International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 10 Issue 3 ǁ 2022 ǁ PP. 37-40

Study and Analysis of Pre-Engineering Building Structure case

Akash A. Chavan[1], Assit. Prof. Vishal Sapate[2]
[1]*M.Tech Student, Dept. Of Civil Engineering, G.H. Raisoni School of Science & Tech, Amravati, Maharashtra, India*
[2]*Assitant Professor,Dept. Of Civil Engineering, G.H. Raisoni School of Science. & Tech, Amravati, Maharashtra, India*

Abstract *-In the recent study Pre-engineered structured Buildings are analysis and studied in according to technical specification. Pre-Engineered Building (PEB) concept in the design of structures has helped in optimized design. Steel is the basic material that is used in the Materials that are used for Pre-engineered steel building. The latest version of the Code of Practice is IS 800:2007 is based on Method Limit State of designs.The adoptation of PEB in the place of Conventional Steel Building structure (CSBS) design concept resulted in many advantages, including economic and easier fabrication.PEB methodology is prismatic not only due to its quality pre-designs and prefabrications, but also due to its lighter weight and easy construction. In this study, an industrial shade structure (WareHouse) is analyzed and designed accordance to the Indian standard, IS code 800-2007. The study of Pre Engineering Building with Conventional Steel Building structure are carried by the observations made based following study are important useful to the practitioner structural engineers.*
Key Words: *STAADPRO, PRE-ENGINEERWD BUILDING,*
IS Code 800-2007,IS DYNAMICS LOADS.

Date of Submission: 15-03-2022 Date of acceptance: 30-03-2022

I. INTRODUCTION

Steel metal is the material for design because of its ductility and flexibility. In practicing structural engineering, a pre-engineered building (PEB) is designed by a manufacturer, to be welded and attachment using a pre-determined invention of raw material and manufacturing steps that can efficient and satisfying a huge range of structural and aesthetic modal requirements. PEB can be fabricated with different structural parts including mezzanines and terrazoo floors, canopy, fasciae, internal partitions, etc. The concept of PEB is the frame geometric which match the shape of the internal stress (bending moment diagram) although optimized material usage and reduced the overall total weightage of the frame structure. The complete designing is done at the factory and the building parts are brought to the site in blow down condition. These components are then fixed or jointed on site and fixed with the crane. An Industrial shade frame house is a storage building usually characterized as single floor steel structures with or without terranzzo,mezzanine floors. Enclosures of these frame or structures may be stone or brick masonry, concrete walls or GI sheet coverings. These structures are low rise structures characterized by very low height, insufficient of internal floor, wall parts, and partitions. The roof system for these building are truss with roofing covered. The walls are generally partition but sufficiently strength enough to resist lateral stress force caused by wind or seismic. The design of industrial shade warehouse includes designs of the structural parts which includes tensile and compression members which are principal rater , roof truss, column and column base, purlin, sag rods, tie rods, gantry girder, bracings, etc. Steel structures also have much better strength to eight ratios than concrete and they also be easily dismantled. Pre-engineered Buildings have attach bolted attachments and yhey can also be many times reused after dismantling. pre-engineered buildings can be transported and shifted expandable as per the future requirements.

II. METHODOLOGY

The recent study is included in the design of Industrial Warehouse shade structure located at Ganesh colony Nagpur.

The structure is proposed as a Pre-Engineered Building of 40.95 meters Length, 6 bays each of 8.16 meters length and clear height 4.6 meters, height of 8.098 meters. In this study, a PEB frame of 33 meter width is taken into account and the design is carried by considering wind load a critical load for the structures. CSBS frame is designed for the same of span and length considering an economical as top roof truss configuration. These designs are then compared to figured out the effective economical output. The designs are carried out in according with the Indian Standards with the help of the structural analysis and designs software STAAD pro and V8i.

III. Factors of Pre-Engineering Frame

Assuming that a Pre-engineered building structure is finalized for the project, the next milestone is to choose among the types of Pre-engineered frame. Suitable selection of the framing, Backbone of Pre-engineered buildings, goes a long way toward a perfect implementation of design steps . Some factors are influenced the choice of primary framing includes:

- Area ,span of the building: width, length, and height. Roof slope angle.
- Size Required Column free clear frame
- Area Occupied of the building and acceptance to exposed steel columns
- Roof & wall materials
- Multistorage -span rigid frame
- Lean to frame
- Single span and trusses

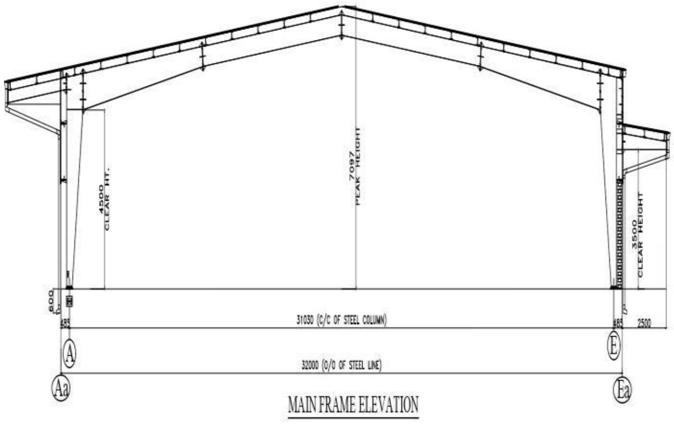

Fig. - Main Frame Elevation Details

Table -1: Structural Configuration Details

Location	Nagpur Maharashtra India
Length	40.95m
Width	33.0m
Clear Height	4.60m
Peak Height	8.097m
Wind Speed (m/s)	45.0m
Seismic zone	III
Slope of roof	1:10
Bay Spacing	5@8.16

IV. Literature Review

4.1 D.Duthinh; J.A.Main; A.P.Wright & E.Simiu

This paper presents a methodology for estimating the mean recurrence interval of failure under Wind loads that accounts for non-linear structural behavior and the directionality of the Wind speeds and the aerodynamic affects, and uses databases of Wind tunnel test results as well as Wind speed data from the NIST hurricane Wind speed database augmented by statistical methods. Under the assumption that uncertainties with respect to the parameters governing wind loading and material performance are negligible, our methodology results in a notional probability of failure during a 50-year period of the order of 1/2,000. This result was obtained for one particular low-rise steel structure at one particular location, but the method is general and can be applied to any structure provided the similar relevant kind meteorological and Wind data exist and nonlinear finite element analysis is very accessible. As structures fails by different mechanics, Perfect engineering judgment is required to identify the factor critical load cases and to hold non-linear analysis to a manage number of cases.

4.2 D.S Mahaarachi, M. Mahendrann

The paper described advance finite elemental proto that precisely predicts the exact behaviour of Crest fixed steel claddings by Wind uplift pressure. The results from the FEA and practicals agreed well for the trapezoidal steel claddings with pans used in this investigation. This demonstrates that non-linear finite element analysis can be used with confidence to carry out extensive parametric studies into the structural study of profiled steel claddings, which undergo local pull-through failures associated with splitting or local failures. Once the use of finite element analysis to determine the most important pull-through failure load was validated using large scale two-span experiments, it was used to investigate the study of trapezoidal section steel claddings with all varying geometry and material properties. Based on these FEA, improved design formulas that has been developed for the failures of trapezoidal structure steel claddings with pans. Paper has also discussed the demirits of using the Conventional single rib FEA model for multi-span steel Cladding accessories and assemblies.

4.3 Saffir Dale C. Perry ; James R. McDonald

Past decade the engineering metal building has emerged as a competition form of low-rise buildings construction. The structure performance of these buildings is very well understood for the most part, adequate code provisions are now in place to ensure satisfactory behavior in zones of high winds. It will be comforting if more full scale measurements on structures were available to corroborate wind data on the code provisions are based-but this will come. While recently an advancement in field of performance has been the additional steps alluded in the paper should be allotted and implemented in order to protect the lives and minimize wind damage to a minimum.

4.4 Dat Duthinh & William P. Fritz

This paper presented an advanced version of the Non-linear data assisted in technique method for estimating ultimate capacity condition under wind loads. The paper also showed how NLDAD can be used to substantially improve the safety levels of the frame under the wind loads with only modest or no increase in material requirement or save materials & energy. There in while maintaining wind resisting capacity. The method consists of using databases of wind pressures measured in wind tests and
applying the pressures in non-linear structural analysis

4.5 Timoothy Wayne Mays

The main purpose of this study is to prove that elastic designs of metal buildings systems for wind forces is a feasible, efficient economical and best alternative to inelasticity design and detailing. Even if the structural system is excited by an earthquake of a magnitude greater than the design earthquake only a small amount of inelastic deformation if any will occur.

V. CONCLUSIONS

Akash chavan G H Raisoni University

Prof. Vishal Sapate G H Raisoni University

By increasing the area of Industrial building material and cost of the building is minimized in case of PEB while in **BIOGRAPHIES** case of Convention building the material and cost is not optimized if we increase the dimension, size and area of building.

REFERENCES

[1]. L.S.Negi "Design of steel structures" by Tata Mc graw Sant Gadhge Baba University hill Amravati Maharashtra India .
[2]. G.Sai Kiran (2014). Comparison of Design Procedures for Pre Engineering Buildings (PEB).
[3]. Pradeep V (March-2014) Comparative Study of Pre Engineered and Conventional Industrial Building Sagar D. Wankhade (June-2014)Design & Comparison
[4]. Milind Bhojkar P (Dec-2014). Comparison of Pre of science & Tech. Amravati Engineering Building and Steel Building with Cost and Maharashtra India. Time Effectiveness.
[5]. Syed Firoz, Sarath Chandra Kumar B, S.Kanakambara Rao," Design Concept of Pre-engineered Building", IJERA Vol. 2, Issue 2,Mar- Apr 2012, pp.267-2
[6]. American Society of Civil Engineers (ASCE) – 7.
[7]. John A Rolphes (2006), "Industrial Building Design - Seismic Issues", The Iron and Steel Technology, pp no. 282-298.
[8]. Kirby technical handbook for special structural & PEB pre-engineered building and systems, 2013 Alghanim Industries.

[9]. Sapna and Kulshrestha (2012), 'TheDesigning of Preengineered Structures',Buildotech Inida.
[10]. Dr. N. Subramanian (2008), "Pre-engineered Buildings Selection of Framing System, Roofing Materials", The Master builder, pp. 48-6.
[11]. Dr.B.C.Punmia, Ashok Jain, Arun Kumar Jain "Design of steel structures" by Laxmi publications.
[12]. Insdag publications, "Design handbook of steel sections-part1: section properties.
[13]. Insdag publications, "Design guidebook type pre-engineered building.
[14]. Alexander and Newman "Metal buildings systems" Mc graw hill.
[15]. IJRET. V5I3662. Pre Engineering Building.
[16]. SP: 38(S&T)-1987 "Bureau of Indian standards".
[17]. I.S.800:1984 "Indian standard code practice for general construction in steel"
[18]. IS : 875 (Part 1)-1987 :- Code Practice for Design Loads (Other Than Earthquake) for Buildings and Structures- Dead Loads.
[19]. IS 875- (Part 2)-1987, Indian Standard Code of Practice for Designed Loads (Other Than Earthquake) for Buildings and Structures.
[20]. IS : 875 (Part 3) -1987 :- Code of Practice for Design Loads (Other Than Earthquake) for Buildings And Structures sismic- Wind Loads.