



A Floor System Using Rectangular Beam Grid

DEVIREDDY DURGA MOUNIKA REDDY

M.Tech Student, Dept of CIVIL, Chalapathi
Institute of Technology, Guntur, A.P, India

KOMMINENI BALA GOPI KRISHNA

Asst.Professor, Dept of CIVIL, Chalapathi Institute
of Technology, Guntur, A.P, India

Abstract: Grid floor systems composed of beams spaced at regular times in vertical with respect directions, monolithic with slab. They can be useful for architectural causes of large rooms for example auditoriums, vestibules, theatre halls, show rooms of retailers where column free space is frequently the primary requirement. The oblong or square void created within the ceiling is advantageously useful for hidden architectural lighting. The sizes from the beams running in vertical with respect directions are usually stored exactly the same. Rather of rectangular beam grid, a diagonal. In our problem G 5 Building is consider and analysis and style id accomplished for both Gravity and lateral (earth quake and wind) loads. The structural system includes RC frame and Grid floors for gravity and lateral loads happen to be taken for analysis using ETABS. Various frame forces, displacements and moments happen to be labored out for various load combinations. Database is presented for that worst load combination. Lateral strain on a multistory building is most important someone to consider for that design. To be able to take notice of the seismic effect and wind impact on multi-story building, research on grid floor building of G continues to be transported out. Seismic zone and all sorts of wind zones are thought for analysis using ETABS. The structural response because of lateral loads with load combination is extracted.

Keywords: Grid Floor; ETABS; Wind And Earth Quake;

I. INTRODUCTION

Structures serve several requirements of society - mainly as shelter from weather, security, living area, privacy, to keep possessions, and also to easily live and work. A structure like a shelter represents an actual division from the human habitat. A slab is really a flat two dimensional planar structural element getting thickness less space-consuming than its other two dimensions. It possesses a working flat working surface or perhaps a covering shelter in structures. It mainly transfers the burden by bending in a couple of directions. Reinforced concrete slabs are utilized in floors, roofs and walls of structures and because the decks of bridges. The ground system of the structure may take great shape for example in situ solid slab, ribbed slab or pre-cast units. Slabs might be supported on monolithic concrete beam, steel beams, walls or directly within the posts [1]. Layer of concrete behave mainly as flexural people and also the design is comparable to those of beams. Grid floor systems composed of beams spaced at regular interval in vertical with respect directions, monolithic with slab. They can be useful for architectural causes of large rooms for example auditoriums, theatre halls, show rooms of shop where column free spaced void created within the ceiling is advantageously useful for hidden architectural lighting. The sizes from the beam running in vertical with respect directions are usually stored exactly the same. Rather of rectangular beam grid, a diagonal.

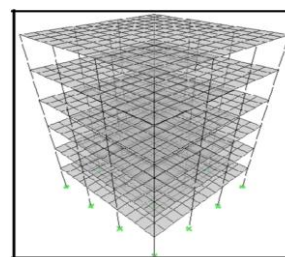


Fig.1.3D view of the structure

II. EXISTING METHOD

The structural components inside a typical multi-floor building, includes a floor system which transfers the ground loads to some plane frames in either directions. The ground system also functions like a diaphragm to transfer lateral loads from wind or earthquakes. The frames contain beams and posts and perhaps braces or perhaps reinforced concrete shear walls. Because the height from the building increases beyond ten tales (tall building), it might be essential to lessen the weight from the structure for functionality and economy. Since concrete floors are functionally more appropriate, tight on vibration and much more abrasion and fire resistance, the typical inclination is to ensure they are act either with profiled steel decks and/or with steel beams to provide an easy weight floor system. Similarly masonry walls might be substituted for glazing and curtains or blinds to lessen the load. The 2-way layer of concrete can be used when aspect ratio from the slab i.e. longitudinal span/transverse span is under 2 and also the slab is supported along all edges. The primary reinforcement runs both in the directions [2]. An average mix-portion of a 1-way slab floor with supporting steel beams. Also proven may be the

situation once the steel beam is encased in concrete for fire protection. The structures are exposed to both vertical and horizontal loads. In the preliminary design stage all of the aspects of structures are equipped for vertical loads only. Ideally a competent system shouldn't require a rise in the sizes of people once the aftereffect of lateral load can also be incorporated. Such designers are classified as „premium free designers and could differ to attain. Scores of air moving in a certain velocity includes a kinetic energy to at least $\frac{1}{2}MV^2$, where M and V would be the mass and velocity of air moving. When a hurdle just like a building is met in the path, an element of the kinetic energy of air moving will get transformed into potential energy of pressure. The particular concentration of wind pressure depends upon numerous factors such as position of incidence from the wind, roughness from the area, results of architecture features, i.e., form of the dwelling etc. and lateral resistance from the structure. Aside from these, the utmost design wind pressure depends upon the time period of the gusts and the prospect of occurrence of the exceptional wind pressure [3]. The designed structure ought to be sufficiently strong to resist the whole lateral Loads without excess deformations or deflections and really should be underneath the largest stipulated loads. The lateral deflection from the building under maximum load will be controlled to some safe line. Committee 435 recommends a deflection limit of just $\frac{1}{500}$ from the height for tall structures. Experience that structures made to satisfy this qualifying criterion make sure the convenience of the occupation and also the stability from the structure in general. Three kinds of units are generally employed for fighting off the lateral loads. Seismic loading is among the fundamental concepts of earthquake engineering meaning use of an earthquake-generated agitation to some structure. It takes place at contact surfaces of the structure either using the ground, or with adjacent structures, or with gravity waves from tsunamis.

III. ENHANCED MODEL

Within this present study ground 5 floor r.c.c building is recognized as 12m x 12m panel. The constriction Technologies are R.C moment fighting off frame and Grid slabs. Grid floor structure getting G 5 floor is analyzed for gravity and lateral loads. The result of axial pressure, from plane moments, lateral loads, shear pressure, floor drift, floor shear and tensile pressure are observed for various tales. In our problem G 5 Building is consider and analysis and style id accomplished for both Gravity and lateral (earth quake and wind) loads. The structural system includes RC frame and Grid floors for gravity and lateral loads happen to be taken for analysis using ETABS. Various frame forces, displacements and moments happen to be

labored out for various load combinations [4]. The most recent form of ETABS continues for the reason that tradition, incorporating structural element terminology which is used every day (Posts, Beams, Bracings, Shear Walls etc.), resistant to the common civil engineering programs which use terms for example nodes, people etc. Furthermore, it provides many automatic functions for that formation, analysis and style from the structural system within an efficient, easily way. The consumer can certainly produce a model, apply any type of load into it after which makes use of the superior abilities of ETABS to carry out a start or art analysis and style. ETABS may be the solution, regardless if you are designing an easy 2D frame or conducting a dynamic analysis of the complex high-rise that employs non-straight line dampers for inter-story drift control. The lateral load is transformed towards the structural elements with the diaphragm action. The diaphragm is produced while modeling the dwelling [5]. The diaphragm action within the structure denoted by id D1 in every floor. By evaluating purpose name id can be used for entire structure. For doing things of diaphragm in every floor the modes are created both in X and Y direction. Structural systems transfer their loading through a number of elements down. This is achieved by designing the joining from the elements in their intersections. Each connection was created in order that it can transfer, or support, a particular kind of load or loading condition. To become in a position to evaluate a structure, it's first essential to be obvious concerning the forces that may be opposed, and transferred, each and every degree of support through the structure. The particular behavior of the support or connection can be very complicated. Seismic analysis is really a subset of structural analysis and it is the calculation from the response of the building (or non building) structure to earthquakes. It belongs to the entire process of structural design, earthquake engineering or structural assessment and retrofit (see structural engineering) in regions where earthquakes are prevalent. An ordinary mode of the oscillating product is a design of movement by which every part from the system move sinusoid ally with similar frequency with a set phase relation. The motion explained the standard modes are known as resonance. The frequencies from the normal modes of the system are classified as its natural frequencies or resonant frequencies. An actual object, like a building, bridge or molecule, has some normal modes that rely on its structure, materials and boundary conditions. In engineering mechanics, bending (also referred to as flexure) characterizes the behavior of the slender structural element exposed for an exterior load applied perpendicularly to some longitudinal axis from the element. The structural element is assumed to

become so that a minimum of one of their dimensions is really a small percentage, typically 1/10 or fewer, from the other two. Once the length is significantly more than the width and also the thickness, the element is known as a beam. For instance, a closet fishing rod sagging underneath the weight of garments on clothes wardrobe hangers is one particular beam experiencing bending. However, a covering is really a structure associated with a geometric form in which the length and also the width are of the identical order of magnitude however the thickness from the structure is significantly smaller sized. A sizable diameter, but thin-walled, short tube supported at its ends and loaded laterally is one particular covering experiencing bending. A mode of vibration is characterized with a modal frequency along with a mode shape. It's numbered based on the quantity of half waves within the vibration. For instance, if your vibrating beam with ends pinned displayed a mode form of 1 / 2 of a sine wave (one peak around the vibrating beam) it might be vibrating in mode 1. Whether it were built with a full sine wave (one peak and something valley) it might be vibrating in mode 2. Drift problem because the horizontal displacements of tall structures is among the most serious issues in building design, concerning the dynamic characteristics from the building during earthquakes and powerful winds. Drift shall result from the accrued deformation of every member, like a column, beam, brace and shear wall [6].

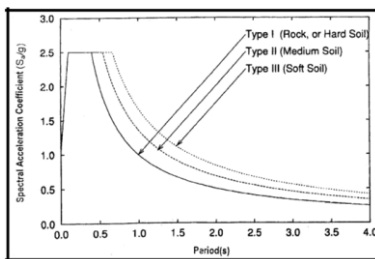


Fig.2.Response spectrum

IV. CONCLUSION

Within this present work ETABS can be used to analysis the R.C moment resting frame structure of G 5 thinking about the gravity and lateral loads. The next conclusion is attracted from present work. Maximum period of time is 3.53901 for mode -one in the dwelling For optimum period of time natural frequency is .28256 cycles/sec Modal participating mass ratios for mode-10 is x-trans is 97% and Y-trans is 99% Maximum axial pressure within the structure is 23031.36 Kn Maximum tensile pressure within the frame is 7350.726 kN Maximum diaphragm drift is .007700 Style of R.C.C column: Size 230 x 450 Reinforcement 8nos of 12dia .874 % reinforcement Style of R.C.C Beam: Size 230 x 380 .eighty five percent reinforcement Style of

R.C.C slab: 200 mm thickness 8 dia 230mm spacing Style of R.C.C footing: 2.5m x 2.3m

V. REFERENCES

- [1] A.M. Mustafa Al Bakri, M.N. Norazian, H. Kamarudin1, M.A.A. MohdSalleh, and A. Alida, "Strength of Concrete Based Cement Using Recycle Ceramic Waste As Aggregate", Advanced Materials Research Vol. 740 (2013) pp 734-738 © (2013) Trans Tech Publications, Switzerland 734
- [2] Replacement of Coarse Aggregate for Wast Tiles and Cement for Rice Husk Ash in Concrete", ISSN: 2248-9622, Vol. 4, Issue 5(Version 1), May 2014, pp.72-76.
- [3] S. Arivalagan Sustainable Studies on Concrete with GGBS As a Replacement Material in Cement Jordan Journal of Civil Engineering, Volume 8, No. 3, 2014. Highway engineering by S.K.Khanna and C.E.G.Justo
- [4] Wilson E.L "Three dimensional Static and Dynamic analysis of structures-A physical approach with emphasis on earthquake engineering", Computers and Structures, Inc Publication, 3rd Edition 2002.
- [5] Garcia Reyes, Hajirasouliha Iman, Pilakoutas Kypros, (2010),"Seismic behavior of deficient RC frames strengthened with CFRP composites". Engineering Structures 32 (2010) 3075-3085.
- [6] K. N. V. Prasada Rao, K. Seetharamulu, and S. Krishnamoorthy, "Frames with staggered panels: experimental study", Journal of Structural Engineering, VOL 110, No. 5, Page no: 1134-1148, 1984.

AUTHOR'S PROFILE



of Technology, affiliated to JNTUK, Kakinada.

DEVIREDDY DURGA MOUNIKA REDDY: I completed my B.tech from JNTUK, Kakinada (Chalapathi Institute of Technology); currently i am pursuing my M.Tech at Chalapathi Institute



engineering. He published many papers in various journals. His areas of interest are structural analysis, concrete technology, & reinforced concrete structures.

KOMMINENI BALA GOPI KRISHNA: He is an Assistant Professor in Department of CIVIL Engineering at Chalapathi Institute of Technology with 3 years of teaching experience in