51
DEAD LOAD + LIVE LOAD	65	27	0.64	17.44	0.04	0.05	-0.12	15.78
		44	-0.64	17.58	-0.04	-0.05	-0.10	-16.18
EARTHQUAKE (TRANSVERSE)		27	-0.08	0.00	-0.21	-0.14	0.65	0.00
		44	0.08	0.00	0.21	0.14	0.49	0.00
EARTHQUAKE (LONGITUDINAL)		27	0.51	-5.57	0.06	0.00	-0.17	-15.26
		44	-0.51	5.57	-0.06	0.00	-0.18	-15.38
WIND BLOWING U/S TO D/S		27	-0.05	0.00	-0.12	-0.08	0.38	0.00
		44	0.05	0.00	0.12	0.08	0.29	0.00
WIND BLOWING D/S TO U/S		27	0.03	0.00	0.08	0.06	-0.25	0.00
		44	-0.03	0.00	-0.08	-0.06	-0.18	0.00
CRANE MOVING U/S TO D/S		27	-0.11	-0.12	-0.10	-0.11	0.33	-0.34
		44	0.11	0.12	0.10	0.11	0.23	-0.34
CRANE MOVING D/S TO U/S		27	0.00	-0.04	0.05	0.03	-0.17	-0.11
		44	0.00	0.04	-0.05	-0.03	-0.12	-0.11
CRANE STRIKING U/S SIDE		27	0.04	0.00	0.12	0.07	-0.35	0.00
		44	-0.04	0.00	-0.12	-0.07	-0.29	0.00
CRANE STRIKING D/S SIDE		27	-0.01	0.00	-0.02	-0.02	0.08	0.00
		44	0.01	0.00	0.02	0.02	0.05	0.00
CRANE MOVING (LONGITUDINAL)		27	0.06	-1.53	0.05	-0.01	-0.13	-4.19
		44	-0.06	1.53	-0.05	0.01	-0.14	-4.22

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	66	28	0.10	19.29	-0.04	-0.05	0.12	17.43
		45	-0.10	19.49	0.04	0.05	0.11	-17.97
EARTHQUAKE (TRANSVERSE)		28	0.11	0.00	-0.26	-0.15	0.78	0.01
		45	-0.11	0.00	0.26	0.15	0.64	0.01
EARTHQUAKE (LONGITUDINAL)		28	0.60	-6.38	-0.02	0.00	0.05	-17.48
		45	-0.60	6.38	0.02	0.00	0.05	-17.61
WIND BLOWING U/S TO D/S		28	0.04	0.00	-0.08	-0.05	0.24	0.00
		45	-0.04	0.00	0.08	0.05	0.18	0.00
WIND BLOWING D/S TO U/S		28	-0.05	0.00	0.11	0.07	-0.34	0.00
		45	0.05	0.00	-0.11	-0.07	-0.27	0.00
CRANE MOVING U/S TO D/S		28	0.01	-0.04	-0.05	-0.04	0.17	-0.11
		45	-0.01	0.04	0.05	0.04	0.13	-0.10
CRANE MOVING D/S TO U/S		28	-0.12	-0.13	0.09	0.09	-0.29	-0.34
		45	0.12	0.13	-0.09	-0.09	-0.22	-0.34
CRANE STRIKING U/S SIDE		28	-0.02	0.00	0.03	0.02	-0.09	0.00
		45	0.02	0.00	-0.03	-0.02	-0.06	0.00
CRANE STRIKING D/S SIDE		28	0.04	0.00	-0.11	-0.06	0.32	0.00
		45	-0.04	0.00	0.11	0.06	0.27	0.00
CRANE MOVING (LONGITUDINAL)		28	0.05	-1.42	-0.06	0.02	0.16	-3.90
		45	-0.05	1.42	0.06	-0.02	0.17	-3.92
DEAD LOAD + LIVE LOAD	67	29	1.37	19.56	-0.04	0.00	0.12	17.71
		46	-1.37	19.22	0.04	0.00	0.09	-16.78
EARTHQUAKE (TRANSVERSE)		29	-0.11	-0.01	-0.22	-0.15	0.72	-0.02
		46	0.11	0.01	0.22	0.15	0.50	-0.02
EARTHQUAKE (LONGITUDINAL)		29	0.35	-4.18	-0.03	0.00	0.06	-11.24
		46	-0.35	4.18	0.03	0.00	0.09	-11.78
WIND BLOWING U/S TO D/S		29	-0.04	0.00	-0.07	-0.05	0.23	-0.01
		46	0.04	0.00	0.07	0.05	0.16	-0.01
WIND BLOWING D/S TO U/S		29	0.05	0.00	0.10	0.06	-0.34	0.01
		46	-0.05	0.00	-0.10	-0.06	-0.24	0.01
CRANE MOVING U/S TO D/S		29	-0.03	0.00	-0.05	-0.03	0.17	0.00
		46	0.03	0.00	0.05	0.03	0.12	0.00
CRANE MOVING D/S TO U/S		29	0.05	0.00	0.08	0.10	-0.27	0.01
		46	-0.05	0.00	-0.08	-0.10	-0.17	0.01
CRANE STRIKING U/S SIDE		29	0.02	0.00	0.03	0.02	-0.09	0.00
		46	-0.02	0.00	-0.03	-0.02	-0.06	0.00
CRANE STRIKING D/S SIDE		29	-0.04	0.00	-0.09	-0.06	0.28	-0.01
		46	0.04	0.00	0.09	0.06	0.19	-0.01
CRANE MOVING (LONGITUDINAL)		29	0.01	-0.34	-0.11	0.02	0.28	-0.91
		46	-0.01	0.34	0.11	-0.02	0.35	-0.95
DEAD LOAD + LIVE LOAD	68	30	1.93	11.40	0.11	0.05	-0.31	10.19
		47	-1.93	11.63	-0.11	-0.05	-0.28	-10.80
EARTHQUAKE (TRANSVERSE)		30	-0.01	0.00	-0.43	-0.15	1.29	0.00
		47	0.01	0.00	0.43	0.15	1.06	0.00
EARTHQUAKE (LONGITUDINAL)		30	1.18	-5.28	0.05	0.00	-0.12	-14.47
		47	-1.18	5.28	-0.05	0.00	-0.14	-14.59
WIND BLOWING U/S TO D/S		30	-0.01	0.00	-0.24	-0.08	0.72	0.00
		47	0.01	0.00	0.24	0.08	0.59	0.00
WIND BLOWING D/S TO U/S		30	0.01	0.00	0.18	0.07	-0.54	0.00
		47	-0.01	0.00	-0.18	-0.07	-0.44	0.00
CRANE MOVING U/S TO D/S		30	-0.08	-0.19	-0.35	-0.21	1.05	-0.52
		47	0.08	0.19	0.35	0.21	0.89	-0.51
CRANE MOVING D/S TO U/S		30	-0.02	-0.06	0.09	0.02	-0.30	-0.16
		47	0.02	0.06	-0.09	-0.02	-0.23	-0.16
CRANE STRIKING U/S SIDE		30	0.01	0.00	0.23	0.07	-0.68	0.00
		47	-0.01	0.00	-0.23	-0.07	-0.58	0.00
CRANE STRIKING D/S SIDE		30	0.00	0.00	-0.07	-0.03	0.21	0.00
		47	0.00	0.00	0.07	0.03	0.16	0.00
CRANE MOVING (LONGITUDINAL)		30	0.63	-1.44	-0.02	-0.07	0.07	-3.95
		47	-0.63	1.44	0.02	0.07	0.04	-3.98

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	69	31	2.31	15.19	-0.10	-0.06	0.30	13.60
		48	-2.31	15.43	0.10	0.06	0.27	-14.28
EARTHQUAKE (TRANSVERSE)		31	0.14	0.00	-0.49	-0.15	1.46	0.01
		48	-0.14	0.00	0.49	0.15	1.25	0.01
EARTHQUAKE (LONGITUDINAL)		31	1.44	-5.94	-0.04	0.00	0.11	-16.26
		48	-1.44	5.94	0.04	0.00	0.12	-16.39
WIND BLOWING U/S TO D/S		31	0.05	0.00	-0.16	-0.07	0.49	0.00
		48	-0.05	0.00	0.16	0.07	0.41	0.00
WIND BLOWING D/S TO U/S		31	-0.06	0.00	0.21	0.07	-0.64	0.00
		48	0.06	0.00	-0.21	-0.07	-0.54	0.00
CRANE MOVING U/S TO D/S		31	0.01	-0.06	-0.10	-0.03	0.32	-0.16
		48	-0.01	0.06	0.10	0.03	0.25	-0.16
CRANE MOVING D/S TO U/S		31	-0.15	-0.19	0.31	0.18	-0.90	-0.52
		48	0.15	0.19	-0.31	-0.18	-0.79	-0.52
CRANE STRIKING U/S SIDE		31	-0.02	0.00	0.07	0.04	-0.21	0.00
		48	0.02	0.00	-0.07	-0.04	-0.17	0.00
CRANE STRIKING D/S SIDE		31	0.05	0.00	-0.20	-0.05	0.60	0.00
		48	-0.05	0.00	0.20	0.05	0.52	0.00
CRANE MOVING (LONGITUDINAL)		31	0.61	-1.33	-0.01	0.08	0.03	-3.66
		48	-0.61	1.33	0.01	-0.08	0.04	-3.68
DEAD LOAD + LIVE LOAD	70	32	2.87	5.19	-0.07	0.07	0.22	4.15
		49	-2.87	5.63	0.07	-0.07	0.17	-5.36
EARTHQUAKE (TRANSVERSE)		32	-0.15	-0.01	-0.43	-0.13	1.35	-0.02
		49	0.15	0.01	0.43	0.13	1.02	-0.02
EARTHQUAKE (LONGITUDINAL)		32	-0.30	-2.60	-0.14	0.00	0.34	-6.79
		49	0.30	2.60	0.14	0.00	0.41	-7.53
WIND BLOWING U/S TO D/S		32	-0.06	0.00	-0.15	-0.05	0.46	-0.01
		49	0.06	0.00	0.15	0.05	0.36	-0.01
WIND BLOWING D/S TO U/S		32	0.07	0.00	0.19	0.05	-0.59	0.01
		49	-0.07	0.00	-0.19	-0.05	-0.45	0.01
CRANE MOVING U/S TO D/S		32	-0.04	0.00	-0.10	-0.03	0.30	0.00
		49	0.04	0.00	0.10	0.03	0.24	0.00
CRANE MOVING D/S TO U/S		32	0.08	0.00	0.26	0.12	-0.80	0.01
		49	-0.08	0.00	-0.26	-0.12	-0.62	0.01
CRANE STRIKING U/S SIDE		32	0.02	0.00	0.07	0.03	-0.20	0.00
		49	-0.02	0.00	-0.07	-0.03	-0.16	0.00
CRANE STRIKING D/S SIDE		32	-0.06	0.00	-0.17	-0.05	0.53	-0.01
		49	0.06	0.00	0.17	0.05	0.40	-0.01
CRANE MOVING (LONGITUDINAL)		32	-0.06	-0.23	-0.13	0.04	0.29	-0.59
		49	0.06	0.23	0.13	-0.04	0.41	-0.66
DEAD LOAD + LIVE LOAD	71	33	1.51	1.43	0.02	-0.10	-0.08	0.95
		50	-1.51	1.80	-0.02	0.10	-0.04	-1.99
EARTHQUAKE (TRANSVERSE)		33	0.00	0.00	-0.54	-0.12	1.67	0.00
		50	0.00	0.00	0.54	0.12	1.29	0.00
EARTHQUAKE (LONGITUDINAL)		33	-1.12	-3.88	0.04	0.01	-0.09	-10.45
		50	1.12	3.88	-0.04	-0.01	-0.12	-10.87
WIND BLOWING U/S TO D/S		33	0.00	0.00	-0.30	-0.06	0.92	0.00
		50	0.00	0.00	0.30	0.06	0.71	0.00
WIND BLOWING D/S TO U/S		33	0.00	0.00	0.27	0.10	-0.83	0.00
		50	0.00	0.00	-0.27	-0.10	-0.65	0.00
CRANE MOVING U/S TO D/S		33	0.19	-0.18	-0.31	0.09	0.98	-0.50
		50	-0.19	0.18	0.31	-0.09	0.74	-0.47
CRANE MOVING D/S TO U/S		33	0.06	-0.06	0.21	0.13	-0.64	-0.16
		50	-0.06	0.06	-0.21	-0.13	-0.51	-0.15
CRANE STRIKING U/S SIDE		33	0.00	0.00	0.17	-0.07	-0.53	0.00
		50	0.00	0.00	-0.17	0.07	-0.39	0.00
CRANE STRIKING D/S SIDE		33	0.00	0.00	-0.13	-0.07	0.40	0.00
		50	0.00	0.00	0.13	0.07	0.32	0.00
CRANE MOVING (LONGITUDINAL)		33	-0.18	-0.96	0.00	0.06	0.03	-2.60
		50	0.18	0.96	0.00	-0.06	-0.01	-2.68

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	72	34	1.91	1.37	-0.03	0.10	0.10	0.81
		51	-1.91	1.86	0.03	-0.10	0.06	-2.15
EARTHQUAKE (TRANSVERSE)		34	0.01	0.00	-0.56	-0.08	1.71	0.00
		51	-0.01	0.00	0.56	0.08	1.35	0.00
EARTHQUAKE (LONGITUDINAL)		34	-1.28	-4.29	-0.03	-0.01	0.09	-11.58
		51	1.28	4.29	0.03	0.01	0.10	-12.04
WIND BLOWING U/S TO D/S		34	0.00	0.00	-0.28	-0.12	0.84	0.00
		51	0.00	0.00	0.28	0.12	0.68	0.00
WIND BLOWING D/S TO U/S		34	0.00	0.00	0.29	0.09	-0.90	0.00
		51	0.00	0.00	-0.29	-0.09	-0.72	0.00
CRANE MOVING U/S TO D/S		34	0.06	-0.06	-0.24	-0.17	0.74	-0.15
		51	-0.06	0.06	0.24	0.17	0.61	-0.15
CRANE MOVING D/S TO U/S		34	0.19	-0.18	0.28	-0.07	-0.86	-0.50
		51	-0.19	0.18	-0.28	0.07	-0.67	-0.47
CRANE STRIKING U/S SIDE		34	0.00	0.00	0.15	0.08	-0.44	0.00
		51	0.00	0.00	-0.15	-0.08	-0.36	0.00
CRANE STRIKING D/S SIDE		34	0.00	0.00	-0.15	0.05	0.47	0.00
		51	0.00	0.00	0.15	-0.05	0.36	0.00
CRANE MOVING (LONGITUDINAL)		34	-0.16	-0.89	-0.02	-0.05	0.04	-2.41
		51	0.16	0.89	0.02	0.05	0.06	-2.49
DEAD LOAD + LIVE LOAD	73	35	50.08	-1.50	-2.45	-0.01	3.34	-2.16
		39	-46.37	1.50	2.45	0.01	6.94	-4.12
EARTHQUAKE (TRANSVERSE)		35	-3.88	0.89	0.00	0.10	0.00	4.41
		39	3.88	-0.89	0.00	-0.10	0.00	-0.69
EARTHQUAKE (LONGITUDINAL)		35	2.93	-0.02	-1.88	0.24	5.72	-0.07
		39	-2.93	0.02	1.88	-0.24	2.19	-0.02
WIND BLOWING U/S TO D/S		35	-1.14	0.93	0.00	0.07	0.00	1.91
		39	1.14	0.28	0.00	-0.07	0.00	-0.56
WIND BLOWING D/S TO U/S		35	1.03	-0.49	0.00	-0.04	0.00	-1.37
		39	-1.03	-0.03	0.00	0.04	0.00	0.39
CRANE MOVING U/S TO D/S		35	-1.59	0.21	0.00	0.04	0.00	1.53
		39	1.59	-0.21	0.00	-0.04	0.00	-0.62
CRANE MOVING D/S TO U/S		35	1.25	-0.27	0.00	-0.03	0.00	-1.35
		39	-1.25	0.27	0.00	0.03	0.00	0.23
CRANE STRIKING U/S SIDE		35	1.20	-0.30	0.00	-0.05	0.00	-1.42
		39	-1.20	0.30	0.00	0.05	0.00	0.17
CRANE STRIKING D/S SIDE		35	-0.76	0.13	0.00	0.01	0.00	0.77
		39	0.76	-0.13	0.00	-0.01	0.00	-0.21
CRANE MOVING (LONGITUDINAL)		35	0.43	-0.12	-0.20	0.10	0.64	-0.26
		39	-0.43	0.12	0.20	-0.10	0.20	-0.23
DEAD LOAD + LIVE LOAD	74	36	143.64	3.89	-3.11	-0.33	4.38	1.78
		40	-125.65	-3.89	3.11	0.33	8.70	14.56
EARTHQUAKE (TRANSVERSE)		36	3.87	13.61	-0.01	2.44	0.03	143.00
		40	-3.87	-13.61	0.01	-2.44	0.00	-85.85
EARTHQUAKE (LONGITUDINAL)		36	18.74	-0.42	-10.89	1.37	74.52	-2.00
		40	-18.74	0.42	10.89	-1.37	-28.79	0.24
WIND BLOWING U/S TO D/S		36	1.14	5.12	0.00	1.37	0.02	45.85
		40	-1.14	-5.12	0.00	-1.37	0.00	-24.33
WIND BLOWING D/S TO U/S		36	-1.03	-3.51	0.00	-1.08	-0.01	-37.74
		40	1.03	3.51	0.00	1.08	0.00	23.01
CRANE MOVING U/S TO D/S		36	80.96	2.58	-0.03	1.56	0.06	52.00
		40	-80.96	-2.58	0.03	-1.56	0.07	-41.17
CRANE MOVING D/S TO U/S		36	23.74	-3.97	-0.01	-0.73	0.01	-44.00
		40	-23.74	3.97	0.01	0.73	0.02	27.35
CRANE STRIKING U/S SIDE		36	-1.20	-4.72	0.00	-1.08	-0.01	-46.10
		40	1.20	4.72	0.00	1.08	0.00	26.28
CRANE STRIKING D/S SIDE		36	0.76	1.81	0.00	0.45	0.00	25.32
		40	-0.76	-1.81	0.00	-0.45	0.00	-17.70
CRANE MOVING (LONGITUDINAL)		36	57.44	-2.31	-2.57	0.62	18.43	-6.76
		40	-57.44	2.31	2.57	-0.62	-7.64	-2.96

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	75	37	162.35	-3.89	-3.07	0.29	4.42	0.76
		41	-144.36	3.89	3.07	-0.29	8.49	-17.08
EARTHQUAKE (TRANSVERSE)		37	-7.41	16.57	0.01	2.30	-0.03	159.21
		41	7.41	-16.57	-0.01	-2.30	0.00	-89.60
EARTHQUAKE (LONGITUDINAL)		37	21.31	0.07	-12.79	-0.22	86.74	0.46
		41	-21.31	-0.07	12.79	0.22	-33.02	-0.16
WIND BLOWING U/S TO D/S		37	-1.93	3.73	0.00	0.90	-0.01	38.58
		41	1.93	-3.73	0.00	-0.90	0.00	-22.90
WIND BLOWING D/S TO U/S		37	2.06	-5.17	0.00	-1.09	0.01	-45.79
		41	-2.06	5.17	0.00	1.09	0.00	24.09
CRANE MOVING U/S TO D/S		37	22.60	4.44	-0.01	0.71	0.01	47.14
		41	-22.60	-4.44	0.01	-0.71	0.02	-28.50
CRANE MOVING D/S TO U/S		37	82.43	-3.14	-0.03	-1.13	0.06	-52.17
		41	-82.43	3.14	0.03	1.13	0.06	38.98
CRANE STRIKING U/S SIDE		37	1.49	-2.14	0.00	-0.42	0.00	-26.97
		41	-1.49	2.14	0.00	0.42	0.00	17.97
CRANE STRIKING D/S SIDE		37	-2.03	4.79	0.00	0.81	-0.01	45.47
		41	2.03	-4.79	0.00	-0.81	0.00	-25.34
CRANE MOVING (LONGITUDINAL)		37	57.15	2.26	-2.43	-0.98	17.27	8.54
		41	-57.15	-2.26	2.43	0.98	-7.06	0.96
DEAD LOAD + LIVE LOAD	76	38	94.48	1.57	-2.44	0.06	3.40	2.74
		42	-88.31	-1.57	2.44	-0.06	6.83	3.87
EARTHQUAKE (TRANSVERSE)		38	7.41	2.87	0.00	0.38	0.01	19.71
		42	-7.41	-2.87	0.00	-0.38	0.00	-7.67
EARTHQUAKE (LONGITUDINAL)		38	10.92	0.01	-4.77	0.05	17.05	0.05
		42	-10.92	-0.01	4.77	-0.05	2.98	-0.02
WIND BLOWING U/S TO D/S		38	1.93	0.97	0.00	0.12	0.00	5.07
		42	-1.93	-0.45	0.00	-0.12	0.00	-2.10
WIND BLOWING D/S TO U/S		38	-2.07	-1.59	0.00	-0.18	0.00	-6.40
		42	2.07	0.37	0.00	0.18	0.00	2.28
CRANE MOVING U/S TO D/S		38	2.40	0.80	0.00	0.08	0.00	5.82
		42	-2.40	-0.80	0.00	-0.08	0.00	-2.45
CRANE MOVING D/S TO U/S		38	-3.07	-0.64	0.00	-0.16	0.00	-6.33
		42	3.07	0.64	0.00	0.16	0.00	3.63
CRANE STRIKING U/S SIDE		38	-1.49	-0.41	0.00	-0.04	0.00	-3.31
		42	1.49	0.41	0.00	0.04	0.00	1.60
CRANE STRIKING D/S SIDE		38	2.03	0.83	0.00	0.15	0.00	5.62
		42	-2.03	-0.83	0.00	-0.15	0.00	-2.14
CRANE MOVING (LONGITUDINAL)		38	0.87	0.34	-0.33	-0.23	1.23	1.14
		42	-0.87	-0.34	0.33	0.23	0.16	0.28
DEAD LOAD + LIVE LOAD	77	39	17.00	-3.33	-2.83	-0.01	7.38	-6.62
		43	-13.21	3.33	2.83	0.01	4.80	-7.69
EARTHQUAKE (TRANSVERSE)		39	-2.18	3.15	0.00	0.14	-0.01	6.59
		43	2.18	-3.15	0.00	-0.14	-0.01	6.93
EARTHQUAKE (LONGITUDINAL)		39	1.24	-0.03	-1.21	0.43	2.25	-0.05
		43	-1.24	0.03	1.21	-0.43	2.95	-0.07
WIND BLOWING U/S TO D/S		39	-0.61	1.62	0.00	0.08	0.00	2.38
		43	0.61	-0.37	0.00	-0.08	0.00	1.90
WIND BLOWING D/S TO U/S		39	0.58	-1.14	0.00	-0.05	0.00	-1.96
		43	-0.58	0.61	0.00	0.05	0.00	-1.79
CRANE MOVING U/S TO D/S		39	-0.93	1.35	0.00	0.08	0.00	2.92
		43	0.93	-1.35	0.00	-0.08	0.00	2.89
CRANE MOVING D/S TO U/S		39	0.71	-1.02	0.00	-0.03	0.00	-2.12
		43	-0.71	1.02	0.00	0.03	0.00	-2.25
CRANE STRIKING U/S SIDE		39	0.67	-0.96	0.00	-0.07	0.00	-2.01
		43	-0.67	0.96	0.00	0.07	0.00	-2.12
CRANE STRIKING D/S SIDE		39	-0.44	0.63	0.00	0.02	0.00	1.33
		43	0.44	-0.63	0.00	-0.02	0.00	1.38
CRANE MOVING (LONGITUDINAL)		39	0.17	0.01	-0.13	0.15	0.26	0.07
		43	-0.17	-0.01	0.13	-0.15	0.30	-0.04

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	78	40	94.91	5.74	-4.07	-0.35	9.04	8.78
		44	-76.49	-5.74	4.07	0.35	8.45	15.89
EARTHQUAKE (TRANSVERSE)		40	2.18	10.31	-0.01	2.51	0.00	91.90
		44	-2.18	-10.31	0.01	-2.51	0.03	-47.59
EARTHQUAKE (LONGITUDINAL)		40	14.71	-0.28	-9.88	1.25	40.32	-0.32
		44	-14.71	0.28	9.88	-1.25	2.15	-0.87
WIND BLOWING U/S TO D/S		40	0.61	3.15	0.00	1.40	0.00	26.19
		44	-0.61	-3.15	0.00	-1.40	0.02	-12.64
WIND BLOWING D/S TO U/S		40	-0.57	-2.30	0.00	-1.12	0.00	-24.62
		44	0.57	2.30	0.00	1.12	-0.01	14.73
CRANE MOVING U/S TO D/S		40	80.24	1.42	-0.06	1.66	0.10	43.50
		44	-80.24	-1.42	0.06	-1.66	0.15	-37.39
CRANE MOVING D/S TO U/S		40	24.27	-3.19	-0.02	-0.76	0.03	-29.29
		44	-24.27	3.19	0.02	0.76	0.03	15.57
CRANE STRIKING U/S SIDE		40	-0.67	-4.00	0.00	-1.10	0.00	-28.17
		44	0.67	4.00	0.00	1.10	-0.01	10.96
CRANE STRIKING D/S SIDE		40	0.44	1.31	0.00	0.48	0.00	18.85
		44	-0.44	-1.31	0.00	-0.48	0.00	-13.22
CRANE MOVING (LONGITUDINAL)		40	56.43	-2.35	-2.52	0.55	10.70	2.77
		44	-56.43	2.35	2.52	-0.55	0.14	-12.87
DEAD LOAD + LIVE LOAD	79	41	113.48	-4.80	-4.28	0.30	9.18	-6.41
		45	-95.06	4.80	4.28	-0.30	9.23	-14.22
EARTHQUAKE (TRANSVERSE)		41	-5.61	15.00	0.00	2.33	0.00	96.13
		45	5.61	-15.00	0.00	-2.33	-0.01	-31.65
EARTHQUAKE (LONGITUDINAL)		41	16.62	0.08	-11.56	-0.56	46.00	0.16
		45	-16.62	-0.08	11.56	0.56	3.72	0.19
WIND BLOWING U/S TO D/S		41	-1.48	3.15	0.00	0.93	0.00	24.50
		45	1.48	-3.15	0.00	-0.93	0.00	-10.94
WIND BLOWING D/S TO U/S		41	1.55	-4.01	0.00	-1.10	0.00	-25.92
		45	-1.55	4.01	0.00	1.10	0.00	8.66
CRANE MOVING U/S TO D/S		41	23.13	4.22	-0.02	0.73	0.03	30.53
		45	-23.13	-4.22	0.02	-0.73	0.04	-12.40
CRANE MOVING D/S TO U/S		41	81.75	-2.93	-0.06	-1.21	0.11	-41.22
		45	-81.75	2.93	0.06	1.21	0.13	28.63
CRANE STRIKING U/S SIDE		41	1.17	-2.02	0.00	-0.44	0.00	-19.15
		45	-1.17	2.02	0.00	0.44	0.00	10.45
CRANE STRIKING D/S SIDE		41	-1.52	4.57	0.00	0.81	0.00	27.18
		45	1.52	-4.57	0.00	-0.81	0.00	-7.52
CRANE MOVING (LONGITUDINAL)		41	56.24	2.15	-2.37	-1.00	9.90	-0.66
		45	-56.24	-2.15	2.37	1.00	0.29	9.89
DEAD LOAD + LIVE LOAD	80	42	57.82	2.48	-4.28	0.08	9.18	6.26
		46	-51.51	-2.48	4.28	-0.08	9.23	4.39
EARTHQUAKE (TRANSVERSE)		42	5.62	3.34	0.00	0.47	0.01	14.16
		46	-5.62	-3.34	0.00	-0.47	0.01	0.21
EARTHQUAKE (LONGITUDINAL)		42	6.78	0.01	-4.06	-0.22	8.71	0.02
		46	-6.78	-0.01	4.06	0.22	8.73	0.02
WIND BLOWING U/S TO D/S		42	1.48	0.99	0.00	0.15	0.00	3.70
		46	-1.48	-0.46	0.00	-0.15	0.00	-0.58
WIND BLOWING D/S TO U/S		42	-1.56	-1.47	0.00	-0.21	0.00	-4.11
		46	1.56	0.22	0.00	0.21	0.00	0.47
CRANE MOVING U/S TO D/S		42	1.84	1.00	0.00	0.10	0.00	4.47
		46	-1.84	-1.00	0.00	-0.10	0.00	-0.19
CRANE MOVING D/S TO U/S		42	-2.45	-0.84	0.00	-0.24	0.00	-5.85
		46	2.45	0.84	0.00	0.24	0.00	2.24
CRANE STRIKING U/S SIDE		42	-1.17	-0.52	0.00	-0.06	0.00	-2.78
		46	1.17	0.52	0.00	0.06	0.00	0.55
CRANE STRIKING D/S SIDE		42	1.52	1.00	0.00	0.19	0.00	3.97
		46	-1.52	-1.00	0.00	-0.19	0.00	0.34
CRANE MOVING (LONGITUDINAL)		42	0.47	0.37	-0.28	-0.34	0.64	0.02
		46	-0.47	-0.37	0.28	0.34	0.58	1.55

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	81	44	50.24	2.48	-3.44	-0.32	7.79	4.21
		47	-31.40	-2.48	3.44	0.32	7.35	6.69
EARTHQUAKE (TRANSVERSE)		44	0.00	9.79	0.01	2.36	-0.03	56.10
		47	0.00	-9.79	-0.01	-2.36	-0.01	-13.02
EARTHQUAKE (LONGITUDINAL)		44	9.16	0.08	-7.79	-0.26	13.90	0.80
		47	-9.16	-0.08	7.79	0.26	20.39	-0.45
WIND BLOWING U/S TO D/S		44	0.00	3.28	0.01	1.31	-0.02	15.05
		47	0.00	-1.84	-0.01	-1.31	-0.01	-3.78
WIND BLOWING D/S TO U/S		44	0.00	-2.74	0.00	-1.09	0.01	-16.98
		47	0.00	2.12	0.00	1.09	0.01	6.27
CRANE MOVING U/S TO D/S		44	79.18	2.56	-0.11	1.64	0.19	41.03
		47	-79.18	-2.56	0.11	-1.64	0.29	-29.79
CRANE MOVING D/S TO U/S		44	24.93	-4.10	-0.04	-0.74	0.07	-18.35
		47	-24.93	4.10	0.04	0.74	0.10	0.31
CRANE STRIKING U/S SIDE		44	0.00	-4.74	0.00	-0.97	0.01	-13.52
		47	0.00	4.74	0.00	0.97	0.01	-7.34
CRANE STRIKING D/S SIDE		44	0.00	1.89	0.00	0.48	0.00	14.94
		47	0.00	-1.89	0.00	-0.48	0.00	-6.64
CRANE MOVING (LONGITUDINAL)		44	54.90	-2.15	-2.64	0.03	4.28	12.90
		47	-54.90	2.15	2.64	-0.03	7.32	-22.38
DEAD LOAD + LIVE LOAD	82	45	63.90	-6.01	-4.20	0.25	8.89	-9.28
		48	-45.05	6.01	4.20	-0.25	9.59	-17.18
EARTHQUAKE (TRANSVERSE)		45	-2.87	9.24	0.01	2.06	0.00	41.60
		48	2.87	-9.24	-0.01	-2.06	-0.04	-0.92
EARTHQUAKE (LONGITUDINAL)		45	10.23	0.06	-8.78	-0.75	14.20	-0.20
		48	-10.23	-0.06	8.78	0.75	24.41	0.44
WIND BLOWING U/S TO D/S		45	-0.78	1.83	0.00	0.89	0.00	13.50
		48	0.78	-1.83	0.00	-0.89	-0.01	-5.44
WIND BLOWING D/S TO U/S		45	0.79	-1.94	0.00	-1.00	0.00	-11.40
		48	-0.79	1.94	0.00	1.00	0.02	2.85
CRANE MOVING U/S TO D/S		45	23.98	3.56	-0.03	0.70	0.07	15.64
		48	-23.98	-3.56	0.03	-0.70	0.08	0.03
CRANE MOVING D/S TO U/S		45	80.53	-1.14	-0.12	-1.17	0.21	-32.60
		48	-80.53	1.14	0.12	1.17	0.32	27.60
CRANE STRIKING U/S SIDE		45	0.63	-1.42	0.00	-0.44	0.00	-12.44
		48	-0.63	1.42	0.00	0.44	0.01	6.21
CRANE STRIKING D/S SIDE		45	-0.76	4.23	0.00	0.68	0.00	10.27
		48	0.76	-4.23	0.00	-0.68	-0.01	8.35
CRANE MOVING (LONGITUDINAL)		45	54.84	2.73	-2.42	-0.77	3.79	-9.78
		48	-54.84	-2.73	2.42	0.77	6.88	21.81
DEAD LOAD + LIVE LOAD	83	46	20.54	3.61	-2.89	0.07	7.39	5.91
		49	-14.08	-3.61	2.89	-0.07	5.33	9.98
EARTHQUAKE (TRANSVERSE)		46	2.88	4.52	-0.01	0.39	0.01	9.69
		49	-2.88	-4.52	0.01	-0.39	0.02	10.19
EARTHQUAKE (LONGITUDINAL)		46	2.60	-0.01	-2.23	-0.46	2.73	-0.03
		49	-2.60	0.01	2.23	0.46	7.06	-0.01
WIND BLOWING U/S TO D/S		46	0.78	1.64	0.00	0.14	0.00	3.12
		49	-0.78	-1.02	0.00	-0.14	0.01	2.71
WIND BLOWING D/S TO U/S		46	-0.79	-2.08	0.00	-0.16	0.00	-3.20
		49	0.79	0.63	0.00	0.16	-0.01	-2.77
CRANE MOVING U/S TO D/S		46	0.96	1.55	0.00	0.08	0.00	3.40
		49	-0.96	-1.55	0.00	-0.08	0.00	3.40
CRANE MOVING D/S TO U/S		46	-1.35	-2.46	0.00	-0.28	-0.01	-6.20
		49	1.35	2.46	0.00	0.28	-0.01	-4.61
CRANE STRIKING U/S SIDE		46	-0.63	-1.07	0.00	-0.06	0.00	-2.52
		49	0.63	1.07	0.00	0.06	0.00	-2.20
CRANE STRIKING D/S SIDE		46	0.76	1.15	0.00	0.16	0.00	2.38
		49	-0.76	-1.15	0.00	-0.16	0.01	2.69
CRANE MOVING (LONGITUDINAL)		46	0.12	-0.40	-0.17	-0.35	0.22	-1.46
		49	-0.12	0.40	0.17	0.35	0.51	-0.29

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	84	47	18.94	2.58	-1.51	-0.04	3.45	9.40
		50	-11.90	-2.58	1.51	0.04	1.99	-0.10
EARTHQUAKE (TRANSVERSE)		47	0.00	3.54	0.00	1.29	0.01	12.87
		50	0.00	-3.54	0.00	-1.29	0.00	-0.12
EARTHQUAKE (LONGITUDINAL)		47	3.88	0.13	-1.41	-0.12	-5.80	0.45
		50	-3.88	-0.13	1.41	0.12	10.87	0.01
WIND BLOWING U/S TO D/S		47	0.00	1.60	0.00	0.71	0.01	3.70
		50	0.00	-0.42	0.00	-0.71	0.00	-0.06
WIND BLOWING D/S TO U/S		47	0.00	-1.95	0.00	-0.65	-0.01	-6.19
		50	0.00	1.44	0.00	0.65	0.00	0.10
CRANE MOVING U/S TO D/S		47	0.18	-4.35	-0.19	0.74	0.22	-15.74
		50	-0.18	4.35	0.19	-0.74	0.47	0.09
CRANE MOVING D/S TO U/S		47	0.06	-4.01	-0.06	-0.51	0.06	-14.55
		50	-0.06	4.01	0.06	0.51	0.15	0.13
CRANE STRIKING U/S SIDE		47	0.00	2.04	0.00	-0.39	-0.01	7.41
		50	0.00	-2.04	0.00	0.39	0.00	-0.07
CRANE STRIKING D/S SIDE		47	0.00	1.82	0.00	0.32	0.00	6.61
		50	0.00	-1.82	0.00	-0.32	0.00	-0.07
CRANE MOVING (LONGITUDINAL)		47	0.96	-2.17	0.18	-0.01	-3.34	-7.89
		50	-0.96	2.17	-0.18	0.01	2.68	0.06
DEAD LOAD + LIVE LOAD	85	48	19.00	-2.58	-1.91	0.06	4.73	-9.37
		51	-11.95	2.58	1.91	-0.06	2.15	0.10
EARTHQUAKE (TRANSVERSE)		48	0.00	3.21	-0.01	1.35	0.03	11.62
		51	0.00	-3.21	0.01	-1.35	0.00	-0.08
EARTHQUAKE (LONGITUDINAL)		48	4.29	-0.13	-1.25	0.10	-7.55	-0.46
		51	-4.29	0.13	1.25	-0.10	12.04	-0.01
WIND BLOWING U/S TO D/S		48	0.00	2.53	0.00	0.68	0.01	8.33
		51	0.00	-2.03	0.00	-0.68	0.00	-0.12
WIND BLOWING D/S TO U/S		48	0.00	-2.18	0.00	-0.72	-0.01	-5.79
		51	0.00	0.99	0.00	0.72	0.00	0.09
CRANE MOVING U/S TO D/S		48	0.06	4.91	-0.06	0.61	0.08	17.82
		51	-0.06	-4.91	0.06	-0.61	0.15	-0.17
CRANE MOVING D/S TO U/S		48	0.18	3.52	-0.19	-0.67	0.20	12.73
		51	-0.18	-3.52	0.19	0.67	0.47	-0.07
CRANE STRIKING U/S SIDE		48	0.00	-2.35	0.00	-0.36	-0.01	-8.56
		51	0.00	2.35	0.00	0.36	0.00	0.08
CRANE STRIKING D/S SIDE		48	0.00	-1.54	0.00	0.36	0.01	-5.58
		51	0.00	1.54	0.00	-0.36	0.00	0.05
CRANE MOVING (LONGITUDINAL)		48	0.89	2.20	0.16	0.06	-3.05	7.95
		51	-0.89	-2.20	-0.16	-0.06	2.49	-0.05
DEAD LOAD + LIVE LOAD	86	39	-1.84	10.98	-0.01	-0.29	0.02	11.92
		40	1.84	11.62	0.01	0.29	0.03	-14.22
EARTHQUAKE (TRANSVERSE)		39	2.68	-1.69	0.04	0.00	-0.15	-5.98
		40	-2.68	1.69	-0.04	0.00	-0.16	-6.15
EARTHQUAKE (LONGITUDINAL)		39	-0.11	0.02	-0.05	-0.36	0.14	0.07
		40	0.11	-0.02	0.05	0.36	0.22	0.07
WIND BLOWING U/S TO D/S		39	1.94	-0.53	0.03	0.00	-0.10	-1.88
		40	-1.94	0.53	-0.03	0.00	-0.10	-1.91
WIND BLOWING D/S TO U/S		39	-1.19	0.45	-0.02	0.00	0.06	1.61
		40	1.19	-0.45	0.02	0.00	0.07	1.64
CRANE MOVING U/S TO D/S		39	1.15	-0.66	0.02	0.00	-0.08	-2.33
		40	-1.15	0.66	-0.02	0.00	-0.09	-2.37
CRANE MOVING D/S TO U/S		39	-0.76	0.54	-0.01	0.00	0.04	1.91
		40	0.76	-0.54	0.01	0.00	0.05	1.96
CRANE STRIKING U/S SIDE		39	-0.69	0.53	-0.02	0.00	0.08	1.88
		40	0.69	-0.53	0.02	0.00	0.08	1.94
CRANE STRIKING D/S SIDE		39	0.50	-0.32	0.01	0.00	-0.02	-1.13
		40	-0.50	0.32	-0.01	0.00	-0.03	-1.16
CRANE MOVING (LONGITUDINAL)		39	0.07	0.05	-0.04	-0.13	0.12	0.17
		40	-0.07	-0.05	0.04	0.13	0.15	0.19

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	87	41	-0.91	11.73	0.01	0.15	-0.02	14.37
		42	0.91	11.68	-0.01	-0.15	-0.02	-14.15
EARTHQUAKE (TRANSVERSE)		41	-0.94	-1.79	0.05	0.00	-0.17	-6.64
		42	0.94	1.79	-0.05	0.00	-0.19	-6.60
EARTHQUAKE (LONGITUDINAL)		41	0.01	0.00	-0.09	0.04	0.33	0.00
		42	-0.01	0.00	0.09	-0.04	0.31	0.00
WIND BLOWING U/S TO D/S		41	-0.56	-0.44	0.02	0.00	-0.06	-1.64
		42	0.56	0.44	-0.02	0.00	-0.07	-1.64
WIND BLOWING D/S TO U/S		41	1.12	0.51	-0.02	0.00	0.08	1.88
		42	-1.12	-0.51	0.02	0.00	0.09	1.88
CRANE MOVING U/S TO D/S		41	-0.21	-0.56	0.01	0.00	-0.05	-2.06
		42	0.21	0.56	-0.01	0.00	-0.05	-2.04
CRANE MOVING D/S TO U/S		41	0.20	0.61	-0.02	0.00	0.08	2.28
		42	-0.20	-0.61	0.02	0.00	0.08	2.26
CRANE STRIKING U/S SIDE		41	0.12	0.32	-0.01	0.00	0.03	1.20
		42	-0.12	-0.32	0.01	0.00	0.03	1.19
CRANE STRIKING D/S SIDE		41	-0.19	-0.51	0.02	0.00	-0.06	-1.89
		42	0.19	0.51	-0.02	0.00	-0.07	-1.87
CRANE MOVING (LONGITUDINAL)		41	-0.08	-0.08	0.02	0.10	-0.08	-0.31
		42	0.08	0.08	-0.02	-0.10	-0.06	-0.31
DEAD LOAD + LIVE LOAD	88	43	3.30	7.75	-0.02	-0.06	0.06	7.48
		44	-3.30	8.67	0.02	0.06	0.06	-10.77
EARTHQUAKE (TRANSVERSE)		43	-1.93	-2.18	0.10	0.00	-0.35	-7.00
		44	1.93	2.18	-0.10	0.00	-0.35	-8.65
EARTHQUAKE (LONGITUDINAL)		43	-0.29	0.02	-0.43	-0.67	1.42	0.07
		44	0.29	-0.02	0.43	0.67	1.69	0.07
WIND BLOWING U/S TO D/S		43	-0.26	-0.61	0.06	0.00	-0.20	-1.91
		44	0.26	0.61	-0.06	0.00	-0.20	-2.48
WIND BLOWING D/S TO U/S		43	0.52	0.57	-0.04	0.00	0.14	1.81
		44	-0.52	-0.57	0.04	0.00	0.15	2.31
CRANE MOVING U/S TO D/S		43	-1.24	-0.93	0.06	0.00	-0.19	-2.94
		44	1.24	0.93	-0.06	0.00	-0.21	-3.75
CRANE MOVING D/S TO U/S		43	0.96	0.71	-0.03	0.00	0.09	2.27
		44	-0.96	-0.71	0.03	0.00	0.10	2.81
CRANE STRIKING U/S SIDE		43	0.85	0.67	-0.05	0.00	0.17	2.15
		44	-0.85	-0.67	0.05	0.00	0.16	2.63
CRANE STRIKING D/S SIDE		43	-0.60	-0.44	0.02	0.00	-0.05	-1.39
		44	0.60	0.44	-0.02	0.00	-0.06	-1.75
CRANE MOVING (LONGITUDINAL)		43	-0.15	0.00	-0.17	-0.20	0.57	0.04
		44	0.15	0.00	0.17	0.20	0.66	-0.04
DEAD LOAD + LIVE LOAD	89	45	-1.17	11.67	0.02	0.15	-0.06	14.17
		46	1.17	11.74	-0.02	-0.15	-0.08	-14.43
EARTHQUAKE (TRANSVERSE)		45	-3.10	-2.73	0.11	0.00	-0.37	-10.11
		46	3.10	2.73	-0.11	0.00	-0.43	-10.04
EARTHQUAKE (LONGITUDINAL)		45	-0.01	0.00	-0.04	0.31	0.14	0.01
		46	0.01	0.00	0.04	-0.31	0.15	0.01
WIND BLOWING U/S TO D/S		45	-1.25	-0.71	0.04	0.00	-0.13	-2.61
		46	1.25	0.71	-0.04	0.00	-0.15	-2.59
WIND BLOWING D/S TO U/S		45	1.96	0.76	-0.05	0.00	0.17	2.81
		46	-1.96	-0.76	0.05	0.00	0.20	2.79
CRANE MOVING U/S TO D/S		45	-0.60	-0.88	0.03	0.00	-0.10	-3.27
		46	0.60	0.88	-0.03	0.00	-0.10	-3.24
CRANE MOVING D/S TO U/S		45	1.70	1.10	-0.05	0.00	0.18	4.06
		46	-1.70	-1.10	0.05	0.00	0.20	4.06
CRANE STRIKING U/S SIDE		45	0.58	0.54	-0.02	0.00	0.06	2.01
		46	-0.58	-0.54	0.02	0.00	0.06	2.00
CRANE STRIKING D/S SIDE		45	-0.23	-0.76	0.04	0.00	-0.14	-2.82
		46	0.23	0.76	-0.04	0.00	-0.16	-2.78
CRANE MOVING (LONGITUDINAL)		45	-0.65	-0.02	0.10	0.16	-0.41	-0.09
		46	-0.65	0.02	-0.10	-0.16	-0.35	-0.06

TABLE NO.~ A- 7 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	90	48	3.54	8.60	0.02	0.04	-0.08	10.44
		49	-3.54	8.45	-0.02	-0.04	-0.10	-9.91
EARTHQUAKE (TRANSVERSE)		48	1.54	-2.87	0.16	0.00	-0.54	-10.85
		49	-1.54	2.87	-0.16	0.00	-0.63	-10.33
EARTHQUAKE (LONGITUDINAL)		48	-0.15	0.00	0.25	0.47	-0.97	0.02
		49	0.15	0.00	-0.25	-0.47	-0.88	0.01
WIND BLOWING U/S TO D/S		48	0.87	-0.77	0.06	0.00	-0.20	-2.96
		49	-0.87	0.77	-0.06	0.00	-0.22	-2.76
WIND BLOWING D/S TO U/S		48	-0.45	0.79	-0.07	0.00	0.25	3.02
		49	0.45	-0.79	0.07	0.00	0.28	2.81
CRANE MOVING U/S TO D/S		48	1.45	-0.95	0.04	0.00	-0.15	-3.61
		49	-1.45	0.95	-0.04	0.00	-0.15	-3.43
CRANE MOVING D/S TO U/S		48	-2.20	1.34	-0.09	0.00	0.29	5.17
		49	2.20	-1.34	0.09	0.00	0.34	4.73
CRANE STRIKING U/S SIDE		48	-1.01	0.62	-0.03	0.00	0.09	2.38
		49	1.01	-0.62	0.03	0.00	0.09	2.22
CRANE STRIKING D/S SIDE		48	0.99	-0.75	0.06	0.00	-0.20	-2.82
		49	-0.99	0.75	-0.06	0.00	-0.24	-2.74
CRANE MOVING (LONGITUDINAL)		48	-0.53	0.11	0.22	0.15	-0.87	0.50
		49	0.53	-0.11	-0.22	-0.15	-0.76	0.33
DEAD LOAD + LIVE LOAD	91	50	-2.60	0.00	0.00	0.00	0.00	0.00
		51	2.60	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		50	-0.18	0.00	0.00	0.00	0.00	0.00
		51	0.18	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		50	-0.17	0.00	0.00	0.00	0.00	0.00
		51	0.17	0.00	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		50	1.19	0.00	0.00	0.00	0.00	0.00
		51	-1.19	0.00	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		50	0.61	0.00	0.00	0.00	0.00	0.00
		51	-0.61	0.00	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		50	4.66	0.00	0.00	0.00	0.00	0.00
		51	-4.66	0.00	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		50	3.80	0.00	0.00	0.00	0.00	0.00
		51	-3.80	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		50	-2.21	0.00	0.00	0.00	0.00	0.00
		51	2.21	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		50	-1.69	0.00	0.00	0.00	0.00	0.00
		51	1.69	0.00	0.00	0.00	0.00	0.00
CRANE MOVING (LONGITUDINAL)		50	2.18	0.00	0.00	0.00	0.00	0.00
		51	-2.18	0.00	0.00	0.00	0.00	0.00

APPENDIX B

RESULTS OF ANALYSIS OF THE SYMMETRICAL FRAME

TABLE NO.~ B-1 RESULTS OF ANALYSIS OF THE TRANSVERSE END FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	2	2	113.64	2.05	0.00	0.00	0.00	0.17
		6	-95.65	-2.05	0.00	0.00	0.00	8.44
EARTHQUAKE (TRANSVERSE)		2	0.00	9.26	0.00	0.00	0.00	117.69
		6	0.00	-9.26	0.00	0.00	0.00	-78.81
CRANE MOVING U/S TO D/S		2	78.82	2.32	0.00	0.00	0.00	60.00
		6	-78.82	-2.32	0.00	0.00	0.00	-50.26
CRANE MOVING D/S TO U/S		2	24.82	-4.23	0.00	0.00	0.00	-55.54
		6	-24.82	4.23	0.00	0.00	0.00	37.77
CRANE STRIKING U/S SIDE		2	0.00	-4.58	0.00	0.00	0.00	-52.05
		6	0.00	4.58	0.00	0.00	0.00	32.80
CRANE STRIKING D/S SIDE		2	0.00	1.95	0.00	0.00	0.00	32.20
		6	0.00	-1.95	0.00	0.00	0.00	-24.00
WIND BLOWING U/S TO D/S		2	0.00	5.51	0.00	0.00	0.00	50.36
		6	0.00	-4.30	0.00	0.00	0.00	-29.76
WIND BLOWING D/S TO U/S		2	0.00	-3.62	0.00	0.00	0.00	-42.34
		6	0.00	3.10	0.00	0.00	0.00	28.22
DEAD LOAD + LIVE LOAD	3	3	113.64	-2.05	0.00	0.00	0.00	-0.17
		7	-95.65	2.05	0.00	0.00	0.00	-8.44
EARTHQUAKE (TRANSVERSE)		3	0.00	9.26	0.00	0.00	0.00	117.69
		7	0.00	-9.26	0.00	0.00	0.00	-78.81
CRANE MOVING U/S TO D/S		3	24.82	4.23	0.00	0.00	0.00	55.54
		7	-24.82	-4.23	0.00	0.00	0.00	-37.77
CRANE MOVING D/S TO U/S		3	78.82	-2.32	0.00	0.00	0.00	-60.00
		7	-78.82	2.32	0.00	0.00	0.00	50.26
CRANE STRIKING U/S SIDE		3	0.00	-1.97	0.00	0.00	0.00	-32.44
		7	0.00	1.97	0.00	0.00	0.00	24.18
CRANE STRIKING D/S SIDE		3	0.00	4.55	0.00	0.00	0.00	51.65
		7	0.00	-4.55	0.00	0.00	0.00	-32.55
WIND BLOWING U/S TO D/S		3	0.00	3.62	0.00	0.00	0.00	42.34
		7	0.00	-3.10	0.00	0.00	0.00	-28.22
WIND BLOWING D/S TO U/S		3	0.00	-5.51	0.00	0.00	0.00	-50.36
		7	0.00	4.30	0.00	0.00	0.00	29.76
DEAD LOAD + LIVE LOAD	6	6	82.17	2.05	0.00	0.00	0.00	0.66
		10	-63.76	-2.05	0.00	0.00	0.00	8.15
EARTHQUAKE (TRANSVERSE)		6	0.00	8.92	0.00	0.00	0.00	78.81
		10	0.00	-8.92	0.00	0.00	0.00	-40.47
CRANE MOVING U/S TO D/S		6	78.82	2.32	0.00	0.00	0.00	50.26
		10	-78.82	-2.32	0.00	0.00	0.00	-40.29
CRANE MOVING D/S TO U/S		6	24.82	-4.23	0.00	0.00	0.00	-37.77
		10	-24.82	4.23	0.00	0.00	0.00	19.58
CRANE STRIKING U/S SIDE		6	0.00	-4.58	0.00	0.00	0.00	-32.80
		10	0.00	4.58	0.00	0.00	0.00	13.09
CRANE STRIKING D/S SIDE		6	0.00	1.95	0.00	0.00	0.00	24.00
		10	0.00	-1.95	0.00	0.00	0.00	-15.61
WIND BLOWING U/S TO D/S		6	0.00	4.30	0.00	0.00	0.00	29.76
		10	0.00	-3.06	0.00	0.00	0.00	-13.95
WIND BLOWING D/S TO U/S		6	0.00	-3.10	0.00	0.00	0.00	-28.22
		10	0.00	2.57	0.00	0.00	0.00	16.03
DEAD LOAD + LIVE LOAD	7	7	82.17	-2.05	0.00	0.00	0.00	-0.66
		11	-63.76	2.05	0.00	0.00	0.00	-8.15
EARTHQUAKE (TRANSVERSE)		7	0.00	8.92	0.00	0.00	0.00	78.81
		11	0.00	-8.92	0.00	0.00	0.00	-40.47
CRANE MOVING U/S TO D/S		7	24.82	4.23	0.00	0.00	0.00	37.77
		11	-24.82	-4.23	0.00	0.00	0.00	-19.58
CRANE MOVING D/S TO U/S		7	78.82	-2.32	0.00	0.00	0.00	-50.26
		11	-78.82	2.32	0.00	0.00	0.00	40.29
CRANE STRIKING U/S SIDE		7	0.00	-1.97	0.00	0.00	0.00	-24.18
		11	0.00	1.97	0.00	0.00	0.00	15.73
CRANE STRIKING D/S SIDE		7	0.00	4.55	0.00	0.00	0.00	32.55

TABLE NO.~ B-1 RESULTS OF ANALYSIS OF THE TRANSVERSE END FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		11	0.00	-4.55	0.00	0.00	0.00	-12.99
WIND BLOWING U/S TO D/S		7	0.00	3.10	0.00	0.00	0.00	28.22
		11	0.00	-2.57	0.00	0.00	0.00	-16.03
WIND BLOWING D/S TO U/S		7	0.00	-4.30	0.00	0.00	0.00	-29.76
		11	0.00	3.06	0.00	0.00	0.00	13.95
DEAD LOAD + LIVE LOAD	9	10	50.01	2.05	0.00	0.00	0.00	1.13
		13	-31.16	-2.05	0.00	0.00	0.00	7.88
EARTHQUAKE (TRANSVERSE)		10	0.00	7.26	0.00	0.00	0.00	40.47
		13	0.00	-7.26	0.00	0.00	0.00	-8.54
CRANE MOVING U/S TO D/S		10	78.82	2.32	0.00	0.00	0.00	40.29
		13	-78.82	-2.32	0.00	0.00	0.00	-30.09
CRANE MOVING D/S TO U/S		10	24.82	-4.23	0.00	0.00	0.00	-19.58
		13	-24.82	4.23	0.00	0.00	0.00	0.96
CRANE STRIKING U/S SIDE		10	0.00	-4.58	0.00	0.00	0.00	-13.09
		13	0.00	4.58	0.00	0.00	0.00	-7.08
CRANE STRIKING D/S SIDE		10	0.00	1.95	0.00	0.00	0.00	15.61
		13	0.00	-1.95	0.00	0.00	0.00	-7.02
WIND BLOWING U/S TO D/S		10	0.00	3.06	0.00	0.00	0.00	13.95
		13	0.00	-1.61	0.00	0.00	0.00	-3.68
WIND BLOWING D/S TO U/S		10	0.00	-2.57	0.00	0.00	0.00	-16.03
		13	0.00	1.95	0.00	0.00	0.00	6.10
DEAD LOAD + LIVE LOAD	10	11	50.01	-2.05	0.00	0.00	0.00	-1.13
		14	-31.16	2.05	0.00	0.00	0.00	-7.88
EARTHQUAKE (TRANSVERSE)		11	0.00	7.26	0.00	0.00	0.00	40.47
		14	0.00	-7.26	0.00	0.00	0.00	-8.54
CRANE MOVING U/S TO D/S		11	24.82	4.23	0.00	0.00	0.00	19.58
		14	-24.82	-4.23	0.00	0.00	0.00	-0.96
CRANE MOVING D/S TO U/S		11	78.82	-2.32	0.00	0.00	0.00	-40.29
		14	-78.82	2.32	0.00	0.00	0.00	30.09
CRANE STRIKING U/S SIDE		11	0.00	-1.97	0.00	0.00	0.00	-15.73
		14	0.00	1.97	0.00	0.00	0.00	7.08
CRANE STRIKING D/S SIDE		11	0.00	4.55	0.00	0.00	0.00	12.99
		14	0.00	-4.55	0.00	0.00	0.00	7.02
WIND BLOWING U/S TO D/S		11	0.00	2.57	0.00	0.00	0.00	16.03
		14	0.00	-1.95	0.00	0.00	0.00	-6.10
WIND BLOWING D/S TO U/S		11	0.00	-3.06	0.00	0.00	0.00	-13.95
		14	0.00	1.61	0.00	0.00	0.00	3.68
DEAD LOAD + LIVE LOAD	12	13	18.79	2.05	0.00	0.00	0.00	7.38
		16	-11.74	-2.05	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		13	0.00	2.37	0.00	0.00	0.00	8.54
		16	0.00	-2.37	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		13	0.00	-4.23	0.00	0.00	0.00	-15.23
		16	0.00	4.23	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		13	0.00	-4.23	0.00	0.00	0.00	-15.23
		16	0.00	4.23	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		13	0.00	1.97	0.00	0.00	0.00	7.08
		16	0.00	-1.97	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		13	0.00	1.95	0.00	0.00	0.00	7.02
		16	0.00	-1.95	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		13	0.00	1.61	0.00	0.00	0.00	3.68
		16	0.00	-0.43	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		13	0.00	-1.95	0.00	0.00	0.00	-6.10
		16	0.00	1.44	0.00	0.00	0.00	0.00
DEAD LOAD + LIVE LOAD	13	14	18.79	-2.05	0.00	0.00	0.00	-7.38
		17	-11.74	2.05	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		14	0.00	2.37	0.00	0.00	0.00	8.54
		17	0.00	-2.37	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		14	0.00	4.23	0.00	0.00	0.00	15.23

TABLE NO.~ B-1 RESULTS OF ANALYSIS OF THE TRANSVERSE END FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		17	0.00	-4.23	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		14	0.00	4.23	0.00	0.00	0.00	15.23
		17	0.00	-4.23	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		14	0.00	-1.97	0.00	0.00	0.00	-7.08
		17	0.00	1.97	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		14	0.00	-1.95	0.00	0.00	0.00	-7.02
		17	0.00	1.95	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		14	0.00	1.95	0.00	0.00	0.00	6.10
		17	0.00	-1.44	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		14	0.00	-1.61	0.00	0.00	0.00	-3.68
		17	0.00	0.43	0.00	0.00	0.00	0.00
DEAD LOAD + LIVE LOAD	19	16	-2.05	0.00	0.00	0.00	0.00	0.00
		17	2.05	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		16	0.00	0.00	0.00	0.00	0.00	0.00
		17	0.00	0.00	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		16	4.23	0.00	0.00	0.00	0.00	0.00
		17	-4.23	0.00	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		16	4.23	0.00	0.00	0.00	0.00	0.00
		17	-4.23	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		16	-1.97	0.00	0.00	0.00	0.00	0.00
		17	1.97	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		16	-1.95	0.00	0.00	0.00	0.00	0.00
		17	1.95	0.00	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		16	0.88	0.00	0.00	0.00	0.00	0.00
		17	-0.88	0.00	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		16	0.88	0.00	0.00	0.00	0.00	0.00
		17	-0.88	0.00	0.00	0.00	0.00	0.00

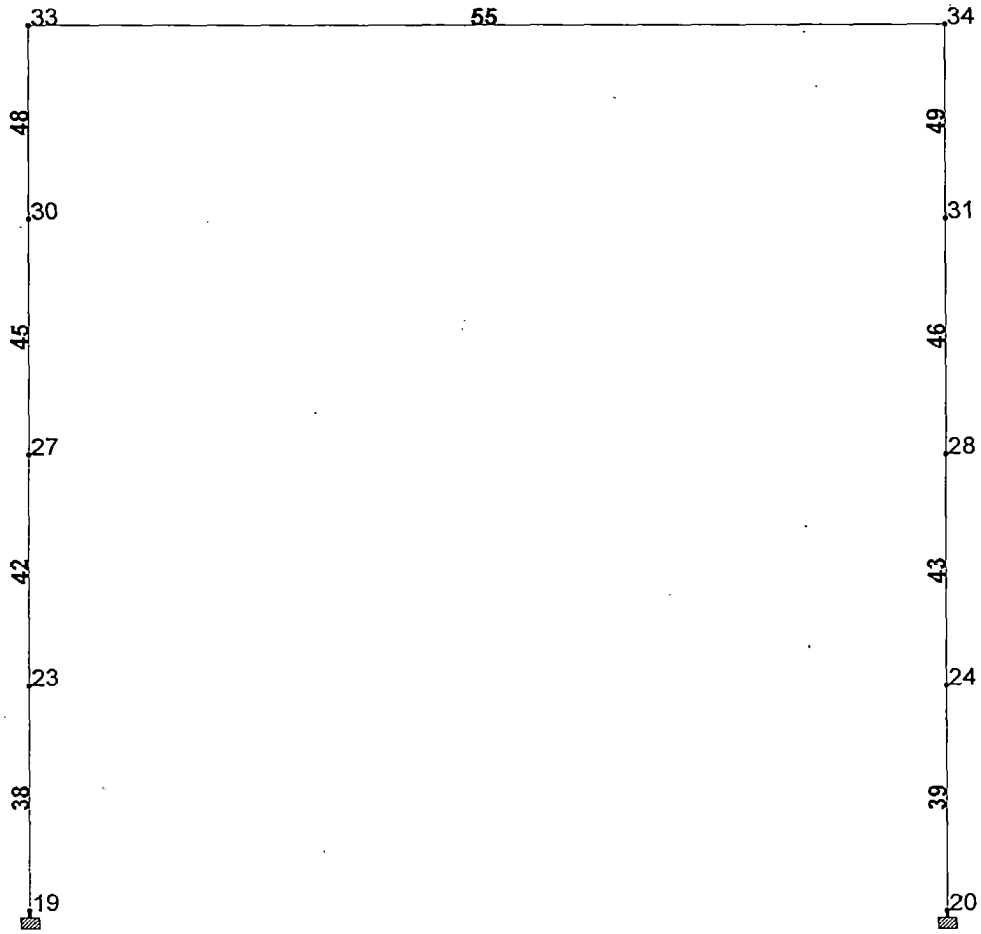

FIG. NO.-B2 THE TRANSVERSE CENTRAL FRAME (SYMMETRICAL FRAME)

TABLE NO.~ B-2 RESULTS OF ANALYSIS OF THE TRANSVERSE CENTRAL FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	38	19	164.39	3.84	0.00	0.00	0.00	-0.53
		23	-146.40	-3.84	0.00	0.00	0.00	16.65
EARTHQUAKE (TRANSVERSE)		19	0.00	10.95	0.00	0.00	0.00	140.74
		23	0.00	-10.95	0.00	0.00	0.00	-94.76
CRANE MOVING U/S TO D/S		19	131.36	3.85	0.00	0.00	0.00	99.89
		23	-131.36	-3.85	0.00	0.00	0.00	-83.70
CRANE MOVING D/S TO U/S		19	41.36	-7.05	0.00	0.00	0.00	-92.48
		23	-41.36	7.05	0.00	0.00	0.00	62.89
CRANE STRIKING U/S SIDE		19	0.00	-7.63	0.00	0.00	0.00	-86.62
		23	0.00	7.63	0.00	0.00	0.00	54.58
CRANE STRIKING D/S SIDE		19	0.00	3.27	0.00	0.00	0.00	53.99
		23	0.00	-3.27	0.00	0.00	0.00	-40.25
WIND BLOWING U/S TO D/S		19	0.00	11.02	0.00	0.00	0.00	100.62
		23	0.00	-8.59	0.00	0.00	0.00	-59.45
WIND BLOWING D/S TO U/S		19	0.00	-7.24	0.00	0.00	0.00	-84.59
		23	0.00	6.20	0.00	0.00	0.00	56.38
DEAD LOAD + LIVE LOAD	39	20	164.39	-3.84	0.00	0.00	0.00	0.53
		24	-146.40	3.84	0.00	0.00	0.00	-16.65
EARTHQUAKE (TRANSVERSE)		20	0.00	10.95	0.00	0.00	0.00	140.74
		24	0.00	-10.95	0.00	0.00	0.00	-94.76
CRANE MOVING U/S TO D/S		20	41.36	7.05	0.00	0.00	0.00	92.48
		24	-41.36	-7.05	0.00	0.00	0.00	-62.89
CRANE MOVING D/S TO U/S		20	131.36	-3.85	0.00	0.00	0.00	-99.89
		24	-131.36	3.85	0.00	0.00	0.00	83.70
CRANE STRIKING U/S SIDE		20	0.00	-3.27	0.00	0.00	0.00	-53.99
		24	0.00	3.27	0.00	0.00	0.00	40.25
CRANE STRIKING D/S SIDE		20	0.00	7.63	0.00	0.00	0.00	86.62
		24	0.00	-7.63	0.00	0.00	0.00	-54.58
WIND BLOWING U/S TO D/S		20	0.00	7.24	0.00	0.00	0.00	84.59
		24	0.00	-6.20	0.00	0.00	0.00	-56.38
WIND BLOWING D/S TO U/S		20	0.00	-11.02	0.00	0.00	0.00	-100.62
		24	0.00	8.59	0.00	0.00	0.00	59.45
DEAD LOAD + LIVE LOAD	42	23	119.45	3.84	0.00	0.00	0.00	1.54
		27	-101.03	-3.84	0.00	0.00	0.00	14.95
EARTHQUAKE (TRANSVERSE)		23	0.00	10.56	0.00	0.00	0.00	94.76
		27	0.00	-10.56	0.00	0.00	0.00	-49.34
CRANE MOVING U/S TO D/S		23	131.36	3.85	0.00	0.00	0.00	83.70
		27	-131.36	-3.85	0.00	0.00	0.00	-67.13
CRANE MOVING D/S TO U/S		23	41.36	-7.05	0.00	0.00	0.00	-62.89
		27	-41.36	7.05	0.00	0.00	0.00	32.60
CRANE STRIKING U/S SIDE		23	0.00	-7.63	0.00	0.00	0.00	-54.58
		27	0.00	7.63	0.00	0.00	0.00	21.78
CRANE STRIKING D/S SIDE		23	0.00	3.27	0.00	0.00	0.00	40.25
		27	0.00	-3.27	0.00	0.00	0.00	-26.18
WIND BLOWING U/S TO D/S		23	0.00	8.59	0.00	0.00	0.00	59.45
		27	0.00	-6.10	0.00	0.00	0.00	-27.86
WIND BLOWING D/S TO U/S		23	0.00	-6.20	0.00	0.00	0.00	-56.38
		27	0.00	5.13	0.00	0.00	0.00	32.04
DEAD LOAD + LIVE LOAD	43	24	119.45	-3.84	0.00	0.00	0.00	-1.54
		28	-101.03	3.84	0.00	0.00	0.00	-14.95
EARTHQUAKE (TRANSVERSE)		24	0.00	10.56	0.00	0.00	0.00	94.76
		28	0.00	-10.56	0.00	0.00	0.00	-49.34
CRANE MOVING U/S TO D/S		24	41.36	7.05	0.00	0.00	0.00	62.89
		28	-41.36	-7.05	0.00	0.00	0.00	-32.60
CRANE MOVING D/S TO U/S		24	131.36	-3.85	0.00	0.00	0.00	-83.70
		28	-131.36	3.85	0.00	0.00	0.00	67.13
CRANE STRIKING U/S SIDE		24	0.00	-3.27	0.00	0.00	0.00	-40.25
		28	0.00	3.27	0.00	0.00	0.00	26.18
CRANE STRIKING D/S SIDE		24	0.00	7.63	0.00	0.00	0.00	54.58

TABLE NO.~ B-2 RESULTS OF ANALYSIS OF THE TRANSVERSE CENTRAL FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		28	0.00	-7.63	0.00	0.00	0.00	-21.78
WIND BLOWING U/S TO D/S		24	0.00	6.20	0.00	0.00	0.00	56.38
		28	0.00	-5.13	0.00	0.00	0.00	-32.04
WIND BLOWING D/S TO U/S		24	0.00	-8.59	0.00	0.00	0.00	-59.45
		28	0.00	6.10	0.00	0.00	0.00	27.86
DEAD LOAD + LIVE LOAD	45	27	73.53	3.84	0.00	0.00	0.00	3.61
		30	-54.69	-3.84	0.00	0.00	0.00	13.27
EARTHQUAKE (TRANSVERSE)		27	0.00	8.96	0.00	0.00	0.00	49.34
		30	0.00	-8.96	0.00	0.00	0.00	-9.93
CRANE MOVING U/S TO D/S		27	131.36	3.85	0.00	0.00	0.00	67.13
		30	-131.36	-3.85	0.00	0.00	0.00	-50.17
CRANE MOVING D/S TO U/S		27	41.36	-7.05	0.00	0.00	0.00	-32.60
		30	-41.36	7.05	0.00	0.00	0.00	1.60
CRANE STRIKING U/S SIDE		27	0.00	-7.63	0.00	0.00	0.00	-21.78
		30	0.00	7.63	0.00	0.00	0.00	-11.78
CRANE STRIKING D/S SIDE		27	0.00	3.27	0.00	0.00	0.00	26.18
		30	0.00	-3.27	0.00	0.00	0.00	-11.78
WIND BLOWING U/S TO D/S		27	0.00	6.10	0.00	0.00	0.00	27.86
		30	0.00	-3.22	0.00	0.00	0.00	-7.35
WIND BLOWING D/S TO U/S		27	0.00	-5.13	0.00	0.00	0.00	-32.04
		30	0.00	3.89	0.00	0.00	0.00	12.19
DEAD LOAD + LIVE LOAD	46	28	73.53	-3.84	0.00	0.00	0.00	-3.61
		31	-54.69	3.84	0.00	0.00	0.00	-13.27
EARTHQUAKE (TRANSVERSE)		28	0.00	8.96	0.00	0.00	0.00	49.34
		31	0.00	-8.96	0.00	0.00	0.00	-9.93
CRANE MOVING U/S TO D/S		28	41.36	7.05	0.00	0.00	0.00	32.60
		31	-41.36	-7.05	0.00	0.00	0.00	-1.60
CRANE MOVING D/S TO U/S		28	131.36	-3.85	0.00	0.00	0.00	-67.13
		31	-131.36	3.85	0.00	0.00	0.00	50.17
CRANE STRIKING U/S SIDE		28	0.00	-3.27	0.00	0.00	0.00	-26.18
		31	0.00	3.27	0.00	0.00	0.00	11.78
CRANE STRIKING D/S SIDE		28	0.00	7.63	0.00	0.00	0.00	21.78
		31	0.00	-7.63	0.00	0.00	0.00	11.78
WIND BLOWING U/S TO D/S		28	0.00	5.13	0.00	0.00	0.00	32.04
		31	0.00	-3.89	0.00	0.00	0.00	-12.19
WIND BLOWING D/S TO U/S		28	0.00	-6.10	0.00	0.00	0.00	-27.86
		31	0.00	3.22	0.00	0.00	0.00	7.35
DEAD LOAD + LIVE LOAD	48	30	29.94	3.84	0.00	0.00	0.00	13.81
		33	-22.89	-3.84	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		30	0.00	2.76	0.00	0.00	0.00	9.93
		33	0.00	-2.76	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		30	0.00	-7.05	0.00	0.00	0.00	-25.36
		33	0.00	7.05	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		30	0.00	-7.05	0.00	0.00	0.00	-25.36
		33	0.00	7.05	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		30	0.00	3.27	0.00	0.00	0.00	11.78
		33	0.00	-3.27	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		30	0.00	3.27	0.00	0.00	0.00	11.78
		33	0.00	-3.27	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		30	0.00	3.22	0.00	0.00	0.00	7.35
		33	0.00	-0.86	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		30	0.00	-3.89	0.00	0.00	0.00	-12.19
		33	0.00	2.88	0.00	0.00	0.00	0.00
DEAD LOAD + LIVE LOAD	49	31	29.94	-3.84	0.00	0.00	0.00	-13.81
		34	-22.89	3.84	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		31	0.00	2.76	0.00	0.00	0.00	9.93
		34	0.00	-2.76	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		31	0.00	7.05	0.00	0.00	0.00	25.36

TABLE NO.~ B-2 RESULTS OF ANALYSIS OF THE TRANSVERSE CENTRAL FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		34	0.00	-7.05	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		31	0.00	7.05	0.00	0.00	0.00	25.36
		34	0.00	-7.05	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		31	0.00	-3.27	0.00	0.00	0.00	-11.78
		34	0.00	3.27	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		31	0.00	-3.27	0.00	0.00	0.00	-11.78
		34	0.00	3.27	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		31	0.00	3.89	0.00	0.00	0.00	12.19
		34	0.00	-2.88	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		31	0.00	-3.22	0.00	0.00	0.00	-7.35
		34	0.00	0.86	0.00	0.00	0.00	0.00
DEAD LOAD + LIVE LOAD	55	33	-3.84	0.00	0.00	0.00	0.00	0.00
		34	3.84	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		33	0.00	0.00	0.00	0.00	0.00	0.00
		34	0.00	0.00	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		33	7.05	0.00	0.00	0.00	0.00	0.00
		34	-7.05	0.00	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		33	7.05	0.00	0.00	0.00	0.00	0.00
		34	-7.05	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING U/S SIDE		33	-3.27	0.00	0.00	0.00	0.00	0.00
		34	3.27	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING D/S SIDE		33	-3.27	0.00	0.00	0.00	0.00	0.00
		34	3.27	0.00	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		33	1.76	0.00	0.00	0.00	0.00	0.00
		34	-1.76	0.00	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		33	1.76	0.00	0.00	0.00	0.00	0.00
		34	-1.76	0.00	0.00	0.00	0.00	0.00

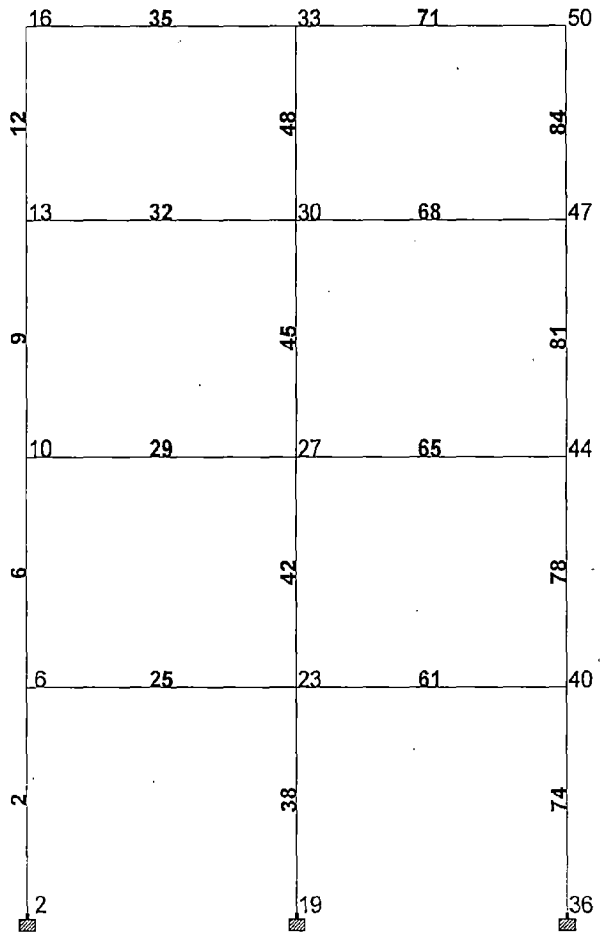

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FIG. NO.- B3 THE U/S GANTRY COLUMN FRAME (SYMMETRICAL FRAME)

TABLE NO.~ B- 3 RESULTS OF ANALYSIS OF THE U/S GANTRY COLUMN FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	2	2	113.17	-2.13	0.00	0.00	0.00	-3.07
		6	-95.18	2.13	0.00	0.00	0.00	-5.88
EARTHQUAKE (LONGITUDINAL)		2	-15.55	8.85	0.00	0.00	0.00	61.36
		6	15.55	-8.85	0.00	0.00	0.00	-24.17
CRANE MOVING (LONGITUDINAL)		2	48.03	2.75	0.00	0.00	0.00	19.64
		6	-48.03	-2.75	0.00	0.00	0.00	-8.10
DEAD LOAD + LIVE LOAD	6	6	81.74	-2.98	0.00	0.00	0.00	-6.40
		10	-63.32	2.98	0.00	0.00	0.00	-6.40
EARTHQUAKE (LONGITUDINAL)		6	-12.20	8.13	0.00	0.00	0.00	33.42
		10	12.20	-8.13	0.00	0.00	0.00	1.56
CRANE MOVING (LONGITUDINAL)		6	49.07	2.61	0.00	0.00	0.00	10.98
		10	-49.07	-2.61	0.00	0.00	0.00	0.26
DEAD LOAD + LIVE LOAD	9	10	49.56	-3.03	0.00	0.00	0.00	-6.26
		13	-30.71	3.03	0.00	0.00	0.00	-7.08
EARTHQUAKE (LONGITUDINAL)		10	-7.58	6.39	0.00	0.00	0.00	11.20
		13	7.58	-6.39	0.00	0.00	0.00	16.91
CRANE MOVING (LONGITUDINAL)		10	50.51	2.47	0.00	0.00	0.00	3.70
		13	-50.51	-2.47	0.00	0.00	0.00	7.18
DEAD LOAD + LIVE LOAD	12	13	18.31	-1.52	0.00	0.00	0.00	-3.58
		16	-11.26	1.52	0.00	0.00	0.00	-1.88
EARTHQUAKE (LONGITUDINAL)		13	-3.20	1.15	0.00	0.00	0.00	-4.84
		16	3.20	-1.15	0.00	0.00	0.00	8.98
CRANE MOVING (LONGITUDINAL)		13	-0.75	-0.45	0.00	0.00	0.00	-3.75
		16	0.75	0.45	0.00	0.00	0.00	2.13
DEAD LOAD + LIVE LOAD	25	6	-0.85	13.44	0.00	0.00	0.00	12.28
		23	0.85	13.44	0.00	0.00	0.00	-12.26
EARTHQUAKE (LONGITUDINAL)		6	-0.42	-3.35	0.00	0.00	0.00	-9.25
		23	0.42	3.35	0.00	0.00	0.00	-9.17
CRANE MOVING (LONGITUDINAL)		6	-0.13	-1.04	0.00	0.00	0.00	-2.89
		23	0.13	1.04	0.00	0.00	0.00	-2.86
DEAD LOAD + LIVE LOAD	29	10	-0.05	13.76	0.00	0.00	0.00	12.65
		27	0.05	13.67	0.00	0.00	0.00	-12.38
EARTHQUAKE (LONGITUDINAL)		10	-0.29	-4.62	0.00	0.00	0.00	-12.76
		27	0.29	4.62	0.00	0.00	0.00	-12.67
CRANE MOVING (LONGITUDINAL)		10	-0.14	-1.43	0.00	0.00	0.00	-3.96
		27	0.14	1.43	0.00	0.00	0.00	-3.93
DEAD LOAD + LIVE LOAD	32	13	1.52	11.58	0.00	0.00	0.00	10.65
		30	-1.52	11.45	0.00	0.00	0.00	-10.32
EARTHQUAKE (LONGITUDINAL)		13	-0.96	-4.37	0.00	0.00	0.00	-12.07
		30	0.96	4.37	0.00	0.00	0.00	-11.97
CRANE MOVING (LONGITUDINAL)		13	-0.73	-1.24	0.00	0.00	0.00	-3.43
		30	0.73	1.24	0.00	0.00	0.00	-3.39
DEAD LOAD + LIVE LOAD	35	16	1.52	1.76	0.00	0.00	0.00	1.88
		33	-1.52	1.47	0.00	0.00	0.00	-1.06
EARTHQUAKE (LONGITUDINAL)		16	0.92	-3.20	0.00	0.00	0.00	-8.98
		33	-0.92	3.20	0.00	0.00	0.00	-8.64
CRANE MOVING (LONGITUDINAL)		16	0.45	-0.75	0.00	0.00	0.00	-2.13
		33	-0.45	0.75	0.00	0.00	0.00	-2.02
DEAD LOAD + LIVE LOAD	38	19	162.99	0.00	0.00	0.00	0.00	0.00
		23	-145.00	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		19	0.00	10.25	0.00	0.00	0.00	63.32
		23	0.00	-10.25	0.00	0.00	0.00	-20.29
CRANE MOVING (LONGITUDINAL)		19	86.77	3.22	0.00	0.00	0.00	20.30
		23	-86.77	-3.22	0.00	0.00	0.00	-6.79
DEAD LOAD + LIVE LOAD	42	23	118.13	0.00	0.00	0.00	0.00	0.00

TABLE NO.~ B- 3 RESULTS OF ANALYSIS OF THE U/S GANTRY COLUMN FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		27	-99.72	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		23	0.00	10.68	0.00	0.00	0.00	38.63
		27	0.00	-10.68	0.00	0.00	0.00	7.27
CRANE MOVING (LONGITUDINAL)		23	86.85	3.45	0.00	0.00	0.00	12.73
		27	-86.85	-3.45	0.00	0.00	0.00	2.09
DEAD LOAD + LIVE LOAD	**45**	27	72.38	0.00	0.00	0.00	0.00	0.00
		30	-53.54	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		27	0.00	9.54	0.00	0.00	0.00	18.06
		30	0.00	-9.54	0.00	0.00	0.00	23.92
CRANE MOVING (LONGITUDINAL)		27	87.02	3.65	0.00	0.00	0.00	6.22
		30	-87.02	-3.65	0.00	0.00	0.00	9.85
DEAD LOAD + LIVE LOAD	**48**	30	28.98	0.00	0.00	0.00	0.00	0.00
		33	-21.93	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		30	0.00	4.81	0.00	0.00	0.00	0.03
		33	0.00	-4.81	0.00	0.00	0.00	17.28
CRANE MOVING (LONGITUDINAL)		30	-0.23	0.64	0.00	0.00	0.00	-2.38
		33	0.23	-0.64	0.00	0.00	0.00	4.69
DEAD LOAD + LIVE LOAD	**61**	23	-0.85	13.44	0.00	0.00	0.00	12.26
		40	0.85	13.44	0.00	0.00	0.00	-12.28
EARTHQUAKE (LONGITUDINAL)		23	0.42	-3.35	0.00	0.00	0.00	-9.17
		40	-0.42	3.35	0.00	0.00	0.00	-9.25
CRANE MOVING (LONGITUDINAL)		23	0.10	-1.13	0.00	0.00	0.00	-3.09
		40	-0.10	1.13	0.00	0.00	0.00	-3.11
DEAD LOAD + LIVE LOAD	**65**	27	-0.05	13.67	0.00	0.00	0.00	12.38
		44	0.05	13.76	0.00	0.00	0.00	-12.65
EARTHQUAKE (LONGITUDINAL)		27	0.29	-4.62	0.00	0.00	0.00	-12.67
		44	-0.29	4.62	0.00	0.00	0.00	-12.76
CRANE MOVING (LONGITUDINAL)		27	0.06	-1.60	0.00	0.00	0.00	-4.38
		44	-0.06	1.60	0.00	0.00	0.00	-4.41
DEAD LOAD + LIVE LOAD	**68**	30	1.52	11.45	0.00	0.00	0.00	10.32
		47	-1.52	11.58	0.00	0.00	0.00	-10.65
EARTHQUAKE (LONGITUDINAL)		30	0.96	-4.37	0.00	0.00	0.00	-11.97
		47	-0.96	4.37	0.00	0.00	0.00	-12.07
CRANE MOVING (LONGITUDINAL)		30	0.63	-1.49	0.00	0.00	0.00	-4.08
		47	-0.63	1.49	0.00	0.00	0.00	-4.11
DEAD LOAD + LIVE LOAD	**71**	33	1.52	1.47	0.00	0.00	0.00	1.06
		50	-1.52	1.76	0.00	0.00	0.00	-1.88
EARTHQUAKE (LONGITUDINAL)		33	-0.92	-3.20	0.00	0.00	0.00	-8.64
		50	0.92	3.20	0.00	0.00	0.00	-8.98
CRANE MOVING (LONGITUDINAL)		33	-0.19	-0.99	0.00	0.00	0.00	-2.68
		50	0.19	0.99	0.00	0.00	0.00	-2.76
DEAD LOAD + LIVE LOAD	**74**	36	113.17	2.13	0.00	0.00	0.00	3.07
		40	-95.18	-2.13	0.00	0.00	0.00	5.88
EARTHQUAKE (LONGITUDINAL)		36	15.55	8.85	0.00	0.00	0.00	61.36
		40	-15.55	-8.85	0.00	0.00	0.00	-24.17
CRANE MOVING (LONGITUDINAL)		36	57.70	2.78	0.00	0.00	0.00	19.70
		40	-57.70	-2.78	0.00	0.00	0.00	-8.01
DEAD LOAD + LIVE LOAD	**78**	40	81.74	2.98	0.00	0.00	0.00	6.40
		44	-63.32	-2.98	0.00	0.00	0.00	6.40
EARTHQUAKE (LONGITUDINAL)		40	12.20	8.13	0.00	0.00	0.00	33.42
		44	-12.20	-8.13	0.00	0.00	0.00	1.56
CRANE MOVING (LONGITUDINAL)		40	56.58	2.69	0.00	0.00	0.00	11.12
		44	-56.58	-2.69	0.00	0.00	0.00	0.43
DEAD LOAD + LIVE LOAD	**81**	44	49.56	3.03	0.00	0.00	0.00	6.26
		47	-30.71	-3.03	0.00	0.00	0.00	7.08

TABLE NO.~ B- 3 RESULTS OF ANALYSIS OF THE U/S GANTRY COLUMN FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
EARTHQUAKE (LONGITUDINAL)		44	7.58	6.39	0.00	0.00	0.00	11.20
		47	-7.58	-6.39	0.00	0.00	0.00	16.91
CRANE MOVING (LONGITUDINAL)		44	54.98	2.62	0.00	0.00	0.00	3.98
		47	-54.98	-2.62	0.00	0.00	0.00	7.57
DEAD LOAD + LIVE LOAD	84	47	18.31	1.52	0.00	0.00	0.00	3.58
		50	-11.26	-1.52	0.00	0.00	0.00	1.88
EARTHQUAKE (LONGITUDINAL)		47	3.20	1.15	0.00	0.00	0.00	-4.84
		50	-3.20	-1.15	0.00	0.00	0.00	8.98
CRANE MOVING (LONGITUDINAL)		47	0.99	-0.19	0.00	0.00	0.00	-3.46
		50	-0.99	0.19	0.00	0.00	0.00	2.76

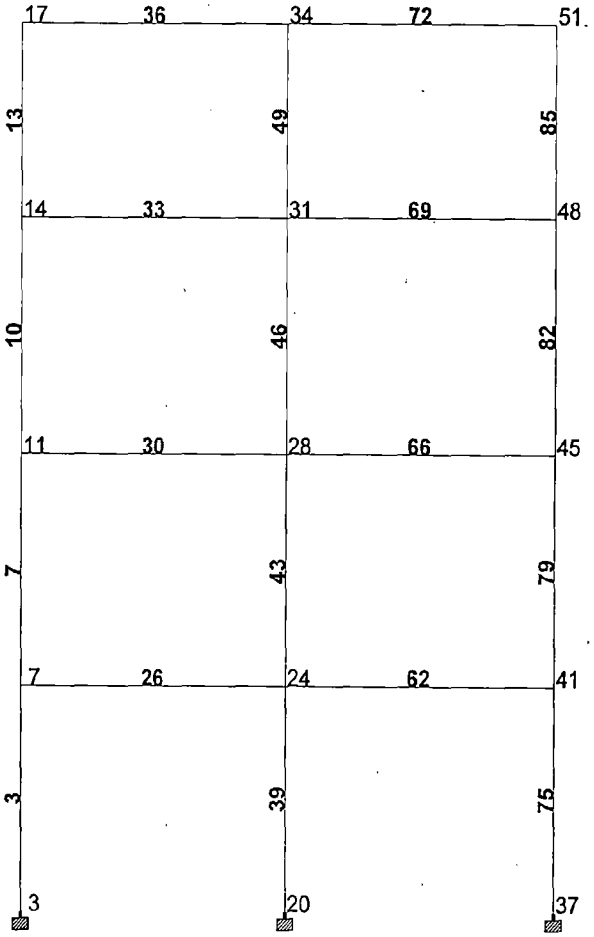

FIG. NO.- B4 THE D/S GANTRY COLUMN FRAME (SYMMETRICAL FRAME)

TABLE NO.~ B- 4 RESULTS OF ANALYSIS OF THE D/S GANTRY COLUMN FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	3	3	113.17	-2.13	0.00	0.00	0.00	-3.07
		7	-95.18	2.13	0.00	0.00	0.00	-5.88
EARTHQUAKE (LONGITUDINAL)		3	-15.55	8.85	0.00	0.00	0.00	61.36
		7	15.55	-8.85	0.00	0.00	0.00	-24.17
CRANE MOVING (LONGITUDINAL)		3	48.03	2.75	0.00	0.00	0.00	19.64
		7	-48.03	-2.75	0.00	0.00	0.00	-8.10
DEAD LOAD + LIVE LOAD	7	7	81.74	-2.98	0.00	0.00	0.00	-6.40
		11	-63.32	2.98	0.00	0.00	0.00	-6.40
EARTHQUAKE (LONGITUDINAL)		7	-12.20	8.13	0.00	0.00	0.00	33.42
		11	12.20	-8.13	0.00	0.00	0.00	1.56
CRANE MOVING (LONGITUDINAL)		7	49.07	2.61	0.00	0.00	0.00	10.98
		11	-49.07	-2.61	0.00	0.00	0.00	0.26
DEAD LOAD + LIVE LOAD	10	11	49.56	-3.03	0.00	0.00	0.00	-6.26
		14	-30.71	3.03	0.00	0.00	0.00	-7.08
EARTHQUAKE (LONGITUDINAL)		11	-7.58	6.39	0.00	0.00	0.00	11.20
		14	7.58	-6.39	0.00	0.00	0.00	16.91
CRANE MOVING (LONGITUDINAL)		11	50.51	2.47	0.00	0.00	0.00	3.70
		14	-50.51	-2.47	0.00	0.00	0.00	7.18
DEAD LOAD + LIVE LOAD	13	14	18.31	-1.52	0.00	0.00	0.00	-3.58
		17	-11.26	1.52	0.00	0.00	0.00	-1.88
EARTHQUAKE (LONGITUDINAL)		14	-3.20	1.15	0.00	0.00	0.00	-4.84
		17	3.20	-1.15	0.00	0.00	0.00	8.98
CRANE MOVING (LONGITUDINAL)		14	-0.75	-0.45	0.00	0.00	0.00	-3.75
		17	0.75	0.45	0.00	0.00	0.00	2.13
DEAD LOAD + LIVE LOAD	26	7	-0.85	13.44	0.00	0.00	0.00	12.28
		24	0.85	13.44	0.00	0.00	0.00	-12.26
EARTHQUAKE (LONGITUDINAL)		7	-0.42	-3.35	0.00	0.00	0.00	-9.25
		24	0.42	3.35	0.00	0.00	0.00	-9.17
CRANE MOVING (LONGITUDINAL)		7	-0.13	-1.04	0.00	0.00	0.00	-2.89
		24	0.13	1.04	0.00	0.00	0.00	-2.86
DEAD LOAD + LIVE LOAD	30	11	-0.05	13.76	0.00	0.00	0.00	12.65
		28	0.05	13.67	0.00	0.00	0.00	-12.38
EARTHQUAKE (LONGITUDINAL)		11	-0.29	-4.62	0.00	0.00	0.00	-12.76
		28	0.29	4.62	0.00	0.00	0.00	-12.67
CRANE MOVING (LONGITUDINAL)		11	-0.14	-1.43	0.00	0.00	0.00	-3.96
		28	0.14	1.43	0.00	0.00	0.00	-3.93
DEAD LOAD + LIVE LOAD	33	14	1.52	11.58	0.00	0.00	0.00	10.65
		31	-1.52	11.45	0.00	0.00	0.00	-10.32
EARTHQUAKE (LONGITUDINAL)		14	-0.96	-4.37	0.00	0.00	0.00	-12.07
		31	0.96	4.37	0.00	0.00	0.00	-11.97
CRANE MOVING (LONGITUDINAL)		14	-0.73	-1.24	0.00	0.00	0.00	-3.43
		31	0.73	1.24	0.00	0.00	0.00	-3.39
DEAD LOAD + LIVE LOAD	36	17	1.52	1.76	0.00	0.00	0.00	1.88
		34	-1.52	1.47	0.00	0.00	0.00	-1.06
EARTHQUAKE (LONGITUDINAL)		17	0.92	-3.20	0.00	0.00	0.00	-8.98
		34	-0.92	3.20	0.00	0.00	0.00	-8.64
CRANE MOVING (LONGITUDINAL)		17	0.45	-0.75	0.00	0.00	0.00	-2.13
		34	-0.45	0.75	0.00	0.00	0.00	-2.02
DEAD LOAD + LIVE LOAD	39	20	162.99	0.00	0.00	0.00	0.00	0.00
		24	-145.00	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		20	0.00	10.25	0.00	0.00	0.00	63.32
		24	0.00	-10.25	0.00	0.00	0.00	-20.29
CRANE MOVING (LONGITUDINAL)		20	86.77	3.22	0.00	0.00	0.00	20.30
		24	-86.77	-3.22	0.00	0.00	0.00	-6.79

TABLE NO.~ B- 4 RESULTS OF ANALYSIS OF THE D/S GANTRY COLUMN FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	43	24	118.13	0.00	0.00	0.00	0.00	0.00
		28	-99.72	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		24	0.00	10.68	0.00	0.00	0.00	38.63
		28	0.00	-10.68	0.00	0.00	0.00	7.27
CRANE MOVING (LONGITUDINAL)		24	86.85	3.45	0.00	0.00	0.00	12.73
		28	-86.85	-3.45	0.00	0.00	0.00	2.09
DEAD LOAD + LIVE LOAD	46	28	72.38	0.00	0.00	0.00	0.00	0.00
		31	-53.54	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		28	0.00	9.54	0.00	0.00	0.00	18.06
		31	0.00	-9.54	0.00	0.00	0.00	23.92
CRANE MOVING (LONGITUDINAL)		28	87.02	3.65	0.00	0.00	0.00	6.22
		31	-87.02	-3.65	0.00	0.00	0.00	9.85
DEAD LOAD + LIVE LOAD	49	31	28.98	0.00	0.00	0.00	0.00	0.00
		34	-21.93	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		31	0.00	4.81	0.00	0.00	0.00	0.03
		34	0.00	-4.81	0.00	0.00	0.00	17.28
CRANE MOVING (LONGITUDINAL)		31	-0.23	0.64	0.00	0.00	0.00	-2.38
		34	0.23	-0.64	0.00	0.00	0.00	4.69
DEAD LOAD + LIVE LOAD	62	24	-0.85	13.44	0.00	0.00	0.00	12.26
		41	0.85	13.44	0.00	0.00	0.00	-12.28
EARTHQUAKE (LONGITUDINAL)		24	0.42	-3.35	0.00	0.00	0.00	-9.17
		41	-0.42	3.35	0.00	0.00	0.00	-9.25
CRANE MOVING (LONGITUDINAL)		24	0.10	-1.13	0.00	0.00	0.00	-3.09
		41	-0.10	1.13	0.00	0.00	0.00	-3.11
DEAD LOAD + LIVE LOAD	66	28	-0.05	13.67	0.00	0.00	0.00	12.38
		45	0.05	13.76	0.00	0.00	0.00	-12.65
EARTHQUAKE (LONGITUDINAL)		28	0.29	-4.62	0.00	0.00	0.00	-12.67
		45	-0.29	4.62	0.00	0.00	0.00	-12.76
CRANE MOVING (LONGITUDINAL)		28	0.06	-1.60	0.00	0.00	0.00	-4.38
		45	-0.06	1.60	0.00	0.00	0.00	-4.41
DEAD LOAD + LIVE LOAD	69	31	1.52	11.45	0.00	0.00	0.00	10.32
		48	-1.52	11.58	0.00	0.00	0.00	-10.65
EARTHQUAKE (LONGITUDINAL)		31	0.96	-4.37	0.00	0.00	0.00	-11.97
		48	-0.96	4.37	0.00	0.00	0.00	-12.07
CRANE MOVING (LONGITUDINAL)		31	0.63	-1.49	0.00	0.00	0.00	-4.08
		48	-0.63	1.49	0.00	0.00	0.00	-4.11
DEAD LOAD + LIVE LOAD	72	34	1.52	1.47	0.00	0.00	0.00	1.06
		51	-1.52	1.76	0.00	0.00	0.00	-1.88
EARTHQUAKE (LONGITUDINAL)		34	-0.92	-3.20	0.00	0.00	0.00	-8.64
		51	0.92	3.20	0.00	0.00	0.00	-8.98
CRANE MOVING (LONGITUDINAL)		34	-0.19	-0.99	0.00	0.00	0.00	-2.68
		51	0.19	0.99	0.00	0.00	0.00	-2.76
DEAD LOAD + LIVE LOAD	75	37	113.17	2.13	0.00	0.00	0.00	3.07
		41	-95.18	-2.13	0.00	0.00	0.00	5.88
EARTHQUAKE (LONGITUDINAL)		37	15.55	8.85	0.00	0.00	0.00	61.36
		41	-15.55	-8.85	0.00	0.00	0.00	-24.17
CRANE MOVING (LONGITUDINAL)		37	57.70	2.78	0.00	0.00	0.00	19.70
		41	-57.70	-2.78	0.00	0.00	0.00	-8.01
DEAD LOAD + LIVE LOAD	79	41	81.74	2.98	0.00	0.00	0.00	6.40
		45	-63.32	-2.98	0.00	0.00	0.00	6.40
EARTHQUAKE (LONGITUDINAL)		41	12.20	8.13	0.00	0.00	0.00	33.42
		45	-12.20	-8.13	0.00	0.00	0.00	1.56
CRANE MOVING (LONGITUDINAL)		41	56.58	2.69	0.00	0.00	0.00	11.12
		45	-56.58	-2.69	0.00	0.00	0.00	0.43

TABLE NO.~ B- 4 RESULTS OF ANALYSIS OF THE D/S GANTRY COLUMN FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	82	45	49.56	3.03	0.00	0.00	0.00	6.26
		48	-30.71	-3.03	0.00	0.00	0.00	7.08
EARTHQUAKE (LONGITUDINAL)		45	7.58	6.39	0.00	0.00	0.00	11.20
		48	-7.58	-6.39	0.00	0.00	0.00	16.91
CRANE MOVING (LONGITUDINAL)		45	54.98	2.62	0.00	0.00	0.00	3.98
		48	-54.98	-2.62	0.00	0.00	0.00	7.57
DEAD LOAD + LIVE LOAD	85	48	18.31	1.52	0.00	0.00	0.00	3.58
		51	-11.26	-1.52	0.00	0.00	0.00	1.88
EARTHQUAKE (LONGITUDINAL)		48	3.20	1.15	0.00	0.00	0.00	-4.84
		51	-3.20	-1.15	0.00	0.00	0.00	8.98
CRANE MOVING (LONGITUDINAL)		48	0.99	-0.19	0.00	0.00	0.00	-3.46
		51	-0.99	0.19	0.00	0.00	0.00	2.76

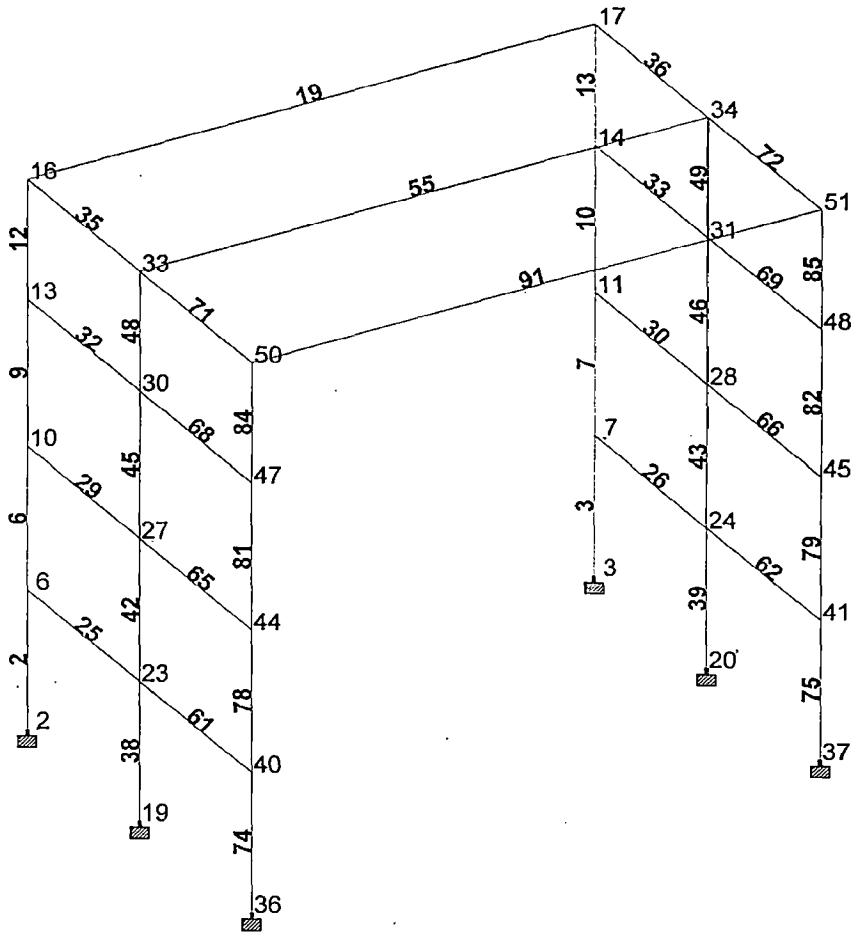

FIG.NO.- B5 THE THREE-DIMENSIONAL (SPACE) FRAME (SYMMETRICAL FRAME)

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	2	2	113.76	1.99	2.13	0.33	-3.07	-0.29
		6	-95.77	-1.99	-2.13	-0.33	-5.88	8.63
EARTHQUAKE (TRANSVERSE)		2	0.00	9.37	0.00	-2.04	0.00	120.19
		6	0.00	-9.37	0.00	2.04	0.00	-80.83
EARTHQUAKE (LONGITUDINAL)		2	-15.55	0.00	-8.85	0.00	61.36	0.00
		6	15.55	0.00	8.85	0.00	-24.17	0.00
WIND BLOWING U/S TO D/S		2	0.00	6.30	0.00	-1.95	0.00	61.02
		6	0.00	-5.08	0.00	1.95	0.00	-37.12
WIND BLOWING D/S TO U/S		2	0.00	-4.33	0.00	1.60	0.00	-52.55
		6	0.00	3.81	0.00	-1.60	0.00	35.44
CRANE MOVING U/S TO D/S		2	79.37	3.09	0.03	-2.08	-0.04	70.52
		6	-79.37	-3.09	-0.03	2.08	-0.06	-57.56
CRANE MOVING D/S TO U/S		2	24.99	-4.86	0.01	1.23	-0.01	-64.95
		6	-24.99	4.86	-0.01	-1.23	-0.02	44.53
CRANE STRIKING U/S		2	0.00	-5.14	0.00	1.50	0.00	-59.04
		6	0.00	5.14	0.00	-1.50	0.00	37.44
CRANE STRIKING D/S		2	0.00	2.36	0.00	-0.76	0.00	38.36
		6	0.00	-2.36	0.00	0.76	0.00	-28.47
CRANE MOVING (LONGITUDINAL)		2	48.03	-2.31	-2.75	-0.05	19.64	-7.65
		6	-48.03	2.31	2.75	0.05	-8.10	-2.05
DEAD LOAD + LIVE LOAD	3	3	113.76	-1.99	2.13	-0.33	-3.07	0.29
		7	-95.77	1.99	-2.13	0.33	-5.88	-8.63
EARTHQUAKE (TRANSVERSE)		3	0.00	9.37	0.00	-2.04	0.00	120.19
		7	0.00	-9.37	0.00	2.04	0.00	-80.83
EARTHQUAKE (LONGITUDINAL)		3	-15.55	0.00	-8.85	0.00	61.36	0.00
		7	15.55	0.00	8.85	0.00	-24.17	0.00
WIND BLOWING U/S TO D/S		3	0.00	4.33	0.00	-1.60	0.00	52.55
		7	0.00	-3.81	0.00	1.60	0.00	-35.44
WIND BLOWING D/S TO U/S		3	0.00	-6.30	0.00	1.95	0.00	-61.02
		7	0.00	5.08	0.00	-1.95	0.00	37.12
CRANE MOVING U/S TO D/S		3	24.99	4.86	0.01	-1.23	-0.01	64.95
		7	-24.99	-4.86	-0.01	1.23	-0.02	-44.53
CRANE MOVING D/S TO U/S		3	79.37	-3.09	0.03	2.08	-0.04	-70.52
		7	-79.37	3.09	-0.03	-2.08	-0.06	57.56
CRANE STRIKING U/S		3	0.00	-2.36	0.00	0.76	0.00	-38.36
		7	0.00	2.36	0.00	-0.76	0.00	28.47
CRANE STRIKING D/S		3	0.00	5.14	0.00	-1.50	0.00	59.04
		7	0.00	-5.14	0.00	1.50	0.00	-37.44
CRANE MOVING (LONGITUDINAL)		3	48.03	2.31	-2.75	0.05	19.64	7.65
		7	-48.03	-2.31	2.75	-0.05	-8.10	2.05
DEAD LOAD + LIVE LOAD	6	6	82.33	1.99	2.98	0.33	-6.40	0.48
		10	-63.91	-1.99	-2.98	-0.33	-6.40	8.07
EARTHQUAKE (TRANSVERSE)		6	0.00	9.03	0.00	-1.99	0.00	80.76
		10	0.00	-9.03	0.00	1.99	0.00	-41.93
EARTHQUAKE (LONGITUDINAL)		6	-12.20	0.00	-8.13	0.00	33.42	0.00
		10	12.20	0.00	8.13	0.00	1.56	0.00
WIND BLOWING U/S TO D/S		6	0.00	5.05	0.00	-1.88	0.00	37.05
		10	0.00	-3.81	0.00	1.88	0.00	-18.01
WIND BLOWING D/S TO U/S		6	0.00	-3.79	0.00	1.57	0.00	-35.40
		10	0.00	3.26	0.00	-1.57	0.00	20.23
CRANE MOVING U/S TO D/S		6	79.31	3.08	0.05	-2.09	-0.10	57.50
		10	-79.31	-3.08	-0.05	2.09	-0.13	-44.26
CRANE MOVING D/S TO U/S		6	24.97	-4.85	0.02	1.21	-0.03	-44.49
		10	-24.97	4.85	-0.02	-1.21	-0.04	23.65
CRANE STRIKING U/S		6	0.00	-5.11	0.00	1.44	0.00	-37.38
		10	0.00	5.11	0.00	-1.44	0.00	15.40
CRANE STRIKING D/S		6	0.00	2.35	0.00	-0.76	0.00	28.45
		10	0.00	-2.35	0.00	0.76	0.00	-18.33
CRANE MOVING (LONGITUDINAL)		6	49.07	-2.29	-2.61	-0.10	10.98	2.06
		10	-49.07	2.29	2.61	0.10	0.26	-11.93

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
DEAD LOAD + LIVE LOAD	7	7	82.33	-1.99	2.98	-0.33	-6.40	-0.48
		11	-63.91	1.99	-2.98	0.33	-6.40	-8.07
EARTHQUAKE (TRANSVERSE)		7	0.00	9.03	0.00	-1.99	0.00	80.76
		11	0.00	-9.03	0.00	1.99	0.00	-41.93
EARTHQUAKE (LONGITUDINAL)		7	-12.20	0.00	-8.13	0.00	33.42	0.00
		11	12.20	0.00	8.13	0.00	1.56	0.00
WIND BLOWING U/S TO D/S		7	0.00	3.79	0.00	-1.57	0.00	35.40
		11	0.00	-3.26	0.00	1.57	0.00	-20.23
WIND BLOWING D/S TO U/S		7	0.00	-5.05	0.00	1.88	0.00	-37.05
		11	0.00	3.81	0.00	-1.88	0.00	18.01
CRANE MOVING U/S TO D/S		7	24.97	4.85	0.02	-1.21	-0.03	44.49
		11	-24.97	-4.85	-0.02	1.21	-0.04	-23.65
CRANE MOVING D/S TO U/S		7	79.31	-3.08	0.05	2.09	-0.10	-57.50
		11	-79.31	3.08	-0.05	-2.09	-0.13	44.26
CRANE STRIKING U/S		7	0.00	-2.35	0.00	0.76	0.00	-28.45
		11	0.00	2.35	0.00	-0.76	0.00	18.33
CRANE STRIKING D/S		7	0.00	5.11	0.00	-1.44	0.00	37.38
		11	0.00	-5.11	0.00	1.44	0.00	-15.40
CRANE MOVING (LONGITUDINAL)		7	49.07	2.29	-2.61	0.10	10.98	-2.06
		11	-49.07	-2.29	2.61	-0.10	0.26	11.93
DEAD LOAD + LIVE LOAD	9	10	50.15	2.02	3.03	0.26	-6.26	1.25
		13	-31.30	-2.02	-3.03	-0.26	-7.08	7.64
EARTHQUAKE (TRANSVERSE)		10	0.00	7.36	0.00	-1.67	0.00	41.83
		13	0.00	-7.36	0.00	1.67	0.00	-9.43
EARTHQUAKE (LONGITUDINAL)		10	-7.58	0.00	-6.39	0.00	11.20	0.00
		13	7.58	0.00	6.39	0.00	16.91	0.00
WIND BLOWING U/S TO D/S		10	0.00	3.66	0.00	-1.54	0.00	17.92
		13	0.00	-2.22	0.00	1.54	0.00	-4.99
WIND BLOWING D/S TO U/S		10	0.00	-3.16	0.00	1.34	0.00	-20.16
		13	0.00	2.54	0.00	-1.34	0.00	7.63
CRANE MOVING U/S TO D/S		10	79.18	2.96	0.11	-1.82	-0.21	44.13
		13	-79.18	-2.96	-0.11	1.82	-0.29	-31.12
CRANE MOVING D/S TO U/S		10	24.93	-4.77	0.04	1.04	-0.07	-23.60
		13	-24.93	4.77	-0.04	-1.04	-0.09	2.59
CRANE STRIKING U/S		10	0.00	-4.98	0.00	1.12	0.00	-15.31
		13	0.00	4.98	0.00	-1.12	0.00	-6.59
CRANE STRIKING D/S		10	0.00	2.31	0.00	-0.68	0.00	18.29
		13	0.00	-2.31	0.00	0.68	0.00	-8.11
CRANE MOVING (LONGITUDINAL)		10	50.51	-2.27	-2.47	-0.17	3.70	11.91
		13	-50.51	2.27	2.47	0.17	7.18	-21.90
DEAD LOAD + LIVE LOAD	10	11	50.15	-2.02	3.03	-0.26	-6.26	-1.25
		14	-31.30	2.02	-3.03	0.26	-7.08	-7.64
EARTHQUAKE (TRANSVERSE)		11	0.00	7.36	0.00	-1.67	0.00	41.83
		14	0.00	-7.36	0.00	1.67	0.00	-9.43
EARTHQUAKE (LONGITUDINAL)		11	-7.58	0.00	-6.39	0.00	11.20	0.00
		14	7.58	0.00	6.39	0.00	16.91	0.00
WIND BLOWING U/S TO D/S		11	0.00	3.16	0.00	-1.34	0.00	20.16
		14	0.00	-2.54	0.00	1.34	0.00	-7.63
WIND BLOWING D/S TO U/S		11	0.00	-3.66	0.00	1.54	0.00	-17.92
		14	0.00	2.22	0.00	-1.54	0.00	4.99
CRANE MOVING U/S TO D/S		11	24.93	4.77	0.04	-1.04	-0.07	23.60
		14	-24.93	-4.77	-0.04	1.04	-0.09	-2.59
CRANE MOVING D/S TO U/S		11	79.18	-2.96	0.11	1.82	-0.21	-44.13
		14	-79.18	2.96	-0.11	-1.82	-0.29	31.12
CRANE STRIKING U/S		11	0.00	-2.31	0.00	0.68	0.00	-18.29
		14	0.00	2.31	0.00	-0.68	0.00	8.11
CRANE STRIKING D/S		11	0.00	4.98	0.00	-1.12	0.00	15.31
		14	0.00	-4.98	0.00	1.12	0.00	6.59
CRANE MOVING (LONGITUDINAL)		11	50.51	2.27	-2.47	0.17	3.70	-11.91

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		14	-50.51	-2.27	2.47	-0.17	7.18	21.90
DEAD LOAD + LIVE LOAD	12	13	18.90	2.11	1.52	0.04	-3.58	7.66
		16	-11.85	-2.11	-1.52	-0.04	-1.88	-0.08
EARTHQUAKE (TRANSVERSE)		13	0.00	2.56	0.00	-0.91	0.00	9.31
		16	0.00	-2.56	0.00	0.91	0.00	-0.08
EARTHQUAKE (LONGITUDINAL)		13	-3.20	0.00	-1.15	0.00	-4.84	0.00
		16	3.20	0.00	1.15	0.00	8.98	0.00
WIND BLOWING U/S TO D/S		13	0.00	1.93	0.00	-0.84	0.00	4.90
		16	0.00	-0.75	0.00	0.84	0.00	-0.07
WIND BLOWING D/S TO U/S		13	0.00	-2.32	0.00	0.80	0.00	-7.54
		16	0.00	1.81	0.00	-0.80	0.00	0.12
CRANE MOVING U/S TO D/S		13	0.18	-3.98	0.19	-0.84	-0.22	-14.42
		16	-0.18	3.98	-0.19	0.84	-0.47	0.08
CRANE MOVING D/S TO U/S		13	0.06	-4.63	0.06	0.70	-0.07	-16.82
		16	-0.06	4.63	-0.06	-0.70	-0.15	0.16
CRANE STRIKING U/S		13	0.00	1.83	0.00	0.46	0.00	6.67
		16	0.00	-1.83	0.00	-0.46	0.00	-0.07
CRANE STRIKING D/S		13	0.00	2.21	0.00	-0.44	0.00	8.06
		16	0.00	-2.21	0.00	0.44	0.00	-0.09
CRANE MOVING (LONGITUDINAL)		13	-0.75	-2.31	0.45	-0.06	-3.75	-8.37
		16	0.75	2.31	-0.45	0.06	2.13	0.05
DEAD LOAD + LIVE LOAD	13	14	18.90	-2.11	1.52	-0.04	-3.58	-7.66
		17	-11.85	2.11	-1.52	0.04	-1.88	0.08
EARTHQUAKE (TRANSVERSE)		14	0.00	2.56	0.00	-0.91	0.00	9.31
		17	0.00	-2.56	0.00	0.91	0.00	-0.08
EARTHQUAKE (LONGITUDINAL)		14	-3.20	0.00	-1.15	0.00	-4.84	0.00
		17	3.20	0.00	1.15	0.00	8.98	0.00
WIND BLOWING U/S TO D/S		14	0.00	2.32	0.00	-0.80	0.00	7.54
		17	0.00	-1.81	0.00	0.80	0.00	-0.12
WIND BLOWING D/S TO U/S		14	0.00	-1.93	0.00	0.84	0.00	-4.90
		17	0.00	0.75	0.00	-0.84	0.00	0.07
CRANE MOVING U/S TO D/S		14	0.06	4.63	0.06	-0.70	-0.07	16.82
		17	-0.06	-4.63	-0.06	0.70	-0.15	-0.16
CRANE MOVING D/S TO U/S		14	0.18	3.98	0.19	0.84	-0.22	14.42
		17	-0.18	-3.98	-0.19	-0.84	-0.47	-0.08
CRANE STRIKING U/S		14	0.00	-2.21	0.00	0.44	0.00	-8.06
		17	0.00	2.21	0.00	-0.44	0.00	0.09
CRANE STRIKING D/S		14	0.00	-1.83	0.00	-0.46	0.00	-6.67
		17	0.00	1.83	0.00	0.46	0.00	0.07
CRANE MOVING (LONGITUDINAL)		14	-0.75	2.31	0.45	0.06	-3.75	8.37
		17	0.75	-2.31	-0.45	-0.06	2.13	-0.05
DEAD LOAD + LIVE LOAD	19	16	-2.12	0.00	0.00	0.00	0.00	0.00
		17	2.12	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		16	0.00	0.00	0.00	0.00	0.00	0.00
		17	0.00	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		16	0.00	0.00	0.00	0.00	0.00	0.00
		17	0.00	0.00	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		16	0.91	0.00	0.00	0.00	0.00	0.00
		17	-0.91	0.00	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		16	0.91	0.00	0.00	0.00	0.00	0.00
		17	-0.91	0.00	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		16	4.34	0.00	0.00	0.00	0.00	0.00
		17	-4.34	0.00	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		16	4.34	0.00	0.00	0.00	0.00	0.00
		17	-4.34	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING U/S		16	-2.03	0.00	0.00	0.00	0.00	0.00
		17	2.03	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING D/S		16	-2.03	0.00	0.00	0.00	0.00	0.00
		17	2.03	0.00	0.00	0.00	0.00	0.00

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
CRANE MOVING (LONGITUDINAL)		16	2.34	0.00	0.00	0.00	0.00	0.00
		17	-2.34	0.00	0.00	0.00	0.00	0.00
DEAD LOAD + LIVE LOAD	**25**	6	-0.85	13.44	0.00	-0.02	0.00	12.28
		23	0.85	13.44	0.00	0.02	0.01	-12.26
EARTHQUAKE (TRANSVERSE)		6	0.00	0.00	0.03	0.07	-0.04	0.00
		23	0.00	0.00	-0.03	-0.07	-0.10	0.00
EARTHQUAKE (LONGITUDINAL)		6	-0.42	-3.35	0.00	0.00	0.00	-9.25
		23	0.42	3.35	0.00	0.00	0.00	-9.17
WIND BLOWING U/S TO D/S		6	0.00	0.00	0.04	0.07	-0.07	0.00
		23	0.00	0.00	-0.04	-0.07	-0.13	0.00
WIND BLOWING D/S TO U/S		6	0.00	0.00	-0.02	-0.05	0.03	0.00
		23	0.00	0.00	0.02	0.05	0.08	0.00
CRANE MOVING U/S TO D/S		6	-0.03	0.06	0.01	0.05	0.01	0.17
		23	0.03	-0.06	-0.01	-0.05	-0.05	0.17
CRANE MOVING D/S TO U/S		6	-0.01	0.02	-0.01	-0.04	0.02	0.05
		23	0.01	-0.02	0.01	0.04	0.06	0.05
CRANE STRIKING U/S		6	0.00	0.00	-0.03	-0.06	0.06	0.00
		23	0.00	0.00	0.03	0.06	0.11	0.00
CRANE STRIKING D/S		6	0.00	0.00	0.00	0.02	0.00	0.00
		23	0.00	0.00	0.00	-0.02	-0.02	0.00
CRANE MOVING (LONGITUDINAL)		6	-0.13	-1.04	-0.02	-0.01	0.05	-2.89
		23	0.13	1.04	0.02	0.01	0.05	-2.86
DEAD LOAD + LIVE LOAD	**26**	7	-0.85	13.44	0.00	0.02	0.00	12.28
		24	0.85	13.44	0.00	-0.02	-0.01	-12.26
EARTHQUAKE (TRANSVERSE)		7	0.00	0.00	0.03	0.07	-0.04	0.00
		24	0.00	0.00	-0.03	-0.07	-0.10	0.00
EARTHQUAKE (LONGITUDINAL)		7	-0.42	-3.35	0.00	0.00	0.00	-9.25
		24	0.42	3.35	0.00	0.00	0.00	-9.17
WIND BLOWING U/S TO D/S		7	0.00	0.00	0.02	0.05	-0.03	0.00
		24	0.00	0.00	-0.02	-0.05	-0.08	0.00
WIND BLOWING D/S TO U/S		7	0.00	0.00	-0.04	-0.07	0.07	0.00
		24	0.00	0.00	0.04	0.07	0.13	0.00
CRANE MOVING U/S TO D/S		7	-0.01	0.02	0.01	0.04	-0.02	0.05
		24	0.01	-0.02	-0.01	-0.04	-0.06	0.05
CRANE MOVING D/S TO U/S		7	-0.03	0.06	-0.01	-0.05	-0.01	0.17
		24	0.03	-0.06	0.01	0.05	0.05	0.17
CRANE STRIKING U/S		7	0.00	0.00	0.00	-0.02	0.00	0.00
		24	0.00	0.00	0.00	0.02	0.02	0.00
CRANE STRIKING D/S		7	0.00	0.00	0.03	0.06	-0.06	0.00
		24	0.00	0.00	-0.03	-0.06	-0.11	0.00
CRANE MOVING (LONGITUDINAL)		7	-0.13	-1.04	0.02	0.01	-0.05	-2.89
		24	0.13	1.04	-0.02	-0.01	-0.05	-2.86
DEAD LOAD + LIVE LOAD	**29**	10	-0.05	13.76	-0.03	-0.03	0.07	12.65
		27	0.05	13.67	0.03	0.03	0.10	-12.38
EARTHQUAKE (TRANSVERSE)		10	0.00	0.00	0.14	0.10	-0.33	0.00
		27	0.00	0.00	-0.14	-0.10	-0.45	0.00
EARTHQUAKE (LONGITUDINAL)		10	-0.29	-4.62	0.00	0.00	0.00	-12.76
		27	0.29	4.62	0.00	0.00	0.00	-12.67
WIND BLOWING U/S TO D/S		10	0.00	0.00	0.15	0.09	-0.35	0.00
		27	0.00	0.00	-0.15	-0.09	-0.46	0.00
WIND BLOWING D/S TO U/S		10	0.00	0.00	-0.10	-0.08	0.23	0.00
		27	0.00	0.00	0.10	0.08	0.33	0.00
CRANE MOVING U/S TO D/S		10	-0.06	0.12	0.12	0.13	-0.27	0.34
		27	0.06	-0.12	-0.12	-0.13	-0.40	0.34
CRANE MOVING D/S TO U/S		10	-0.02	0.04	-0.07	-0.05	0.17	0.11
		27	0.02	-0.04	0.07	0.05	0.24	0.11
CRANE STRIKING U/S		10	0.00	0.00	-0.13	-0.09	0.32	0.00
		27	0.00	0.00	0.13	0.09	0.42	0.00
CRANE STRIKING D/S		10	0.00	0.00	0.04	0.04	-0.08	0.00

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		27	0.00	0.00	-0.04	-0.04	-0.13	0.00
CRANE MOVING (LONGITUDINAL)		10	-0.14	-1.43	-0.02	0.01	0.07	-3.96
		27	0.14	1.43	0.02	-0.01	0.07	-3.93
DEAD LOAD + LIVE LOAD	30	11	-0.05	13.76	0.03	0.03	-0.07	12.65
		28	0.05	13.67	-0.03	-0.03	-0.10	-12.38
EARTHQUAKE (TRANSVERSE)		11	0.00	0.00	0.14	0.10	-0.33	0.00
		28	0.00	0.00	-0.14	-0.10	-0.45	0.00
EARTHQUAKE (LONGITUDINAL)		11	-0.29	-4.62	0.00	0.00	0.00	-12.76
		28	0.29	4.62	0.00	0.00	0.00	-12.67
WIND BLOWING U/S TO D/S		11	0.00	0.00	0.10	0.08	-0.23	0.00
		28	0.00	0.00	-0.10	-0.08	-0.33	0.00
WIND BLOWING D/S TO U/S		11	0.00	0.00	-0.15	-0.09	0.35	0.00
		28	0.00	0.00	0.15	0.09	0.46	0.00
CRANE MOVING U/S TO D/S		11	-0.02	0.04	0.07	0.05	-0.17	0.11
		28	0.02	-0.04	-0.07	-0.05	-0.24	0.11
CRANE MOVING D/S TO U/S		11	-0.06	0.12	-0.12	-0.13	0.27	0.34
		28	0.06	-0.12	0.12	0.13	0.40	0.34
CRANE STRIKING U/S		11	0.00	0.00	-0.04	-0.04	0.08	0.00
		28	0.00	0.00	0.04	0.04	0.13	0.00
CRANE STRIKING D/S		11	0.00	0.00	0.13	0.09	-0.32	0.00
		28	0.00	0.00	-0.13	-0.09	-0.42	0.00
CRANE MOVING (LONGITUDINAL)		11	-0.14	-1.43	0.02	-0.01	-0.07	-3.96
		28	0.14	1.43	-0.02	0.01	-0.07	-3.93
DEAD LOAD + LIVE LOAD	32	13	1.52	11.58	-0.09	-0.05	0.22	10.65
		30	-1.52	11.45	0.09	0.05	0.25	-10.32
EARTHQUAKE (TRANSVERSE)		13	0.00	0.00	0.31	0.11	-0.75	0.00
		30	0.00	0.00	-0.31	-0.11	-0.93	0.00
EARTHQUAKE (LONGITUDINAL)		13	-0.96	-4.37	0.00	0.00	0.00	-12.07
		30	0.96	4.37	0.00	0.00	0.00	-11.97
WIND BLOWING U/S TO D/S		13	0.00	0.00	0.28	0.10	-0.70	0.00
		30	0.00	0.00	-0.28	-0.10	-0.87	0.00
WIND BLOWING D/S TO U/S		13	0.00	0.00	-0.22	-0.09	0.54	0.00
		30	0.00	0.00	0.22	0.09	0.68	0.00
CRANE MOVING U/S TO D/S		13	-0.08	0.19	0.39	0.22	-0.98	0.51
		30	0.08	-0.19	-0.39	-0.22	-1.17	0.52
CRANE MOVING D/S TO U/S		13	-0.02	0.06	-0.15	-0.04	0.35	0.16
		30	0.02	-0.06	0.15	0.04	0.46	0.16
CRANE STRIKING U/S		13	0.00	0.00	-0.26	-0.07	0.66	0.00
		30	0.00	0.00	0.26	0.07	0.79	0.00
CRANE STRIKING D/S		13	0.00	0.00	0.10	0.05	-0.24	0.00
		30	0.00	0.00	-0.10	-0.05	-0.31	0.00
CRANE MOVING (LONGITUDINAL)		13	-0.73	-1.24	0.04	0.08	-0.11	-3.43
		30	0.73	1.24	-0.04	-0.08	-0.12	-3.39
DEAD LOAD + LIVE LOAD	33	14	1.52	11.58	0.09	0.05	-0.22	10.65
		31	-1.52	11.45	-0.09	-0.05	-0.25	-10.32
EARTHQUAKE (TRANSVERSE)		14	0.00	0.00	0.31	0.11	-0.75	0.00
		31	0.00	0.00	-0.31	-0.11	-0.93	0.00
EARTHQUAKE (LONGITUDINAL)		14	-0.96	-4.37	0.00	0.00	0.00	-12.07
		31	0.96	4.37	0.00	0.00	0.00	-11.97
WIND BLOWING U/S TO D/S		14	0.00	0.00	0.22	0.09	-0.54	0.00
		31	0.00	0.00	-0.22	-0.09	-0.68	0.00
WIND BLOWING D/S TO U/S		14	0.00	0.00	-0.28	-0.10	0.70	0.00
		31	0.00	0.00	0.28	0.10	0.87	0.00
CRANE MOVING U/S TO D/S		14	-0.02	0.06	0.15	0.04	-0.35	0.16
		31	0.02	-0.06	-0.15	-0.04	-0.46	0.16
CRANE MOVING D/S TO U/S		14	-0.08	0.19	-0.39	-0.22	0.98	0.51
		31	0.08	-0.19	0.39	0.22	1.17	0.52
CRANE STRIKING U/S		14	0.00	0.00	-0.10	-0.05	0.24	0.00
		31	0.00	0.00	0.10	0.05	0.31	0.00

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
CRANE STRIKING D/S		14	0.00	0.00	0.26	0.07	-0.66	0.00
		31	0.00	0.00	-0.26	-0.07	-0.79	0.00
CRANE MOVING (LONGITUDINAL)		14	-0.73	-1.24	-0.04	-0.08	0.11	-3.43
		31	0.73	1.24	0.04	0.08	0.12	-3.39
DEAD LOAD + LIVE LOAD	35	16	1.52	1.76	-0.02	0.08	0.04	1.88
		33	-1.52	1.47	0.02	-0.08	0.07	-1.06
EARTHQUAKE (TRANSVERSE)		16	0.00	0.00	0.38	0.08	-0.91	0.00
		33	0.00	0.00	-0.38	-0.08	-1.19	0.00
EARTHQUAKE (LONGITUDINAL)		16	0.92	-3.20	0.00	0.00	0.00	-8.98
		33	-0.92	3.20	0.00	0.00	0.00	-8.64
WIND BLOWING U/S TO D/S		16	0.00	0.00	0.35	0.07	-0.84	0.00
		33	0.00	0.00	-0.35	-0.07	-1.10	0.00
WIND BLOWING D/S TO U/S		16	0.00	0.00	-0.33	-0.12	0.80	0.00
		33	0.00	0.00	0.33	0.12	1.03	0.00
CRANE MOVING U/S TO D/S		16	0.19	0.18	0.36	-0.08	-0.84	0.47
		33	-0.19	-0.18	-0.36	0.08	-1.12	0.50
CRANE MOVING D/S TO U/S		16	0.06	0.06	-0.29	-0.16	0.70	0.15
		33	-0.06	-0.06	0.29	0.16	0.88	0.16
CRANE STRIKING U/S		16	0.00	0.00	-0.20	0.07	0.46	0.00
		33	0.00	0.00	0.20	-0.07	0.64	0.00
CRANE STRIKING D/S		16	0.00	0.00	0.18	0.09	-0.44	0.00
		33	0.00	0.00	-0.18	-0.09	-0.56	0.00
CRANE MOVING (LONGITUDINAL)		16	0.45	-0.75	0.02	-0.05	-0.06	-2.13
		33	-0.45	0.75	-0.02	0.05	-0.08	-2.02
DEAD LOAD + LIVE LOAD	36	17	1.52	1.76	0.02	-0.08	-0.04	1.88
		34	-1.52	1.47	-0.02	0.08	-0.07	-1.06
EARTHQUAKE (TRANSVERSE)		17	0.00	0.00	0.38	0.08	-0.91	0.00
		34	0.00	0.00	-0.38	-0.08	-1.19	0.00
EARTHQUAKE (LONGITUDINAL)		17	0.92	-3.20	0.00	0.00	0.00	-8.98
		34	-0.92	3.20	0.00	0.00	0.00	-8.64
WIND BLOWING U/S TO D/S		17	0.00	0.00	0.33	0.12	-0.80	0.00
		34	0.00	0.00	-0.33	-0.12	-1.03	0.00
WIND BLOWING D/S TO U/S		17	0.00	0.00	-0.35	-0.07	0.84	0.00
		34	0.00	0.00	0.35	0.07	1.10	0.00
CRANE MOVING U/S TO D/S		17	0.06	0.06	0.29	0.16	-0.70	0.15
		34	-0.06	-0.06	-0.29	-0.16	-0.88	0.16
CRANE MOVING D/S TO U/S		17	0.19	0.18	-0.36	0.08	0.84	0.47
		34	-0.19	-0.18	0.36	-0.08	1.12	0.50
CRANE STRIKING U/S		17	0.00	0.00	-0.18	-0.09	0.44	0.00
		34	0.00	0.00	0.18	0.09	0.56	0.00
CRANE STRIKING D/S		17	0.00	0.00	0.20	-0.07	-0.46	0.00
		34	0.00	0.00	-0.20	0.07	-0.64	0.00
CRANE MOVING (LONGITUDINAL)		17	0.45	-0.75	-0.02	0.05	0.06	-2.13
		34	-0.45	0.75	0.02	-0.05	0.08	-2.02
DEAD LOAD + LIVE LOAD	38	19	163.58	3.96	0.00	0.00	0.00	0.38
		23	-145.59	-3.96	0.00	0.00	0.00	16.25
EARTHQUAKE (TRANSVERSE)		19	0.00	10.63	0.00	0.00	0.00	134.79
		23	0.00	-10.63	0.00	0.00	0.00	-90.15
EARTHQUAKE (LONGITUDINAL)		19	0.00	0.00	-10.25	0.00	63.32	0.00
		23	0.00	0.00	10.25	0.00	-20.29	0.00
WIND BLOWING U/S TO D/S		19	0.00	9.44	0.00	0.00	0.00	79.30
		23	0.00	-7.02	0.00	0.00	0.00	-44.73
WIND BLOWING D/S TO U/S		19	0.00	-5.82	0.00	0.00	0.00	-64.18
		23	0.00	4.77	0.00	0.00	0.00	41.94
CRANE MOVING U/S TO D/S		19	130.27	2.32	0.00	0.00	0.00	78.85
		23	-130.27	-2.32	0.00	0.00	0.00	-69.11
CRANE MOVING D/S TO U/S		19	41.02	-5.78	0.00	0.00	0.00	-73.65
		23	-41.02	5.78	0.00	0.00	0.00	49.36
CRANE STRIKING U/S		19	0.00	-6.51	0.00	0.00	0.00	-72.63

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		23	0.00	6.51	0.00	0.00	0.00	45.29
CRANE STRIKING D/S		19	0.00	2.49	0.00	0.00	0.00	42.15
		23	0.00	-2.49	0.00	0.00	0.00	-31.68
CRANE MOVING (LONGITUDINAL)		19	86.77	-3.79	-3.22	0.00	20.30	-12.81
		23	-86.77	3.79	3.22	0.00	-6.79	-3.11
DEAD LOAD + LIVE LOAD	39	20	163.58	-3.96	0.00	0.00	0.00	-0.38
		24	-145.59	3.96	0.00	0.00	0.00	-16.25
EARTHQUAKE (TRANSVERSE)		20	0.00	0.00	-10.25	0.00	63.32	0.00
		24	0.00	0.00	10.25	0.00	-20.29	0.00
EARTHQUAKE (LONGITUDINAL)		20	163.58	-3.96	0.00	0.00	0.00	-0.38
		24	-145.59	3.96	0.00	0.00	0.00	-16.25
WIND BLOWING U/S TO D/S		20	0.00	5.82	0.00	0.00	0.00	64.18
		24	0.00	-4.77	0.00	0.00	0.00	-41.94
WIND BLOWING D/S TO U/S		20	0.00	-9.44	0.00	0.00	0.00	-79.30
		24	0.00	7.02	0.00	0.00	0.00	44.73
CRANE MOVING U/S TO D/S		20	41.02	5.78	0.00	0.00	0.00	73.65
		24	-41.02	-5.78	0.00	0.00	0.00	-49.36
CRANE MOVING D/S TO U/S		20	130.27	-2.32	0.00	0.00	0.00	-78.85
		24	-130.27	2.32	0.00	0.00	0.00	69.11
CRANE STRIKING U/S		20	0.00	-2.49	0.00	0.00	0.00	-42.15
		24	0.00	2.49	0.00	0.00	0.00	31.68
CRANE STRIKING D/S		20	0.00	6.51	0.00	0.00	0.00	72.63
		24	0.00	-6.51	0.00	0.00	0.00	-45.29
CRANE MOVING (LONGITUDINAL)		20	86.77	3.79	-3.22	0.00	20.30	12.81
		24	-86.77	-3.79	3.22	0.00	-6.79	3.11
DEAD LOAD + LIVE LOAD	42	23	118.72	3.96	0.00	0.00	0.00	1.90
		27	-100.31	-3.96	0.00	0.00	0.00	15.11
EARTHQUAKE (TRANSVERSE)		23	0.00	10.25	0.00	0.00	0.00	90.28
		27	0.00	-10.25	0.00	0.00	0.00	-46.21
EARTHQUAKE (LONGITUDINAL)		23	0.00	0.00	-10.68	0.00	38.63	0.00
		27	0.00	0.00	10.68	0.00	7.27	0.00
WIND BLOWING U/S TO D/S		23	0.00	7.09	0.00	0.00	0.00	44.87
		27	0.00	-4.60	0.00	0.00	0.00	-19.74
WIND BLOWING D/S TO U/S		23	0.00	-4.81	0.00	0.00	0.00	-42.04
		27	0.00	3.75	0.00	0.00	0.00	23.64
CRANE MOVING U/S TO D/S		23	130.39	2.33	0.00	0.00	0.00	69.22
		27	-130.39	-2.33	0.00	0.00	0.00	-59.18
CRANE MOVING D/S TO U/S		23	41.05	-5.81	0.00	0.00	0.00	-49.43
		27	-41.05	5.81	0.00	0.00	0.00	24.44
CRANE STRIKING U/S		23	0.00	-6.57	0.00	0.00	0.00	-45.41
		27	0.00	6.57	0.00	0.00	0.00	17.16
CRANE STRIKING D/S		23	0.00	2.50	0.00	0.00	0.00	31.72
		27	0.00	-2.50	0.00	0.00	0.00	-20.98
CRANE MOVING (LONGITUDINAL)		23	86.85	-3.82	-3.45	0.00	12.73	3.09
		27	-86.85	3.82	3.45	0.00	2.09	-19.53
DEAD LOAD + LIVE LOAD	43	24	118.72	-3.96	0.00	0.00	0.00	-1.90
		28	-100.31	3.96	0.00	0.00	0.00	-15.11
EARTHQUAKE (TRANSVERSE)		24	0.00	10.25	0.00	0.00	0.00	90.28
		28	0.00	-10.25	0.00	0.00	0.00	-46.21
EARTHQUAKE (LONGITUDINAL)		24	0.00	0.00	-10.68	0.00	38.63	0.00
		28	0.00	0.00	10.68	0.00	7.27	0.00
WIND BLOWING U/S TO D/S		24	0.00	4.81	0.00	0.00	0.00	42.04
		28	0.00	-3.75	0.00	0.00	0.00	-23.64
WIND BLOWING D/S TO U/S		24	0.00	-7.09	0.00	0.00	0.00	-44.87
		28	0.00	4.60	0.00	0.00	0.00	19.74
CRANE MOVING U/S TO D/S		24	41.05	5.81	0.00	0.00	0.00	49.43
		28	-41.05	-5.81	0.00	0.00	0.00	-24.44
CRANE MOVING D/S TO U/S		24	130.39	-2.33	0.00	0.00	0.00	-69.22
		28	-130.39	2.33	0.00	0.00	0.00	59.18

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
CRANE STRIKING U/S		24	0.00	-2.50	0.00	0.00	0.00	-31.72
		28	0.00	2.50	0.00	0.00	0.00	20.98
CRANE STRIKING D/S		24	0.00	6.57	0.00	0.00	0.00	45.41
		28	0.00	-6.57	0.00	0.00	0.00	-17.16
CRANE MOVING (LONGITUDINAL)		24	86.85	3.82	-3.45	0.00	12.73	-3.09
		28	-86.85	-3.82	3.45	0.00	2.09	19.53
DEAD LOAD + LIVE LOAD	45	27	72.98	3.90	0.00	0.00	0.00	3.38
		30	-54.13	-3.90	0.00	0.00	0.00	13.76
EARTHQUAKE (TRANSVERSE)		27	0.00	8.72	0.00	0.00	0.00	46.42
		30	0.00	-8.72	0.00	0.00	0.00	-8.04
EARTHQUAKE (LONGITUDINAL)		27	0.00	0.00	-9.54	0.00	18.06	0.00
		30	0.00	0.00	9.54	0.00	23.92	0.00
WIND BLOWING U/S TO D/S		27	0.00	4.90	0.00	0.00	0.00	19.92
		30	0.00	-2.01	0.00	0.00	0.00	-4.72
WIND BLOWING D/S TO U/S		27	0.00	-3.95	0.00	0.00	0.00	-23.79
		30	0.00	2.71	0.00	0.00	0.00	9.13
CRANE MOVING U/S TO D/S		27	130.63	2.58	0.00	0.00	0.00	59.44
		30	-130.63	-2.58	0.00	0.00	0.00	-48.10
CRANE MOVING D/S TO U/S		27	41.13	-5.96	0.00	0.00	0.00	-24.55
		30	-41.13	5.96	0.00	0.00	0.00	-1.68
CRANE STRIKING U/S		27	0.00	-6.84	0.00	0.00	0.00	-17.34
		30	0.00	6.84	0.00	0.00	0.00	-12.75
CRANE STRIKING D/S		27	0.00	2.57	0.00	0.00	0.00	21.05
		30	0.00	-2.57	0.00	0.00	0.00	-9.72
CRANE MOVING (LONGITUDINAL)		27	87.02	-3.87	-3.65	0.00	6.22	19.56
		30	-87.02	3.87	3.65	0.00	9.85	-36.60
DEAD LOAD + LIVE LOAD	46	28	72.98	-3.90	0.00	0.00	0.00	-3.38
		31	-54.13	3.90	0.00	0.00	0.00	-13.76
EARTHQUAKE (TRANSVERSE)		28	0.00	8.72	0.00	0.00	0.00	46.42
		31	0.00	-8.72	0.00	0.00	0.00	-8.04
EARTHQUAKE (LONGITUDINAL)		28	0.00	0.00	-9.54	0.00	18.06	0.00
		31	0.00	0.00	9.54	0.00	23.92	0.00
WIND BLOWING U/S TO D/S		28	0.00	3.95	0.00	0.00	0.00	23.79
		31	0.00	-2.71	0.00	0.00	0.00	-9.13
WIND BLOWING D/S TO U/S		28	0.00	-4.90	0.00	0.00	0.00	-19.92
		31	0.00	2.01	0.00	0.00	0.00	4.72
CRANE MOVING U/S TO D/S		28	41.13	5.96	0.00	0.00	0.00	24.55
		31	-41.13	-5.96	0.00	0.00	0.00	1.68
CRANE MOVING D/S TO U/S		28	130.63	-2.58	0.00	0.00	0.00	-59.44
		31	-130.63	2.58	0.00	0.00	0.00	48.10
CRANE STRIKING U/S		28	0.00	-2.57	0.00	0.00	0.00	-21.05
		31	0.00	2.57	0.00	0.00	0.00	9.72
CRANE STRIKING D/S		28	0.00	6.84	0.00	0.00	0.00	17.34
		31	0.00	-6.84	0.00	0.00	0.00	12.75
CRANE MOVING (LONGITUDINAL)		28	87.02	3.87	-3.65	0.00	6.22	-19.56
		31	-87.02	-3.87	3.65	0.00	9.85	36.60
DEAD LOAD + LIVE LOAD	48	30	29.57	3.72	0.00	0.00	0.00	13.23
		33	-22.52	-3.72	0.00	0.00	0.00	0.17
EARTHQUAKE (TRANSVERSE)		30	0.00	2.34	0.00	0.00	0.00	8.27
		33	0.00	-2.34	0.00	0.00	0.00	0.16
EARTHQUAKE (LONGITUDINAL)		30	0.00	0.00	-4.81	0.00	0.03	0.00
		33	0.00	0.00	4.81	0.00	17.28	0.00
WIND BLOWING U/S TO D/S		30	0.00	2.58	0.00	0.00	0.00	4.91
		33	0.00	-0.23	0.00	0.00	0.00	0.15
WIND BLOWING D/S TO U/S		30	0.00	-3.16	0.00	0.00	0.00	-9.31
		33	0.00	2.15	0.00	0.00	0.00	-0.23
CRANE MOVING U/S TO D/S		30	-0.35	-7.54	0.00	0.00	0.00	-26.98
		33	0.35	7.54	0.00	0.00	0.00	-0.16
CRANE MOVING D/S TO U/S		30	-0.11	-6.25	0.00	0.00	0.00	-22.18

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		33	0.11	6.25	0.00	0.00	0.00	-0.33
CRANE STRIKING U/S		30	0.00	3.54	0.00	0.00	0.00	12.60
		33	0.00	-3.54	0.00	0.00	0.00	0.13
CRANE STRIKING D/S		30	0.00	2.77	0.00	0.00	0.00	9.82
		33	0.00	-2.77	0.00	0.00	0.00	0.17
CRANE MOVING (LONGITUDINAL)		30	-0.23	-3.79	-0.64	0.00	-2.38	-13.55
		33	0.23	3.79	0.64	0.00	4.69	-0.09
DEAD LOAD + LIVE LOAD	49	31	29.57	-3.72	0.00	0.00	0.00	-13.23
		34	-22.52	3.72	0.00	0.00	0.00	-0.17
EARTHQUAKE (TRANSVERSE)		31	0.00	2.34	0.00	0.00	0.00	8.27
		34	0.00	-2.34	0.00	0.00	0.00	0.16
EARTHQUAKE (LONGITUDINAL)		31	0.00	0.00	-4.81	0.00	0.03	0.00
		34	0.00	0.00	4.81	0.00	17.28	0.00
WIND BLOWING U/S TO D/S		31	0.00	3.16	0.00	0.00	0.00	9.31
		34	0.00	-2.15	0.00	0.00	0.00	0.23
WIND BLOWING D/S TO U/S		31	0.00	-2.58	0.00	0.00	0.00	-4.91
		34	0.00	0.23	0.00	0.00	0.00	-0.15
CRANE MOVING U/S TO D/S		31	-0.11	6.25	0.00	0.00	0.00	22.18
		34	0.11	-6.25	0.00	0.00	0.00	0.33
CRANE MOVING D/S TO U/S		31	-0.35	7.54	0.00	0.00	0.00	26.98
		34	0.35	-7.54	0.00	0.00	0.00	0.16
CRANE STRIKING U/S		31	0.00	-2.77	0.00	0.00	0.00	-9.82
		34	0.00	2.77	0.00	0.00	0.00	-0.17
CRANE STRIKING D/S		31	0.00	-3.54	0.00	0.00	0.00	-12.60
		34	0.00	3.54	0.00	0.00	0.00	-0.13
CRANE MOVING (LONGITUDINAL)		31	-0.23	3.79	-0.64	0.00	-2.38	13.55
		34	0.23	-3.79	0.64	0.00	4.69	0.09
DEAD LOAD + LIVE LOAD	55	33	-3.68	0.00	0.00	0.00	0.00	0.00
		34	3.68	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		33	0.00	0.00	0.00	0.00	0.00	0.00
		34	0.00	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		33	0.00	0.00	0.00	0.00	0.00	0.00
		34	0.00	0.00	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		33	1.69	0.00	0.00	0.00	0.00	0.00
		34	-1.69	0.00	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		33	1.69	0.00	0.00	0.00	0.00	0.00
		34	-1.69	0.00	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		33	6.83	0.00	0.00	0.00	0.00	0.00
		34	-6.83	0.00	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		33	6.83	0.00	0.00	0.00	0.00	0.00
		34	-6.83	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING U/S		33	-3.14	0.00	0.00	0.00	0.00	0.00
		34	3.14	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING D/S		33	-3.14	0.00	0.00	0.00	0.00	0.00
		34	3.14	0.00	0.00	0.00	0.00	0.00
CRANE MOVING (LONGITUDINAL)		33	3.74	0.00	0.00	0.00	0.00	0.00
		34	-3.74	0.00	0.00	0.00	0.00	0.00
DEAD LOAD + LIVE LOAD	61	23	-0.85	13.44	0.00	0.02	-0.01	12.26
		40	0.85	13.44	0.00	-0.02	0.00	-12.28
EARTHQUAKE (TRANSVERSE)		23	0.00	0.00	-0.03	-0.07	0.10	0.00
		40	0.00	0.00	0.03	0.07	0.04	0.00
EARTHQUAKE (LONGITUDINAL)		23	0.42	-3.35	0.00	0.00	0.00	-9.17
		40	-0.42	3.35	0.00	0.00	0.00	-9.25
WIND BLOWING U/S TO D/S		23	0.00	0.00	-0.04	-0.07	0.13	0.00
		40	0.00	0.00	0.04	0.07	0.07	0.00
WIND BLOWING D/S TO U/S		23	0.00	0.00	0.02	0.05	-0.08	0.00
		40	-0.00	0.00	-0.02	-0.05	-0.03	0.00
CRANE MOVING U/S TO D/S		23	-0.03	-0.06	-0.01	-0.05	0.05	-0.17
		40	0.03	0.06	0.01	0.05	-0.01	-0.17

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
CRANE MOVING D/S TO U/S		23	-0.01	-0.02	0.01	0.04	-0.06	-0.05
		40	0.01	0.02	-0.01	-0.04	-0.02	-0.05
CRANE STRIKING U/S		23	0.00	0.00	0.03	0.06	-0.11	0.00
		40	0.00	0.00	-0.03	-0.06	-0.06	0.00
CRANE STRIKING D/S		23	0.00	0.00	0.00	-0.02	0.02	0.00
		40	0.00	0.00	0.00	0.02	0.00	0.00
CRANE MOVING (LONGITUDINAL)		23	0.10	-1.13	0.02	0.01	-0.05	-3.09
		40	-0.10	1.13	-0.02	-0.01	-0.05	-3.11
DEAD LOAD + LIVE LOAD	62	24	-0.85	13.44	0.00	-0.02	0.01	12.26
		41	0.85	13.44	0.00	0.02	0.00	-12.28
EARTHQUAKE (TRANSVERSE)		24	0.00	0.00	-0.03	-0.07	0.10	0.00
		41	0.00	0.00	0.03	0.07	0.04	0.00
EARTHQUAKE (LONGITUDINAL)		24	0.42	-3.35	0.00	0.00	0.00	-9.17
		41	-0.42	3.35	0.00	0.00	0.00	-9.25
WIND BLOWING U/S TO D/S		24	0.00	0.00	-0.02	-0.05	0.08	0.00
		41	0.00	0.00	0.02	0.05	0.03	0.00
WIND BLOWING D/S TO U/S		24	0.00	0.00	0.04	0.07	-0.13	0.00
		41	0.00	0.00	-0.04	-0.07	-0.07	0.00
CRANE MOVING U/S TO D/S		24	-0.01	-0.02	-0.01	-0.04	0.06	-0.05
		41	0.01	0.02	0.01	0.04	0.02	-0.05
CRANE MOVING D/S TO U/S		24	-0.03	-0.06	0.01	0.05	-0.05	-0.17
		41	0.03	0.06	-0.01	-0.05	0.01	-0.17
CRANE STRIKING U/S		24	0.00	0.00	0.00	0.02	-0.02	0.00
		41	0.00	0.00	0.00	-0.02	0.00	0.00
CRANE STRIKING D/S		24	0.00	0.00	-0.03	-0.06	0.11	0.00
		41	0.00	0.00	0.03	0.06	0.06	0.00
CRANE MOVING (LONGITUDINAL)		24	0.10	-1.13	-0.02	-0.01	0.05	-3.09
		41	-0.10	1.13	0.02	0.01	0.05	-3.11
DEAD LOAD + LIVE LOAD	65	27	-0.05	13.67	0.03	0.03	-0.10	12.38
		44	0.05	13.76	-0.03	-0.03	-0.07	-12.65
EARTHQUAKE (TRANSVERSE)		27	0.00	0.00	-0.14	-0.10	0.45	0.00
		44	0.00	0.00	0.14	0.10	0.33	0.00
EARTHQUAKE (LONGITUDINAL)		27	0.29	-4.62	0.00	0.00	0.00	-12.67
		44	-0.29	4.62	0.00	0.00	0.00	-12.76
WIND BLOWING U/S TO D/S		27	0.00	0.00	-0.15	-0.09	0.46	0.00
		44	0.00	0.00	0.15	0.09	0.35	0.00
WIND BLOWING D/S TO U/S		27	0.00	0.00	0.10	0.08	-0.33	0.00
		44	0.00	0.00	-0.10	-0.08	-0.23	0.00
CRANE MOVING U/S TO D/S		27	-0.06	-0.12	-0.12	-0.13	0.40	-0.34
		44	0.06	0.12	0.12	0.13	0.27	-0.34
CRANE MOVING D/S TO U/S		27	-0.02	-0.04	0.07	0.05	-0.24	-0.11
		44	0.02	0.04	-0.07	-0.05	-0.17	-0.11
CRANE STRIKING U/S		27	0.00	0.00	0.13	0.09	-0.42	0.00
		44	0.00	0.00	-0.13	-0.09	-0.32	0.00
CRANE STRIKING D/S		27	0.00	0.00	-0.04	-0.04	0.13	0.00
		44	0.00	0.00	0.04	0.04	0.08	0.00
CRANE MOVING (LONGITUDINAL)		27	0.06	-1.60	0.02	-0.01	-0.07	-4.38
		44	-0.06	1.60	-0.02	0.01	-0.07	-4.41
DEAD LOAD + LIVE LOAD	66	28	-0.05	13.67	-0.03	-0.03	0.10	12.38
		45	0.05	13.76	0.03	0.03	0.07	-12.65
EARTHQUAKE (TRANSVERSE)		28	0.00	0.00	-0.14	-0.10	0.45	0.00
		45	0.00	0.00	0.14	0.10	0.33	0.00
EARTHQUAKE (LONGITUDINAL)		28	0.29	-4.62	0.00	0.00	0.00	-12.67
		45	-0.29	4.62	0.00	0.00	0.00	-12.76
WIND BLOWING U/S TO D/S		28	0.00	0.00	-0.10	-0.08	0.33	0.00
		45	0.00	0.00	0.10	0.08	0.23	0.00
WIND BLOWING D/S TO U/S		28	0.00	0.00	0.15	0.09	-0.46	0.00
		45	0.00	0.00	-0.15	-0.09	-0.35	0.00
CRANE MOVING U/S TO D/S		28	-0.02	-0.04	-0.07	-0.05	0.24	-0.11

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		45	0.02	0.04	0.07	0.05	0.17	-0.11
CRANE MOVING D/S TO U/S		28	-0.06	-0.12	0.12	0.13	-0.40	-0.34
		45	0.06	0.12	-0.12	-0.13	-0.27	-0.34
CRANE STRIKING U/S		28	0.00	0.00	0.04	0.04	-0.13	0.00
		45	0.00	0.00	-0.04	-0.04	-0.08	0.00
CRANE STRIKING D/S		28	0.00	0.00	-0.13	-0.09	0.42	0.00
		45	0.00	0.00	0.13	0.09	0.32	0.00
CRANE MOVING (LONGITUDINAL)		28	0.06	-1.60	-0.02	0.01	0.07	-4.38
		45	-0.06	1.60	0.02	-0.01	0.07	-4.41
DEAD LOAD + LIVE LOAD	68	30	1.52	11.45	0.09	0.05	-0.25	10.32
		47	-1.52	11.58	-0.09	-0.05	-0.22	-10.65
EARTHQUAKE (TRANSVERSE)		30	0.00	0.00	-0.31	-0.11	0.93	0.00
		47	0.00	0.00	0.31	0.11	0.75	0.00
EARTHQUAKE (LONGITUDINAL)		30	0.96	-4.37	0.00	0.00	0.00	-11.97
		47	-0.96	4.37	0.00	0.00	0.00	-12.07
WIND BLOWING U/S TO D/S		30	0.00	0.00	-0.28	-0.10	0.87	0.00
		47	0.00	0.00	0.28	0.10	0.70	0.00
WIND BLOWING D/S TO U/S		30	0.00	0.00	0.22	0.09	-0.68	0.00
		47	0.00	0.00	-0.22	-0.09	-0.54	0.00
CRANE MOVING U/S TO D/S		30	-0.08	-0.19	-0.39	-0.22	1.17	-0.52
		47	0.08	0.19	0.39	0.22	0.98	-0.51
CRANE MOVING D/S TO U/S		30	-0.02	-0.06	0.15	0.04	-0.46	-0.16
		47	0.02	0.06	-0.15	-0.04	-0.35	-0.16
CRANE STRIKING U/S		30	0.00	0.00	0.26	0.07	-0.79	0.00
		47	0.00	0.00	-0.26	-0.07	-0.66	0.00
CRANE STRIKING D/S		30	0.00	0.00	-0.10	-0.05	0.31	0.00
		47	0.00	0.00	0.10	0.05	0.24	0.00
CRANE MOVING (LONGITUDINAL)		30	0.63	-1.49	-0.04	-0.08	0.12	-4.08
		47	-0.63	1.49	0.04	0.08	0.11	-4.11
DEAD LOAD + LIVE LOAD	69	31	1.52	11.45	-0.09	-0.05	0.25	10.32
		48	-1.52	11.58	0.09	0.05	0.22	-10.65
EARTHQUAKE (TRANSVERSE)		31	0.00	0.00	-0.31	-0.11	0.93	0.00
		48	0.00	0.00	0.31	0.11	0.75	0.00
EARTHQUAKE (LONGITUDINAL)		31	0.96	-4.37	0.00	0.00	0.00	-11.97
		48	-0.96	4.37	0.00	0.00	0.00	-12.07
WIND BLOWING U/S TO D/S		31	0.00	0.00	-0.22	-0.09	0.68	0.00
		48	0.00	0.00	0.22	0.09	0.54	0.00
WIND BLOWING D/S TO U/S		31	0.00	0.00	0.28	0.10	-0.87	0.00
		48	0.00	0.00	-0.28	-0.10	-0.70	0.00
CRANE MOVING U/S TO D/S		31	-0.02	-0.06	-0.15	-0.04	0.46	-0.16
		48	0.02	0.06	0.15	0.04	0.35	-0.16
CRANE MOVING D/S TO U/S		31	-0.08	-0.19	0.39	0.22	-1.17	-0.52
		48	0.08	0.19	-0.39	-0.22	-0.98	-0.51
CRANE STRIKING U/S		31	0.00	0.00	0.10	0.05	-0.31	0.00
		48	0.00	0.00	-0.10	-0.05	-0.24	0.00
CRANE STRIKING D/S		31	0.00	0.00	-0.26	-0.07	0.79	0.00
		48	0.00	0.00	0.26	0.07	0.66	0.00
CRANE MOVING (LONGITUDINAL)		31	0.63	-1.49	0.04	0.08	-0.12	-4.08
		48	-0.63	1.49	-0.04	-0.08	-0.11	-4.11
DEAD LOAD + LIVE LOAD	71	33	1.52	1.47	0.02	-0.08	-0.07	1.06
		50	-1.52	1.76	-0.02	0.08	-0.04	-1.88
EARTHQUAKE (TRANSVERSE)		33	0.00	0.00	-0.38	-0.08	1.19	0.00
		50	0.00	0.00	0.38	0.08	0.91	0.00
EARTHQUAKE (LONGITUDINAL)		33	-0.92	-3.20	0.00	0.00	0.00	-8.64
		50	0.92	3.20	0.00	0.00	0.00	-8.98
WIND BLOWING U/S TO D/S		33	0.00	0.00	-0.35	-0.07	1.10	0.00
		50	-0.00	0.00	0.35	0.07	0.84	0.00
WIND BLOWING D/S TO U/S		33	0.00	0.00	0.33	0.12	-1.03	0.00
		50	0.00	0.00	-0.33	-0.12	-0.80	0.00

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
CRANE MOVING U/S TO D/S		33	0.19	-0.18	-0.36	0.08	1.12	-0.50
		50	-0.19	0.18	0.36	-0.08	0.84	-0.47
CRANE MOVING D/S TO U/S		33	0.06	-0.06	0.29	0.16	-0.88	-0.16
		50	-0.06	0.06	-0.29	-0.16	-0.70	-0.15
CRANE STRIKING U/S		33	0.00	0.00	0.20	-0.07	-0.64	0.00
		50	0.00	0.00	-0.20	0.07	-0.46	0.00
CRANE STRIKING D/S		33	0.00	0.00	-0.18	-0.09	0.56	0.00
		50	0.00	0.00	0.18	0.09	0.44	0.00
CRANE MOVING (LONGITUDINAL)		33	-0.19	-0.99	-0.02	0.05	0.08	-2.68
		50	0.19	0.99	0.02	-0.05	0.06	-2.76
DEAD LOAD + LIVE LOAD	72	34	1.52	1.47	-0.02	0.08	0.07	1.06
		51	-1.52	1.76	0.02	-0.08	0.04	-1.88
EARTHQUAKE (TRANSVERSE)		34	0.00	0.00	-0.38	-0.08	1.19	0.00
		51	0.00	0.00	0.38	0.08	0.91	0.00
EARTHQUAKE (LONGITUDINAL)		34	-0.92	-3.20	0.00	0.00	0.00	-8.64
		51	0.92	3.20	0.00	0.00	0.00	-8.98
WIND BLOWING U/S TO D/S		34	0.00	0.00	-0.33	-0.12	1.03	0.00
		51	0.00	0.00	0.33	0.12	0.80	0.00
WIND BLOWING D/S TO U/S		34	0.00	0.00	0.35	0.07	-1.10	0.00
		51	0.00	0.00	-0.35	-0.07	-0.84	0.00
CRANE MOVING U/S TO D/S		34	0.06	-0.06	-0.29	-0.16	0.88	-0.16
		51	-0.06	0.06	0.29	0.16	0.70	-0.15
CRANE MOVING D/S TO U/S		34	0.19	-0.18	0.36	-0.08	-1.12	-0.50
		51	-0.19	0.18	-0.36	0.08	-0.84	-0.47
CRANE STRIKING U/S		34	0.00	0.00	0.18	0.09	-0.56	0.00
		51	0.00	0.00	-0.18	-0.09	-0.44	0.00
CRANE STRIKING D/S		34	0.00	0.00	-0.20	0.07	0.64	0.00
		51	0.00	0.00	0.20	-0.07	0.46	0.00
CRANE MOVING (LONGITUDINAL)		34	-0.19	-0.99	0.02	-0.05	-0.08	-2.68
		51	0.19	0.99	-0.02	0.05	-0.06	-2.76
DEAD LOAD + LIVE LOAD	74	36	113.76	1.99	-2.13	-0.33	3.07	-0.29
		40	-95.77	-1.99	2.13	0.33	5.88	8.63
EARTHQUAKE (TRANSVERSE)		36	0.00	9.37	0.00	2.04	0.00	120.19
		40	0.00	-9.37	0.00	-2.04	0.00	-80.83
EARTHQUAKE (LONGITUDINAL)		36	15.55	0.00	-8.85	0.00	61.36	0.00
		40	-15.55	0.00	8.85	0.00	-24.17	0.00
WIND BLOWING U/S TO D/S		36	0.00	6.30	0.00	1.95	0.00	61.02
		40	0.00	-5.08	0.00	-1.95	0.00	-37.12
WIND BLOWING D/S TO U/S		36	0.00	-4.33	0.00	-1.60	0.00	-52.55
		40	0.00	3.81	0.00	1.60	0.00	35.44
CRANE MOVING U/S TO D/S		36	79.37	3.09	-0.03	2.08	0.04	70.52
		40	-79.37	-3.09	0.03	-2.08	0.06	-57.56
CRANE MOVING D/S TO U/S		36	24.99	-4.86	-0.01	-1.23	0.01	-64.95
		40	-24.99	4.86	0.01	1.23	0.02	44.53
CRANE STRIKING U/S		36	0.00	-5.14	0.00	-1.50	0.00	-59.04
		40	0.00	5.14	0.00	1.50	0.00	37.44
CRANE STRIKING D/S		36	0.00	2.36	0.00	0.76	0.00	38.36
		40	0.00	-2.36	0.00	-0.76	0.00	-28.47
CRANE MOVING (LONGITUDINAL)		36	57.70	-2.31	-2.78	0.05	19.70	-7.65
		40	-57.70	2.31	2.78	-0.05	-8.01	-2.05
DEAD LOAD + LIVE LOAD	75	37	113.76	-1.99	-2.13	0.33	3.07	0.29
		41	-95.77	1.99	2.13	-0.33	5.88	-8.63
EARTHQUAKE (TRANSVERSE)		37	0.00	9.37	0.00	2.04	0.00	120.19
		41	0.00	-9.37	0.00	-2.04	0.00	-80.83
EARTHQUAKE (LONGITUDINAL)		37	15.55	0.00	-8.85	0.00	61.36	0.00
		41	-15.55	0.00	8.85	0.00	-24.17	0.00
WIND BLOWING U/S TO D/S		37	0.00	4.33	0.00	1.60	0.00	52.55
		41	0.00	-3.81	0.00	-1.60	0.00	-36.44
WIND BLOWING D/S TO U/S		37	0.00	-6.30	0.00	-1.95	0.00	-61.02

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		41	0.00	5.08	0.00	1.95	0.00	37.12
CRANE MOVING U/S TO D/S		37	24.99	4.86	-0.01	1.23	0.01	64.95
		41	-24.99	-4.86	0.01	-1.23	0.02	-44.53
CRANE MOVING D/S TO U/S		37	79.37	-3.09	-0.03	-2.08	0.04	-70.52
		41	-79.37	3.09	0.03	2.08	0.06	57.56
CRANE STRIKING U/S		37	0.00	-2.36	0.00	-0.76	0.00	-38.36
		41	0.00	2.36	0.00	0.76	0.00	28.47
CRANE STRIKING D/S		37	0.00	5.14	0.00	1.50	0.00	59.04
		41	0.00	-5.14	0.00	-1.50	0.00	-37.44
CRANE MOVING (LONGITUDINAL)		37	57.70	2.31	-2.78	-0.05	19.70	7.65
		41	-57.70	-2.31	2.78	0.05	-8.01	2.05
DEAD LOAD + LIVE LOAD	78	40	82.33	1.99	-2.98	-0.33	6.40	0.48
		44	-63.91	-1.99	2.98	0.33	6.40	8.07
EARTHQUAKE (TRANSVERSE)		40	0.00	9.03	0.00	1.99	0.00	80.76
		44	0.00	-9.03	0.00	-1.99	0.00	-41.93
EARTHQUAKE (LONGITUDINAL)		40	12.20	0.00	-8.13	0.00	33.42	0.00
		44	-12.20	0.00	8.13	0.00	1.56	0.00
WIND BLOWING U/S TO D/S		40	0.00	5.05	0.00	1.88	0.00	37.05
		44	0.00	-3.81	0.00	-1.88	0.00	-18.01
WIND BLOWING D/S TO U/S		40	0.00	-3.79	0.00	-1.57	0.00	-35.40
		44	0.00	3.26	0.00	1.57	0.00	20.23
CRANE MOVING U/S TO D/S		40	79.31	3.08	-0.05	2.09	0.10	57.50
		44	-79.31	-3.08	0.05	-2.09	0.13	-44.26
CRANE MOVING D/S TO U/S		40	24.97	-4.85	-0.02	-1.21	0.03	-44.49
		44	-24.97	4.85	0.02	1.21	0.04	23.65
CRANE STRIKING U/S		40	0.00	-5.11	0.00	-1.44	0.00	-37.38
		44	0.00	5.11	0.00	1.44	0.00	15.40
CRANE STRIKING D/S		40	0.00	2.35	0.00	0.76	0.00	28.45
		44	0.00	-2.35	0.00	-0.76	0.00	-18.33
CRANE MOVING (LONGITUDINAL)		40	56.58	-2.29	-2.69	0.10	11.12	2.06
		44	-56.58	2.29	2.69	-0.10	0.43	-11.93
DEAD LOAD + LIVE LOAD	79	41	82.33	-1.99	-2.98	0.33	6.40	-0.48
		45	-63.91	1.99	2.98	-0.33	6.40	-8.07
EARTHQUAKE (TRANSVERSE)		41	0.00	9.03	0.00	1.99	0.00	80.76
		45	0.00	-9.03	0.00	-1.99	0.00	-41.93
EARTHQUAKE (LONGITUDINAL)		41	12.20	0.00	-8.13	0.00	33.42	0.00
		45	-12.20	0.00	8.13	0.00	1.56	0.00
WIND BLOWING U/S TO D/S		41	0.00	3.79	0.00	1.57	0.00	35.40
		45	0.00	-3.26	0.00	-1.57	0.00	-20.23
WIND BLOWING D/S TO U/S		41	0.00	-5.05	0.00	-1.88	0.00	-37.05
		45	0.00	3.81	0.00	1.88	0.00	18.01
CRANE MOVING U/S TO D/S		41	24.97	4.85	-0.02	1.21	0.03	44.49
		45	-24.97	-4.85	0.02	-1.21	0.04	-23.65
CRANE MOVING D/S TO U/S		41	79.31	-3.08	-0.05	-2.09	0.10	-57.50
		45	-79.31	3.08	0.05	2.09	0.13	44.26
CRANE STRIKING U/S		41	0.00	-2.35	0.00	-0.76	0.00	-28.45
		45	0.00	2.35	0.00	0.76	0.00	18.33
CRANE STRIKING D/S		41	0.00	5.11	0.00	1.44	0.00	37.38
		45	0.00	-5.11	0.00	-1.44	0.00	-15.40
CRANE MOVING (LONGITUDINAL)		41	56.58	2.29	-2.69	-0.10	11.12	-2.06
		45	-56.58	-2.29	2.69	0.10	0.43	11.93
DEAD LOAD + LIVE LOAD	81	44	50.15	2.02	-3.03	-0.26	6.26	1.25
		47	-31.30	-2.02	3.03	0.26	7.08	7.64
EARTHQUAKE (TRANSVERSE)		44	0.00	7.36	0.00	1.67	0.00	41.83
		47	0.00	-7.36	0.00	-1.67	0.00	-9.43
EARTHQUAKE (LONGITUDINAL)		44	7.58	0.00	-6.39	0.00	11.20	0.00
		47	-7.58	0.00	6.39	0.00	16.91	0.00
WIND BLOWING U/S TO D/S		44	0.00	3.66	0.00	1.54	0.00	17.92
		47	0.00	-2.22	0.00	-1.54	0.00	-4.99

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
WIND BLOWING D/S TO U/S		44	0.00	-3.16	0.00	-1.34	0.00	-20.16
		47	0.00	2.54	0.00	1.34	0.00	7.63
CRANE MOVING U/S TO D/S		44	79.18	2.96	-0.11	1.82	0.21	44.13
		47	-79.18	-2.96	0.11	-1.82	0.29	-31.12
CRANE MOVING D/S TO U/S		44	24.93	-4.77	-0.04	-1.04	0.07	-23.60
		47	-24.93	4.77	0.04	1.04	0.09	2.59
CRANE STRIKING U/S		44	0.00	-4.98	0.00	-1.12	0.00	-15.31
		47	0.00	4.98	0.00	1.12	0.00	-6.59
CRANE STRIKING D/S		44	0.00	2.31	0.00	0.68	0.00	18.29
		47	0.00	-2.31	0.00	-0.68	0.00	-8.11
CRANE MOVING (LONGITUDINAL)		44	54.98	-2.27	-2.62	0.17	3.98	11.91
		47	-54.98	2.27	2.62	-0.17	7.57	-21.90
DEAD LOAD + LIVE LOAD	82	45	50.15	-2.02	-3.03	0.26	6.26	-1.25
		48	-31.30	2.02	3.03	-0.26	7.08	-7.64
EARTHQUAKE (TRANSVERSE)		45	0.00	7.36	0.00	1.67	0.00	41.83
		48	0.00	-7.36	0.00	-1.67	0.00	-9.43
EARTHQUAKE (LONGITUDINAL)		45	7.58	0.00	-6.39	0.00	11.20	0.00
		48	-7.58	0.00	6.39	0.00	16.91	0.00
WIND BLOWING U/S TO D/S		45	0.00	3.16	0.00	1.34	0.00	20.16
		48	0.00	-2.54	0.00	-1.34	0.00	-7.63
WIND BLOWING D/S TO U/S		45	0.00	-3.66	0.00	-1.54	0.00	-17.92
		48	0.00	2.22	0.00	1.54	0.00	4.99
CRANE MOVING U/S TO D/S		45	24.93	4.77	-0.04	1.04	0.07	23.60
		48	-24.93	-4.77	0.04	-1.04	0.09	-2.59
CRANE MOVING D/S TO U/S		45	79.18	-2.96	-0.11	-1.82	0.21	-44.13
		48	-79.18	2.96	0.11	1.82	0.29	31.12
CRANE STRIKING U/S		45	0.00	-2.31	0.00	-0.68	0.00	-18.29
		48	0.00	2.31	0.00	0.68	0.00	8.11
CRANE STRIKING D/S		45	0.00	4.98	0.00	1.12	0.00	15.31
		48	0.00	-4.98	0.00	-1.12	0.00	6.59
CRANE MOVING (LONGITUDINAL)		45	54.98	2.27	-2.62	-0.17	3.98	-11.91
		48	-54.98	-2.27	2.62	0.17	7.57	21.90
DEAD LOAD + LIVE LOAD	84	47	18.90	2.11	-1.52	-0.04	3.58	7.66
		50	-11.85	-2.11	1.52	0.04	1.88	-0.08
EARTHQUAKE (TRANSVERSE)		47	0.00	2.56	0.00	0.91	0.00	9.31
		50	0.00	-2.56	0.00	-0.91	0.00	-0.08
EARTHQUAKE (LONGITUDINAL)		47	3.20	0.00	-1.15	0.00	-4.84	0.00
		50	-3.20	0.00	1.15	0.00	8.98	0.00
WIND BLOWING U/S TO D/S		47	0.00	1.93	0.00	0.84	0.00	4.90
		50	0.00	-0.75	0.00	-0.84	0.00	-0.07
WIND BLOWING D/S TO U/S		47	0.00	-2.32	0.00	-0.80	0.00	-7.54
		50	0.00	1.81	0.00	0.80	0.00	0.12
CRANE MOVING U/S TO D/S		47	0.18	-3.98	-0.19	0.84	0.22	-14.42
		50	-0.18	3.98	0.19	-0.84	0.47	0.08
CRANE MOVING D/S TO U/S		47	0.06	-4.63	-0.06	-0.70	0.07	-16.82
		50	-0.06	4.63	0.06	0.70	0.15	0.16
CRANE STRIKING U/S		47	0.00	1.83	0.00	-0.46	0.00	6.67
		50	0.00	-1.83	0.00	0.46	0.00	-0.07
CRANE STRIKING D/S		47	0.00	2.21	0.00	0.44	0.00	8.06
		50	0.00	-2.21	0.00	-0.44	0.00	-0.09
CRANE MOVING (LONGITUDINAL)		47	0.99	-2.31	0.19	0.06	-3.46	-8.37
		50	-0.99	2.31	-0.19	-0.06	2.76	0.05
DEAD LOAD + LIVE LOAD	85	48	18.90	-2.11	-1.52	0.04	3.58	-7.66
		51	-11.85	2.11	1.52	-0.04	1.88	0.08
EARTHQUAKE (TRANSVERSE)		48	0.00	2.56	0.00	0.91	0.00	9.31
		51	0.00	-2.56	0.00	-0.91	0.00	-0.08
EARTHQUAKE (LONGITUDINAL)		48	3.20	0.00	-1.15	0.00	-4.84	0.00
		51	-3.20	0.00	1.15	0.00	8.98	0.00
WIND BLOWING U/S TO D/S		48	0.00	2.32	0.00	0.80	0.00	7.54

TABLE NO.~ B- 5 RESULTS OF ANALYSIS OF THE THREE-DIMENSIONAL SPACE FRAME

LOADS	Member	Node	Axial Force	Shear-Y	Shear-Z	Torsion	Moment-Y	Moment-Z
		51	0.00	-1.81	0.00	-0.80	0.00	-0.12
WIND BLOWING D/S TO U/S		48	0.00	-1.93	0.00	-0.84	0.00	-4.90
		51	0.00	0.75	0.00	0.84	0.00	0.07
CRANE MOVING U/S TO D/S		48	0.06	4.63	-0.06	0.70	0.07	16.82
		51	-0.06	-4.63	0.06	-0.70	0.15	-0.16
CRANE MOVING D/S TO U/S		48	0.18	3.98	-0.19	-0.84	0.22	14.42
		51	-0.18	-3.98	0.19	0.84	0.47	-0.08
CRANE STRIKING U/S		48	0.00	-2.21	0.00	-0.44	0.00	-8.06
		51	0.00	2.21	0.00	0.44	0.00	0.09
CRANE STRIKING D/S		48	0.00	-1.83	0.00	0.46	0.00	-6.67
		51	0.00	1.83	0.00	-0.46	0.00	0.07
CRANE MOVING (LONGITUDINAL)		48	0.99	2.31	0.19	-0.06	-3.46	8.37
		51	-0.99	-2.31	-0.19	0.06	2.76	-0.05

DEAD LOAD + LIVE LOAD	**91**	50	-2.12	0.00	0.00	0.00	0.00	0.00
		51	2.12	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (TRANSVERSE)		50	0.00	0.00	0.00	0.00	0.00	0.00
		51	0.00	0.00	0.00	0.00	0.00	0.00
EARTHQUAKE (LONGITUDINAL)		50	0.00	0.00	0.00	0.00	0.00	0.00
		51	0.00	0.00	0.00	0.00	0.00	0.00
WIND BLOWING U/S TO D/S		50	0.91	0.00	0.00	0.00	0.00	0.00
		51	-0.91	0.00	0.00	0.00	0.00	0.00
WIND BLOWING D/S TO U/S		50	0.91	0.00	0.00	0.00	0.00	0.00
		51	-0.91	0.00	0.00	0.00	0.00	0.00
CRANE MOVING U/S TO D/S		50	4.34	0.00	0.00	0.00	0.00	0.00
		51	-4.34	0.00	0.00	0.00	0.00	0.00
CRANE MOVING D/S TO U/S		50	4.34	0.00	0.00	0.00	0.00	0.00
		51	-4.34	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING U/S		50	-2.03	0.00	0.00	0.00	0.00	0.00
		51	2.03	0.00	0.00	0.00	0.00	0.00
CRANE STRIKING D/S		50	-2.03	0.00	0.00	0.00	0.00	0.00
		51	2.03	0.00	0.00	0.00	0.00	0.00
CRANE MOVING (LONGITUDINAL)		50	2.34	0.00	0.00	0.00	0.00	0.00
		51	-2.34	0.00	0.00	0.00	0.00	0.00