ANAYLSES AND DESIGN OF G+4 BUILDING ON STAAD PRO AND COMPARISON STUDY

A

PROJECT REPORT

Submitted in partial fulfilment of the requirements for the award of the degree

of

BACHELOR OF TECHNOLOGY

IN

CIVIL ENGINEERING

Under the supervision

of

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To

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY

WAKNAGHAT SOLAN-173234

HIMACHAL PRADESH INDIA MAY, 2022

DECLARATION

I hereby declare that the work presented in the Project report entitled "**Analysis And Design of G+4 Building on STAAD PRO And Comparison Study**" submitted for partial fulfilment of the requirements for the degree of Bachelor of Technology in Civil

Engineering at **Jaypee University of Information Technology, Waknaghat** is an authentic record of my work carried out under the supervision of **DR. Saurav**. This work has not been submitted elsewhere for the reward of any other degree/diploma. I am fully

responsible for the contents of my project report. Ritik Kumar Puri (181617) Utkarsh (181627)

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CERTIFICATE

This is to certify that the work which is being presented in the project report titled **"Analysis And Design of G+4 Building on STAAD Pro And Comparison Study"** in partial fulfilment of the requirements for the award of the degree of Bachelor of Technology in Civil Engineering submitted to the Department of Civil Engineering**, Jaypee University of Information Technology, Wakhnghat** is an authentic record of work carried out **by Ritik Kumar Puri (181617) and Utkarsh (181627)** during a period from August 2021 to May, 2022 under the supervision of **Dr. Saurav** (Assistant Professor), Department of Civil Engineering, Jaypee University of Information Technology, Wakhnghat.

The above statement made is correct to the best of our knowledge.

Date: May 2022

Dr. Saurav	Signature of HOD
Assistant Professor	Dr. Ashish Kumar
Department of Civil Engineering	Department of Civil Engineering
JUIT, Wakhnghat	JUIT, Wakhnghat .

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I would like to thanks everybody who has helped me in every possible way to successfully complete this project. Firstly I would like to thanks my guide Dr. Saurav who has provided me this opportunity to do this project under his guidance. He has provided valuable idea and support during the course of this work. This work would not have been possible without his support. I would like to thanks other project coordinator and faculty members and technical staff of Department of Civil Engineering of Jaypee University of Information Technology to provide valuable input through the course of this work. I would also like to thank my institute Jaypee University of Information Technology.

Thank you all

Date:

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ABSTRACT

This paper gives information about static analysis of G+4 residential building which deals with lateral static forces at beam and column joints and their displacements. The building is designed as three dimensional vertical frames and analyzed for the maximum and minimum bending moments and shear forces.

Keywords: Structural Analysis, Load Analysis, Structural Elements, Design, Displacements.

CHAPTER 1

INTRODUCTION

1.1General

This paper offers records about shape to be developed tough to fulfil the required efficiency, for which it is intended and shall be long-lasting for its required lifestyle or lifespan. To operate or for a correct evaluation it is the duty of the structural engineer to decide such facts as structural load, geometry, help reaction, stresses and displacements. The layout is totally secure and comfortable with the need. Here we have used IS 456–2000 notation.

Now days the house building is genuine work of the social headway of the area. Step by step new strategies are being created for the improvement of houses monetarily quickly and fulfilling the necessities of the system authorities and artists do the structure work masterminding and plan etc of the structure. Originator is responsible for doing the outline work of structure as for the heading of pros and designers. The draftsman must know his and should have the ability to hold fast to the direction of the planner and should have the ability to draw the required delineation of the structure site plans and organisation designs etc regarding the essentials the arrangement is made using program on helper extension structure STAAD Pro . The structure presented to both the vertical lords similarly as even loads. The vertical weight includes dead stack of helper part for Instance, bars, segments, PCs etc and live loads

1.2 Design Philosophies

The format philosophies adopted in the challenge is restriction in rotation method. An extended sketch philosophy is to overcome the drawback of the working stress technique is the restrict kingdom method. There is a strict states are the quiet, a number of necessities that a Structure is anticipated to fulfil the requirements which is needed. So that the overall performance of the shape satisfies the main reason for which it is built.

1. **Limit State of Strength/Collapse (Ultimate Limit State)**

This restrict country is related with real failure(or approaching failure) underneath the motion of the likely and the most unfavourable mixture of hundreds on a shape which may also endanger the protection of existence and property. The diagram values are derived from the attribute values thru the use of partial security factors, each for fabri c strengths and for loads.The reliability of diagram is ensured by using gratifying the necessities i.e. Design Action is much less or equal to the Design Strength

2. Limit State of Serviceability

This restrict kingdom is related with the functioning of shape or its elements below pr ovider or working loads. It reasons soreness to the occupants or impacts the look of a shape and, on the whole, might also minimize the useful effectiveness of the structure. It consists of

- Deformation/Deflection
- Vibration repairable damage or crack due to fatigue
- Corrosion/durability; and fire.

1.3 Significance of Study

This find out about focuses on grasp behaviour of RC framed brick infill constructin g below specific loading as monotonic, static and cyclic loading. A parametric learn about has been executed in order to recognize impact of more than a few parameters such as one of a kind brick sizes, openings in wall, distinct mortar thickness, consideration of lintel and sill bands, and impact of vertical and horizontal reinforcement on constructing strength.Later harm estimation has been achieved primar ily based on the strength, stiffness and ductility from load displacement curve. The cause of the dialogue is to identify troubles bearing on to constructing overall performance that should be addressed inthe improvement of recommendations and equi pment for the implementation of performance-based earthquake engineering. At the time of this writing, constructing (system)response is regularly judged on the ground work of the most rather broken aspects in the building. Clearly, this approach, even though conservative,is neither correct nor value effective.Poor conduct of one or two random factors does no longer always lead to bad soils device behaviour, eventhough n- -egative conduct of one or two key elements may also lead to device fall down if mechanisms for distribution of gravity masses do now not exist in a building. Much stays to be discovered about the crumple of structures and the diagram of structu res inclined to liquefaction or failure.Research on the above matters is wished to enh ance analysis, evaluation, and diagram processes to make certain with excessive self assurance and low fee that structures will collapse.

1.4 STAAD PRO.

In every section of human improvement we required buildings to stay in or to get what we need.In case,it’s now not shape buildings then again to fabricate expert constructi ons with the intention that it can fulfil the precept cause for what it was once made for. Here comes the job of shape designing and the entire extra precisely the job of investigation of the structure.

There are several installed techniques to take care of layout troubles and with time new programming moreover turning into an vital factors. Here in this project work rely on programming named kingdom Pro has been used. Few requirements problems like cle ver have been unravelled to show how STAAD Pro can be utilised in a number of cases. These regular troubles have been settled utilising fundamental thoughts of stacking, examination, situation in accordance to Is code. These necessary techniques would possibly be found beneficial for future investigation of issues. Examination of shape intends to assurance of the interior powers like hub strain bowing minute, shear constrain and so on in the section phase for which the phase are to be deliberate un derneath the endeavour of given backyard burden.The design is system of phase precauti on from the examination outcomes by way of utilising terrific investigation method. The factor of configuration is to accomplishment a first class likelihoods that shape being deliberate will function agreeably amid there. Proposed lifestyles

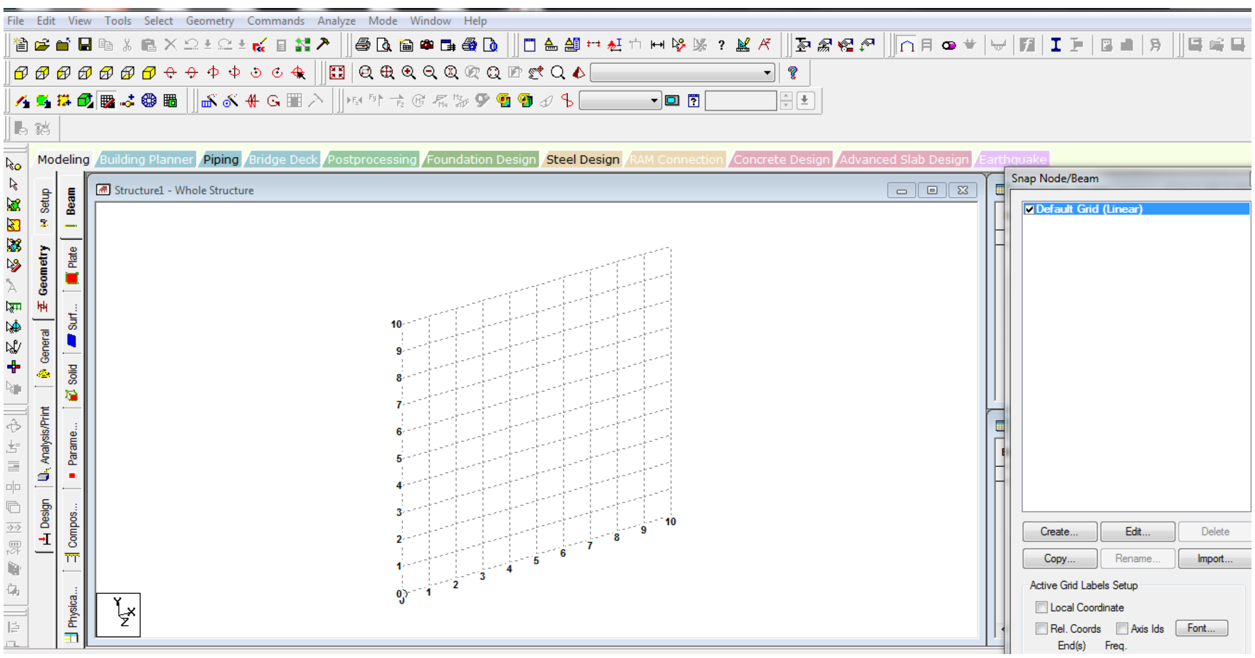


Figure 1.1 STAAD PRO working interface

1.4.1 Advantages of STAAD PRO software

i. Flexible modelling environment.
ii. For designing code there is a wide range of availability.
iii. Open architecture.
iv. All feature of structural engineering.
v. IS codes.

vi. Assurances of Quality.
vii. Documentation and Report.

Investigation of structure of different components of structure.

i. Planning of different parts of a structure with section situating.
ii. Introduction of STAAD Pro.
iii. Modelling of the structure in the STAAD Pro giving all limiting conditions (Underpins ,stacking and so on)
iv. Analysis and Design of different basic parts of the modular structure.
v. Study of investigation Data of product.
vi. Detailing of shafts ,segments ,piece with area proportioning and fortification.

BEAM: Beams are frequently horizontal structural member which switch the load horizontal alongside their size to the help the place the load are normally resolved into vertical forces. Beams are used for revisiting vertical load, bending second and Shear forces

There are three types of RCC beam

- Singly reinforced beam
- Doubly reinforced beam
- Flanged beam .

Singly reinforced beam: Incase of a singly Reinforced beam,The concreteon higher c omponent (topfibre) Is subjected to compression and the reinforcements are furnishe d to withstand anxiety on decrease part. In this case on the other hand the depth of the beam is greater. As proven in the discern

1.2Doubly Reinforced Beam:Beam or shaft preserve with metal in weight and energ y zones are known as doubly strengthened columns.The variety of shaft Will be deter mined fullsize when on account of headroom thru or constructing thru the importance of the physique is kept.

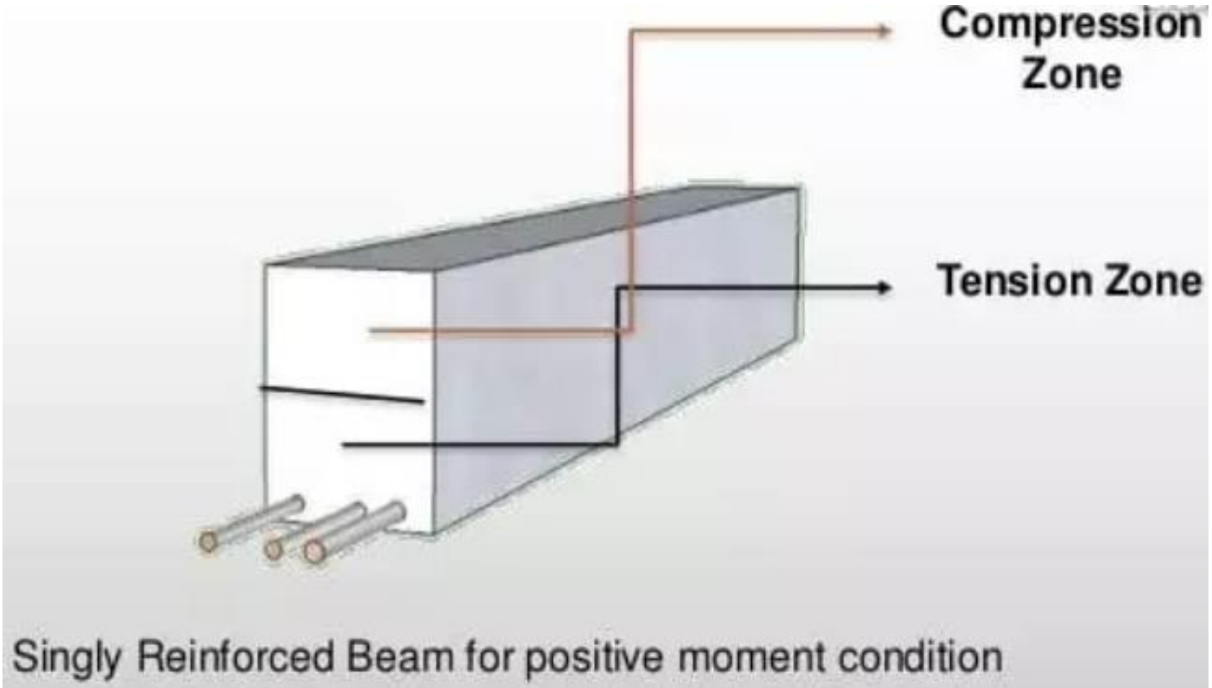


Figure 1.2: Singly reinforced beam

Flanged Beam:A Tbeam (tee beam),Utilized in development,Is a heap bearing shape of power soil, wooden Or metal,With a Tmolded go segment.The net vertical section o f the shaft beneath neath the strain backbone serves to oppose sheer pleasure and to supply greater prominence division to the coupled electricity of bowing. As proven in the parent 1.3

Flanged beam is of two types:

- **T BEAM**
- **L BEAM**

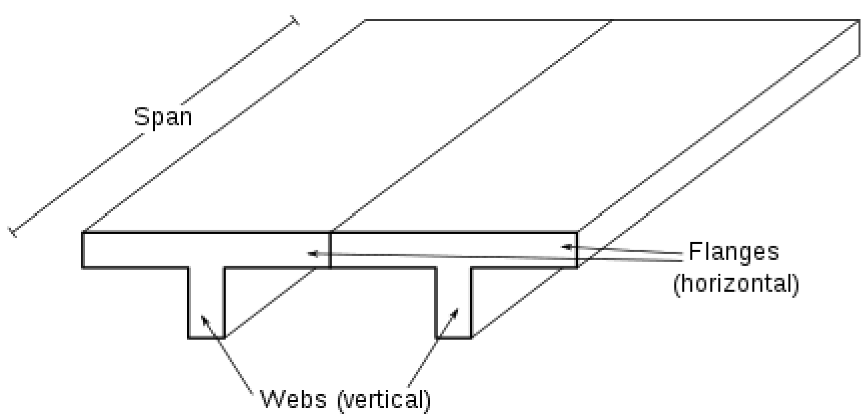


Figure 1.3: Flanged T Beam

COLUMN:A column would possibly be characterised as a trouble utilized indispensabl e to assist hub Compressive burdens and with the tallness of a least extra than one cases it's parallel dimension. The excellent of section is predicated the fantastic of substances, shape and size of go segment, period and diploma of corresponding and str ength of mind limits at its closures.

SLAB: Slabs are developed to grant flat surfaces, commonly flat, In shape floors, rooftops, Spain, and one of a form varieties of structures. The junk would possibly be a upheld via Means of dividers, thru energy and robust bars in the main university solidly with the phase, by the way of simple metallic pillars, by way of way of segments or via the floor. The depth of a slab is typically very small as evaluate to its span.

1.4.2 Aim of STAAD PRO

This task goes for re-learning of concept or primary diagram with the help of PC helps.Quickly we have skilled ending calls interest of the assignment work

i. Comprehension of design and itemising idea.
ii. Main purpose for instance studying of STAAD PRO programming bundle.
iii. Learning of examination and diagram process which can be treasured in the field.
iv. Understanding of seismic tremor obstruction design idea.
v. Approach for specialist exercise in the area of simple designing.

CHAPTER 2
LITERATURE REVIEW

Prof. Aradhana Chavan,Kranti Pawar,Anagha Ahire, Anagha Ahire, Hritik Rathod and Janmejay More[1] This task consists of G four constructing with parking at floor floor and relaxation of the flooring occupied with 2BHK flats.The response of a RCC exc essive upward thrust constructing beneath lifeless load, stay load and seismic load is studied as per IS 875(Part 1):1987,IS 875(Part 2):1987and IS 1893: Part 1: 2016 respectively.

Reinforcement small print for every member i.e.,beams and columns can be got imme diately after the technique of analysis is carried out.Estimation and Costing is finished the use of MS Excel to understand the constructing Appropriate value the use of Long Wall and Short Wall Method. Over all challenge helped us to recognize the Building Process and use of unique software program for convenient and well timed completion of work.

Kunal Wailkar,Pranay Chide,Manthan Shende,Jinendra Ralekar, Dhanashree Walke, Dhanashree Tayde and AtulKurzekar[2]The structural factors of constructing are prote cted in flexure and shear. Two Quantity of metal furnished for constructing is low-budget and adequate. Three Proposed sizes of structural elements can be used in co nstructing as it is. four The format of beam, slab, column, footing and stair case are protected in deflection,bending,shear and different aspects.On evaluation of the gui de graph and geometrical mannequin the usage of STAAD Pro,the vicinity of metal re quired for beam, column, footing, slab, staircase are comparatively comparable to that of the requirement.

Nikhi Ghuge,Neha Shahare,Mohini Tupsunder, Shivram Totewad, Nikhil Gaydhani and Kushal Yadav [3] This paper is based on design and analysis multistoried residential building(G+5) using commercial software STAAD-pro. Plan of the building is drafted with the help of the drafting software with required dimensions. We applied different kind of the loads on the building Earthquake load, live load and the respective load combination. We found the structure is capable to sustain applied loads. It is included that with the help of the using software STAAD-pro etc, there is possibility of having stable and safe construction of the structure with the provided load. By using the STAAD-pro software it is easy to get fast, efficient and accurate platform for analyzing and designing software.

Inguva Sai Surya Prakash,Adireddy Siva Satya Vara Prasad,R Rama Krishna [4] Analysis and diagram outcomes Structure on Plain Ground and Sloping Terrain are given in chapter.The assessment of effects of constructing indicates that.Although,the structur es on simple floor entice much less motion forces as in contrast to constructions on sloping ground, typical financial price concerned in levelling the sloping floor In struc tures on sloping ground, it is discovered that excessive left column at floor level, which are short, are the worst affected. Special interest need to be given to these columns in plan and detailing. The sketch indicates that there is enormous discount in bending moments of columns in Z Direction from R.C.C Structure on Plain Ground and Sloping Terrain Base shear of R.C.C Structure on sloping terrain is very much less in contrast to R.C.C shape undeniable ground. The storey float in R.C.C Structure on Plain Ground and Sloping Terrain is almost equal.This is because; metal shape is extra bendy as co mpared to RCC structure. Bending second is appear to be decreased due to step up columns in R.C.C Structure on sloping terrain The bending second in column is extend at base of body due to the lengthy column and quick column impact in R.C.C Structure on sloping ground. From the study, it is located that the building which are resting on sloping are subjected to brief column impact , appeal to greater forces and are worst affected at some stage in seismic excitation. Hence structure format factor of view, different interest need to be given to the size, orientation, and ductility demand of brief column.It is additionally determined that the hill slope constructing are subjec ted to big torsional outcomes due to uneven distribution of Axial pressure in the mor e than a few frames of constructing advise improvement of torsional motion which is observed to be greater on a sloping floor building.This values in addition support the i dea of brief column impact as nicely as torsion and twisting increase in shape due to uneven heighted column.

Shuai Wu and Fang Tan[5] With greater and more,the special plan of constructing str uc-tures in mountains encountered greater and more, however the extraordinary nature of mountain seismic constructing shape is no longer ample theoretical lookup and evaluati on of present norms is distinctly uncommon for a mountain constructing of provisions, theoretical lookup lags at the back of the genuine project.This article from the authen tic assignment encountered problems,this paper proposes partial solutions.But lookup and theory constructing on mountain realistic engineering elements of the lookup want ed majority of designers and pupils to do extra work in order to put together as early as viable and to enact mountain constructing shape layout speciation’s.

Mr. Achin Jain, Dr. Rakesh Patel [6] Analysis of constructing body for seismic forces is a frequent trouble system now a day’s due to availability of various software progra m equipment and programs.Reinforced concrete(RC) structural frames are frequent sh ape of constructions resting on aircraft and sloping floor (hilly areas) in India. There structures are subjected to a number of sorts of forces for the duration of their lifetime, such forces due to lifeless and stay masses and dynamic forces due to the wind and earthquake. Results from seismic analyses carried out on three RC structures with three one-of-a-kind floor slopes (00, 100, 150, 200, 250 and 300) have been carried out by using the use of static method. The pinnacle storey displacement and the footing reaction, axial force, shear and second motion caused in columns and beams have been studied to check out the affect of sloping floor on structural overall performance of co nstructing frame.Maximum pinnacle storey displacement for M5acquired from equival ent static evaluation reduced for smooth clay(SC),dense sand (DS), difficult clay (HC) and rock (RCK) with admire to mannequin M1.Thus as stiffness of soil will increase storey displacement decreases.

B.G. Birajdar, S.S. Nalawade [7] Based on dynamic evaluation of three one-of-a-kind configurations of buildings; the following conclusions can be drawn. The overall performance of STEP returned constructing throughout seismic excitation should show extra prone than different configurations of buildings. The improvement of tensional moments in Step again structures is greater than that in the Step lower back Set agai n buildings.Hence,Step returned Set returned constructions are located to be muchless in clined than Step lower back constructing in opposition to seismic floor motion. In Step returned constructions and Step backSet returned buildings, it is found that sever e left column at floor level, which are short, are the worst affected. Special interest ought to be given to these columns in diagram and detailing. Although, the Set again constructions on simple floor appeal to much less motion forces as in contrast to Step lower back Set returned buildings, typical financial price worried in levelling the sloping floor and different associated problems wishes to be studied in detail.

Ms. Rudrani G. Sanap, Mr. Vishal Sapate [8] The conclusions are made up of the above observations as follows.The performance of STEP BACK constructing configuration at some stage in earthquake excitations should show extra inclined than different configur ation like Step Back Set Back and Set Back constructing structures. Step Back Set returned constructing Structures is discovered to be much less prone than Step Back constructing in opposition to seismic floor motions. Although the Set Back configuration resting on flat floor attracts lesser base shear motion in contrast to step returned set returned configuration typical comparatively cheap fee worried to stag e the sloping floor and different associated problem with this can be learn about well. As perspective of floor will increase pinnacle storey displacement decreases.Top storey sway decreases as range of bays make bigger consequently it is demonstrated at higher variety of bays are located to be higher beneath seismic conditions.

P.Chaitanya,Kishore,R.Sumathi[9]From the above learn about the following conclusions have been made.Earthquake is precipitated when it is subjected to the fl oor action and due to which constructions suffers injury and to take care of such out comes it is vital to comprehend the houses of earthquake and predicts its feasible resp onse which can incur on the buildings. These houses are base shear, most storey displacement. The values of Drift in each X and Y-Direction are located most for Flat floor in Zone III, Zone IV, Zone V. from this it used to be conformed that sloping structures are greater earth quake resistant than flat buildings. The fee of Shear force, Bending moment, Building torsion used to be determined to be greater values for the Flat slop constructing than sloping buildings.Due to gives of slop the constructio ns are greater steady with the aid of supplying slop.The evaluation and layout of Slopi ng floor constructing with 1200and 1400 slope used to be finished through the usage of ETABS V9.7.4 Software.The quantity of modes regarded in the evaluation is gratif ying the codal provisions.The modal mass participation of the sloped body mannequ in are lowering for the first mode and growing for the 2nd mode with the extend in slope angle. The shear of all the structures are greater for flat floor constructing than sloping floor constructing their distribution on columns of floor storey is such that the quick column attracts the majority (75% approx.) of the shear pressure which leads to plastic hinge formation on the brief column and are prone to damage. Proper plan standards ought to be utilized to keep away from formation of plastic hinge.On diagram ground, setback constructing entice much less motion forces as eval uating with different configurations on sloping floor which make it greater steady and it would not go through extra damages due to the shear action. On sloping floor set-step lower back constructing appeal to much less motion forces as evaluating with step again constructing however if the reducing price of sloping floor is with ideal limits then setback constructing can also be preferred. Also by using looking at the graphs we can conclude that for sloped floor constructing the i mpact of earthquake is lowwhen in contrast to flat floor building**.**

Shreyas M G, Vasudev M V [10] By thinking about all three angles (i.e. 150, 200, 250)and varying top of the mannequin below find out about (i.e. 24m, 27m, 30m), the conclusions are as follows:

The SB constructing frames supply larger values of Storey displacement as in contrast to SBS frames. The SB constructing indicates greater values of time duration when in contrast with SBS building. In each SB and SBS frames, it is found that the columns which are brief are most affected. Special interest is required whilst designing these quick columns. On statement in all the models, round 30-35% minimize in storey shear in case of SBS when in contrast to SB frames. Around 7-10% discount of storey waft in SBS configuration when in contrast with different configuration. The Performance of SB frames in the course of seismic excitation may want to show greater prone than different configurations of building frames, Hence SBS frames are extra suited than SB frames. As the make bigger in the peak of the constructing the most displacement and time length in each configuration increases, whereas in slope the most displacement is getting decreased. Hence it can be referred to that the SBS constructing body operate higher than SB constructing body when subjected to seismic force. Step back-setback constructing body may also be favoured on sloping ground. Based on Observation of outcomes obtained, Step back-Setback configuration indicates lesser values of displacements and drifts consequently sloping attitude can be accredited to 30 Degree.

CHAPTER 3

Building Resting On Plain

3.1 General

Due to shortage of flat land in hilly areas, majority of the structures is developed on the hill slopes with normal structural configuration having foundations at distinct levels. Such structures pose one-ofakind structural and constructional problems.The version of stiffness and mass in vertical as nicely as horizontal directions, effects in centre of mass and centre of stiffness of a story no longer coinciding with every different and now not being on a vertical line for exceptional floors. A massive element of India is prone to unfavourable stages of seismic hazards. Hence, it is imperative to take in to account the seismic load for the sketch of structures. In constructions the lateral masses due to earthquake are a depend of concern. The shape need to stand up to reasonable stage of earthquake floor movement besides structural damage, however p er chance with some structural as properly as non-structural damage. The annual losses due to earthquakes are very giant in many components of the world. They now not solely purpose splendid destruction in phrases of human casualties, how ever additionally have a super financial have an impact on on the affected area. India had witnessed various principal failures due to earthquakes over the previous century relies upon on the greenback alternate charge fluctuations and different factors, which are constrained in most of the world. The charge fluctuations are as variable as the stages for gold or oil.

3.2 Material Availability and Construction Scheduling

Concrete provide and availability may additionally restriction the availability of trans port ships and delivery rates. In the match of a tight grant of any character areas or countries, the smaller corporations both pay abusive fees at some stage in concrete ra te or wait till the concrete is available. Concrete constructing building takes up to twice as lengthy constructing duration than metal buildings.Especially when we are speaking about bolstered castin concrete.Each ground for strengthened concrete constructions ca n be constructed each 2nd to 4th day, relying on the thickness and kind of concrete. In one day it can be construct up to 4,000 m2.Such a cyclical development additionall y offers its benefits in largest cities, the place constructions are tightly subsequent to ev

-ery different and have restrained traffic, the place it is hard to get entry to with cranes and different development equipment.

3.3 Plan of the Project

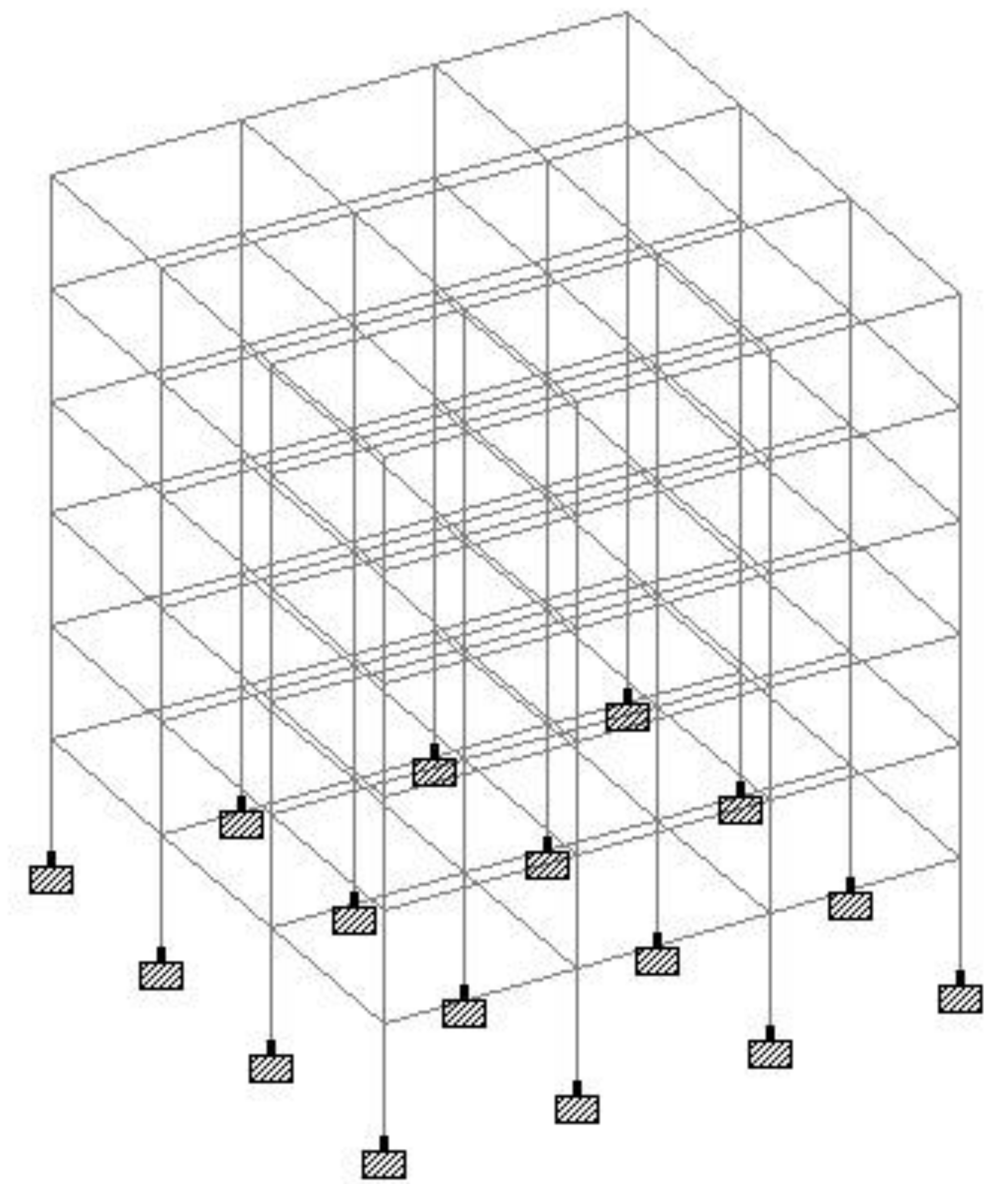


Figure 3.1: G+4 Building

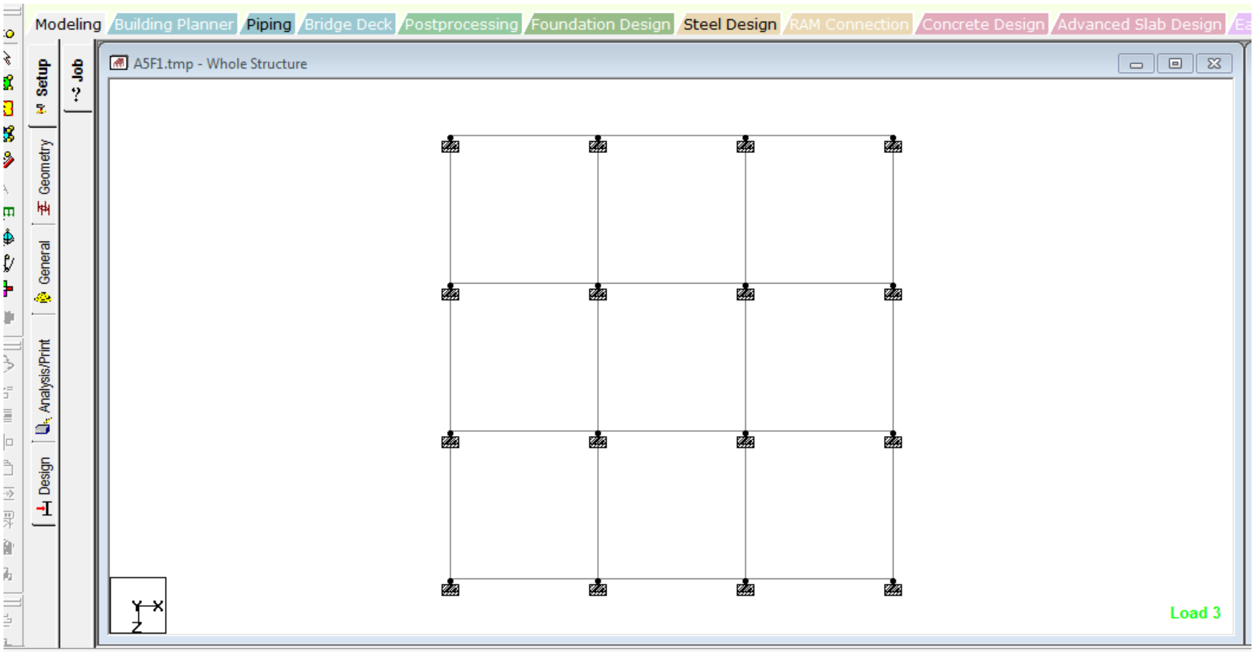


Figure 3.2: Top View

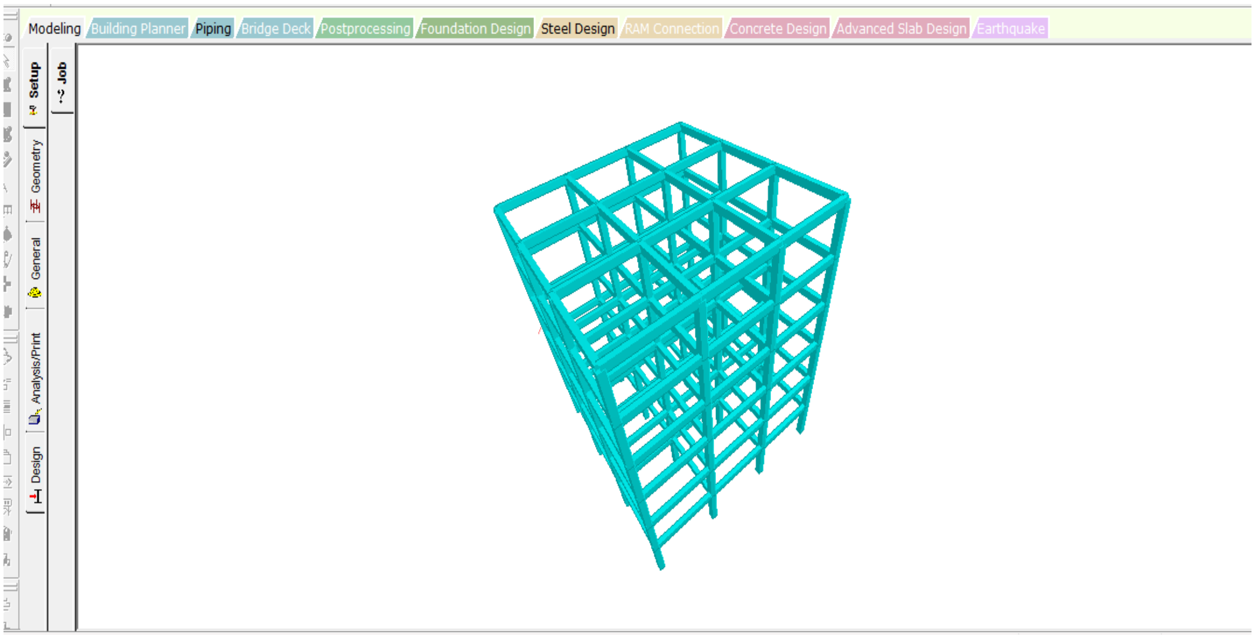


Figure 3.3: 3-D or Render View

3.4.1 Post Processing

Post-processing may additionally refer to: Image modifying in photography. Audio enhancing software program in audio. Differential GPS post-processing, an enhancement to GPS structures that improves accuracy. Video post processing, strategies used in video processing and 3D snap shots. Extract evaluation results, assessment deflected shapes, put together shear and second diagrams, generate tables to existing outcomes.

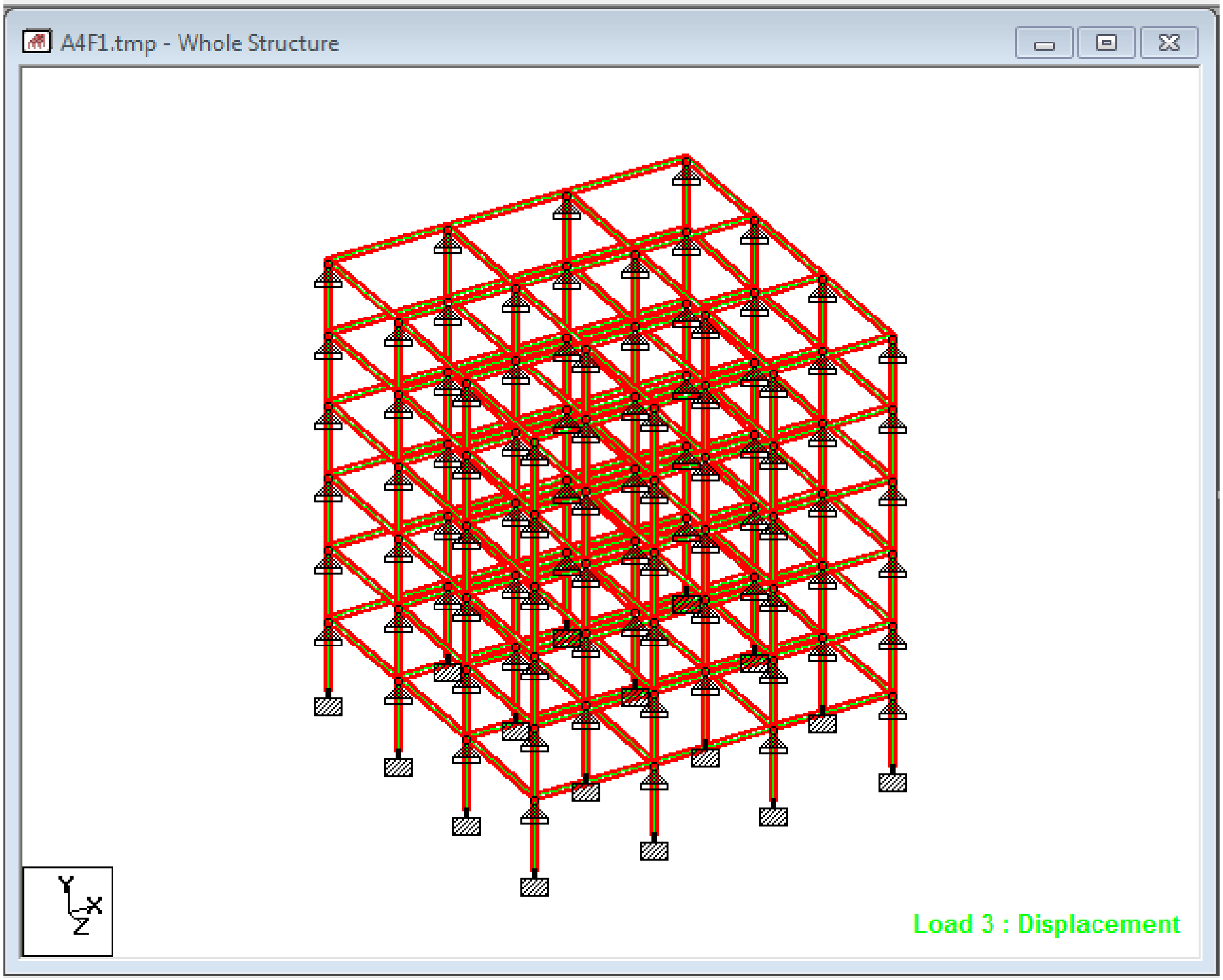


Figure 3.4: Displacement

Table 3.1: Beam Displacement

All Relative Displacement / Max Relative Displacements

Beam	L/C	Dist m	x in	y in	z in	Resultant in
65	1 COMBINATI	0.000	0.000	0.000	0.000	0.000
		1.250	-0.000	-0.035	0.000	0.035
		2.500	0.000	-0.064	0.000	0.064
		3.750	-0.000	-0.035	0.000	0.035
		5.000	0.000	0.000	0.000	0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000
		1.250	-0.000	-0.019	0.000	0.019
		2.500	0.000	-0.034	0.000	0.034
		3.750	-0.000	-0.019	0.000	0.019
		5.000	0.000	0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000
		1.250	-0.000	-0.004	0.000	0.004
		2.500	0.000	-0.008	0.000	0.008
		3.750	-0.000	-0.004	0.000	0.004
		5.000	0.000	0.000	0.000	0.000
66	1 COMBINATI	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	-0.001	-0.001	0.001
		1.500	-0.000	-0.001	-0.001	0.001
		2.250	-0.000	-0.000	-0.000	0.000
		3.000	0.000	0.000	0.000	0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	-0.000	-0.000	0.001
		1.500	-0.000	-0.000	-0.000	0.000
		2.250	-0.000	-0.000	-0.000	0.000
		3.000	0.000	0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	-0.000	-0.000	0.000
		1.500	-0.000	-0.000	-0.000	0.000
		2.250	-0.000	-0.000	-0.000	0.000

All Relative Displacement / Max Relative Displacements

Beam	L/C	Dist m	x in	y in	z in	Resultant in
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	-0.000	-0.000	0.000
		1.500	-0.000	-0.000	-0.000	0.000
		2.250	-0.000	-0.000	-0.000	0.000
		3.000	0.000	0.000	0.000	0.000
67	1 COMBINATI	0.000	0.000	0.000	0.000	0.000
		1.250	-0.000	-0.043	0.000	0.043
		2.500	-0.000	-0.082	0.000	0.082
		3.750	0.000	-0.052	0.000	0.052
		5.000	0.000	0.000	0.000	0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000
		1.250	-0.000	-0.023	0.000	0.023
		2.500	-0.000	-0.044	0.000	0.044
		3.750	0.000	-0.028	0.000	0.028
		5.000	0.000	0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000
		1.250	-0.000	-0.006	0.000	0.006
		2.500	-0.000	-0.011	0.000	0.011
		3.750	0.000	-0.007	0.000	0.007
		5.000	0.000	0.000	0.000	0.000
68	1 COMBINATI	0.000	0.000	0.000	0.000	0.000
		1.250	-0.000	-0.028	0.000	0.028
		2.500	0.000	-0.051	0.000	0.051
		3.750	-0.000	-0.028	0.000	0.028
		5.000	0.000	0.000	0.000	0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000
		1.250	-0.000	-0.016	0.000	0.016
		2.500	0.000	-0.030	0.000	0.030
		3.750	-0.000	-0.016	0.000	0.016

Table 3.2: Node Displacement

		Horizontal	Vertical	Horizontal	Resultant	Rotational		
Node	L/C	X in	Y in	Z in	in	rX rad	rY rad	rZ rad
41	1 COMBINATI	0.000	0.000	0.000	0.000	0.000	0.000	-0.001
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
42	1 COMBINATI	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000	0.000	0.000
43	1 COMBINATI	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
44	1 COMBINATI	0.000	0.000	0.000	0.000	0.000	0.000	0.001
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000	0.000	0.000
45	1 COMBINATI	0.000	0.000	0.000	0.000	-0.000	0.000	-0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	-0.000	0.000	-0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	-0.000	0.000	-0.000
46	1 COMBINATI	0.000	0.000	0.000	0.000	-0.001	0.000	0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	-0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	-0.000	0.000	0.000
47	1 COMBINATI	0.000	0.000	0.000	0.000	-0.001	0.000	-0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	-0.000	0.000	-0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	-0.000	0.000	-0.000
48	1 COMBINATI	0.000	0.000	0.000	0.000	-0.000	0.000	0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	-0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	-0.000	0.000	0.000
49	1 COMBINATI	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
50	1 COMBINATI	0.000	0.000	0.000	0.000	0.000	0.000	0.000

3.4.2 Beam Properties

Beam Number: 81

Table 3.3: Geometry

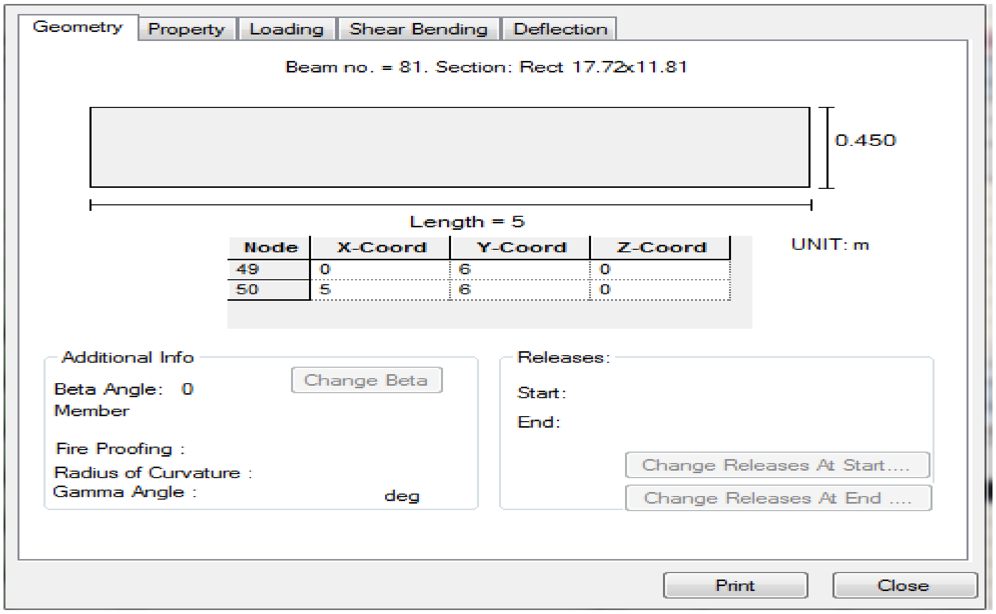


Table 3.4: Property

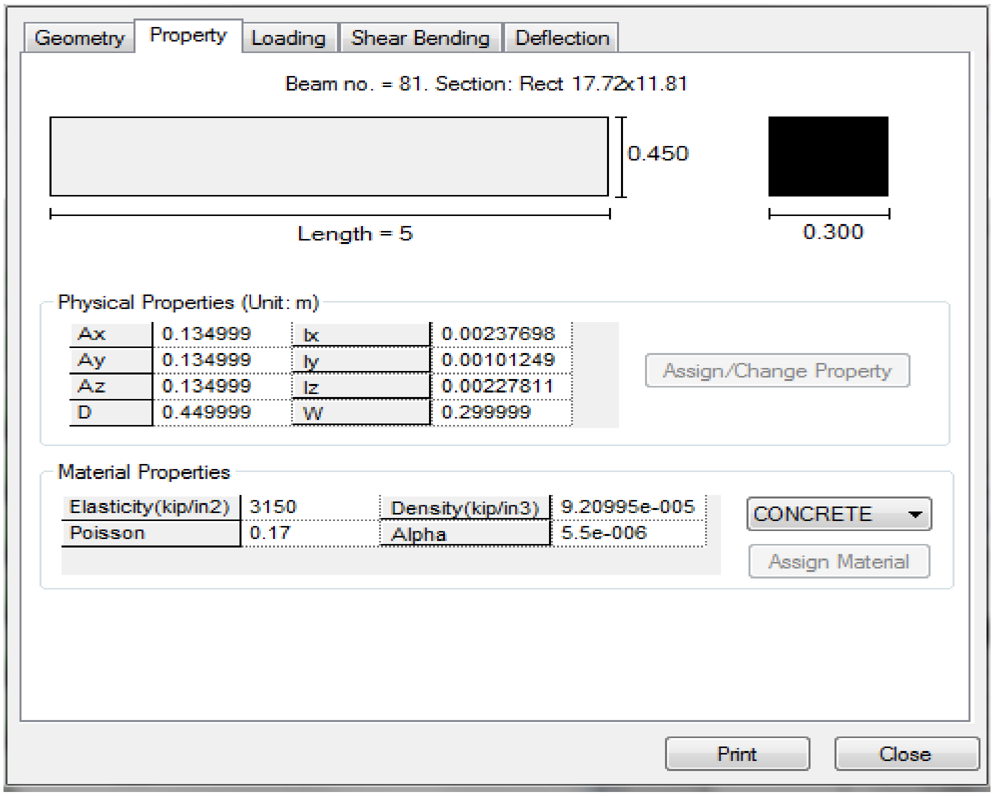


Table 3.5: Shear Bending

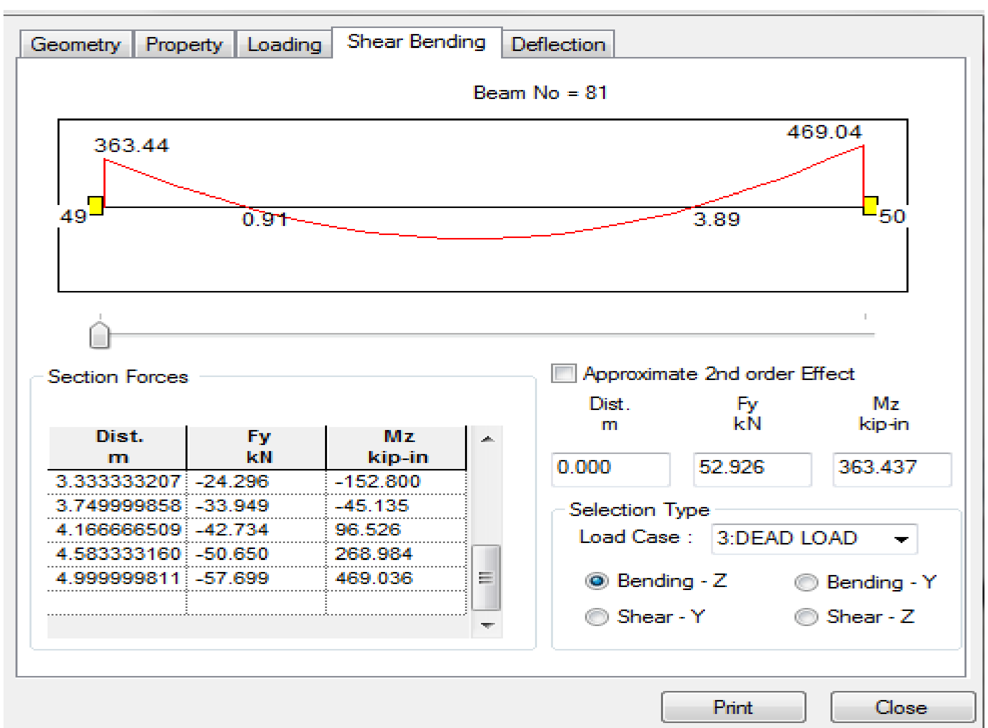
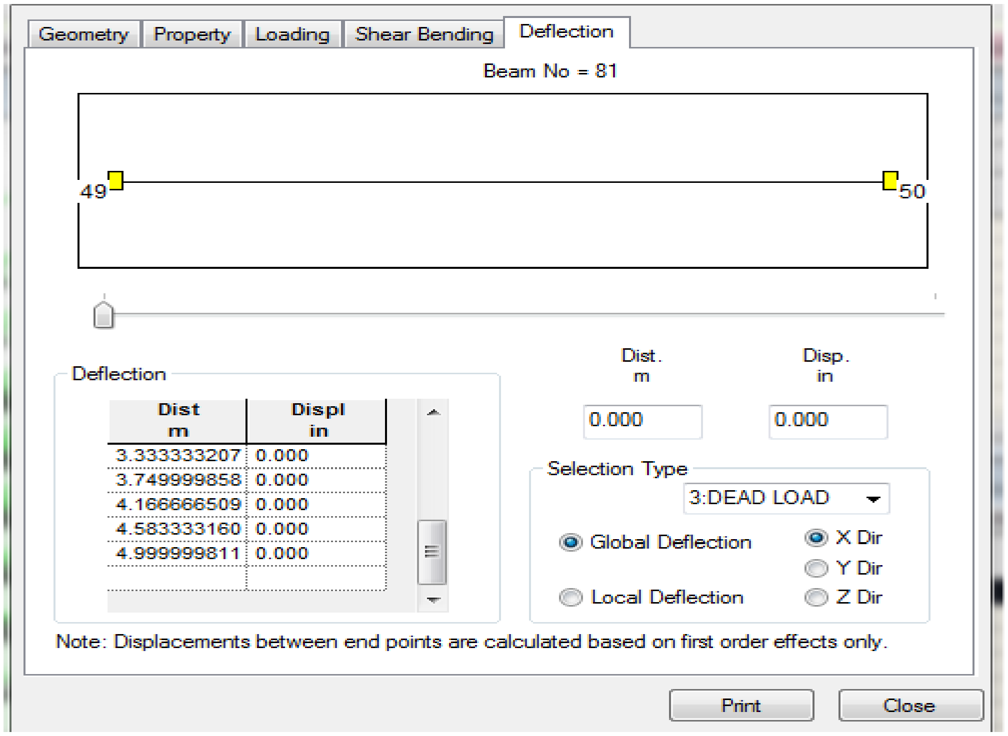


Table 3.6: Deflection



Beam Number: 158

Table 3.7: Geometry

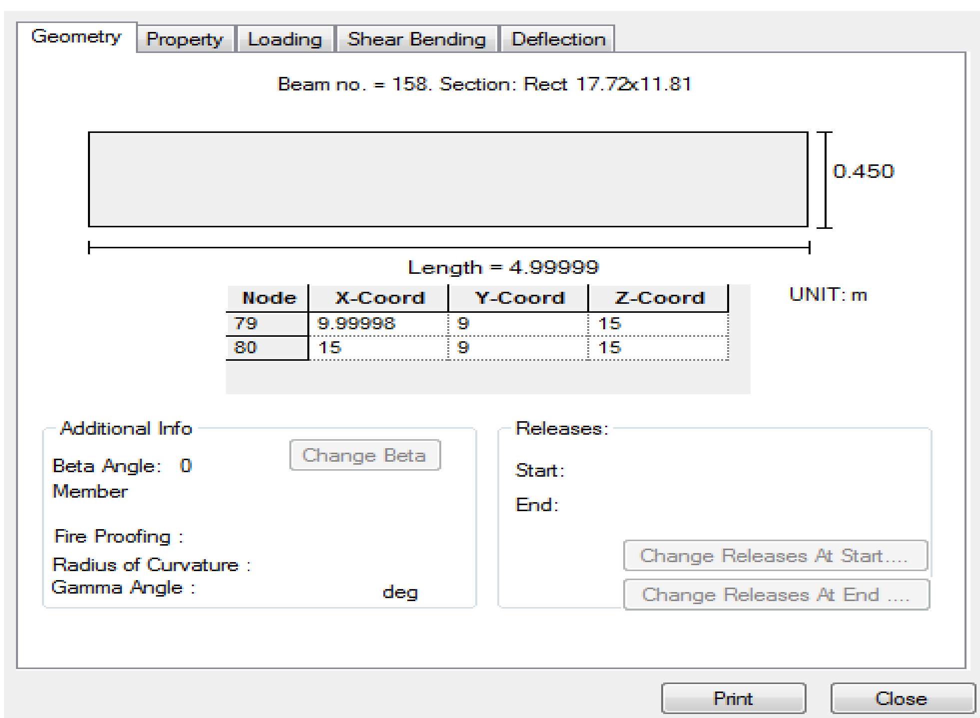


Table 3.8: Property

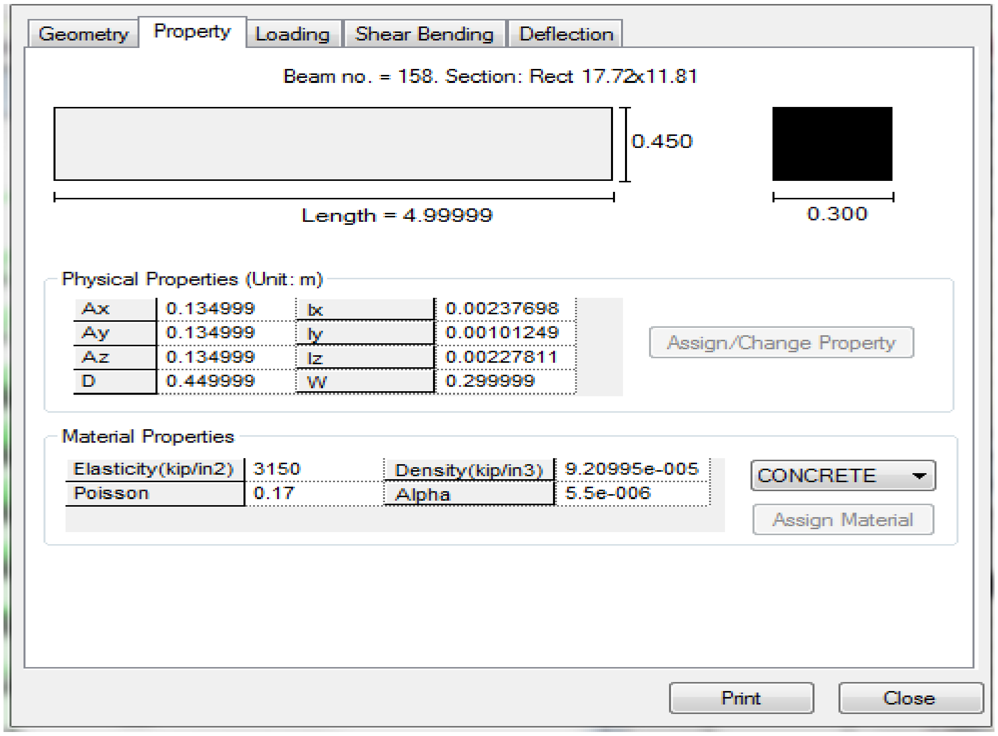


Table 3.9: Shear Bending

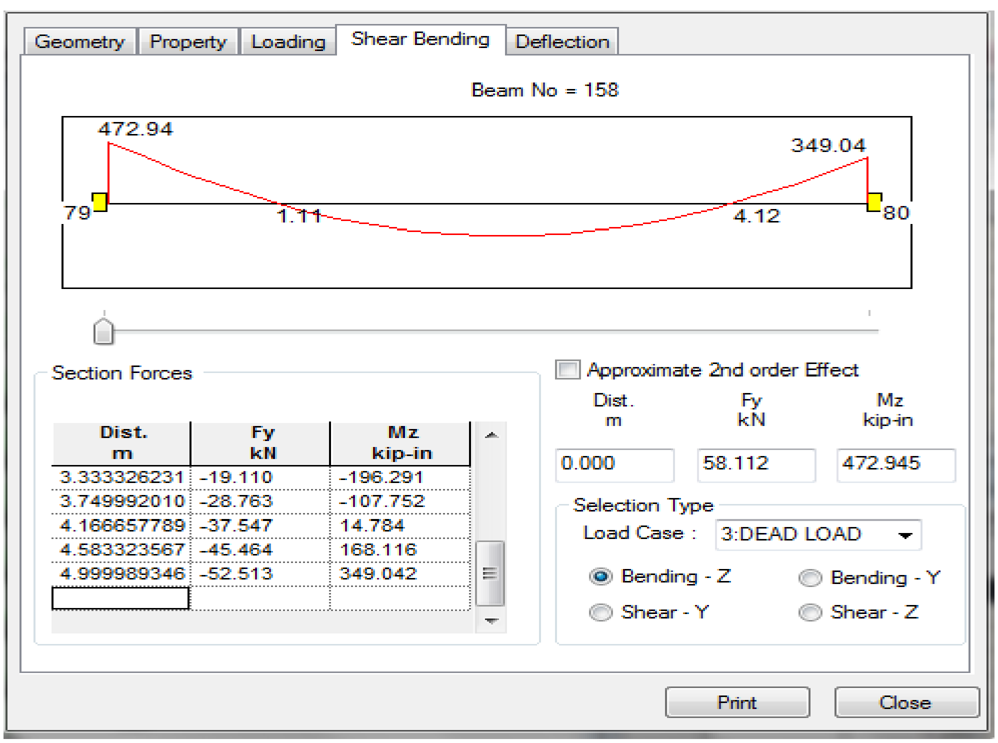
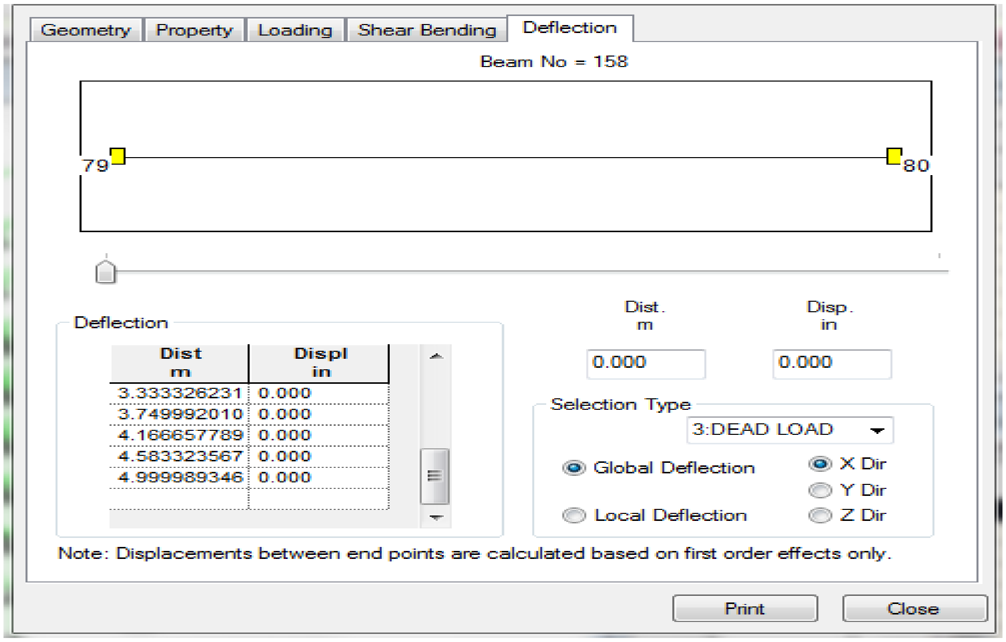


Table 3.10: Deflection



Beam Number: 210

Table 3.11: Geometry

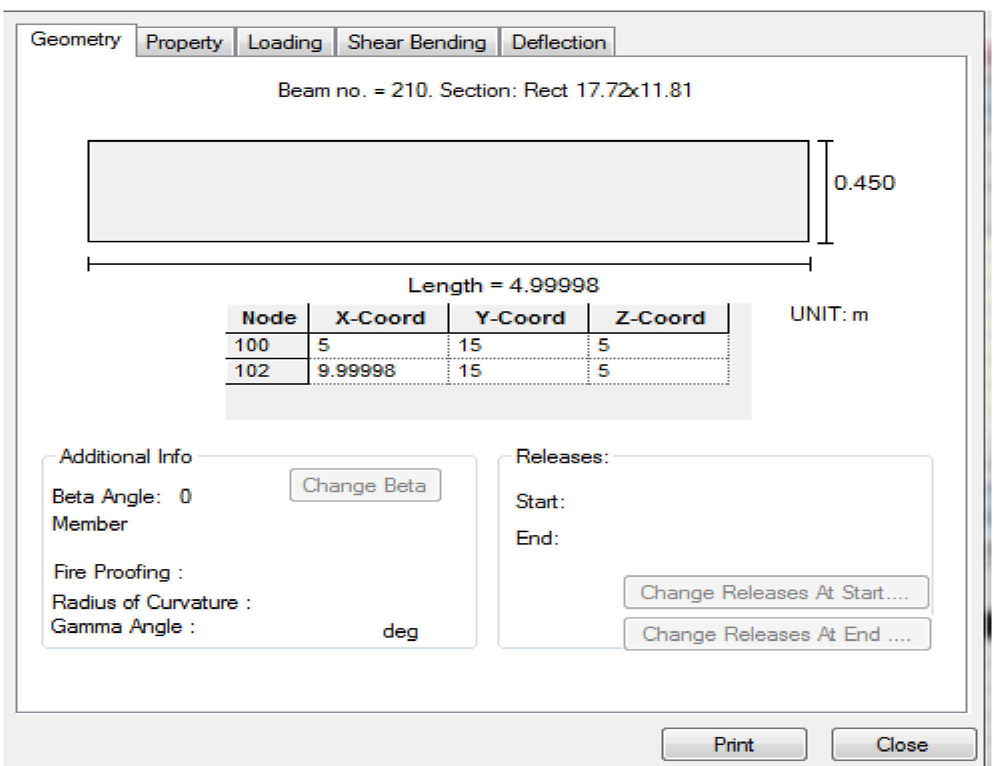


Table 3.12: Property

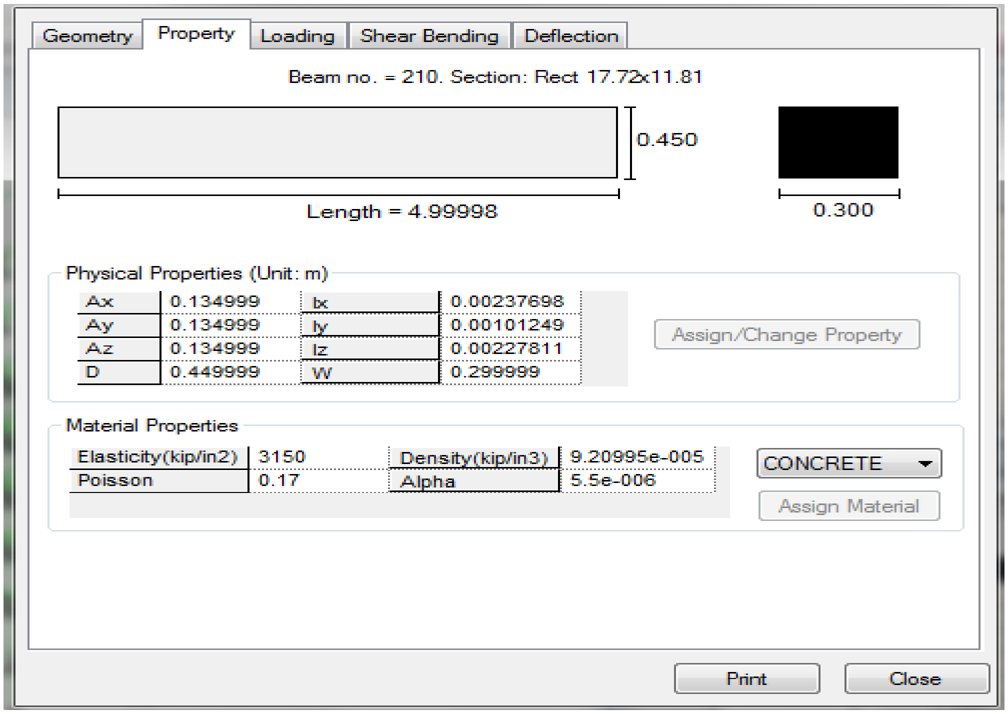


Table 3.13: Shear Bending

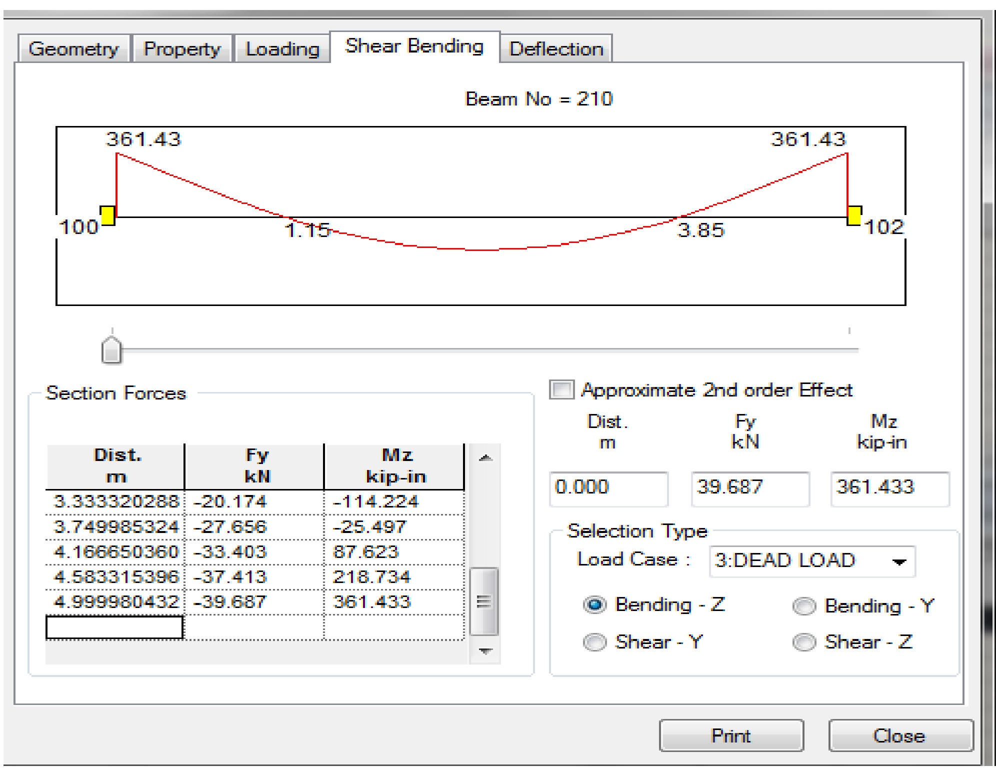
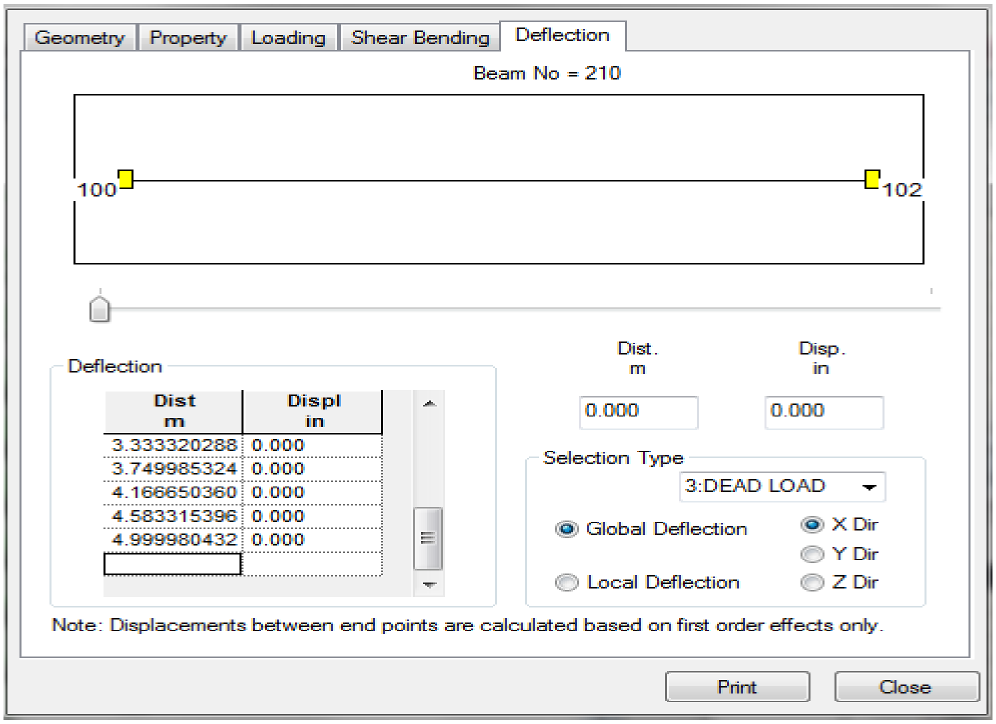


Table 3.14: Deflection



3.4.3 Column Properties

Column Number: 45

Table 3.15: Geometry

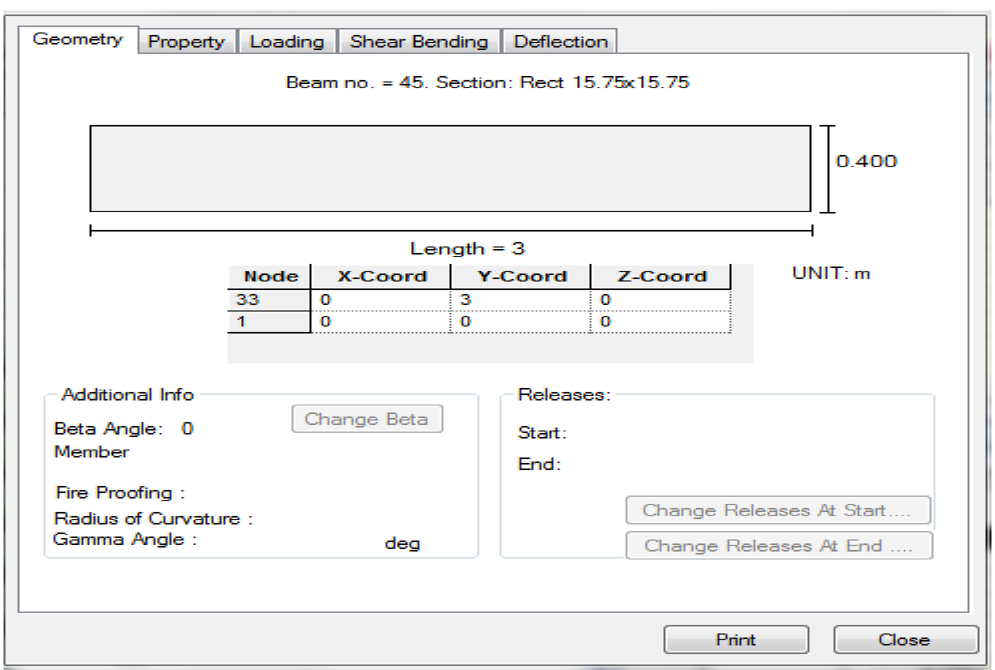


Table 3.16: Property

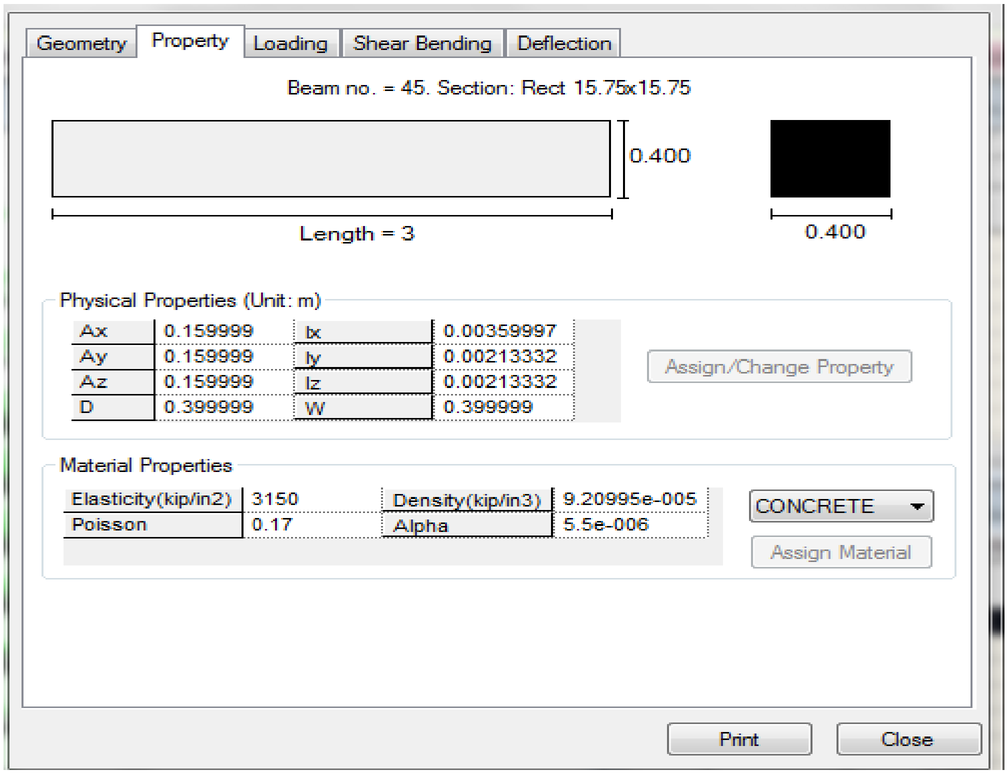


Table 3.17: Shear Bending

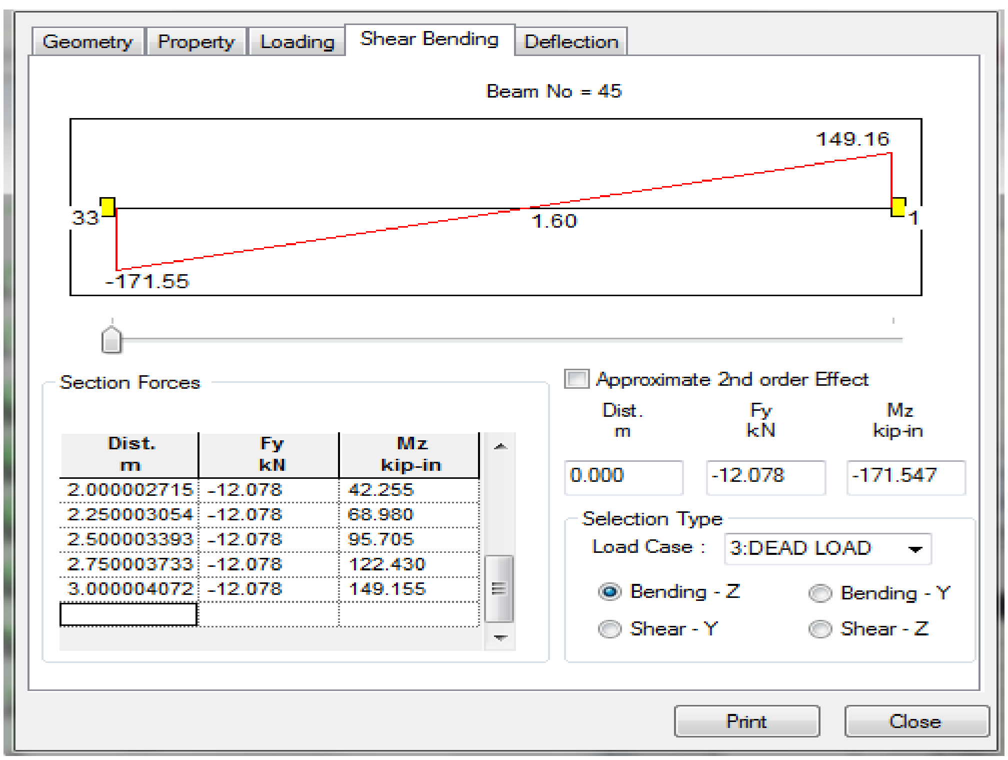
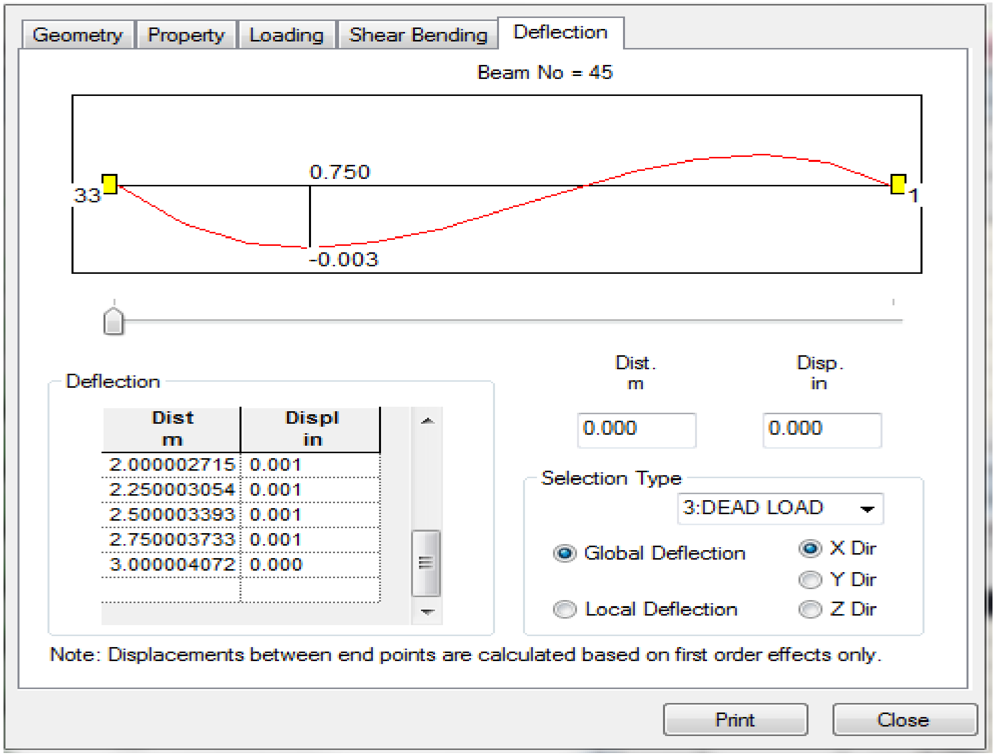


Table 3.18: Deflection



Column Number: 208

Table 3.19: Geometry

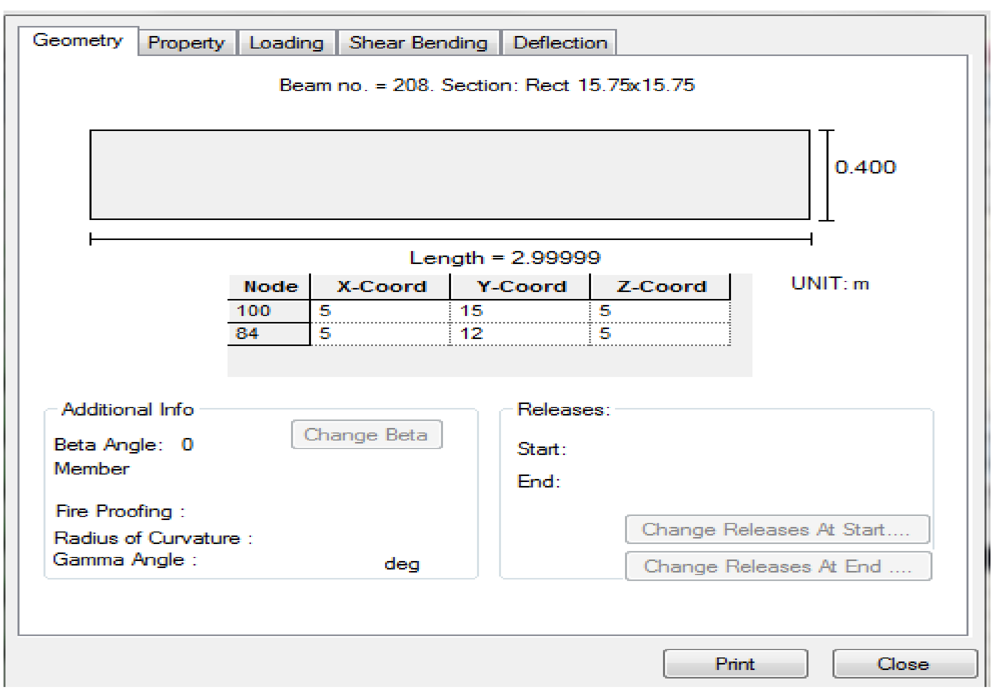


Table 3.20: Property

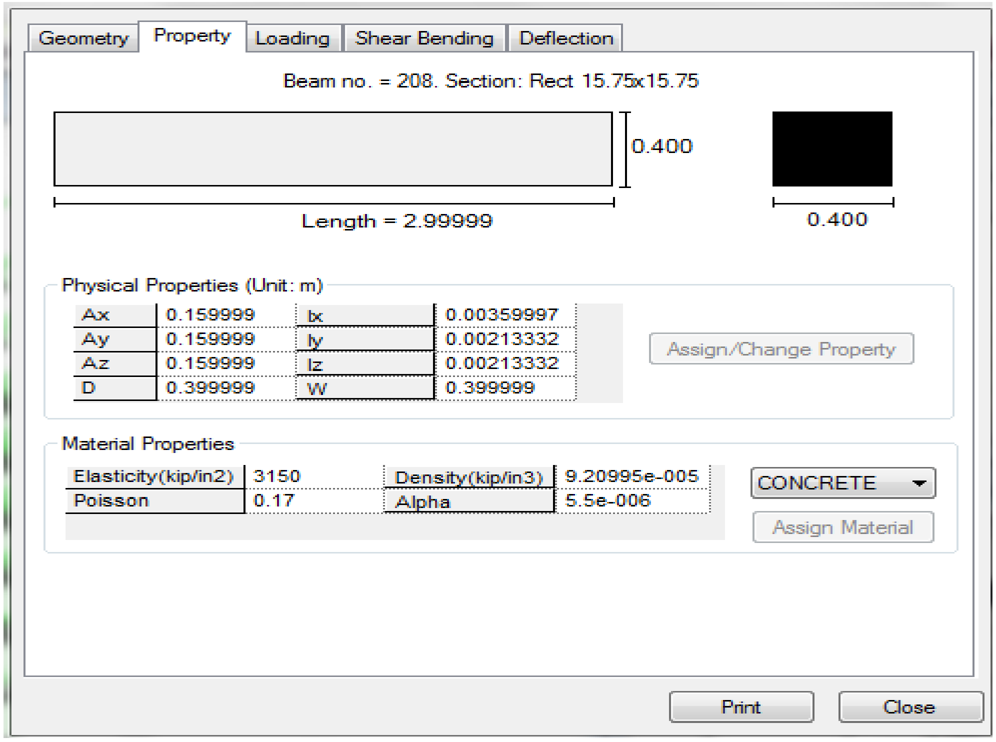


Table 3.21: Shear Bending

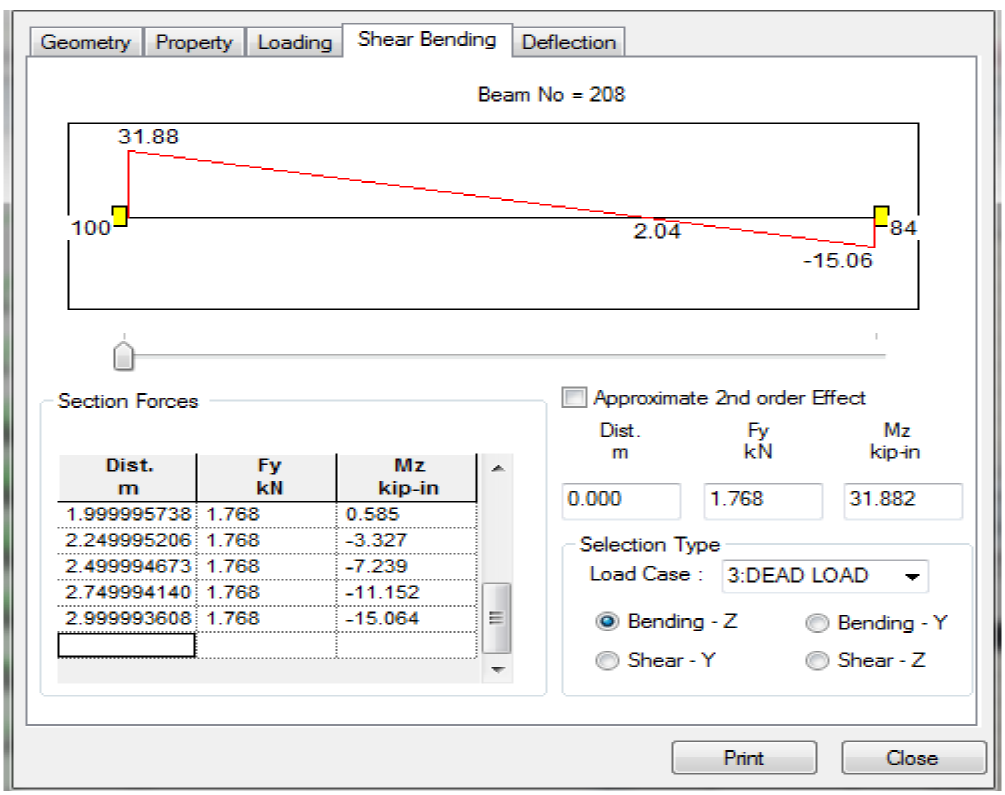


Table 3.22: Shear Bending

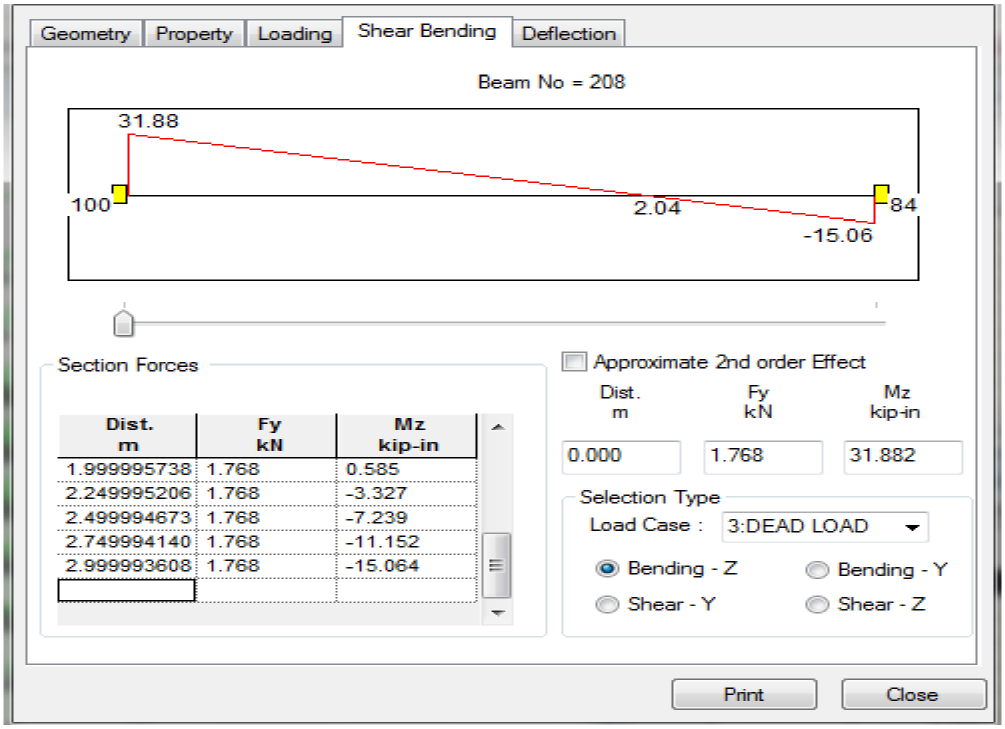
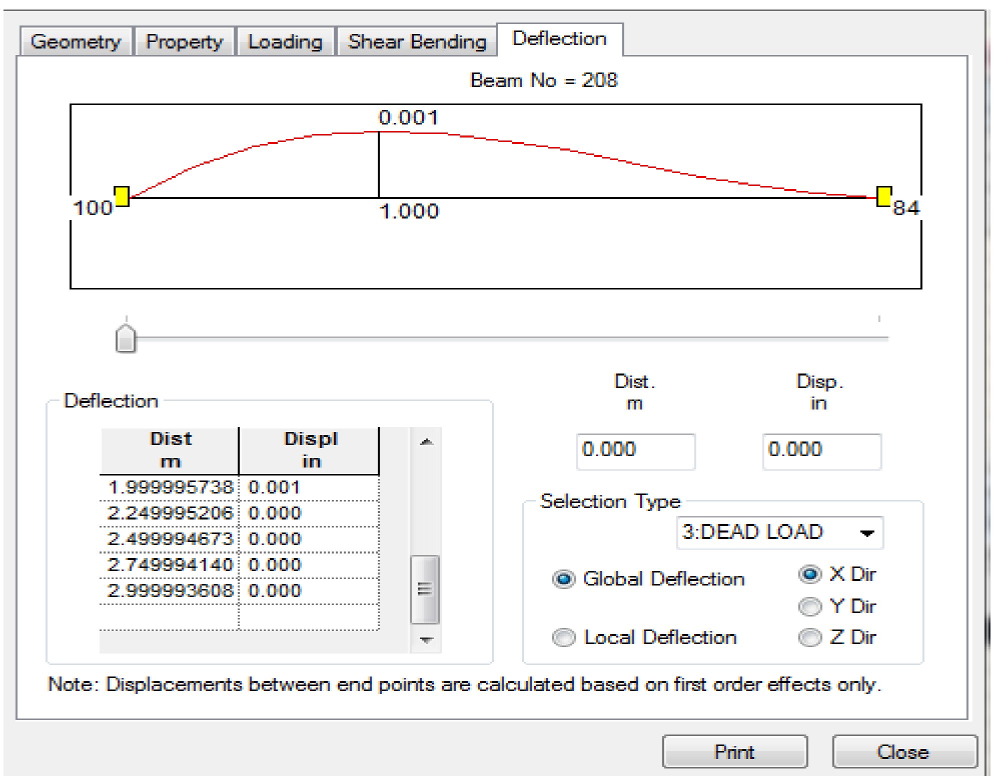


Table 3.23: Deflection



Column Number: 229

Table 3.24: Geometry

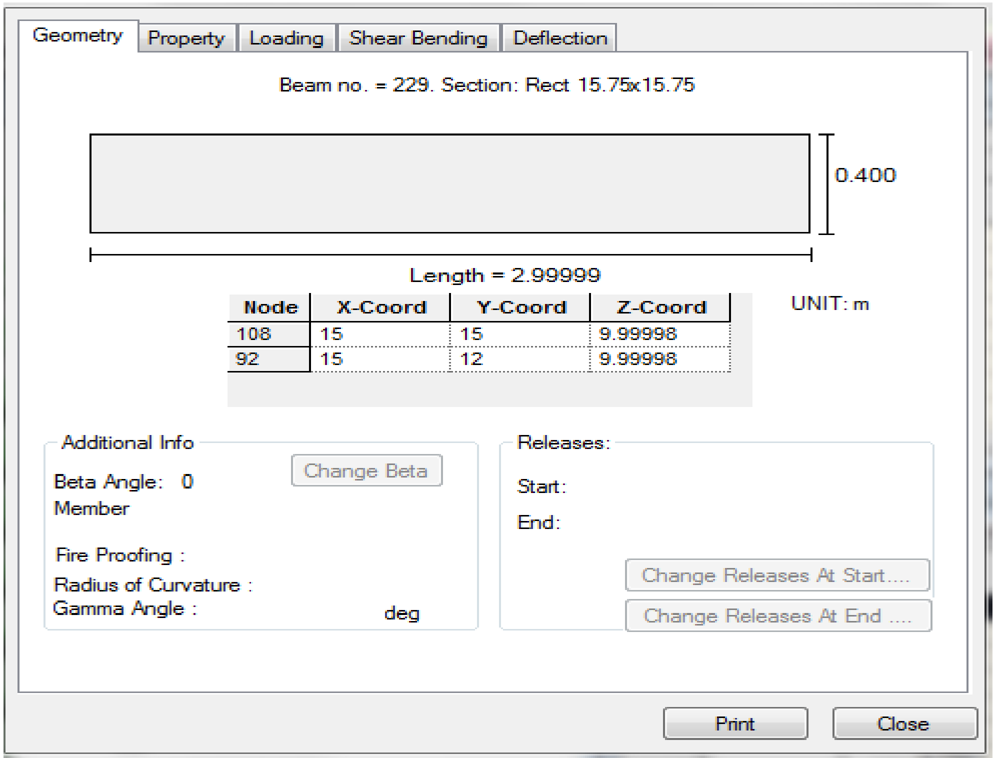


Table 3.25: Property

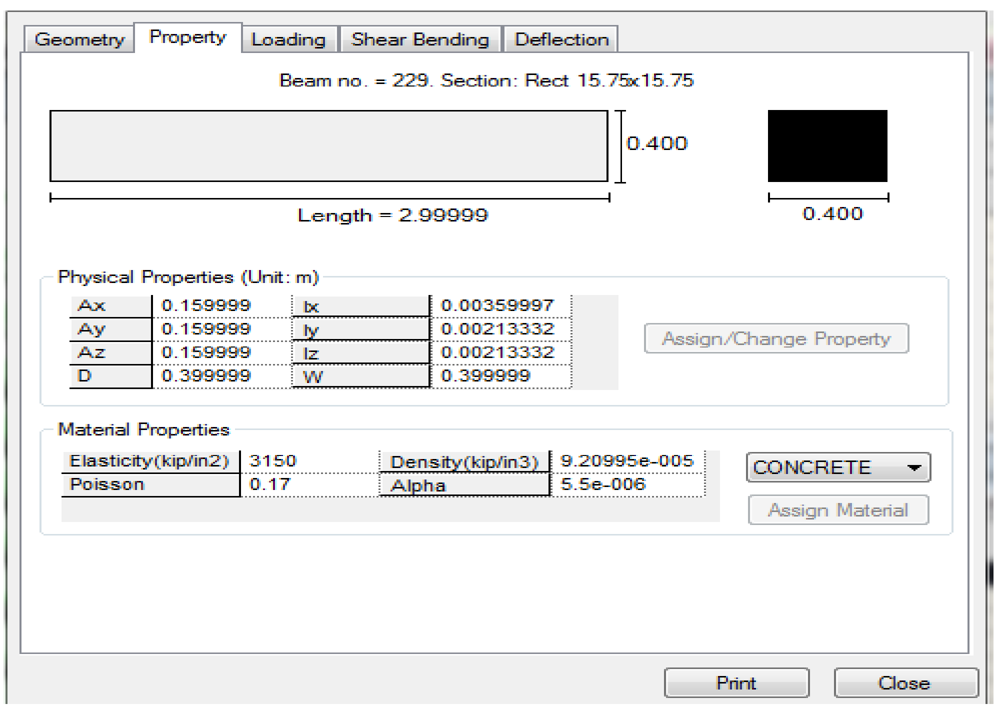
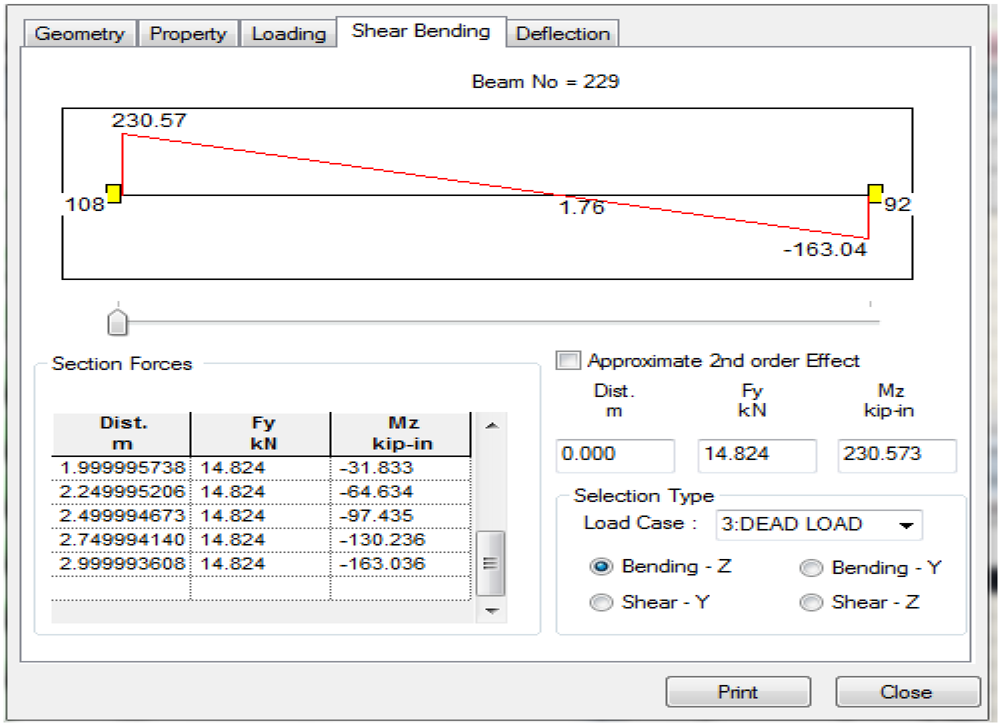
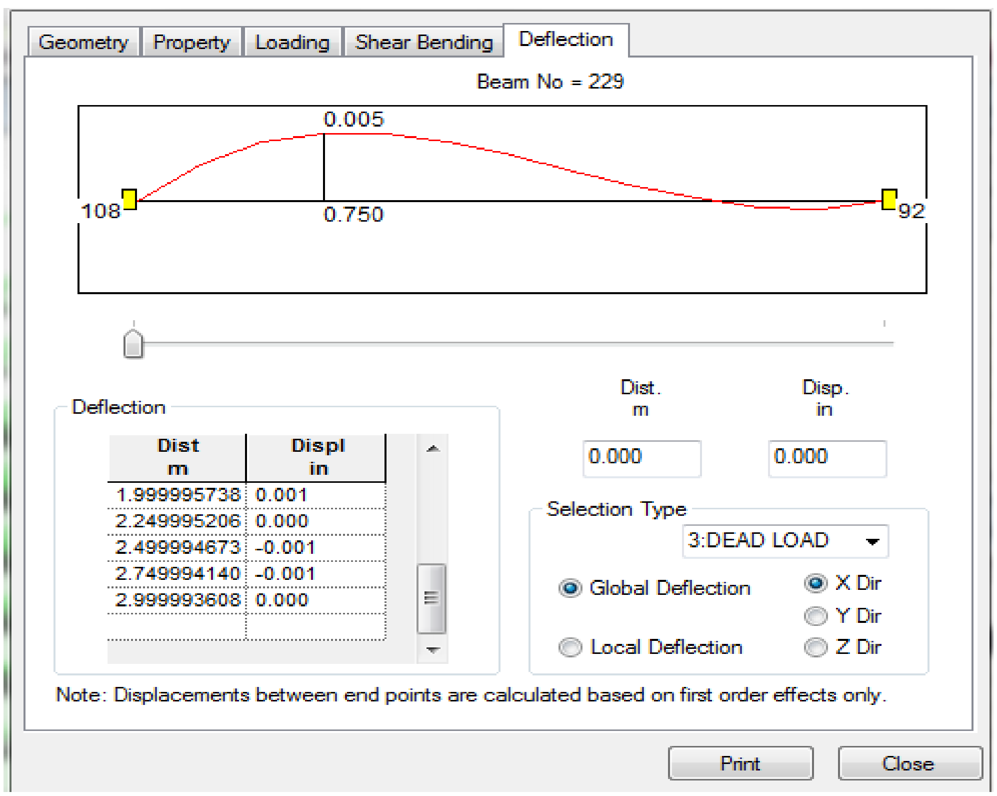


Table 3.26: Shear Bending



Dist. m	Fy kN	Mz kip-in
1.999995738	14.824	-31.833
2.249995206	14.824	-64.634
2.499994673	14.824	-97.435
2.749994140	14.824	-130.236
2.999993608	14.824	-163.036

Table 3.27: Deflection



Dist m	Displ in
1.999995738	0.001
2.249995206	0.000
2.499994673	-0.001
2.749994140	-0.001
2.999993608	0.000

3.5 Joint Displacement

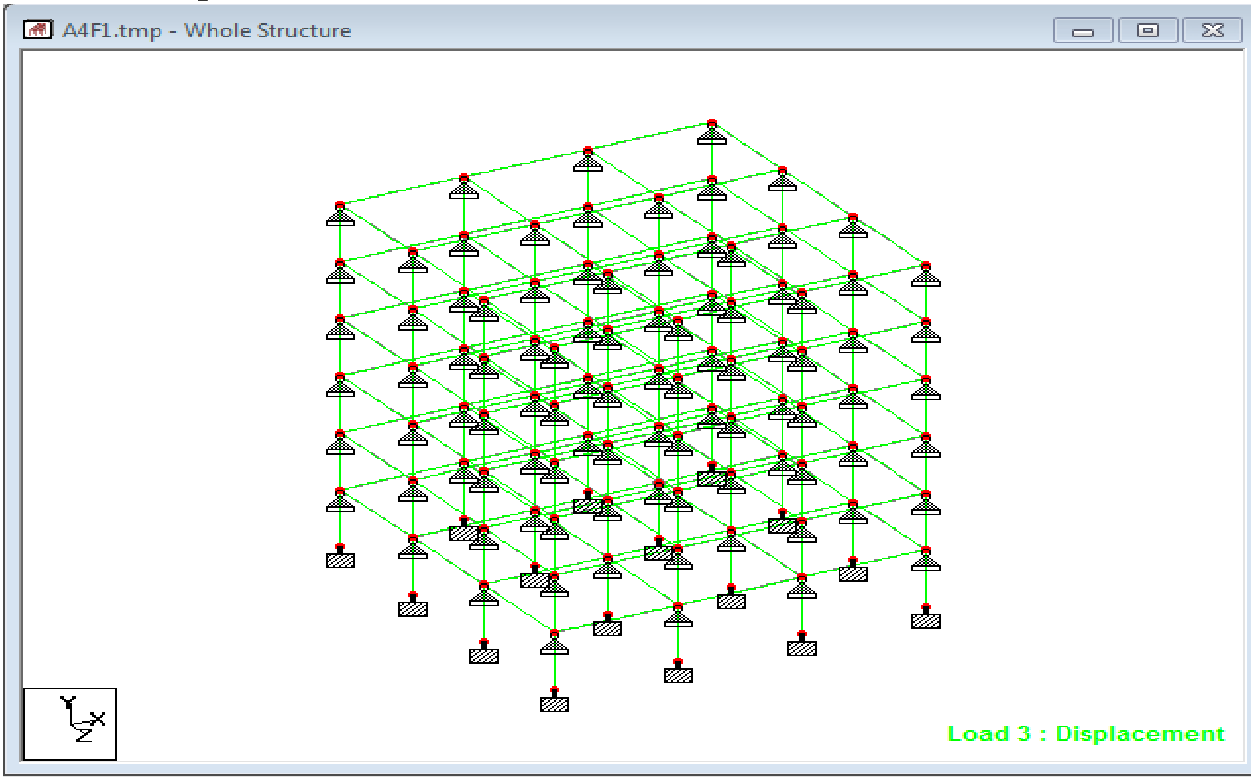


Figure 3.5: Joint Displacement

Table 3.28: Node Displacement

Node	L/C	Horizontal X in	Vertical Y in	Horizontal Z in	Resultant in	Rotational rX rad	Rotational rY rad	Rotational rZ rad
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000	0.000	0.000
104	1 COMBINATI	0.000	0.000	0.000	0.000	-0.000	0.000	0.001
	3 DEAD LOA	0.000	0.000	0.000	0.000	-0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	-0.000	0.000	0.000
105	1 COMBINATI	0.000	0.000	0.000	0.000	0.000	0.000	-0.001
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
106	1 COMBINATI	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000	0.000	0.000
107	1 COMBINATI	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000	0.000	-0.000
108	1 COMBINATI	0.000	0.000	0.000	0.000	0.000	0.000	0.001
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000	0.000	0.000
109	1 COMBINATI	0.000	0.000	0.000	0.000	-0.001	0.000	-0.001
	3 DEAD LOA	0.000	0.000	0.000	0.000	-0.000	0.000	-0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	-0.000	0.000	-0.000
110	1 COMBINATI	0.000	0.000	0.000	0.000	-0.001	0.000	0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	-0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	-0.000	0.000	0.000
111	1 COMBINATI	0.000	0.000	0.000	0.000	-0.001	0.000	-0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	-0.000	0.000	-0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	-0.000	0.000	-0.000
112	1 COMBINATI	0.000	0.000	0.000	0.000	-0.001	0.000	0.001
	3 DEAD LOA	0.000	0.000	0.000	0.000	-0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	-0.000	0.000	0.000

Table 3.29: Beam Displacement

All Relative Displacement / Max Relative Displacements

Beam	L/C	Dist m	x in	y in	z in	Resultant in
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	-0.003	-0.003	0.004
		1.500	-0.000	-0.002	-0.002	0.003
		2.250	-0.000	-0.001	-0.001	0.001
		3.000	0.000	0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	0.000	0.000	0.000
		1.500	-0.000	0.000	0.000	0.000
		2.250	-0.000	0.000	0.000	0.000
		3.000	0.000	0.000	0.000	0.000
6	1 COMBINATI	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	0.000	-0.002	0.002
		1.500	-0.000	0.000	-0.002	0.002
		2.250	-0.000	0.000	-0.001	0.001
		3.000	0.000	0.000	0.000	0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	0.000	-0.002	0.002
		1.500	-0.000	0.000	-0.001	0.001
		2.250	-0.000	0.000	-0.001	0.001
		3.000	0.000	0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	-0.000	0.000	0.000
		1.500	-0.000	-0.000	0.000	0.000
		2.250	-0.000	-0.000	0.000	0.000
		3.000	0.000	0.000	0.000	0.000
7	1 COMBINATI	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	-0.002	0.000	0.002
		1.500	-0.000	-0.002	0.000	0.002
		2.250	-0.000	-0.001	0.000	0.001

All Relative Displacement / Max Relative Displacements

Beam	L/C	Dist m	x in	y in	z in	Resultant in
97	1 COMBINATI	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	0.004	-0.004	0.005
		1.500	-0.000	-0.001	0.001	0.001
		2.250	0.000	-0.005	0.005	0.007
		3.000	0.000	0.000	0.000	0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	0.002	-0.002	0.003
		1.500	-0.000	-0.000	0.000	0.001
		2.250	0.000	-0.003	0.003	0.004
		3.000	0.000	0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	0.000	-0.000	0.000
		1.500	-0.000	-0.000	0.000	0.000
		2.250	0.000	-0.000	0.000	0.001
		3.000	0.000	0.000	0.000	0.000
98	1 COMBINATI	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	0.004	0.000	0.004
		1.500	-0.000	-0.001	-0.000	0.001
		2.250	0.000	-0.006	-0.000	0.006
		3.000	0.000	0.000	0.000	0.000
	3 DEAD LOA	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	0.002	0.000	0.002
		1.500	-0.000	-0.001	-0.000	0.001
		2.250	0.000	-0.003	-0.000	0.003
		3.000	0.000	0.000	0.000	0.000
	4 LIVE LOAD	0.000	0.000	0.000	0.000	0.000
		0.750	-0.000	0.000	0.000	0.000
		1.500	-0.000	-0.000	-0.000	0.000
		2.250	0.000	-0.001	-0.000	0.001

3.6 Support Reaction

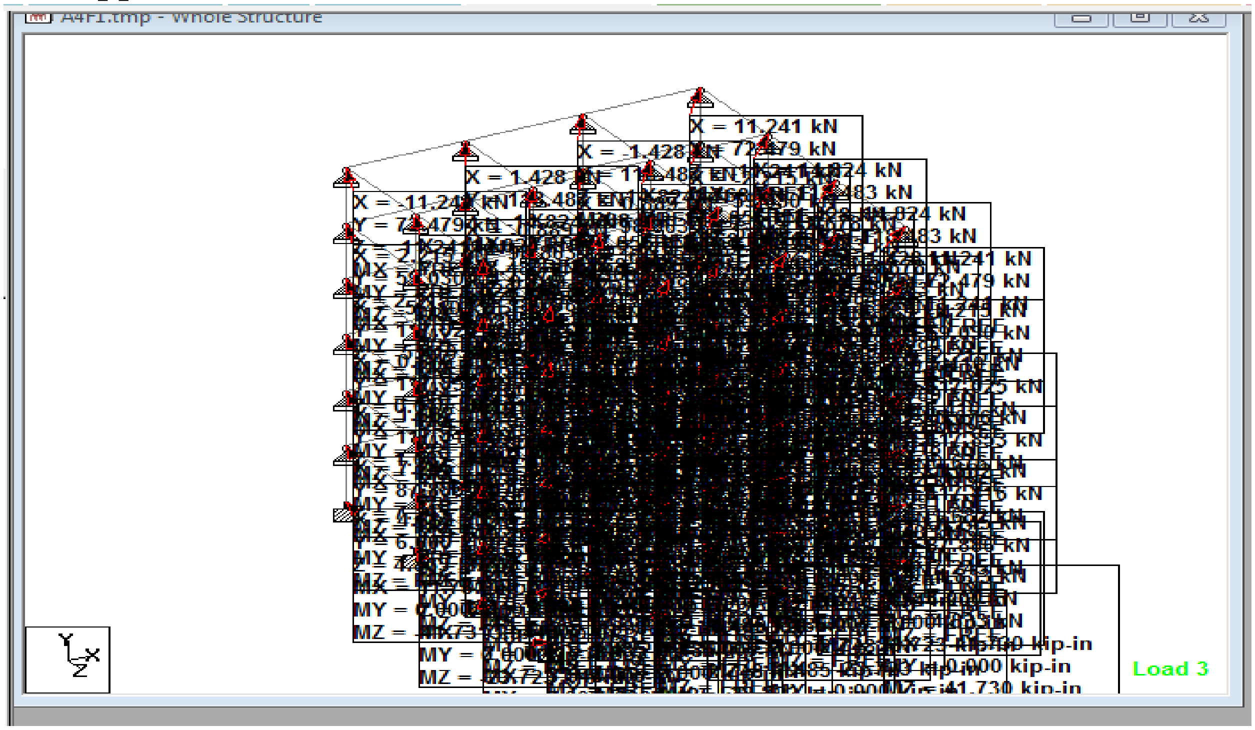


Figure 3.6: Support Reaction

Table 3.30: Support Reaction

Node	L/C	Horizontal Fx kN	Vertical Fy kN	Horizontal Fz kN	Moment Mx kip-in	Moment My kip-in	Moment Mz kip-in
1	1 COMBINATI	12.579	132.035	12.579	0.000	0.000	0.000
	3 DEAD LOA	7.245	87.886	7.245	0.000	0.000	0.000
	4 LIVE LOAD	1.141	0.137	1.141	0.000	0.000	0.000
2	1 COMBINATI	-1.147	179.026	16.088	0.000	0.000	0.000
	3 DEAD LOA	-0.642	119.291	8.532	0.000	0.000	0.000
	4 LIVE LOAD	-0.123	0.059	2.194	0.000	0.000	0.000
3	1 COMBINATI	16.088	179.026	-1.147	0.000	0.000	0.000
	3 DEAD LOA	8.532	119.291	-0.642	0.000	0.000	0.000
	4 LIVE LOAD	2.194	0.059	-0.123	0.000	0.000	0.000
4	1 COMBINATI	-1.545	183.790	-1.545	0.000	0.000	0.000
	3 DEAD LOA	-0.803	122.782	-0.803	0.000	0.000	0.000
	4 LIVE LOAD	-0.228	-0.255	-0.228	0.000	0.000	0.000
5	1 COMBINATI	6.923	9.000	6.923	59.775	0.000	-59.775
	3 DEAD LOA	4.833	6.000	4.833	41.731	0.000	-41.731
	4 LIVE LOAD	-0.218	0.000	-0.218	-1.880	0.000	1.880
6	1 COMBINATI	-0.549	9.000	3.517	30.368	0.000	4.744
	3 DEAD LOA	-0.410	6.000	2.748	23.723	0.000	3.544
	4 LIVE LOAD	0.044	0.000	-0.403	-3.478	0.000	-0.381
7	1 COMBINATI	3.517	9.000	-0.549	-4.744	0.000	-30.368
	3 DEAD LOA	2.748	6.000	-0.410	-3.544	0.000	-23.723
	4 LIVE LOAD	-0.403	0.000	0.044	0.381	0.000	3.478
8	1 COMBINATI	-0.139	9.000	-0.139	-1.201	0.000	1.201
	3 DEAD LOA	-0.172	6.000	-0.172	-1.485	0.000	1.485
	4 LIVE LOAD	0.079	0.000	0.079	0.684	0.000	-0.684
9	1 COMBINATI	1.147	179.025	16.088	0.000	0.000	0.000
	3 DEAD LOA	0.642	119.291	8.532	0.000	0.000	0.000
	4 LIVE LOAD	0.123	0.059	2.194	0.000	0.000	0.000
10	1 COMBINATI	1.545	183.790	-1.545	0.000	0.000	0.000

3.7 Beam End Forces

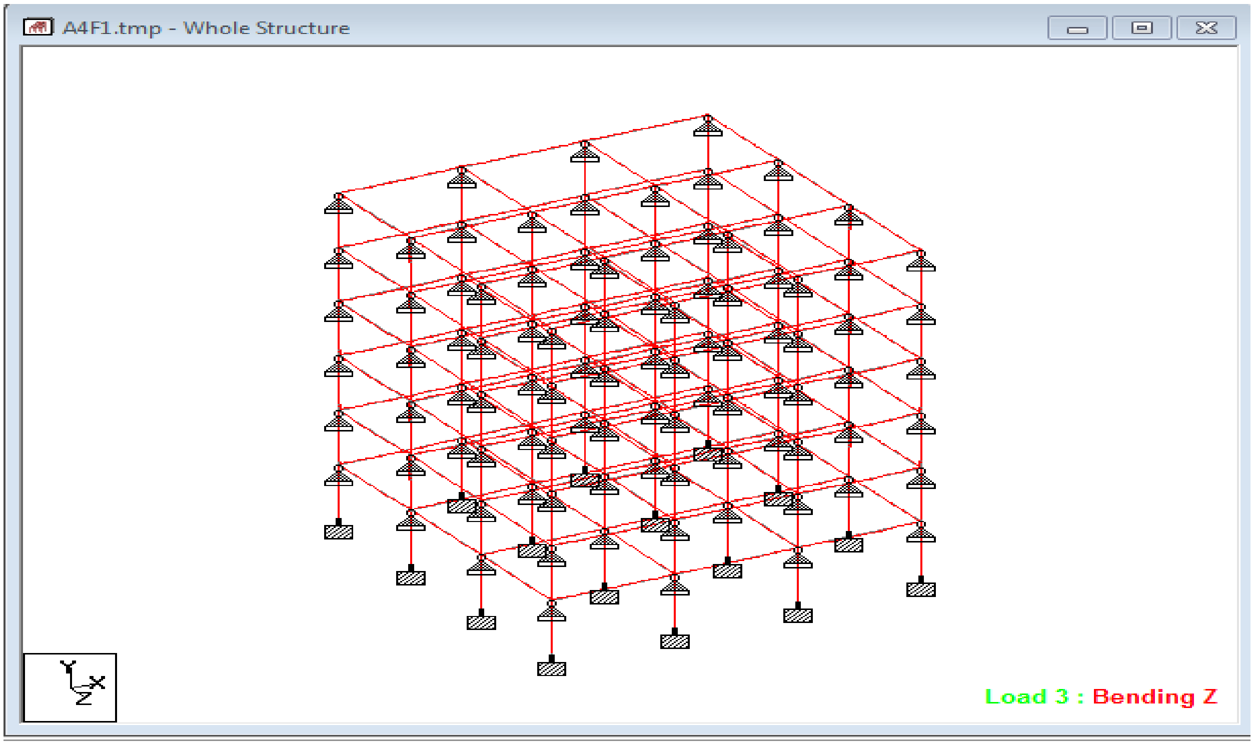


Figure 3.7: Beam End Force

Table 3.31: Beam End Forces

Beam	L/C	Node	Fx kN	Fy kN	Fz kN	Mx kip-in	My kip-in	Mz kip-in
1	1 COMBINATI	1	0.000	57.017	0.000	4.517	0.000	361.227
		2	0.000	62.045	0.000	-4.517	0.000	-472.486
	3 DEAD LOA	1	0.000	37.943	0.000	2.766	0.000	238.524
		2	0.000	41.432	0.000	-2.766	0.000	-315.727
	4 LIVE LOAD	1	0.000	0.068	0.000	0.245	0.000	2.295
		2	0.000	-0.068	0.000	-0.245	0.000	0.736
2	1 COMBINATI	3	0.000	39.449	0.000	-0.544	0.000	260.430
		4	0.000	42.114	0.000	0.544	0.000	-319.397
	3 DEAD LOA	3	0.000	26.172	0.000	-0.316	0.000	169.362
		4	0.000	28.204	0.000	0.316	0.000	-214.322
	4 LIVE LOAD	3	0.000	0.128	0.000	-0.047	0.000	4.258
		4	0.000	-0.128	0.000	0.047	0.000	1.391
3	1 COMBINATI	3	0.000	62.045	0.000	-4.517	0.000	472.486
		1	0.000	57.017	0.000	4.517	0.000	-361.227
	3 DEAD LOA	3	0.000	41.432	0.000	-2.766	0.000	315.727
		1	0.000	37.943	0.000	2.766	0.000	-238.523
	4 LIVE LOAD	3	0.000	-0.068	0.000	-0.245	0.000	-0.736
		1	0.000	0.068	0.000	0.245	0.000	-2.295
4	1 COMBINATI	4	0.000	42.114	0.000	0.544	0.000	319.397
		2	0.000	39.449	0.000	-0.544	0.000	-260.430
	3 DEAD LOA	4	0.000	28.204	0.000	0.316	0.000	214.322
		2	0.000	26.172	0.000	-0.316	0.000	-169.362
	4 LIVE LOAD	4	0.000	-0.128	0.000	0.047	0.000	-1.391
		2	0.000	0.128	0.000	-0.047	0.000	-4.258
5	1 COMBINATI	1	-9.000	-6.923	-6.923	0.000	124.049	-124.049
		5	-9.000	6.923	6.923	0.000	59.775	-59.775
	3 DEAD LOA	1	-6.000	-4.833	-4.833	0.000	86.602	-86.602
		5	-6.000	4.833	4.833	0.000	41.731	-41.731
	4 LIVE LOAD	1	0.000	0.218	0.218	0.000	-3.902	3.902

3.8 Section Displacement

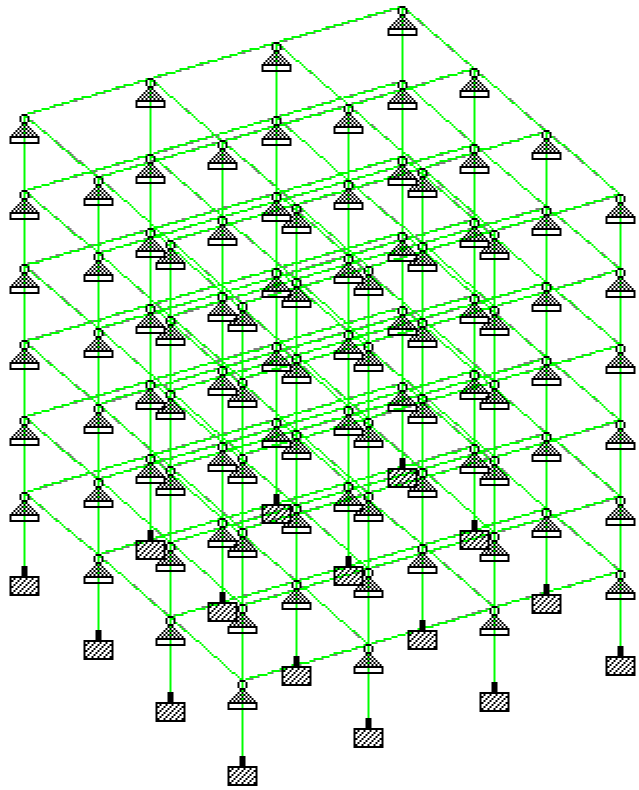


Figure 3.8: Section Displacement

3.9 Section Forces

A4F1.tmp - Max Forces by Section Property: Whole Structure

		Axial	Shear		Torsion	Bending	
Section		Max Fx kN	Max Fy kN	Max Fz kN	Max Mx kip-in	Max My kip-in	Max Mz kip-in
Rect 1	Max +ve	9.000	29.659	29.659	0.000	458.849	458.846
	Max -ve	-9.000	-29.659	-29.659	0.000	-458.846	-458.849
Rect 1	Max +ve	0.000	112.143	0.000	6.737	0.000	981.242
	Max -ve	0.000	-112.143	0.000	-6.737	0.000	-564.924

3.10 Modelling
Analyze

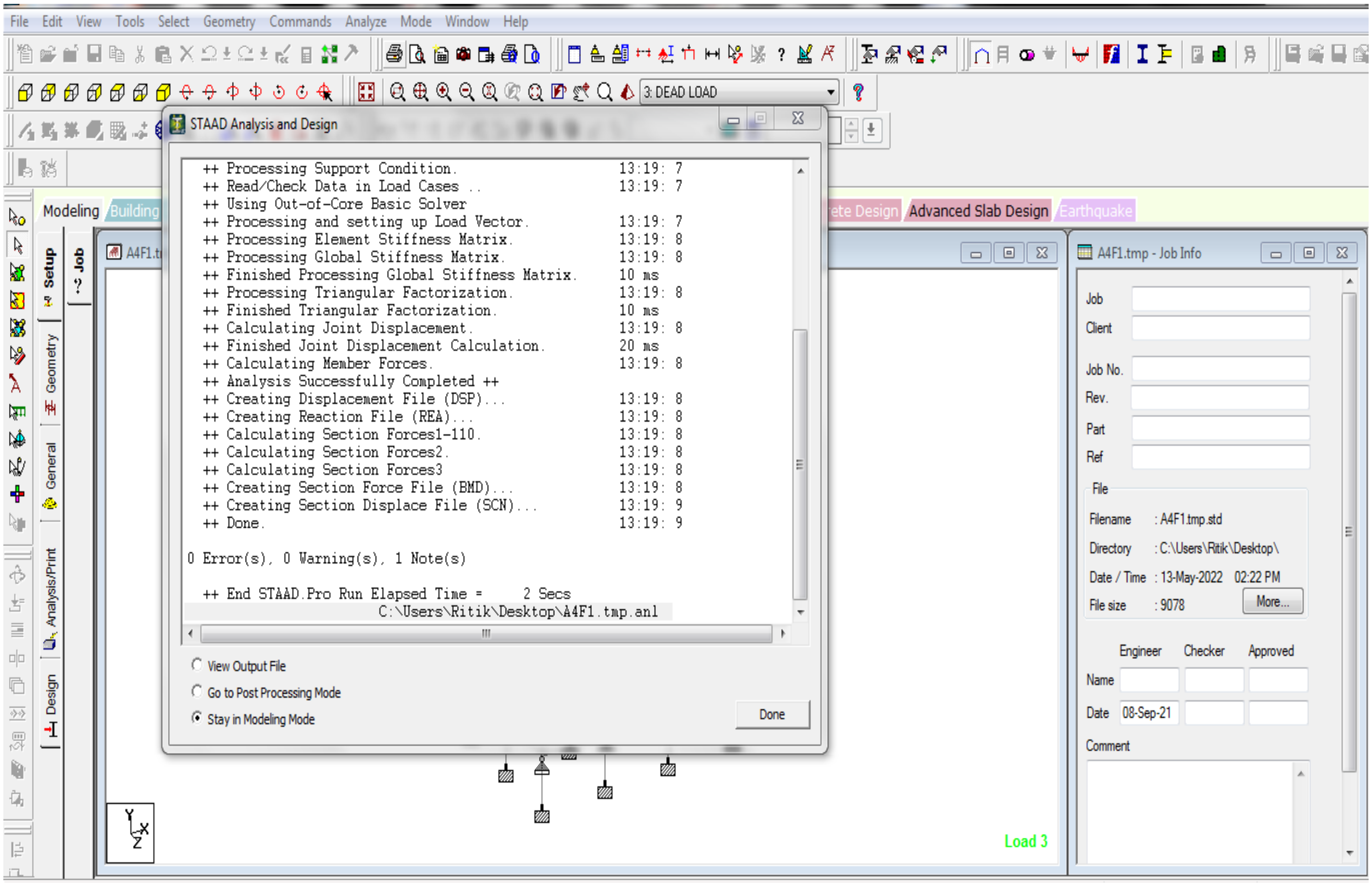


Figure 3.9: Modelling Analyze

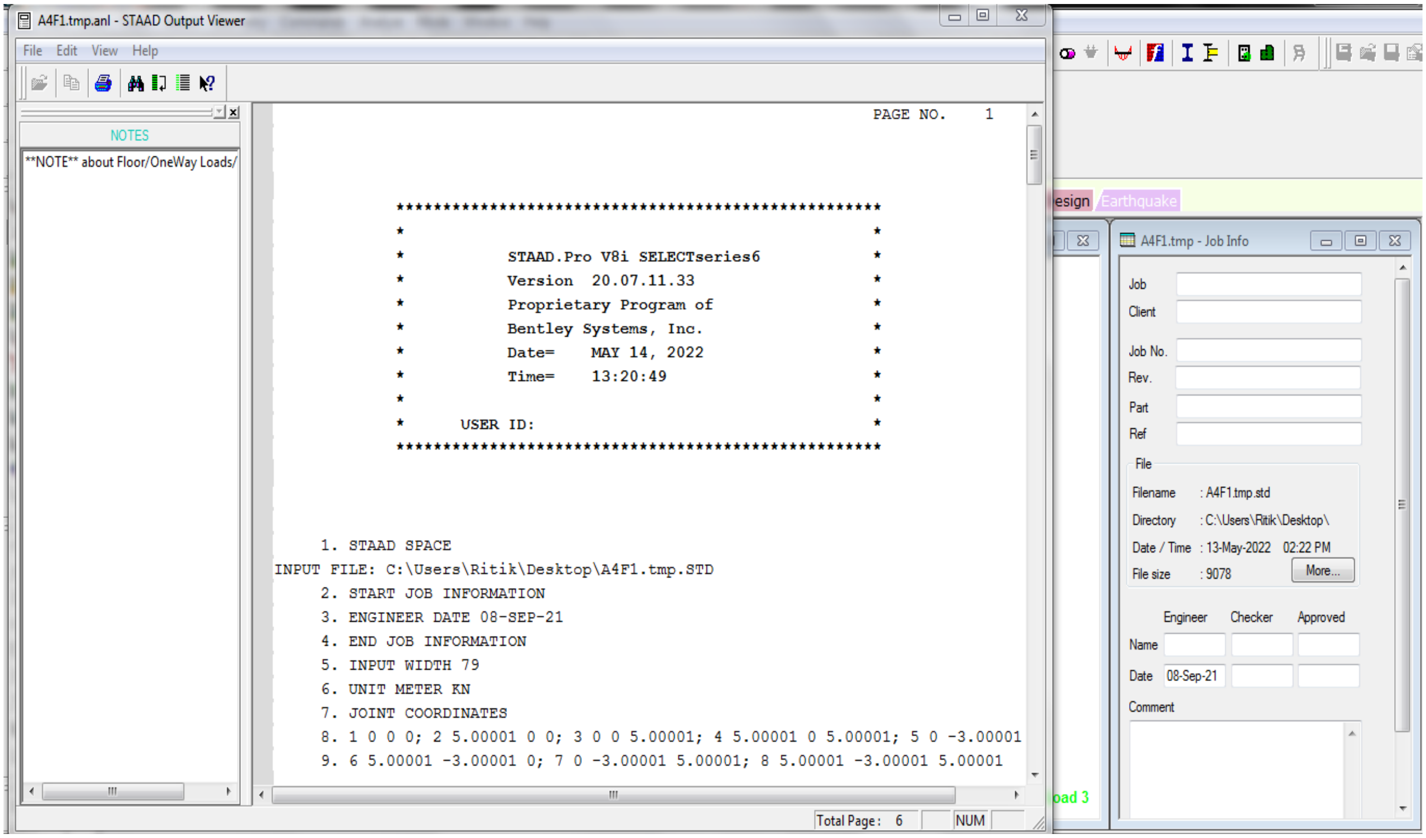


Figure 3.10: Analyze in view output file

CHAPTER 4
Building Resting On Hilly Area

4.1 General

Due to increasing in population now days in hilly region we have to construct multistoried building in hilly areas. This project is Analysis and Design of hilly area multistoried residential building [G+4] using very popular analytical and designing software STADD-pro. Reason of choosing this software is it gives accuracy of solution, versatile nature of solving of problems, confirmation of IS codes. Building in hilly area subjected to the lateral earth pressure at various levels in addition to other normal loads as specified on building on level ground. The soil profile is not uniform and the result into total collapse of the building. The bearing capacity, cohesion, angle of internal friction etc. this project is drafted in drafting software AUTO-cad and after the plan is import in STADD-pro.

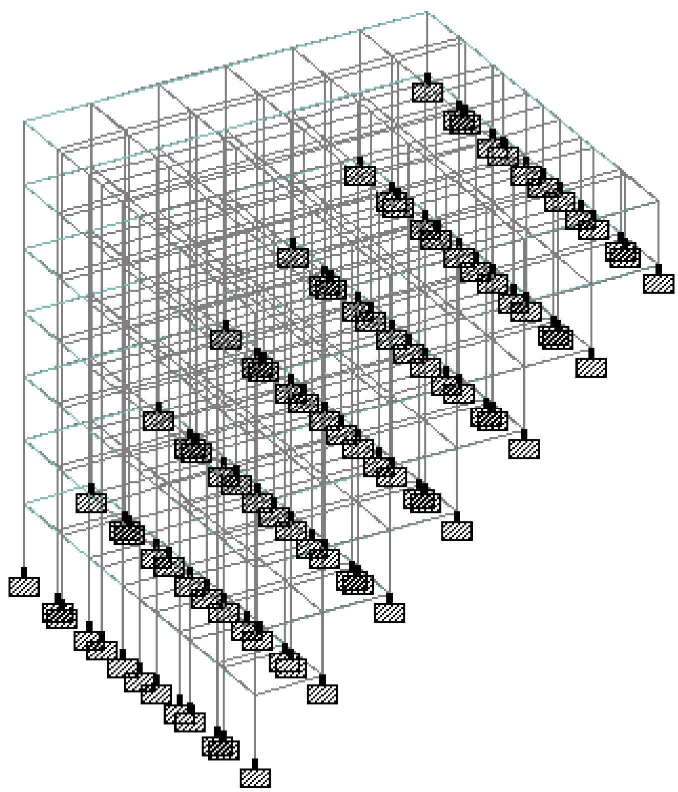


Figure 4.1: Isometric View

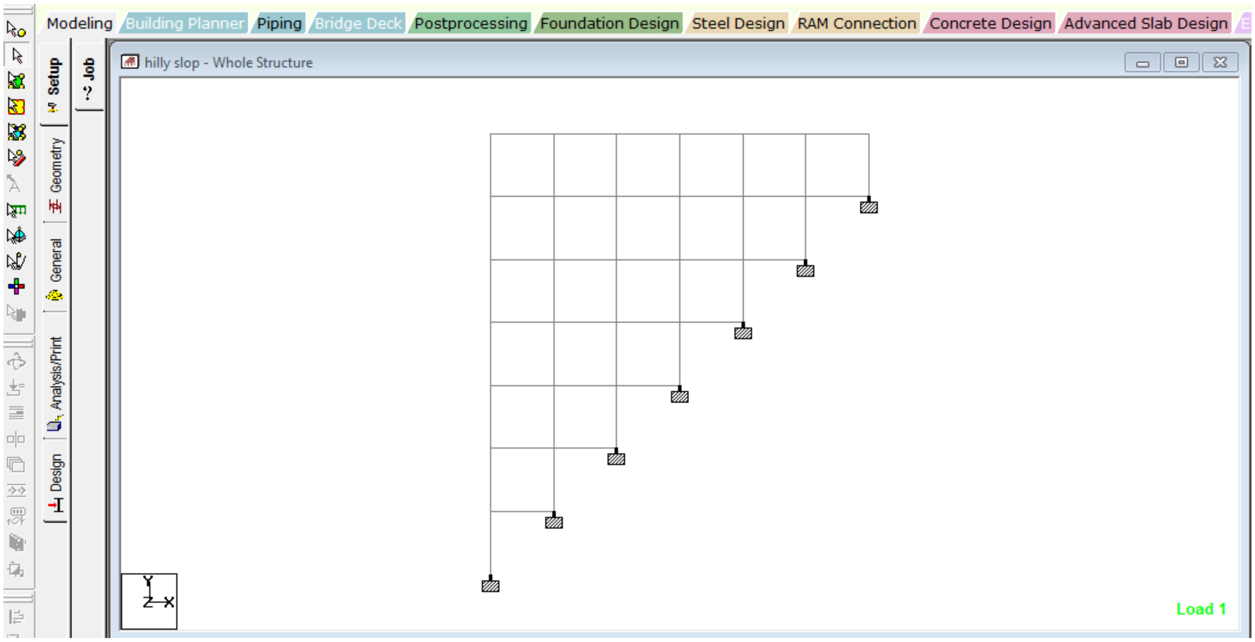


Figure 4.2: Front or +z-axis view

4.2.1 Post Processing

Post-processing may additionally refer to: Image modifying in photography. Audio enhancing software program in audio. Differential GPS post-processing, an enhancement to GPS structures that improves accuracy. Video post processing, strategies used in video processing and 3D snap shots. Extract evaluation results, assessment deflected shapes, put together shear and second diagrams, generate tables to existing outcomes.

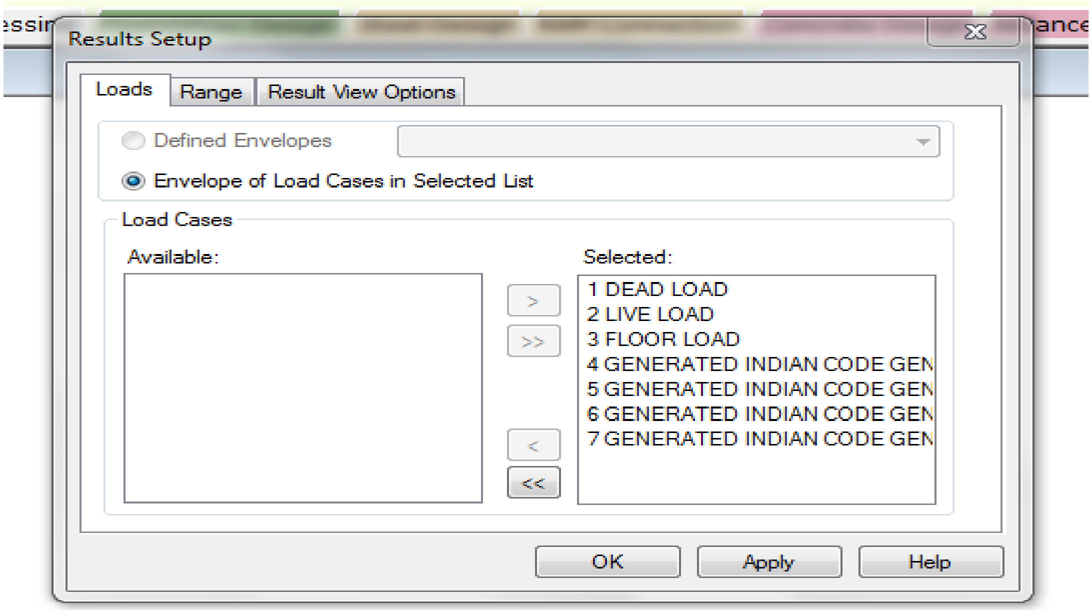


Figure 4.3: Result Setup

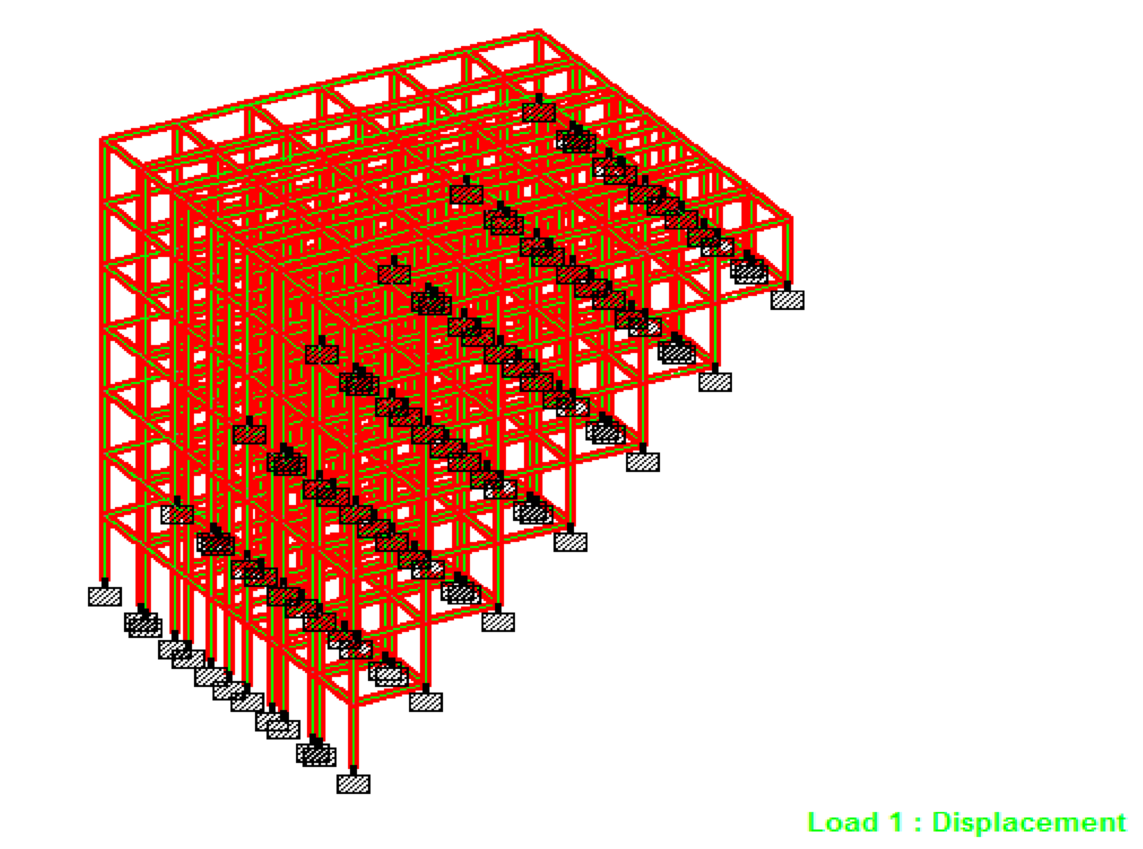


Figure 4.4: Displacement of Building

Table 4.1: Node Displacement

hilly slop - Node Displacements:

All / Summary

		Horizontal	Vertical	Horizontal	Resultant	Rotational		
Node	L/C	X in	Y in	Z in	in	rX rad	rY rad	rZ rad
	3 FLOOR LO	-0.000	-0.000	-0.000	0.000	-0.000	0.000	-0.000
	4 GENERATE	0.000	-0.001	0.000	0.001	-0.000	0.000	0.000
	5 GENERATE	0.000	-0.000	0.000	0.000	-0.000	0.000	0.000
	6 GENERATE	0.000	-0.001	0.000	0.001	-0.000	0.000	0.000
	7 GENERATE	0.000	-0.000	0.000	0.000	-0.000	0.000	0.000
177	1 DEAD LOA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	2 LIVE LOAD	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	3 FLOOR LO	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	4 GENERATE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	5 GENERATE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	6 GENERATE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	7 GENERATE	0.000	0.000	0.000	0.000	0.000	0.000	0.000
183	1 DEAD LOA	0.000	-0.001	0.000	0.001	-0.000	0.000	0.000
	2 LIVE LOAD	-0.000	-0.000	-0.000	0.000	-0.000	0.000	-0.000
	3 FLOOR LO	-0.000	-0.000	-0.000	0.000	-0.000	0.000	-0.000
	4 GENERATE	0.000	-0.001	0.000	0.001	-0.000	0.000	0.000
	5 GENERATE	0.000	-0.001	0.000	0.001	-0.000	0.000	0.000
	6 GENERATE	0.000	-0.001	0.000	0.001	-0.000	0.000	0.000
	7 GENERATE	0.000	-0.001	0.000	0.001	-0.000	0.000	0.000
184	1 DEAD LOA	0.000	-0.000	0.000	0.000	-0.000	0.000	0.000
	2 LIVE LOAD	-0.000	-0.000	0.000	0.000	-0.000	0.000	0.000
	3 FLOOR LO	-0.000	-0.000	0.000	0.000	-0.000	0.000	0.000
	4 GENERATE	0.000	-0.001	0.000	0.001	-0.000	0.000	0.000

Table 4.2: Beam Relative Displacement

hilly slop - Beam Relative Displacement Detail:

All Relative Displacement / Max Relative Displacements

Beam	L/C	Dist m	x in	y in	z in	Resultant in
663	1 DEAD LOA	0.000	0.000	0.000	0.000	0.000
		0.229	0.000	-0.000	-0.000	0.000
		0.457	0.000	0.000	-0.000	0.000
		0.686	0.000	0.000	-0.000	0.000
		0.914	0.000	0.000	0.000	0.000
	2 LIVE LOAD	0.000	0.000	0.000	0.000	0.000
		0.229	-0.000	0.000	0.000	0.000
		0.457	-0.000	0.000	0.000	0.000
		0.686	-0.000	0.000	0.000	0.000
		0.914	0.000	0.000	0.000	0.000
	3 FLOOR LO	0.000	0.000	0.000	0.000	0.000
		0.229	0.000	-0.000	0.000	0.000
		0.457	-0.000	0.000	0.000	0.000
		0.686	-0.000	0.000	0.000	0.000
		0.914	0.000	0.000	0.000	0.000
	4 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.229	0.000	-0.000	-0.000	0.000
		0.457	-0.000	0.000	-0.000	0.000
		0.686	-0.000	0.000	0.000	0.000
		0.914	0.000	0.000	0.000	0.000
	5 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.229	0.000	-0.000	-0.000	0.000
		0.457	0.000	0.000	-0.000	0.000
		0.686	0.000	0.000	-0.000	0.000
		0.914	0.000	0.000	0.000	0.000
	6 GENERATE	0.000	0.000	0.000	0.000	0.000

hilly slop - Beam Relative Displacement Detail:

All Relative Displacement / Max Relative Displacements

Beam	L/C	Dist m	x in	y in	z in	Resultant in
	6 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.229	-0.000	-0.000	-0.000	0.000
		0.457	-0.000	0.000	-0.000	0.000
		0.686	0.000	0.000	0.000	0.000
		0.914	0.000	0.000	0.000	0.000
	7 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.229	0.000	-0.000	-0.000	0.000
		0.457	-0.000	0.000	-0.000	0.000
		0.686	-0.000	0.000	-0.000	0.000
		0.914	0.000	0.000	0.000	0.000
664	1 DEAD LOA	0.000	0.000	0.000	0.000	0.000
		0.229	-0.000	-0.000	0.000	0.000
		0.457	-0.000	0.000	0.000	0.000
		0.686	-0.000	0.000	0.000	0.000
		0.914	0.000	0.000	0.000	0.000
	2 LIVE LOAD	0.000	0.000	0.000	0.000	0.000
		0.229	-0.000	0.000	0.000	0.000
		0.457	-0.000	0.000	0.000	0.000
		0.686	-0.000	-0.000	0.000	0.000
		0.914	0.000	0.000	0.000	0.000
	3 FLOOR LO	0.000	0.000	0.000	0.000	0.000
		0.229	-0.000	-0.000	0.000	0.000
		0.457	-0.000	0.000	0.000	0.000
		0.686	-0.000	0.000	0.000	0.000
		0.914	0.000	0.000	0.000	0.000
	4 GENERATE	0.000	0.000	0.000	0.000	0.000

hilly slop - Beam Relative Displacement Detail:

All Relative Displacement / Max Relative Displacements

Beam	L/C	Dist m	x in	y in	z in	Resultant in
	4 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.229	-0.000	-0.000	0.000	0.000
		0.457	-0.000	-0.000	0.000	0.000
		0.686	0.000	0.000	0.000	0.000
		0.914	0.000	0.000	0.000	0.000
	5 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.229	-0.000	-0.000	0.000	0.000
		0.457	-0.000	-0.000	0.000	0.000
		0.686	0.000	0.000	0.000	0.000
		0.914	0.000	0.000	0.000	0.000
	6 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.229	-0.000	-0.000	0.000	0.000
		0.457	-0.000	-0.000	0.000	0.000
		0.686	0.000	0.000	0.000	0.000
		0.914	0.000	0.000	0.000	0.000
	7 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.229	-0.000	-0.000	0.000	0.000
		0.457	-0.000	-0.000	0.000	0.000
		0.686	0.000	0.000	0.000	0.000
		0.914	0.000	0.000	0.000	0.000
665	1 DEAD LOA	0.000	0.000	0.000	0.000	0.000
		0.229	-0.000	-0.000	0.000	0.000
		0.457	0.000	-0.000	0.000	0.000
		0.686	0.000	0.000	0.000	0.000
		0.914	0.000	0.000	0.000	0.000
	2 LIVE LOAD	0.000	0.000	0.000	0.000	0.000

4.2.2 Beam Properties

Beam Number: 38 **Table 4.3:** Geometry

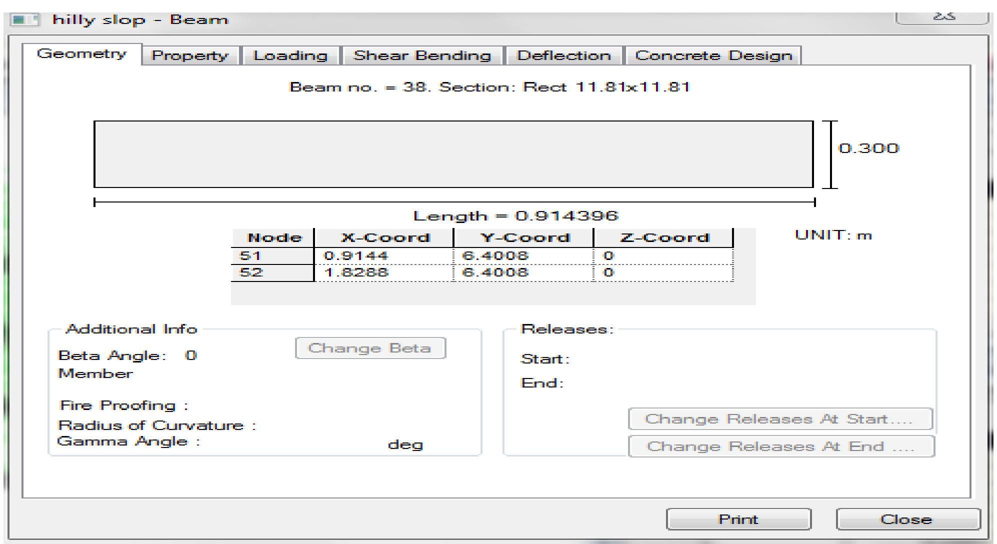


Table 4.4: Property

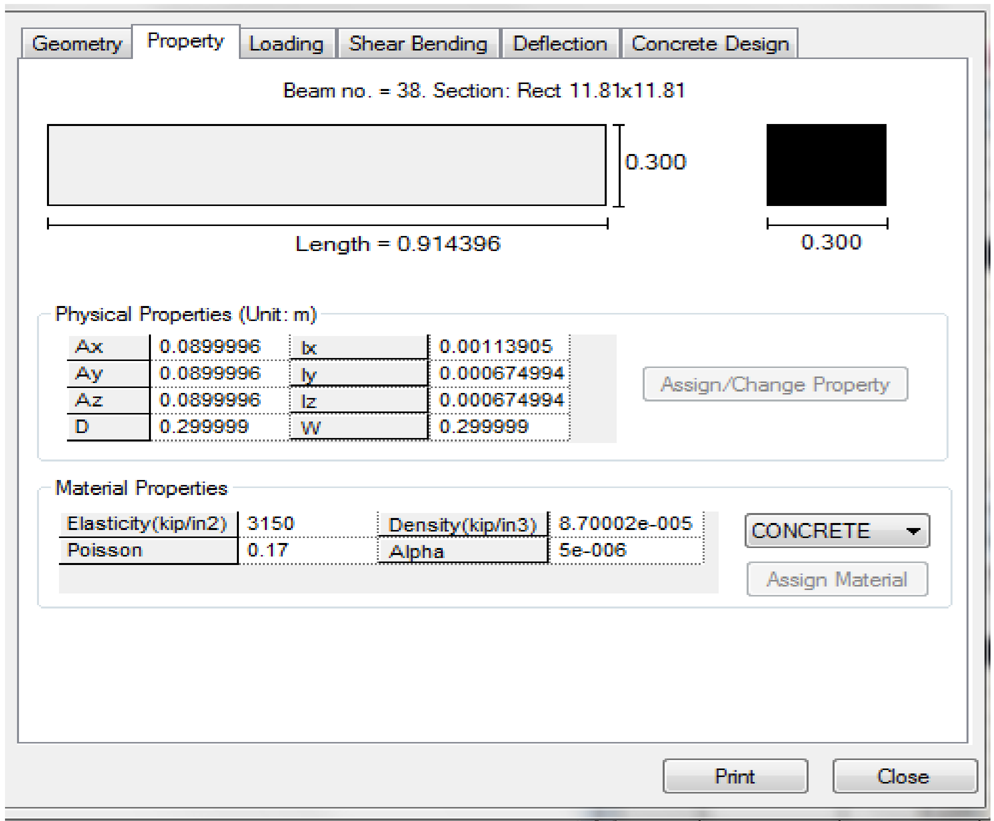


Table 4.5: Shear Bending

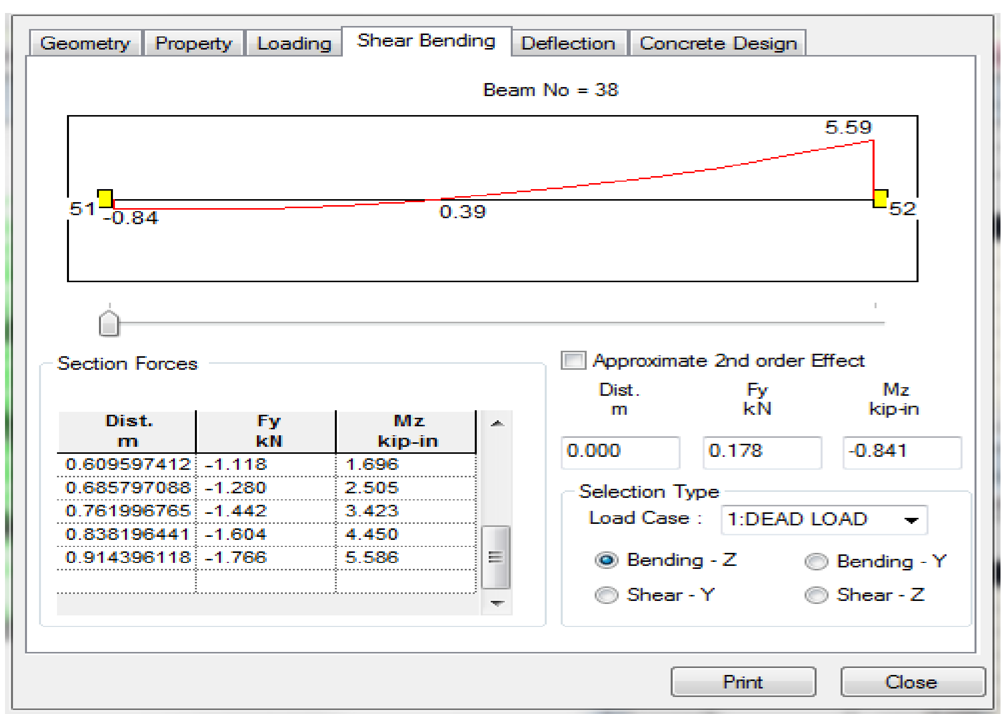


Table 4.6: Deflection

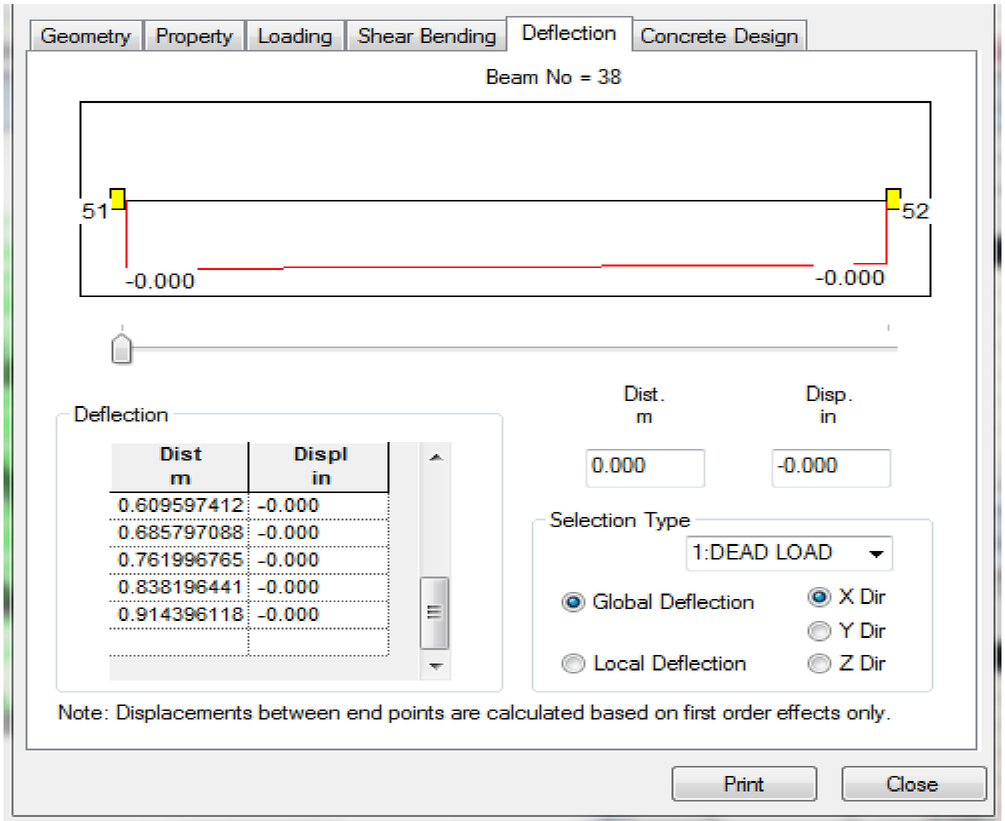
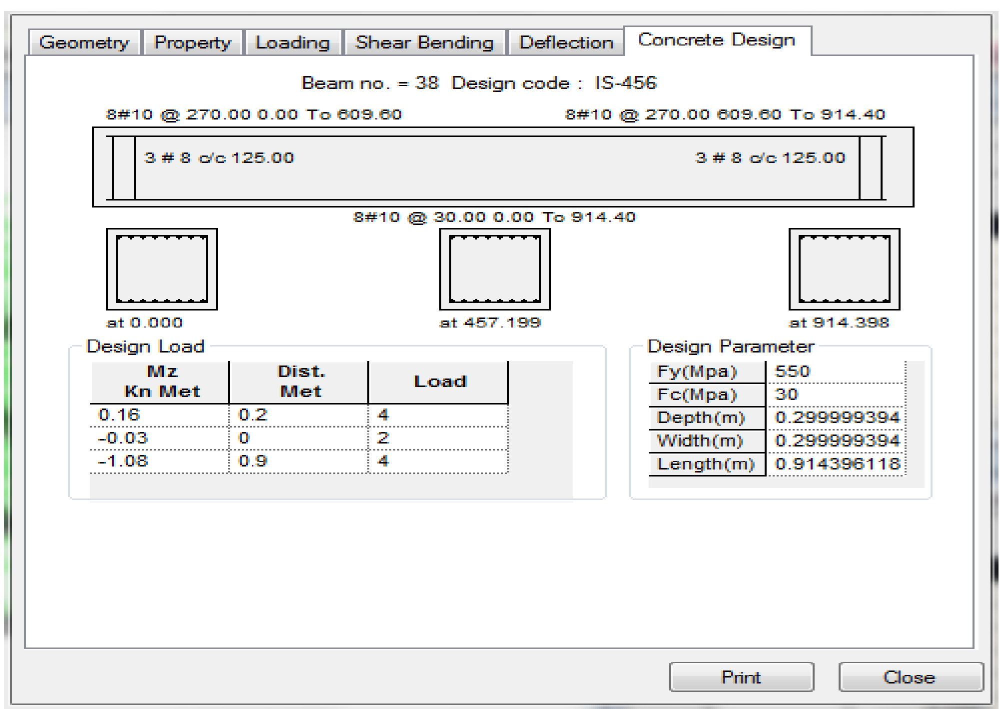


Table 4.7: Concrete Design



Beam Number: 1820

Table 4.8: Geometry

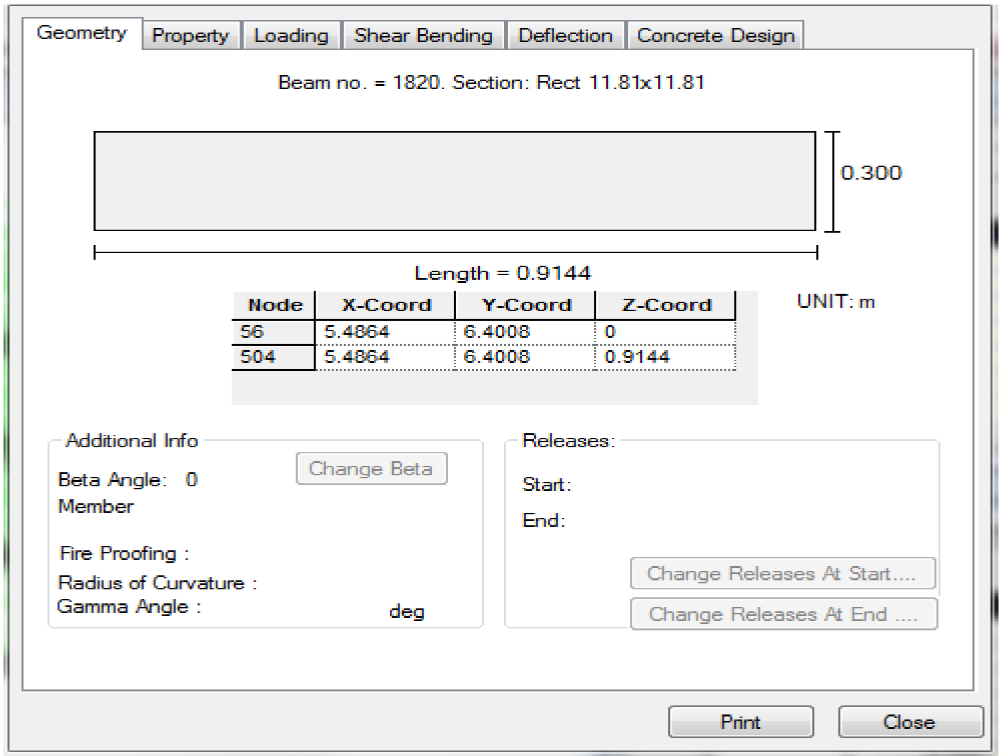


Table 4.9: Property

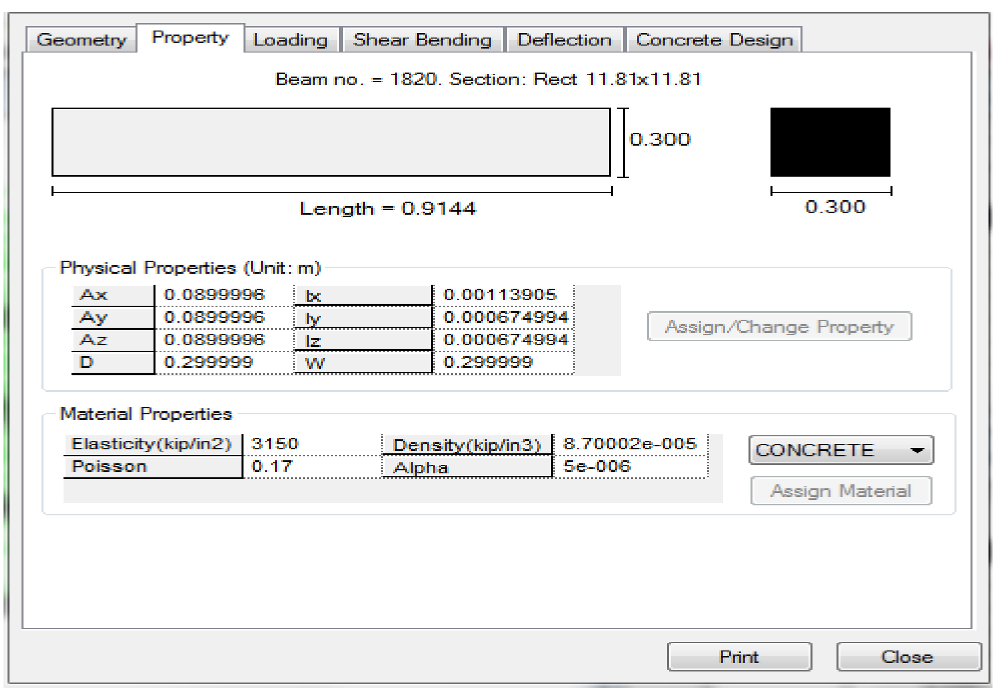


Table 4.10: Shear Bending

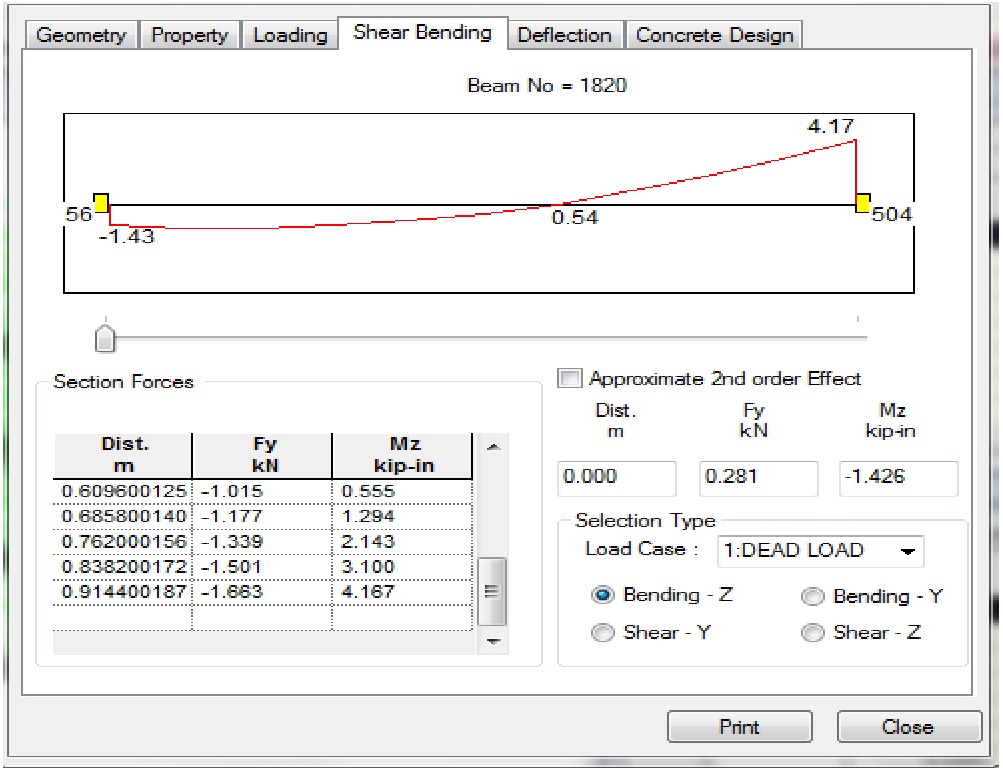


Table 4.11: Deflection

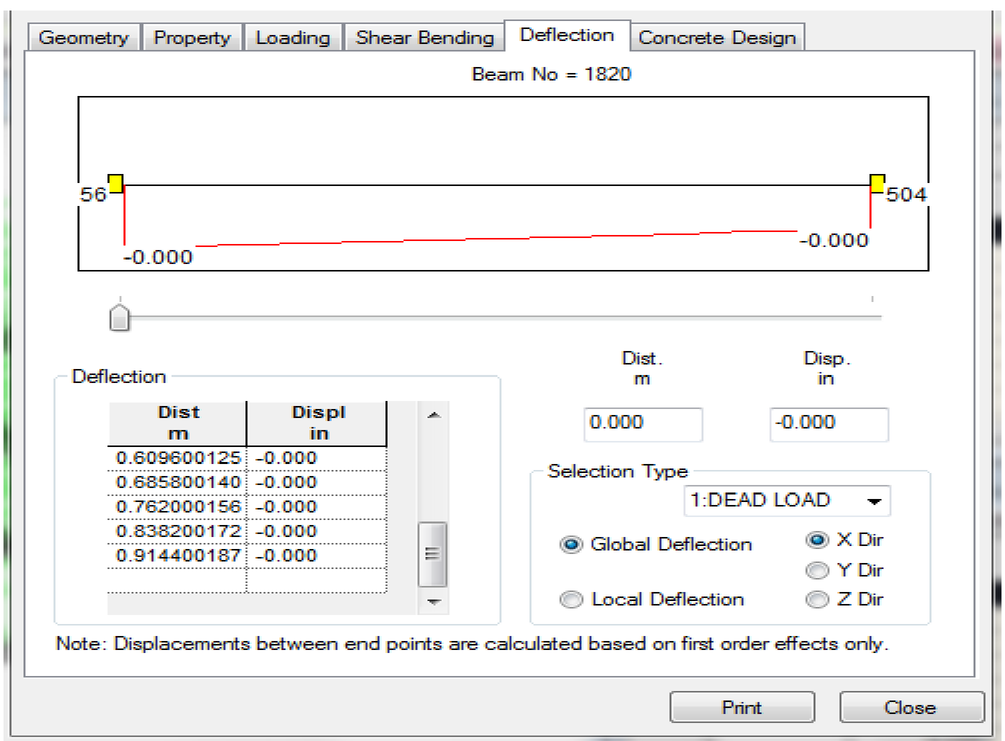
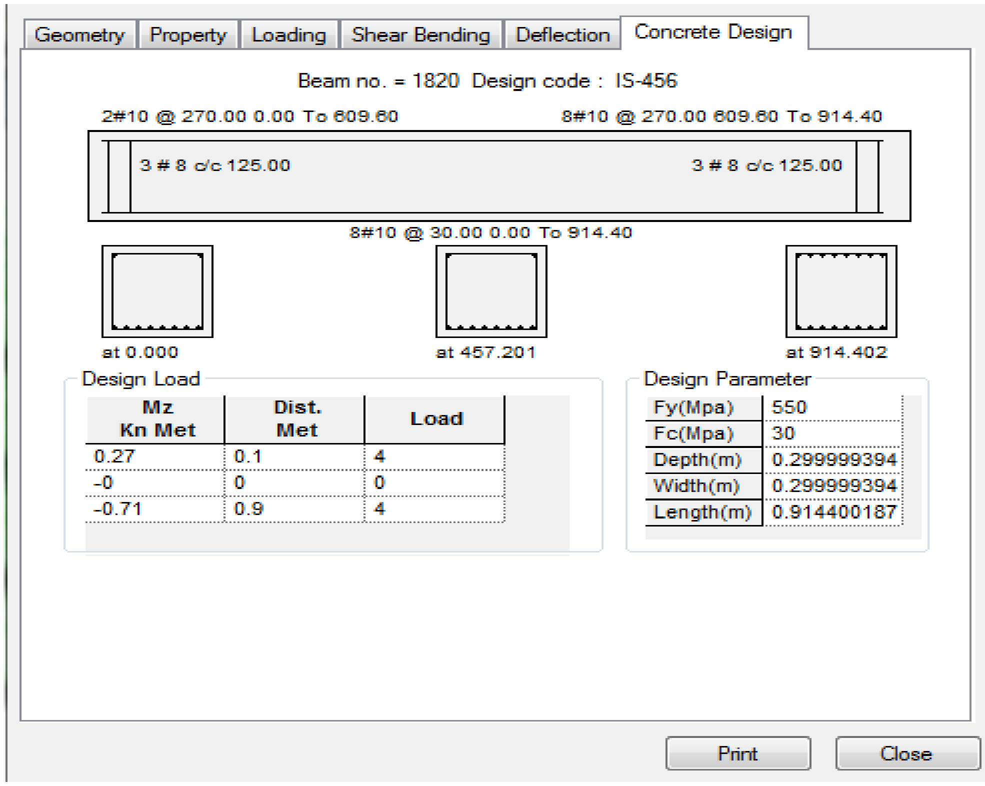


Table 4.12: Concrete Design



Beam Number: 1954

Table 4.13: Geometry

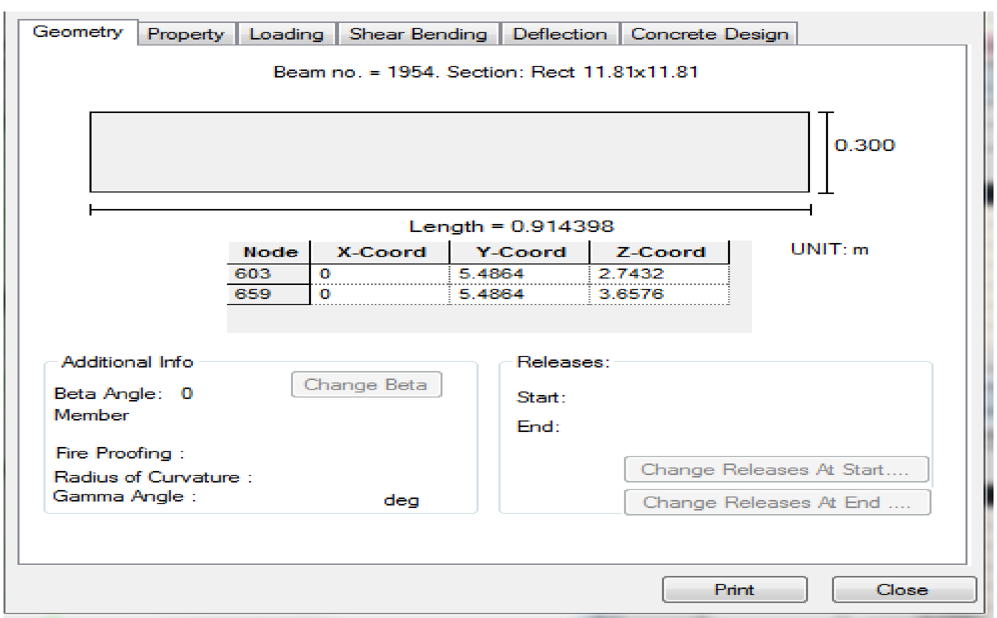


Table 4.14: Property

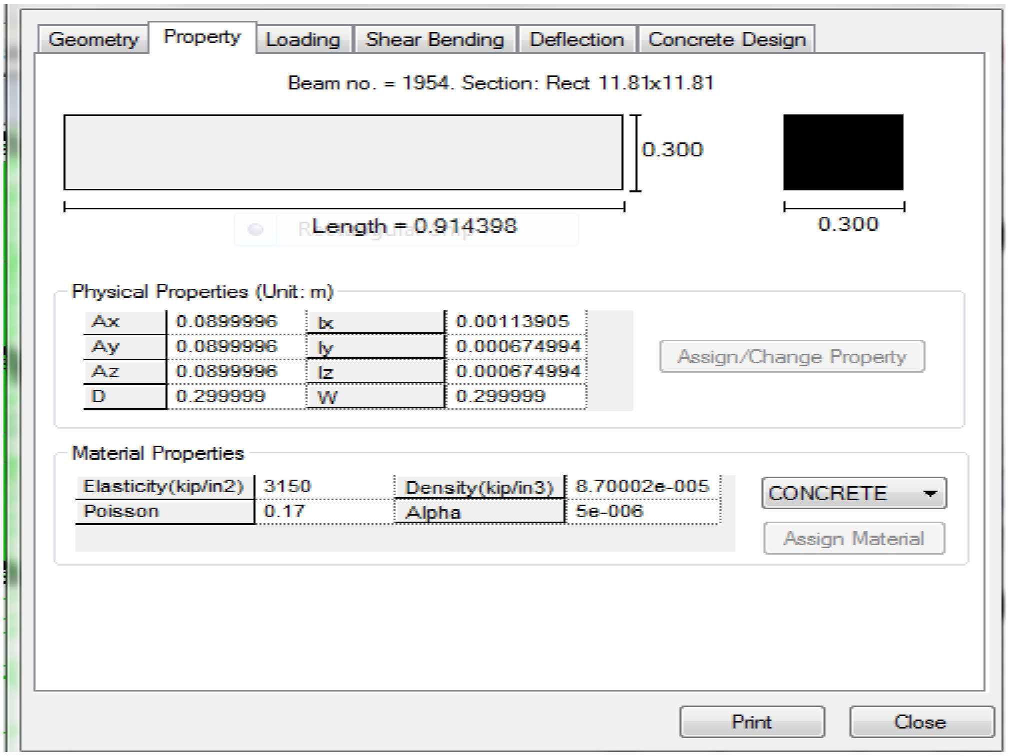


Table 4.15: Shear Bending

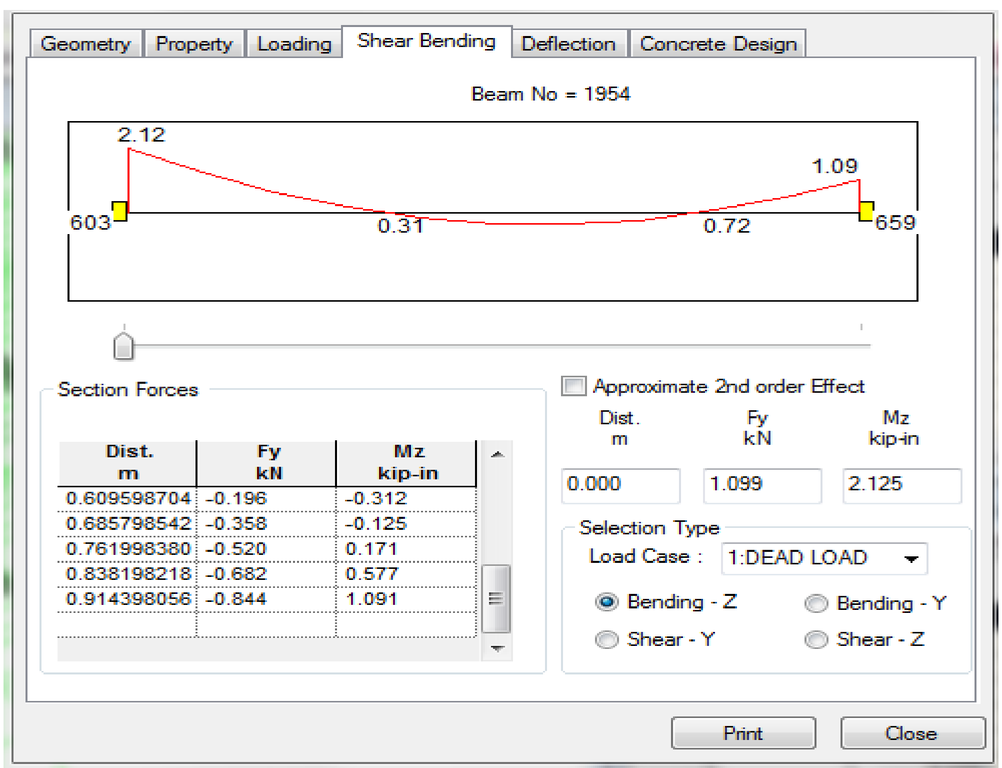


Table 4.16: Deflection

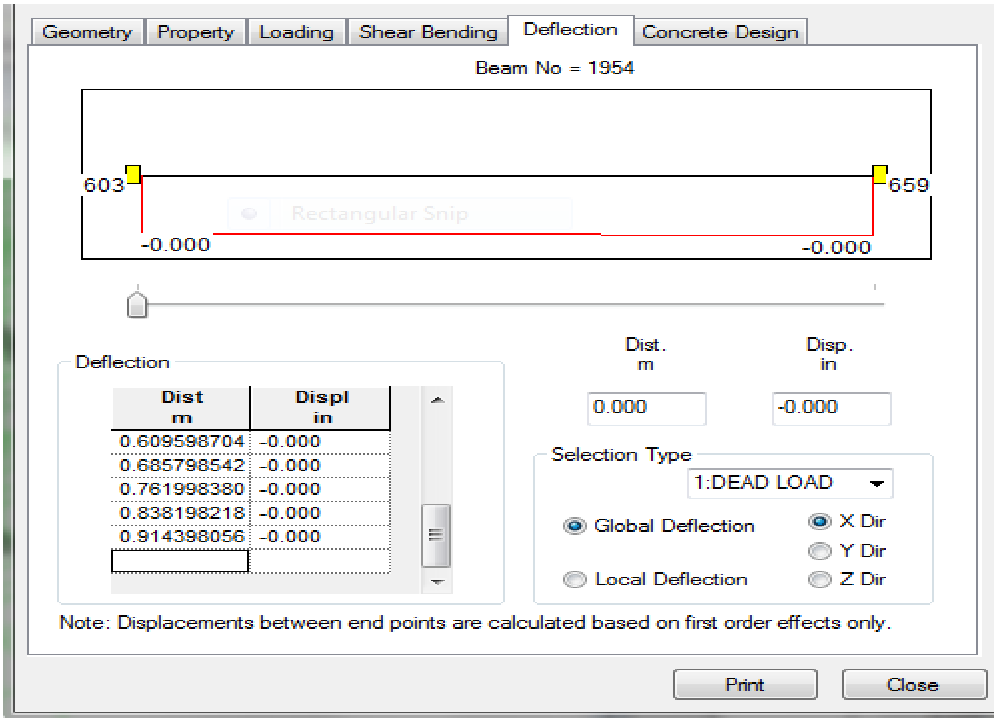
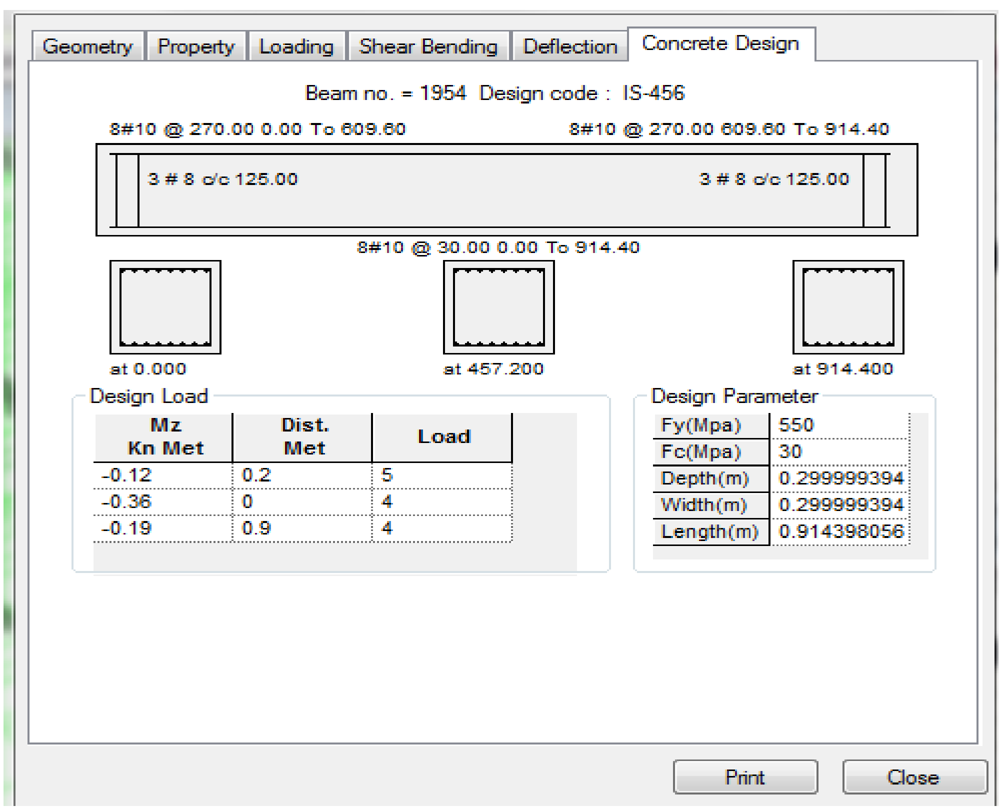


Table 4.17: Concrete Design



Column Properties

Column Number: 78

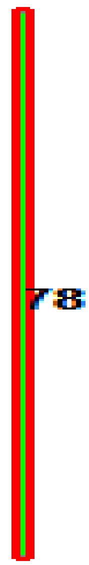
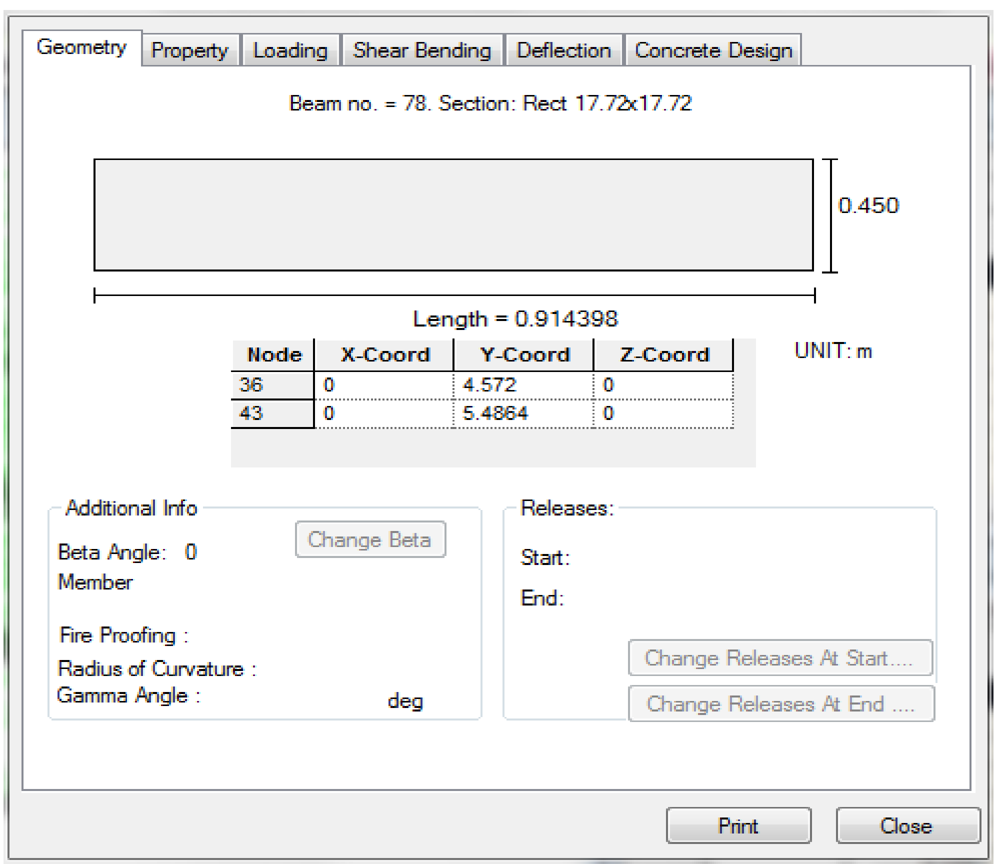


Table 4.18: Geometry



Node	X-Coord	Y-Coord	Z-Coord
36	0	4.572	0
43	0	5.4864	0

Table 4.19: Property

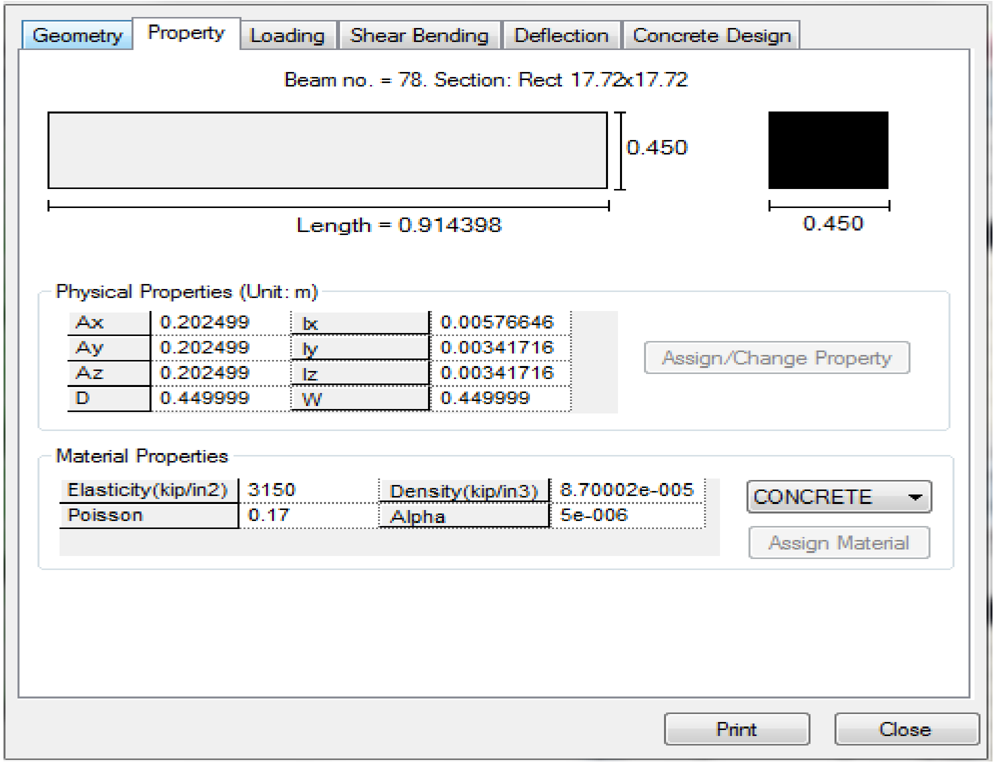


Table 4.20: Shear Bending

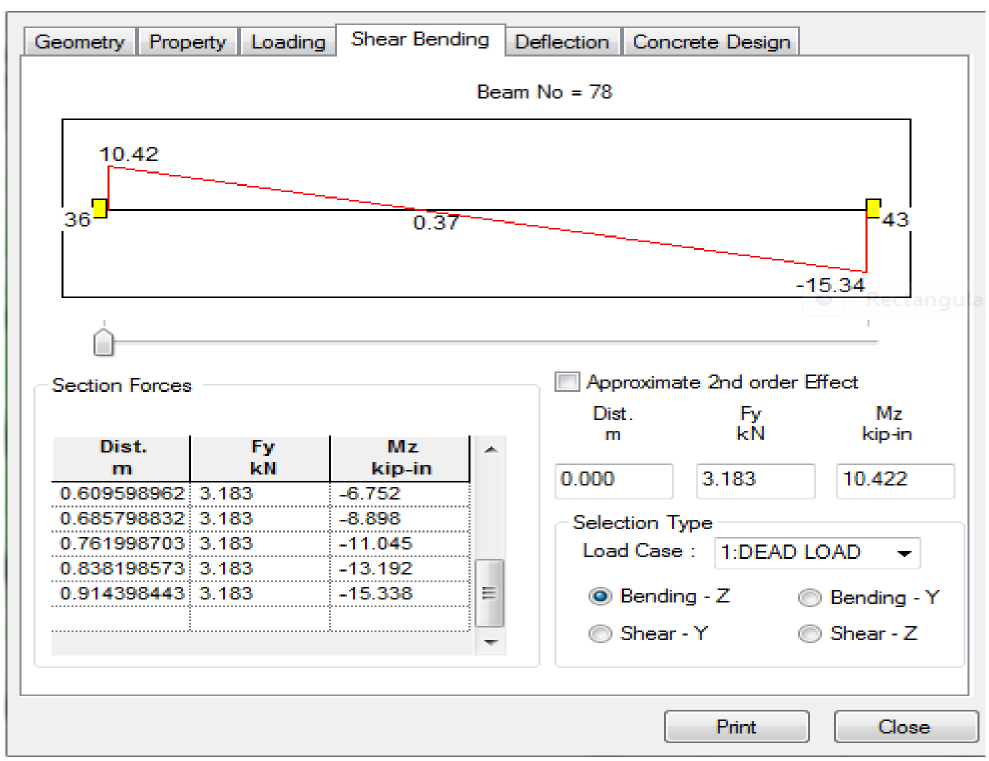


Table 4.21: Deflection

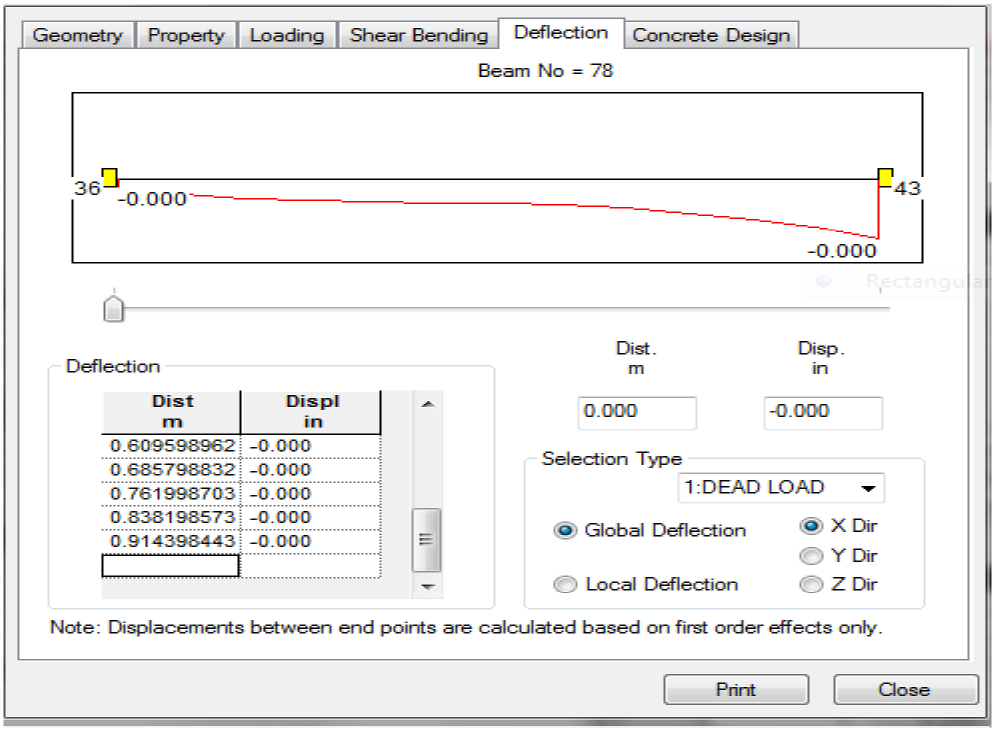
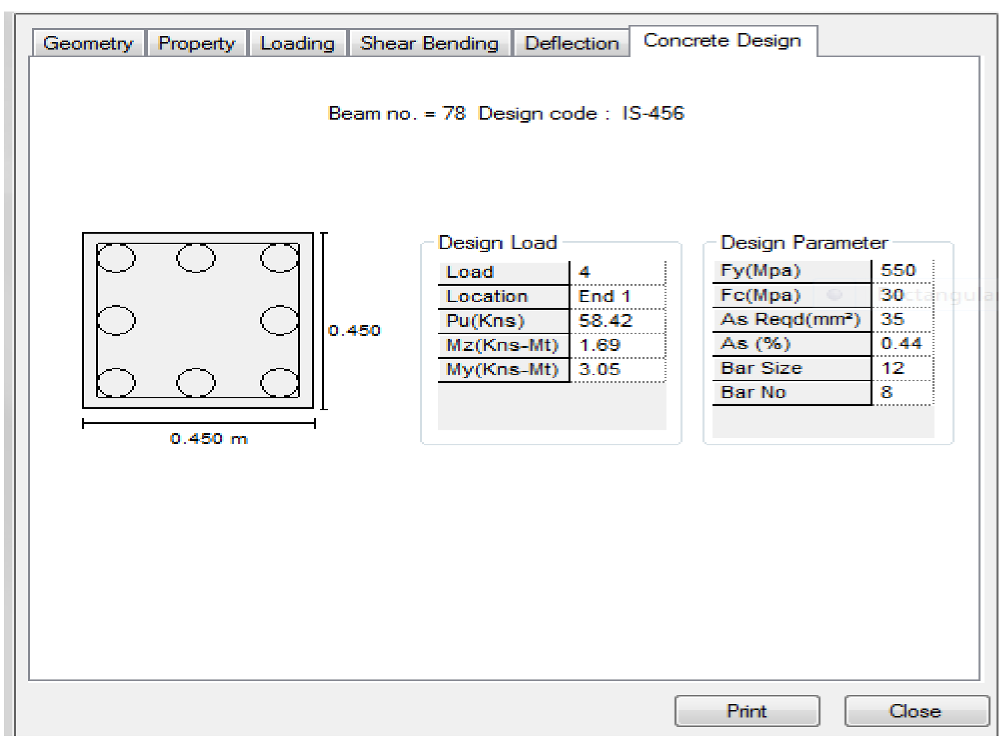


Table 4.22: Concrete Design



Column Number: 1674

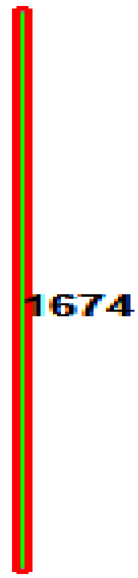
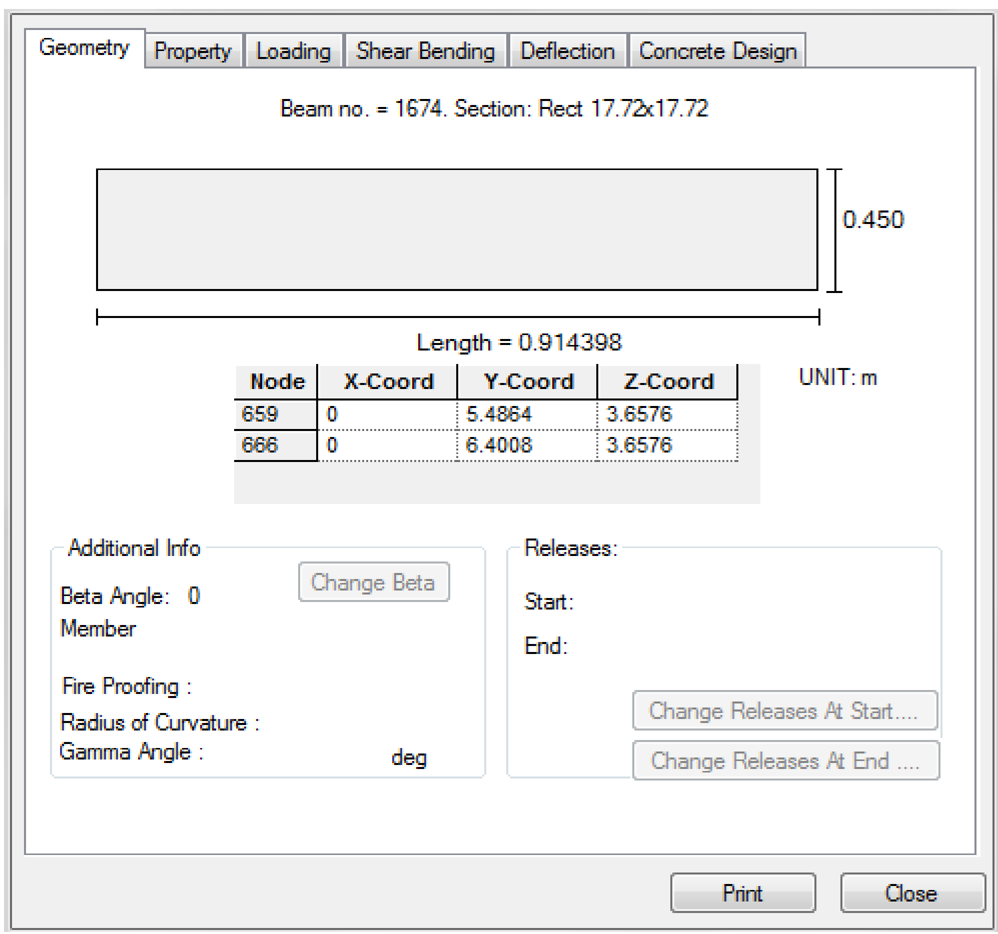


Table 4.23: Geometry



Node	X-Coord	Y-Coord	Z-Coord
659	0	5.4864	3.6576
666	0	6.4008	3.6576

Table 4.24: Property

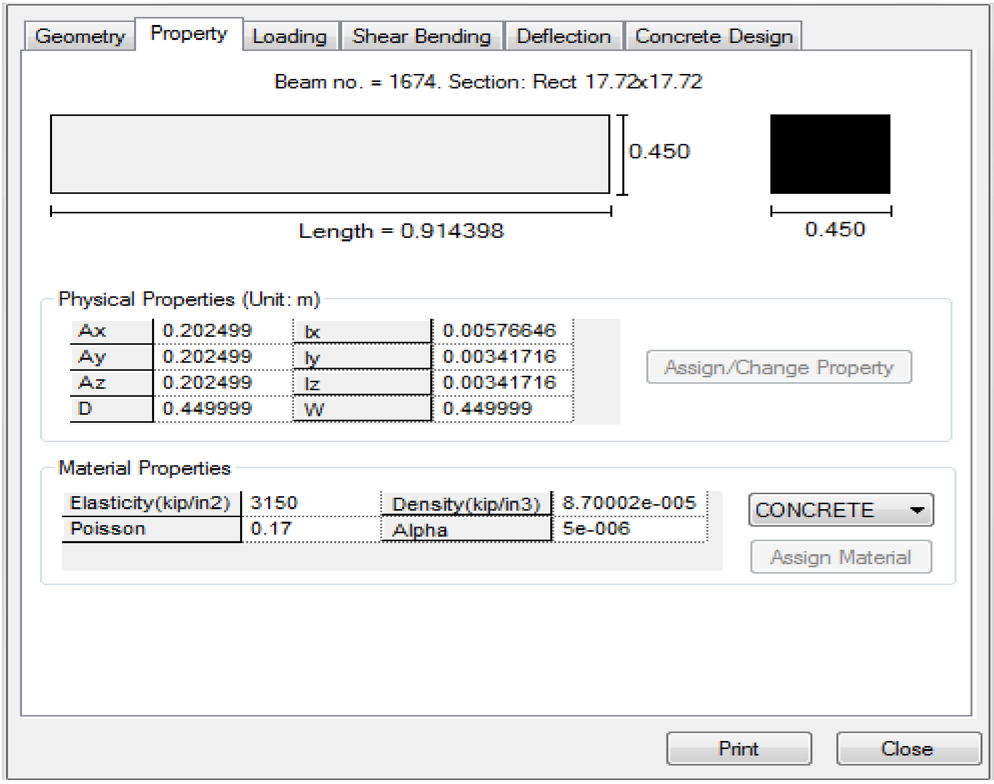


Table 4.25: Shear Bending

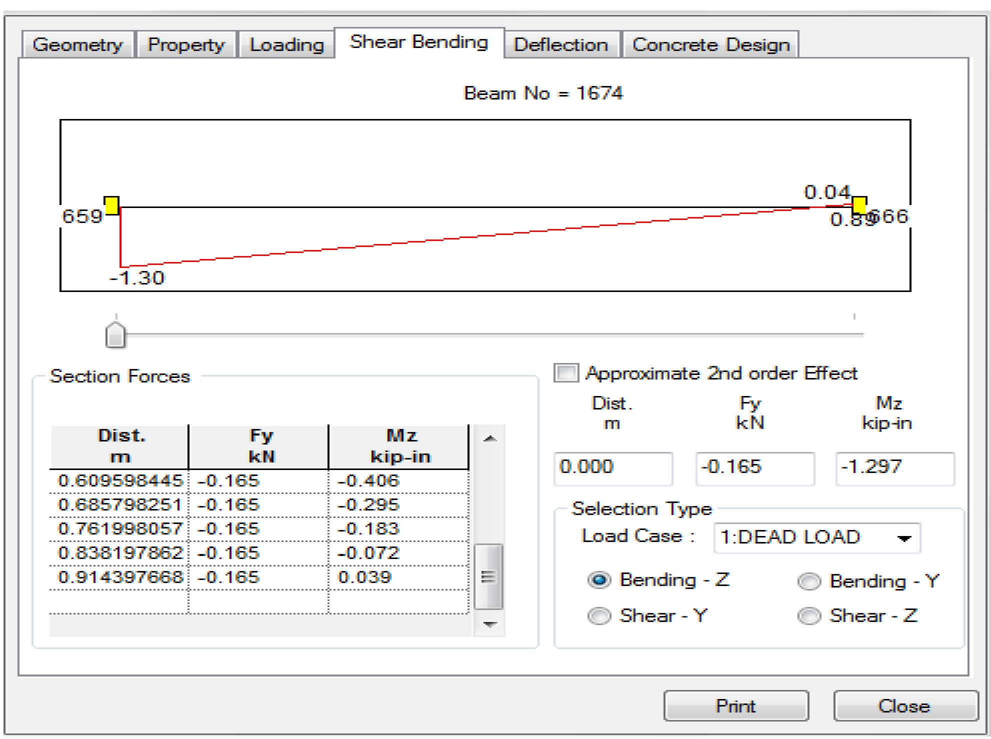


Table 4.26: Deflection

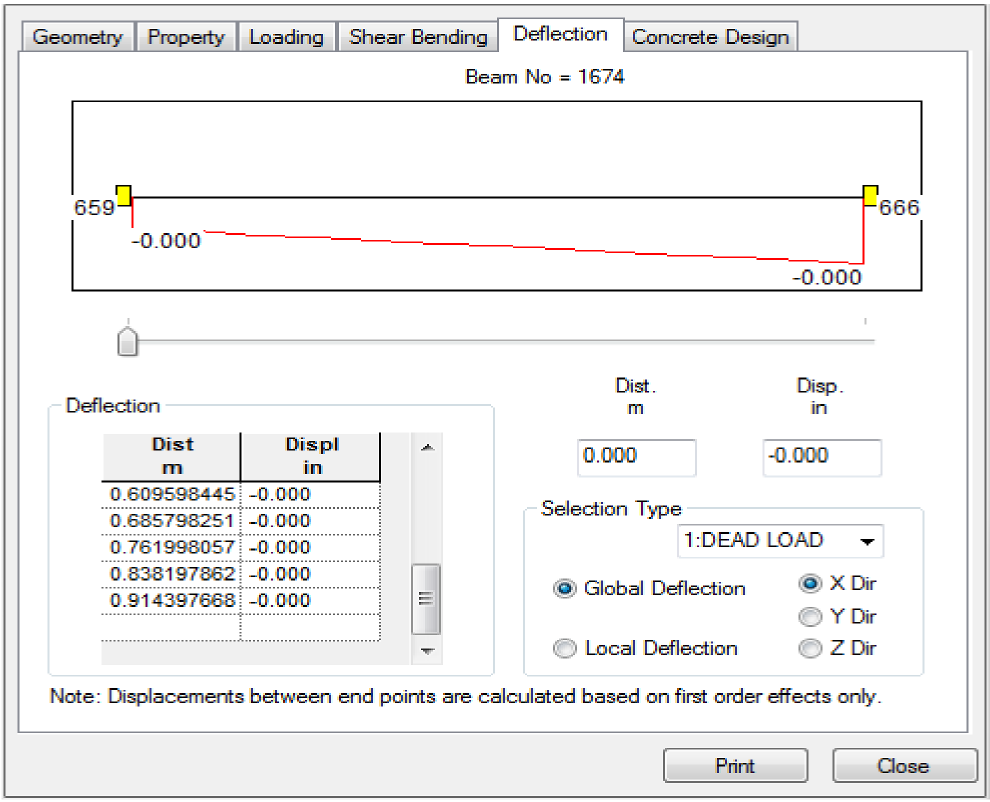
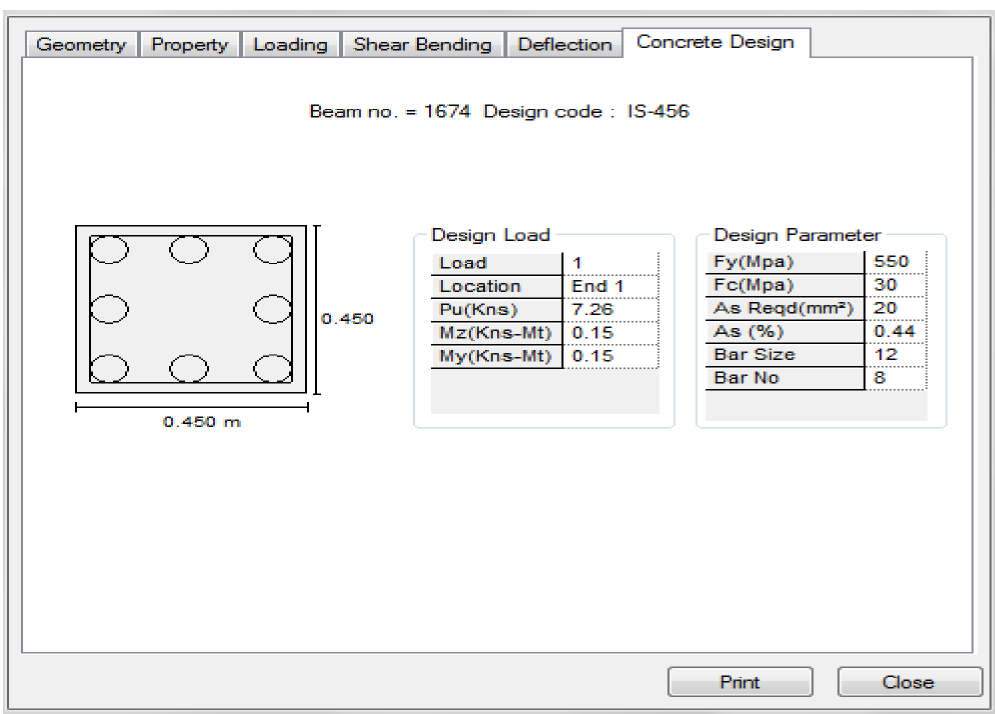
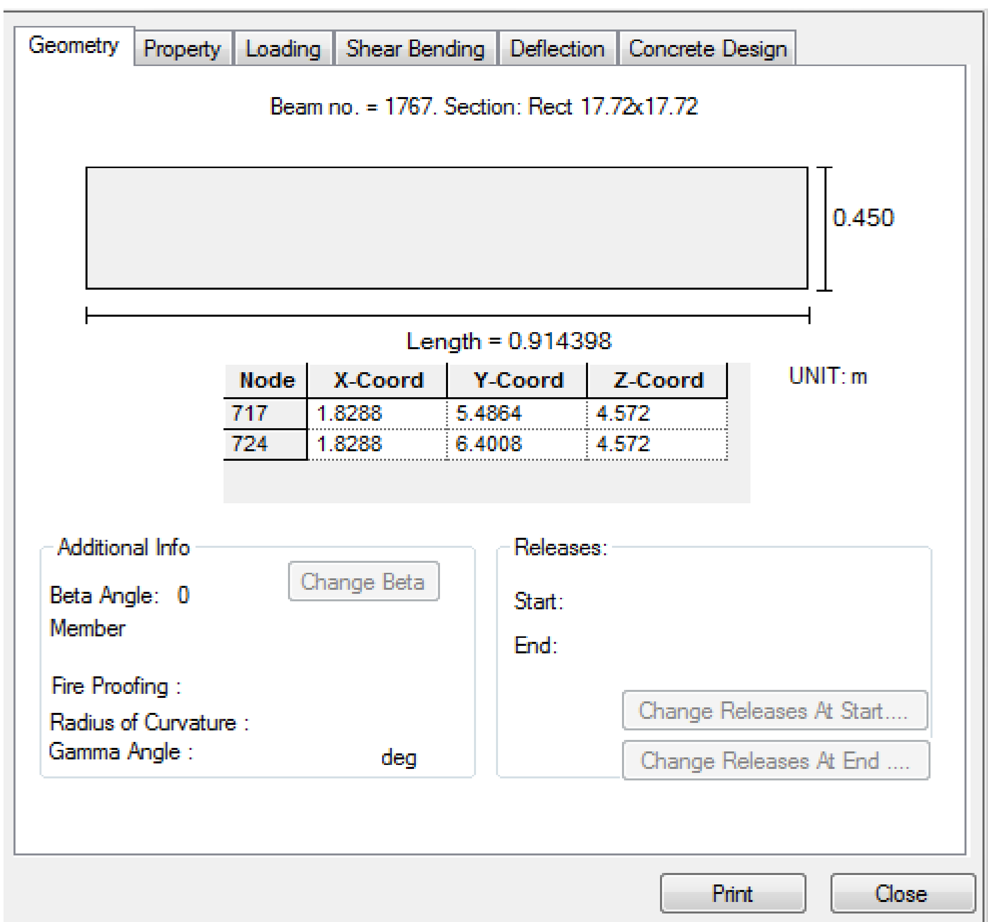


Table 4.27: Concrete Design



Column Number: 1767

Table 4.28: Geometry



Geometry | Property | Loading | Shear Bending | Deflection | Concrete Design

Beam no. = 1767. Section: Rect 17.72x17.72

0.450

Length = 0.914398

UNIT: m

Node	X-Coord	Y-Coord	Z-Coord
717	1.8288	5.4864	4.572
724	1.8288	6.4008	4.572

Additional Info

Beta Angle: 0

Member

Change Beta

Fire Proofing :

Radius of Curvature :

Gamma Angle : deg

Releases:

Start:

End:

Change Releases At Start....

Change Releases At End ....

Print

Close

Table 4.29: Property

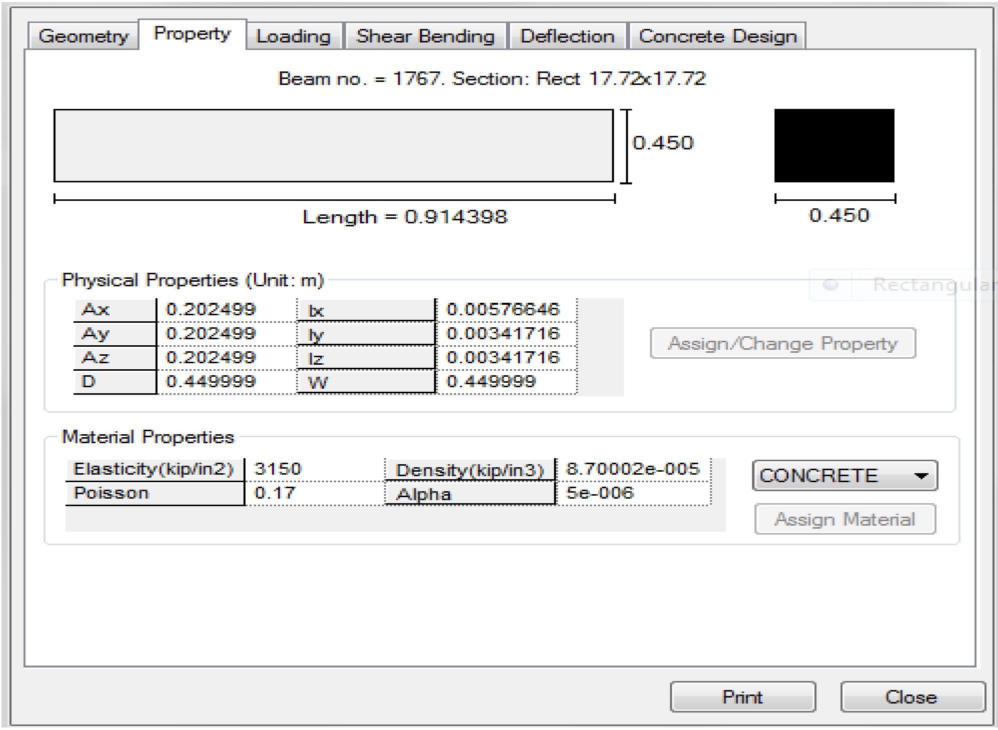


Table 4.30: Shear Bending

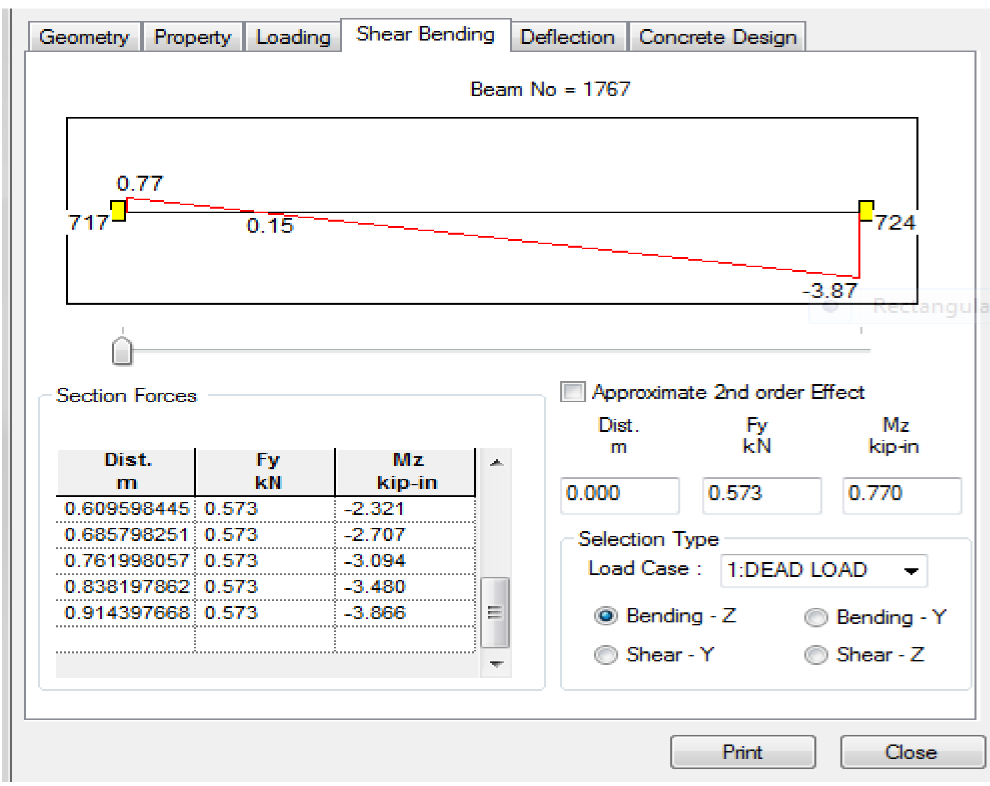


Table 4.31: Deflection

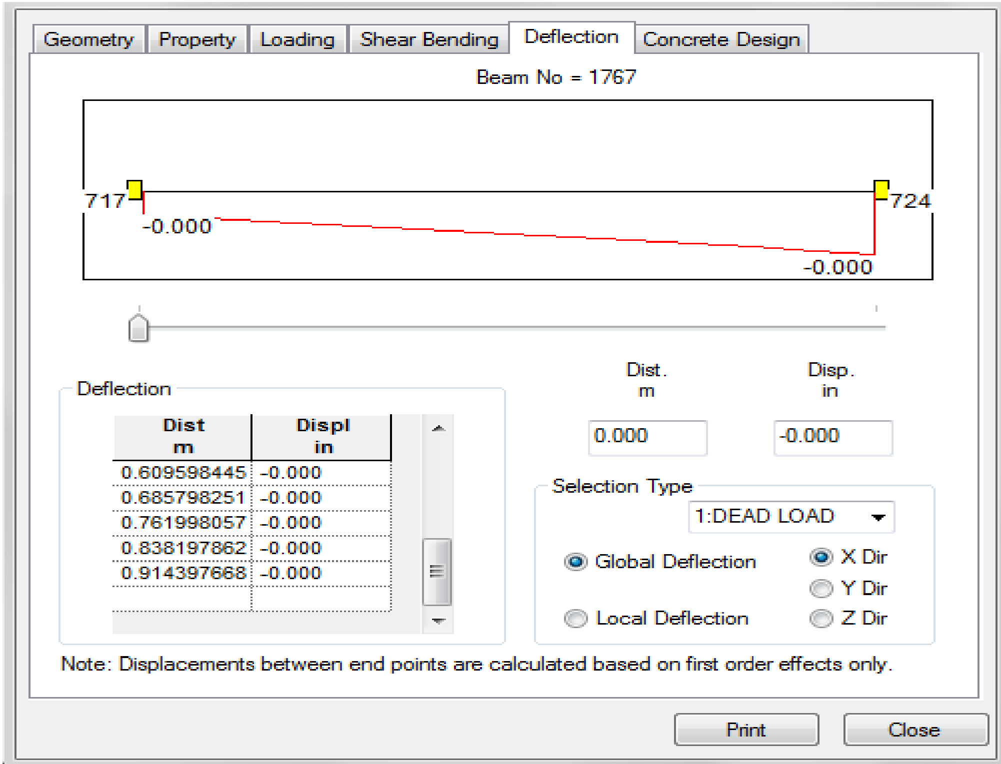
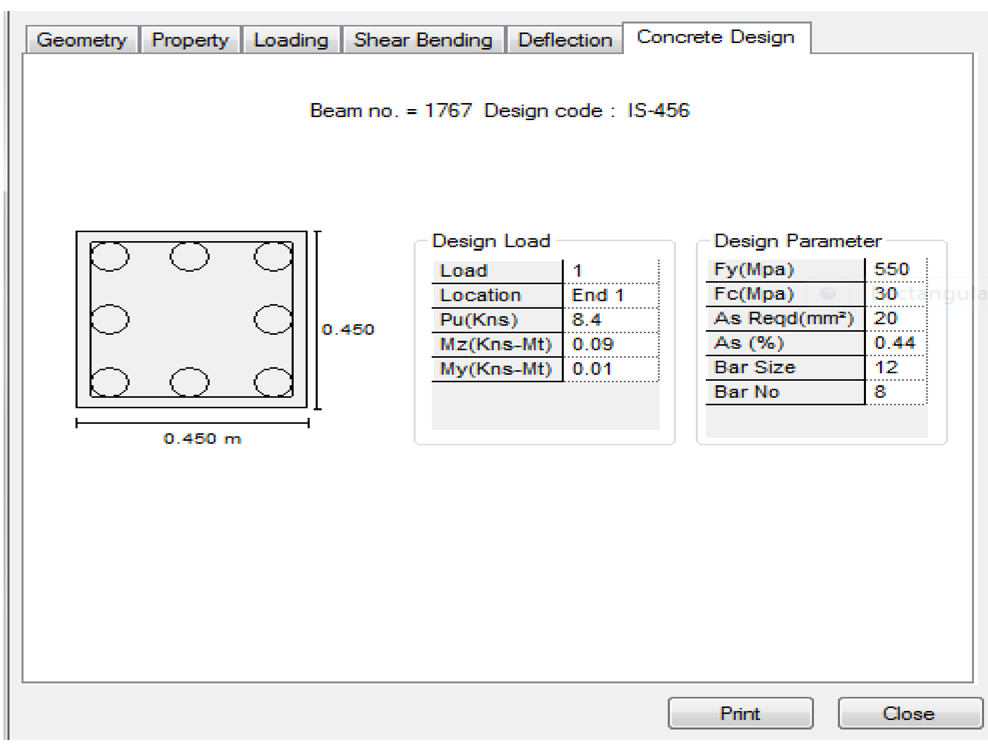


Table 4.32: Concrete Design



4.3 Joint Displacement

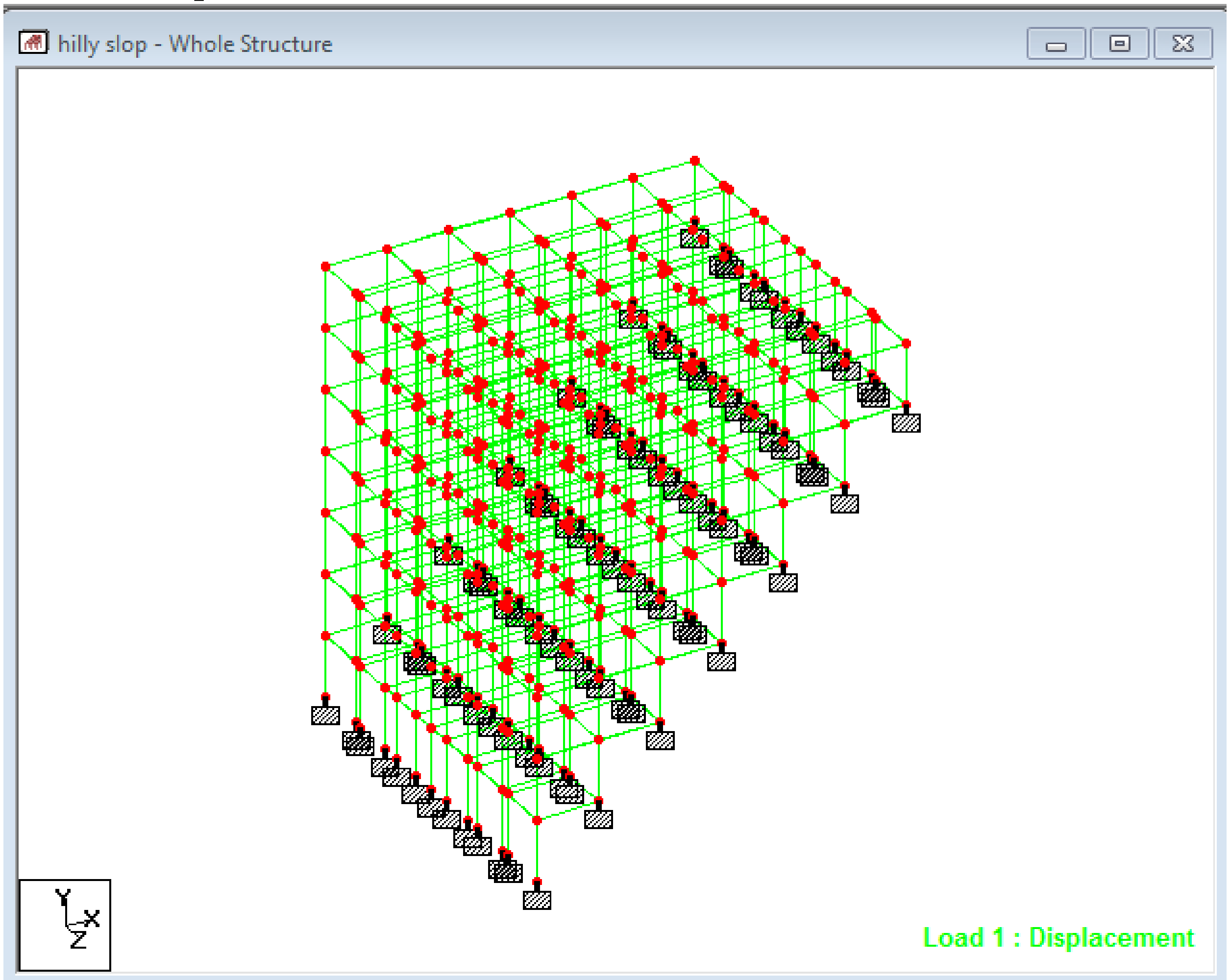


Figure 4.5: Joint Displacement

Table 4.33: Node Displacement

hilly slop - Node Displacements:

All / Summary

Node	L/C	Horizontal X in	Vertical Y in	Horizontal Z in	Resultant in	Rotational rX rad	rY rad	rZ rad
717	1 DEAD LOA	-0.000	-0.001	-0.000	0.001	0.000	0.000	0.000
	2 LIVE LOAD	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000
	3 FLOOR LO	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000
	4 GENERATE	-0.000	-0.002	-0.000	0.002	0.000	0.000	0.000
	5 GENERATE	-0.000	-0.001	-0.000	0.001	0.000	0.000	0.000
	6 GENERATE	-0.000	-0.001	-0.000	0.001	0.000	0.000	0.000
	7 GENERATE	-0.000	-0.001	-0.000	0.001	0.000	0.000	0.000
718	1 DEAD LOA	-0.000	-0.001	-0.000	0.001	-0.000	-0.000	0.000
	2 LIVE LOAD	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000
	3 FLOOR LO	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000
	4 GENERATE	-0.000	-0.001	-0.000	0.001	0.000	-0.000	0.000
	5 GENERATE	-0.000	-0.001	-0.000	0.001	0.000	-0.000	0.000
	6 GENERATE	-0.000	-0.001	-0.000	0.001	-0.000	-0.000	0.000
	7 GENERATE	-0.000	-0.001	-0.000	0.001	-0.000	-0.000	0.000
719	1 DEAD LOA	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	0.000
	2 LIVE LOAD	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000
	3 FLOOR LO	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000
	4 GENERATE	-0.000	-0.001	-0.000	0.001	-0.000	-0.000	0.000
	5 GENERATE	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	0.000
	6 GENERATE	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	0.000
	7 GENERATE	-0.000	-0.000	-0.000	0.000	-0.000	-0.000	0.000

Table 4.34: Beam Displacement

All Relative Displacement / Max Relative Displacements /

Beam	L/C	Dist m	x in	y in	z in	Resultant in
1159	1 DEAD LOA	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	-0.000	-0.000	0.000
		0.261	-0.000	0.000	0.000	0.000
		0.392	-0.000	0.000	0.000	0.000
		0.523	0.000	0.000	0.000	0.000
	2 LIVE LOAD	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	-0.000	-0.000	0.000
		0.261	-0.000	-0.000	-0.000	0.000
		0.392	-0.000	-0.000	-0.000	0.000
		0.523	0.000	0.000	0.000	0.000
	3 FLOOR LO	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	0.000	0.000	0.000
		0.261	-0.000	0.000	0.000	0.000
		0.392	-0.000	0.000	0.000	0.000
		0.523	0.000	0.000	0.000	0.000
	4 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	-0.000	-0.000	0.000
		0.261	-0.000	0.000	0.000	0.000
		0.392	-0.000	0.000	0.000	0.000
		0.523	0.000	0.000	0.000	0.000
	5 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	-0.000	-0.000	0.000
		0.261	-0.000	0.000	0.000	0.000
		0.392	-0.000	0.000	0.000	0.000
		0.523	0.000	0.000	0.000	0.000
	6 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	-0.000	-0.000	0.000
		0.261	-0.000	0.000	0.000	0.000
		0.392	-0.000	-0.000	-0.000	0.000

All Relative Displacement / Max Relative Displacements

Beam	L/C	Dist m	x in	y in	z in	Resultant in
	6 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	-0.000	-0.000	0.000
		0.261	-0.000	0.000	0.000	0.000
		0.392	-0.000	-0.000	-0.000	0.000
		0.523	0.000	0.000	0.000	0.000
	7 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	-0.000	-0.000	0.000
		0.261	-0.000	-0.000	-0.000	0.000
		0.392	-0.000	0.000	0.000	0.000
		0.523	0.000	0.000	0.000	0.000
1160	1 DEAD LOA	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	-0.000	-0.000	0.000
		0.261	-0.000	-0.000	-0.000	0.000
		0.392	-0.000	0.000	0.000	0.000
		0.523	0.000	0.000	0.000	0.000
	2 LIVE LOAD	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	0.000	0.000	0.000
		0.261	-0.000	0.000	0.000	0.000
		0.392	-0.000	0.000	0.000	0.000
		0.523	0.000	0.000	0.000	0.000
	3 FLOOR LO	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	0.000	0.000	0.000
		0.261	-0.000	0.000	0.000	0.000
		0.392	-0.000	0.000	0.000	0.000
		0.523	0.000	0.000	0.000	0.000
	4 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	-0.000	-0.000	0.000
		0.261	-0.000	0.000	0.000	0.000
		0.392	-0.000	0.000	0.000	0.000

All Relative Displacement / Max Relative Displacements

Beam	L/C	Dist m	x in	y in	z in	Resultant in
	4 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	-0.000	-0.000	0.000
		0.261	-0.000	0.000	0.000	0.000
		0.392	-0.000	0.000	0.000	0.000
		0.523	0.000	0.000	0.000	0.000
	5 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	-0.000	-0.000	0.000
		0.261	-0.000	0.000	0.000	0.000
		0.392	-0.000	0.000	0.000	0.000
		0.523	0.000	0.000	0.000	0.000
	6 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	-0.000	-0.000	0.000
		0.261	-0.000	0.000	0.000	0.000
		0.392	-0.000	-0.000	-0.000	0.000
		0.523	0.000	0.000	0.000	0.000
	7 GENERATE	0.000	0.000	0.000	0.000	0.000
		0.131	-0.000	0.000	0.000	0.000
		0.261	-0.000	0.000	0.000	0.000
		0.392	-0.000	0.000	0.000	0.000
		0.523	0.000	0.000	0.000	0.000

4.4 Support Reaction

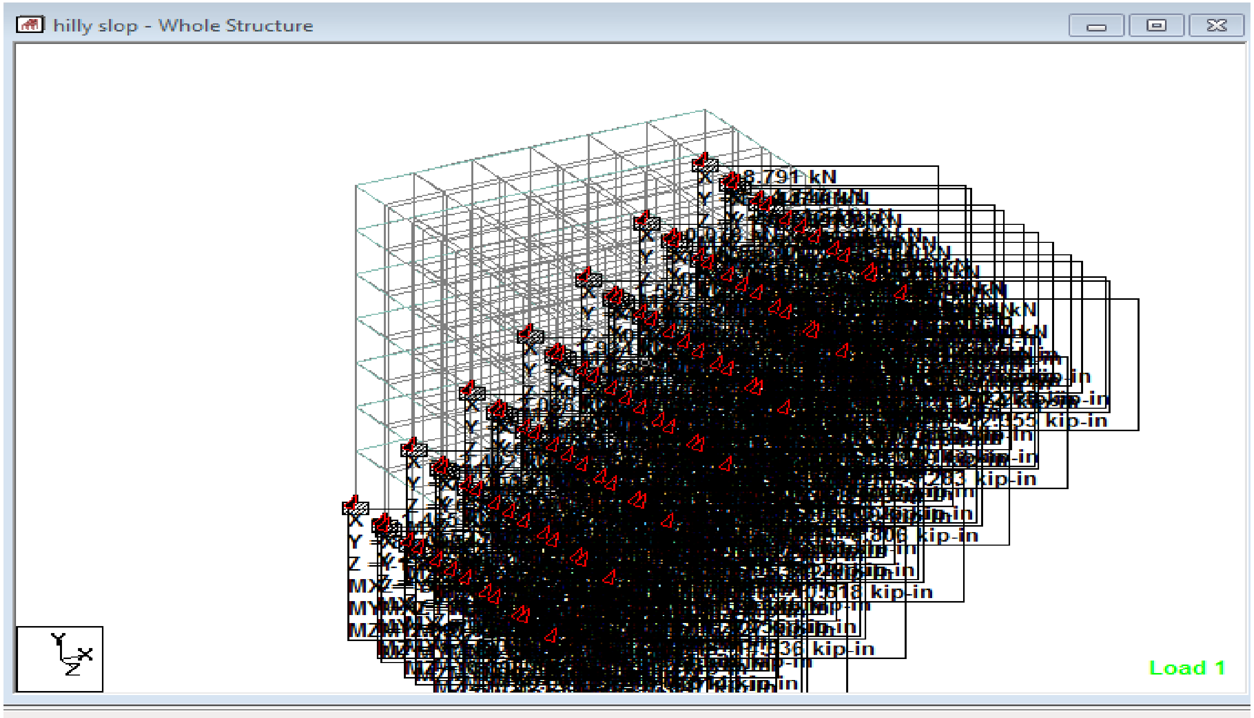


Figure 4.6: Support Reaction

Table 4.35: Support Reaction

hilly slop - Support Reactions:

All | Summary | Envelope

		Horizontal	Vertical	Horizontal	Moment		
Node	L/C	Fx kN	Fy kN	Fz kN	Mx kip-in	My kip-in	Mz kip-in
1	1 DEAD LOA	-1.465	85.096	-1.889	-3.965	0.114	2.997
	2 LIVE LOAD	-0.050	4.356	-0.062	-0.107	-0.000	0.089
	3 FLOOR LO	-0.022	1.867	-0.026	-0.046	-0.000	0.038
	4 GENERATE	-2.273	134.178	-2.926	-6.108	0.171	4.629
	5 GENERATE	-1.818	107.343	-2.341	-4.886	0.137	3.703
	6 GENERATE	-2.198	127.644	-2.834	-5.947	0.171	4.495
	7 GENERATE	-1.319	76.587	-1.700	-3.568	0.103	2.697
9	1 DEAD LOA	-2.402	71.490	-0.708	-24.539	-6.014	-21.456
	2 LIVE LOAD	-0.072	7.369	0.056	-1.662	0.044	-1.800
	3 FLOOR LO	-0.031	3.158	0.024	-0.712	0.019	-0.771
	4 GENERATE	-3.711	118.287	-0.978	-39.301	-8.955	-34.884
	5 GENERATE	-2.969	94.630	-0.783	-31.440	-7.164	-27.907
	6 GENERATE	-3.603	107.235	-1.062	-36.808	-9.021	-32.184
	7 GENERATE	-2.162	64.341	-0.637	-22.085	-5.413	-19.310
17	1 DEAD LOA	-2.086	57.468	-0.035	-10.175	-4.755	-14.636
	2 LIVE LOAD	-0.079	7.144	0.065	-0.823	0.323	-1.804
	3 FLOOR LO	-0.034	3.062	0.028	-0.353	0.138	-0.773
	4 GENERATE	-3.248	96.917	0.044	-16.496	-6.649	-24.659
	5 GENERATE	-2.598	77.533	0.035	-13.197	-5.319	-19.727
	6 GENERATE	-3.129	86.201	-0.053	-15.262	-7.133	-21.953
	7 GENERATE	-1.878	51.721	-0.032	-9.157	-4.280	-13.172
25	1 DEAD LOA	-1.934	51.069	0.263	-5.908	-5.129	-10.618
	2 LIVE LOAD	-0.089	6.062	0.058	-0.562	0.313	-1.619
	3 FLOOR LO	-0.038	2.598	0.025	-0.241	0.134	-0.694
	4 GENERATE	-3.034	85.697	0.481	-9.705	-7.224	-18.355

4.5 Beam End Forces

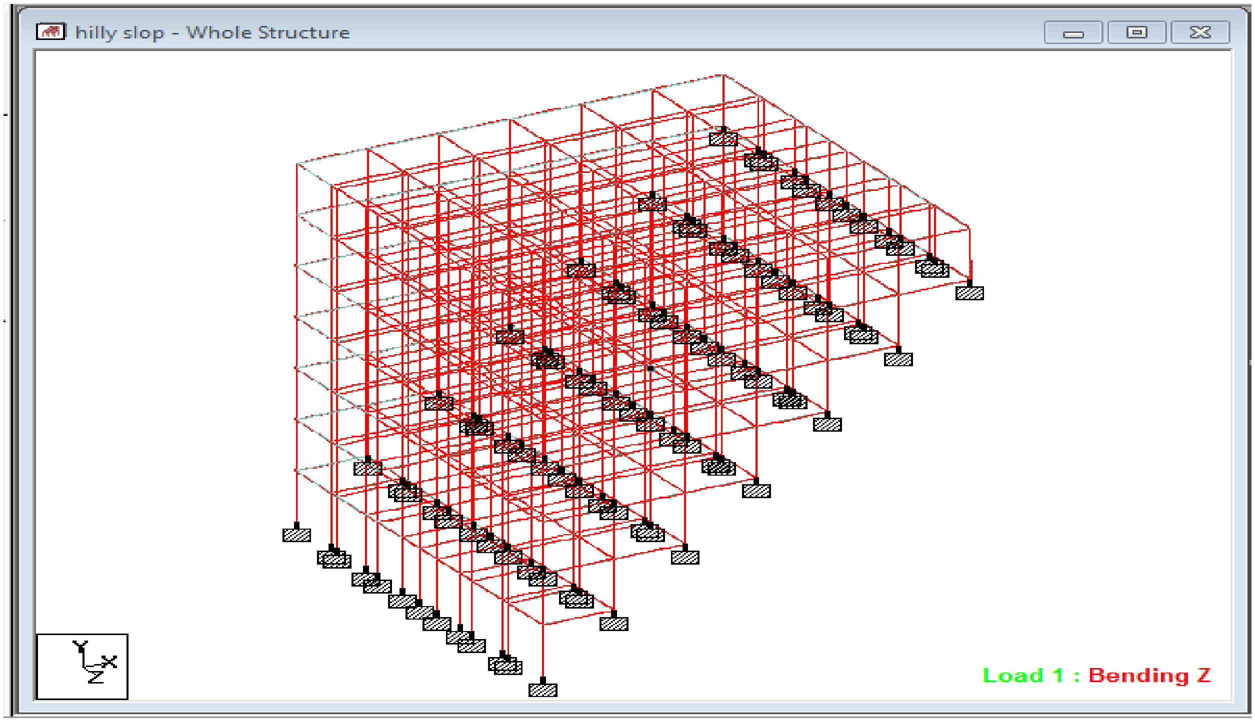


Figure 4.7: Beam End Forces

Table 4.36: Beam End Forces

All / Summary / Envelope

Beam	L/C	Node	Fx kN	Fy kN	Fz kN	Mx kip-in	My kip-in	Mz kip-in
723	1 DEAD LOA	436	10.638	3.462	0.613	0.072	-1.374	9.055
		443	-6.265	-3.462	-0.613	-0.072	-3.591	18.962
	2 LIVE LOAD	436	1.063	-0.033	-0.127	0.005	0.397	-0.164
		443	-1.063	0.033	0.127	-0.005	0.630	-0.103
	3 FLOOR LO	436	0.456	-0.014	-0.054	0.002	0.170	-0.070
		443	-0.456	0.014	0.054	-0.002	0.270	-0.044
	4 GENERATE	436	17.551	5.143	0.730	0.115	-1.465	13.337
		443	-10.992	-5.143	-0.730	-0.115	-4.440	28.290
	5 GENERATE	436	14.041	4.115	0.584	0.092	-1.172	10.670
		443	-8.793	-4.115	-0.584	-0.092	-3.552	22.632
	6 GENERATE	436	15.957	5.193	0.920	0.108	-2.061	13.583
		443	-9.397	-5.193	-0.920	-0.108	-5.386	28.444
	7 GENERATE	436	9.574	3.116	0.552	0.065	-1.237	8.150
		443	-5.638	-3.116	-0.552	-0.065	-3.232	17.066
724	1 DEAD LOA	437	8.460	0.665	-0.230	0.076	0.798	0.675
		444	-4.087	-0.665	0.230	-0.076	1.067	4.705
	2 LIVE LOAD	437	1.176	0.124	-0.074	0.002	0.234	0.304
		444	-1.176	-0.124	0.074	-0.002	0.361	0.695
	3 FLOOR LO	437	0.504	0.053	-0.032	0.001	0.100	0.130
		444	-0.504	-0.053	0.032	-0.001	0.155	0.298
	4 GENERATE	437	14.453	1.182	-0.456	0.117	1.549	1.469
		444	-7.894	-1.182	0.456	-0.117	2.142	8.100
	5 GENERATE	437	11.563	0.946	-0.365	0.093	1.239	1.175
		444	-6.315	-0.946	0.365	-0.093	1.713	6.480
	6 GENERATE	437	12.690	0.997	-0.346	0.114	1.198	1.013
		444	-6.131	-0.997	0.346	-0.114	1.600	7.057
	7 GENERATE	437	7.614	0.598	-0.207	0.068	0.719	0.608
		444	-3.678	-0.598	0.207	-0.068	0.960	4.234

4.5 Section Displacement

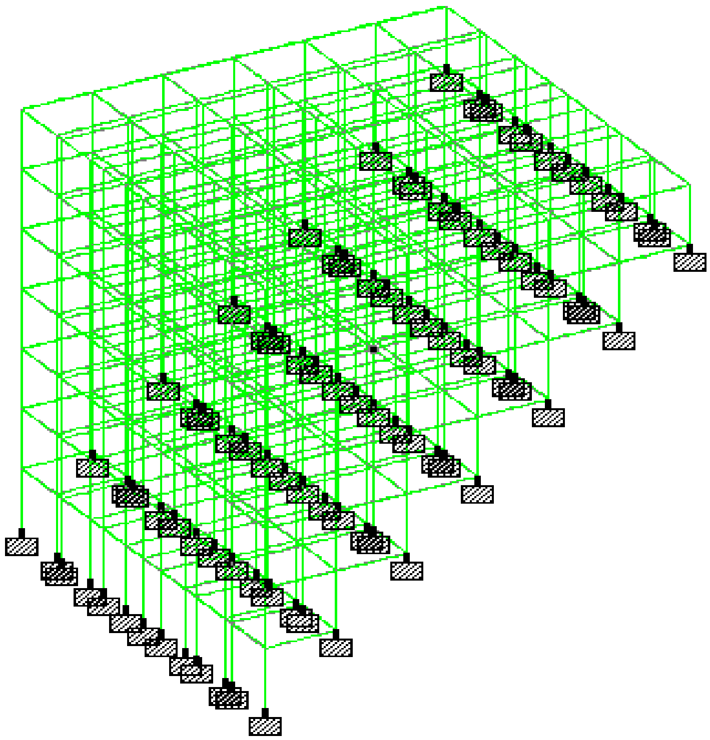


Figure 4.8: Section Displacement

4.6 Section Forces

Table 4.37: Section Forces

hilly slop - Max Forces by Section Property: Whole Structure

		Axial	Shear		Torsion	Bending	
Section		Max Fx kN	Max Fy kN	Max Fz kN	Max Mx kip-in	Max My kip-in	Max Mz kip-in
Rect 1	Max +ve	2.686	11.309	0.649	2.097	2.672	36.117
	Max -ve	-5.720	-11.335	-0.649	-2.104	-2.565	-31.652
Rect 1	Max +ve	1.186	8.096	0.493	1.336	2.318	29.255
	Max -ve	-5.066	-8.101	-0.586	-1.339	-2.168	-24.514
Rect 1	Max +ve	134.339	5.578	8.250	1.424	42.271	19.610
	Max -ve		-4.268	-8.250	-1.424	-42.271	-28.444

4.7 Modelling

Analyze

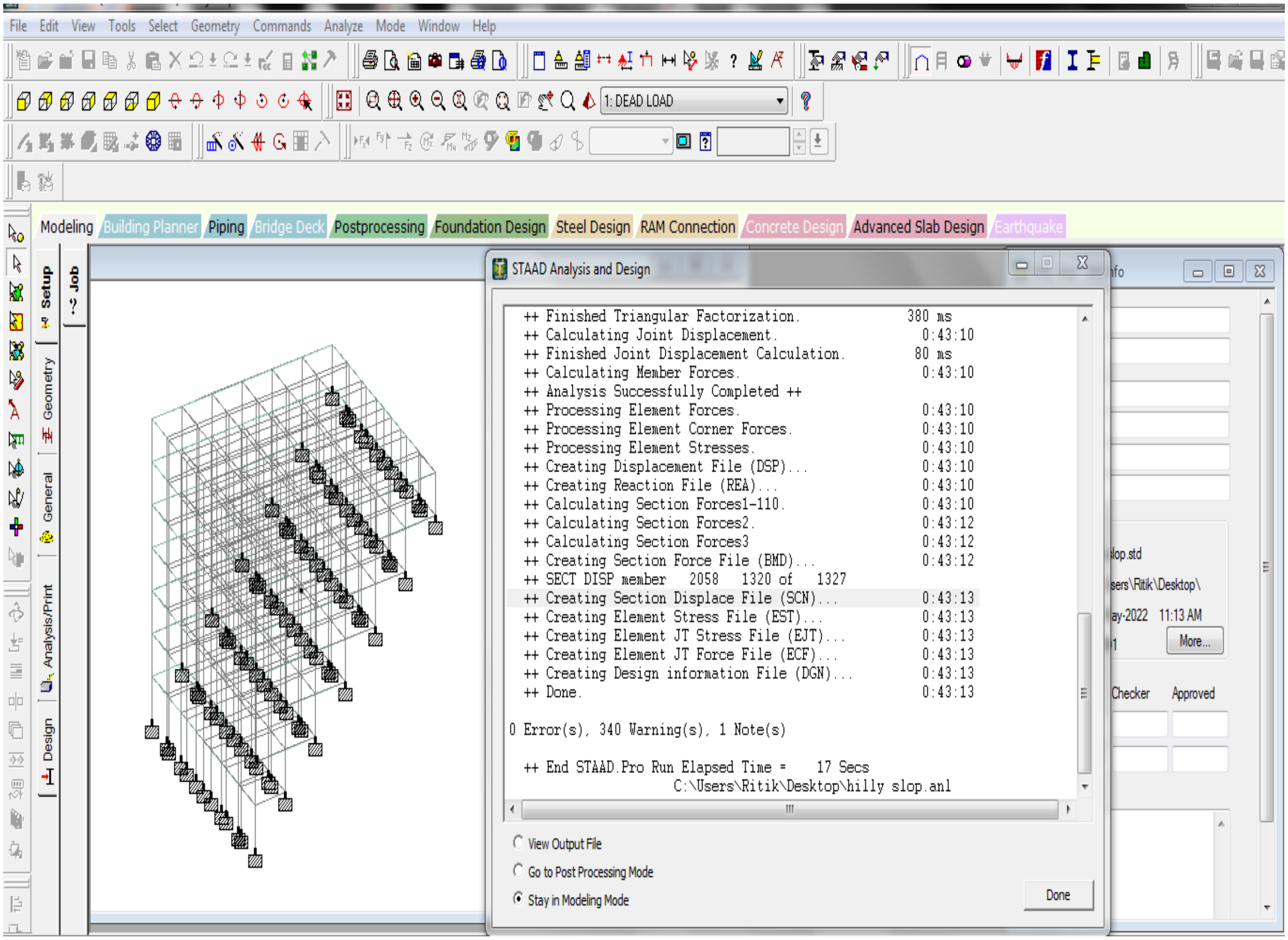


Figure 4.9: Modelling Analyze

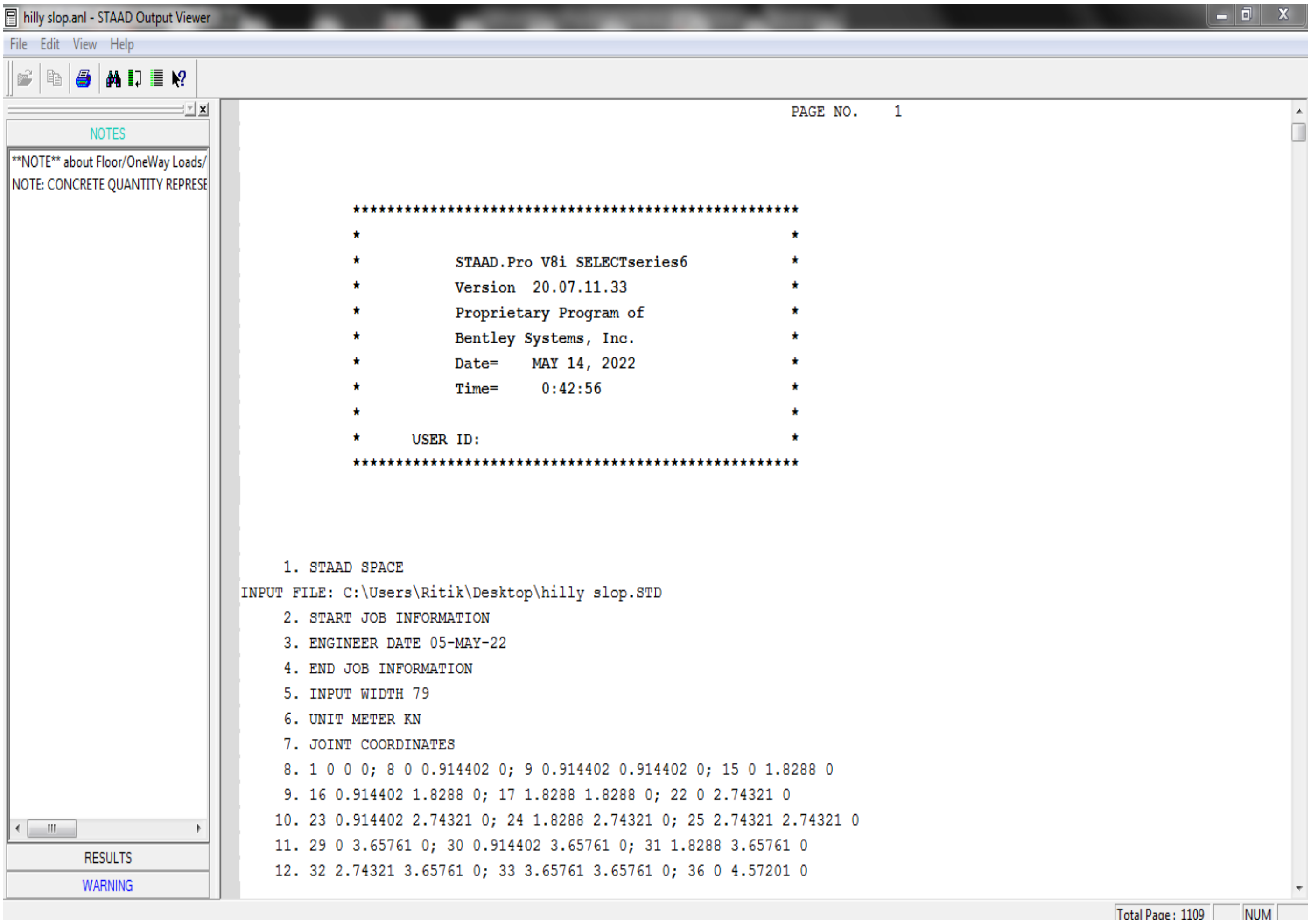


Figure 4.10: Analyze in view output file

CHAPTER 5
Conclusion

Analysis and diagram outcomes Structure on Plain Ground and Sloping Terrain are given in chapter.The assessment of effects of constructing indicates that.Although,the structur es on simple floor entice much less motion forces as in contrast to constructions on sloping ground, typical financial price concerned in levelling the sloping floor In struc tures on sloping ground, it is discovered that excessive left column at floor level, which are short, are the worst affected. Special interest need to be given to these columns in plan and detailing. The sketch indicates that there is enormous discount in bending moments of columns in Z Direction from R.C.C Structure on Plain Ground and Sloping Terrain Base shear of R.C.C Structure on sloping terrain is very much less in contrast to R.C.C shape undeniable ground. The storey float in R.C.C Structure on Plain Ground and Sloping Terrain is almost equal.This is because; metal shape is extra bendy as co mpared to RCC structure. Bending second is appear to be decreased due to step up columns in R.C.C Structure on sloping terrain The bending second in column is extend at base of body due to the lengthy column and quick column impact in R.C.C Structure on sloping ground. From the study, it is located that the building which are resting on sloping are subjected to brief column impact , appeal to greater forces and are worst affected at some stage in seismic excitation. Hence structure format factor of view, different interest need to be given to the size, orientation, and ductility demand of brief column.It is additionally determined that the hill slope constructing are subjec ted to big torsional outcomes due to uneven distribution of Axial pressure in the mor e than a few frames of constructing advise improvement of torsional motion which is observed to be greater on a sloping floor building.This values in addition support the i dea of brief column impact as nicely as torsion and twisting increase in shape due to uneven heighted column.

References

[1] Chavan, A. , Pawar, K. And Ahire, A.-**2**021- Analysis and Estimation of G+4 Residential Building-International Journal Engineering Research and Technology (IJERT)- ISSN: 2278-0181-Vol. 10 Issue 06, June-2021.

[2] Wailkar, k., Chide, P. And Ralekar, J.-2021-Analysis and Design of a Residential Building by Using STAAD Pro-International Journal of Modern Agriculture-ISSN:2305-7246-Vlo. 10, Issues 2, 2021.

[3] Ghuge, N.,Shahare, N.,Tupsunder, M.-2020-Analysis and Design of Multi-storey Building in Hilly Areas using STAAD-Pro-International Research Journal of Engineering and Technology(IRJET)-Vol. 07 Issue:04-April 2020.

[4] Sai Surya Prakash , I.,Vara Prasad , S.S.,Krishna, R.R.-2018-A Study on Comparative Analysis Of RCC Building Resting on Plain and Hilly Terrain-International Journal For Scientific Research And Development –Vol.6,Issue 01,2018.

[5] Jain, A.,Patel, R.-2017-Analysis of Building constructed on Sloping Ground for Different type of Soil-Internationals journal for Technological Research in Engineering-Vol.4,Issue 12,August-2017.

[6] Wu, S.And Tan, F.-The study on Structural Design Building on the slope-Vol7, Issue 14 September, 2004.

[7] Sanap,R.G.And Sapate,V.2020-Analysis of building on sloping ground-International Journal for Reserch in Applied Science and Engineering Technology(IJRASET)-ISSN:2321-9653:IC VALUE:45.98-Vol8,Issue 6june 2020.

[8]Birajdar,B.G.And Nalawade,S.S.-2004-Seismic Analysis of Building Resting on Sloping Ground-13th word Conference on Earthquake engineering-Vancouver, B.C., Canada –August1-6-2004.

[9] Kishore C.P.And Sumathi R.-2018-Design and analysis of Multi-storey Building on sloppy and flat ground by using ETABS-International Journal of Research in Advert technology (IJRAT) Special issue-ICADMMES 2018-E-ISSN: 2321-9637.

[10]Shreyas. M.G.And Vasudev M.B.-2018-Analysis of RC building resting on Sloping Ground-International Journal of Science and Research (IJSR)-ISSN:2319-7064-Reserch gate impact factor(2018).