Impact Factor (SJIF): 4.542

International Journal of Advance Research in Engineering, Science & Technology

e-ISSN: 2393-9877, p-ISSN: 2394-2444

Volume 4, Issue 12, December-2017

"COMPARITIVE STUDY OF PEB & CSB STEEL STRUCTURES"

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ABSTRACT: Technological improvement over the year has contributed immensely to the enhancement of quality of life through various new products and services. One such revolution was the pre Engineered buildings. Through its origin can be traced back to 1960's its potential has been felt only during the recent years.

Pre-engineered buildings are generally low rise buildings however the maximum height can go up to 25 to 30 meters. Low rise buildings are ideal for offices, houses, showrooms, shop fronts etc. The application of pre-engineered buildings concept to low rise buildings is very economical and speedy. Buildings can be constructed in less than half the normal time especially when complemented with the other engineered sub systems.

Keywords*- Steel structure, Design, Modelling, Review, PEB,CSB.*

I. INTRODUCTION

Buildings & houses are one of the oldest construction activities of human beings. The construction technology has advanced since the beginning from primitive construction technology to the present concept of modern house buildings. The present construction methodology for buildings calls for the best aesthetic look, high quality & fast construction, cost effective & innovative touch.

Pre Engineered Steel Buildings are manufactured or Produced in the plant itself. The manufacturing of structural members is done on customer requirements. The detailed structural members are designed for their respective location and are numbered, which cannot be altered; because members are manufactured with respect to design features. These components are made in modular or completely knocked condition for transportation.

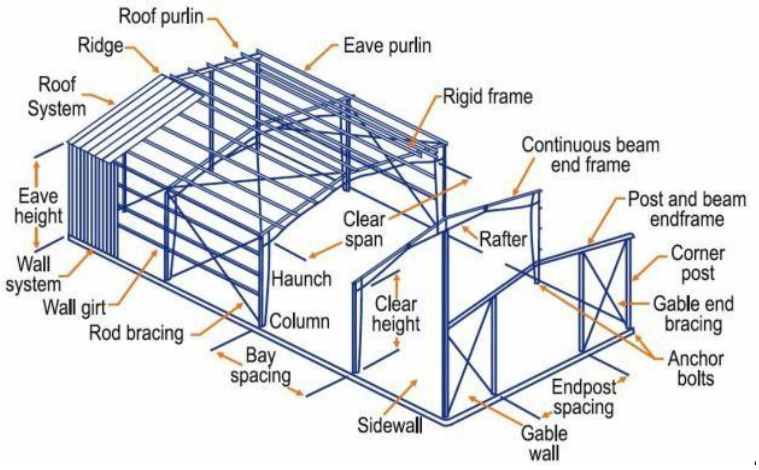

Fig 1.1 PARTS OF STRUCTURE

1.1 IMPORTANT DEFINATIONS

- **Rafter**- the frame members which runs between the columns and which carry the loads from purlins to supporting columns in a steel framework are called as rafters.
- **Purlins** – The frame members which run across the rafters in a steel framework and carry the covering sheet loads to supporting rafters are called as purlins.
- **Bay space** – The perpendicular distance between the adjacent rafters longitudinally in a steel framework is called as bay space
- **Clear space**- The distance between end to end outermost supporting columns in a steel framework is called as clear space.

1.2 OBJECTIVES

- To compare the economies in between PEB and Conventional steel buildings.
- To make Percentage of material wastage in between PEB and Conventional steel buildings
- To draw the graph, between PEB and Conventional steel structures with respect to story shear, displacements, bending and Shear force diagram in columns.

II. METHODOLOGY

E-TABS is a special-purpose computer program developed specifically for building structures. It provides the Structural Engineer with all the tools necessary to create, modify, analyse, design, and optimize building models. These features are fully integrated in a single, Windows-based, graphical user interface that is unmatched in terms of ease-of-use, productivity, and capability.

It is a full-featured program that can be used for the simplest problems or the most complex projects. This topic briefly describes the newer features in the program and directs you to manuals and technical support to help you get started using this version of the program.

2.1 GENERAL DETAILS OF THE SITE:

- Name of Client/ Owner: Karnataka rural infrastructure development ltd
- Location of the project: kannahalli
- Type of structure: Industrial warehouse
- Structural consultants: Everest industries limited
-

2.1.1 WAREHOUSE PARTICULARS

Type of structure:	Single Storey Industrial warehouse
Location:	kannahalli
Type of building:	Industrial Warehouse
Area of building:	100m * 90m
Eave height:	4.5 m
Total span width:	90 m
Number of bays:	13
Single bay length:	7.66m
Total bay length:	100 m
Support condition:	fixed
Roof slope:	5 degree

2.2 MODELLING

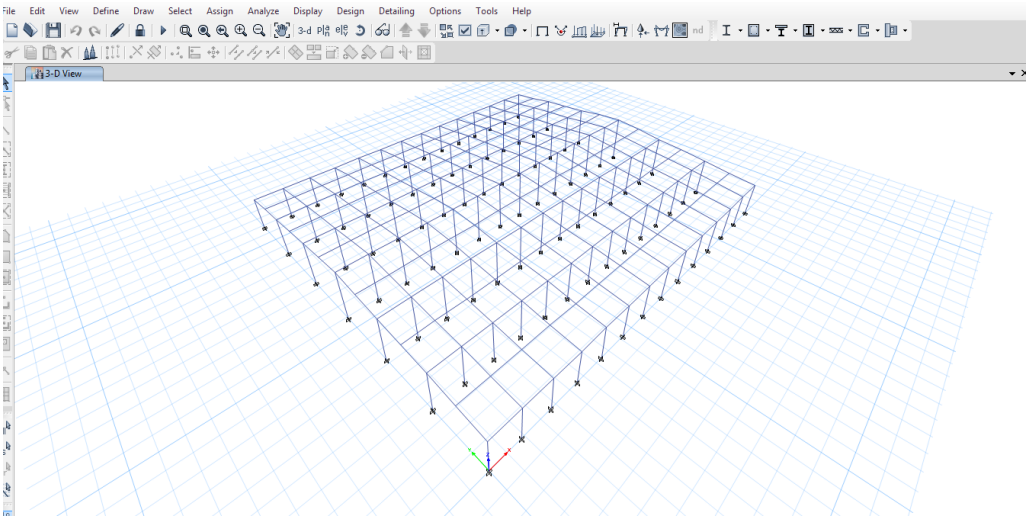

Fig 2.1 skeleton view

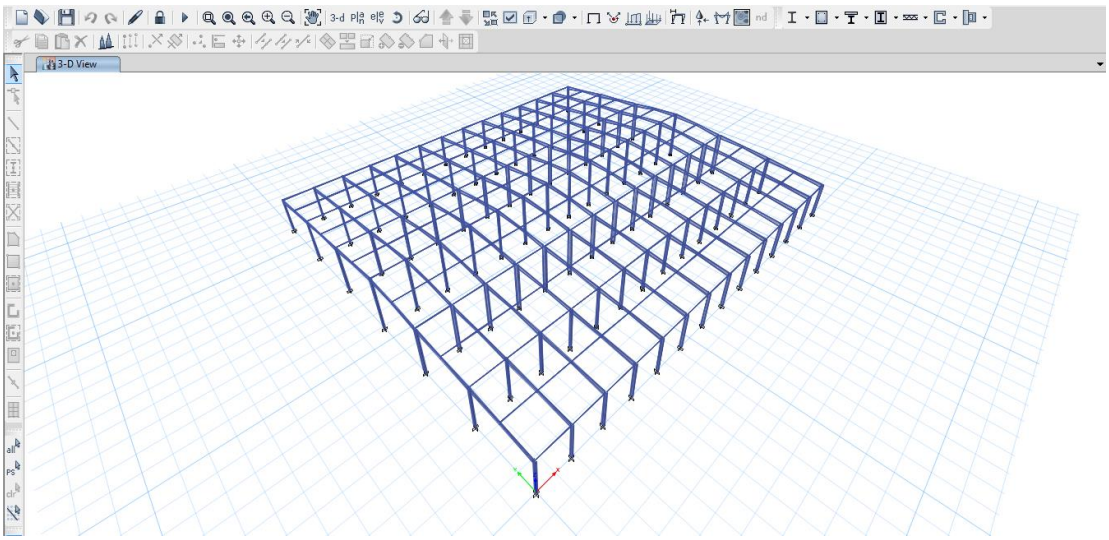

Fig 2.2 Extrude view

III. ANALYSIS

3.2 Load combinations

After completion of modelling the model should be checked for all the variable load sets which acts on it during the entire span of structure. The variable load combinations are obtained from code books and should be checked for its stability during the analysis part.

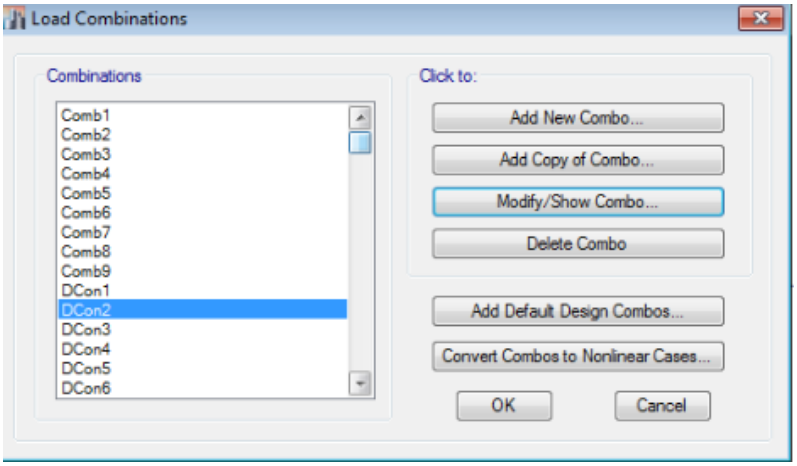

Fig 3.1 load combinations

3.2 DEFORMED SHAPES

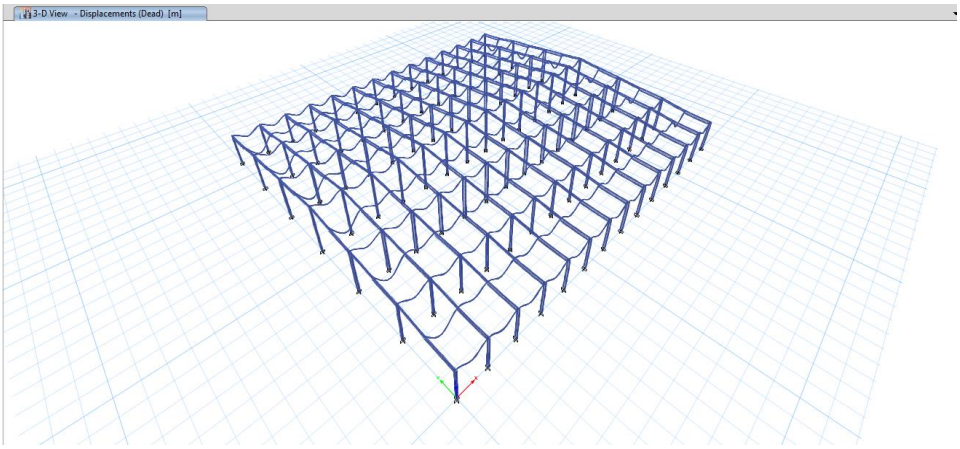

Fig 3.2 deformation under Dead Load

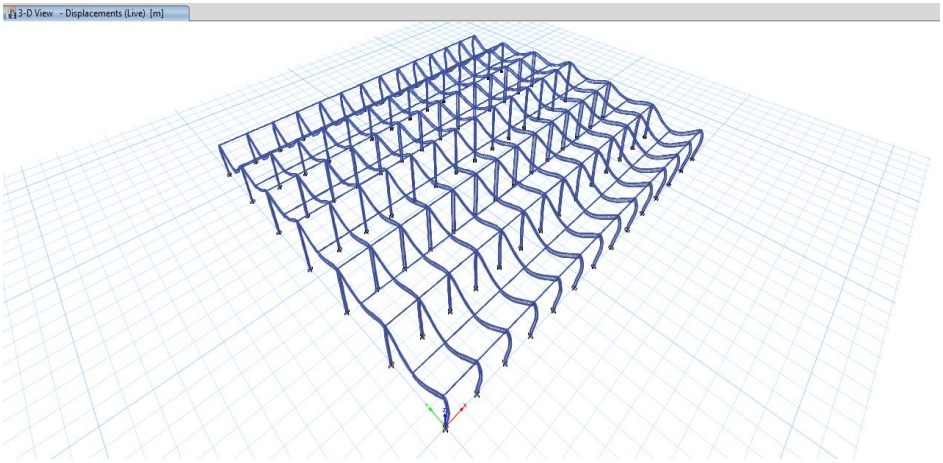

Fig 3.3 deformation under Live Load

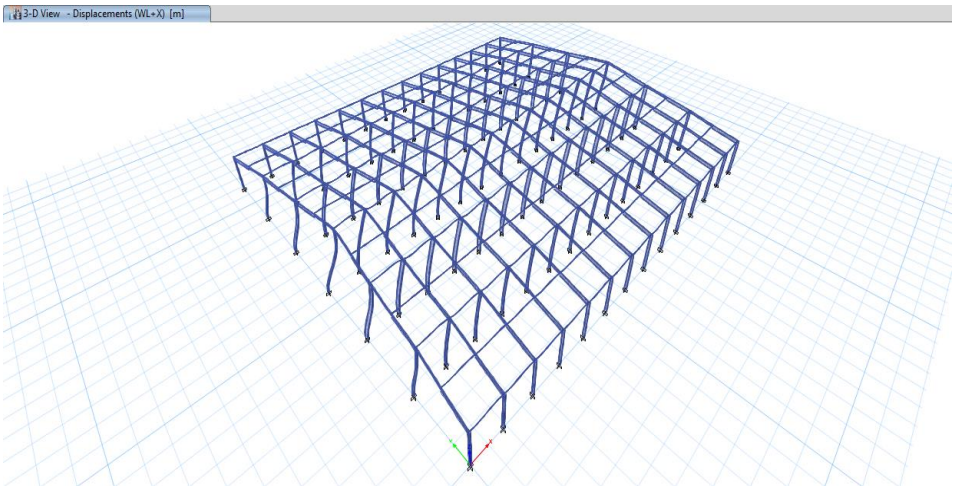

Fig 3.4 deformation under wind Load

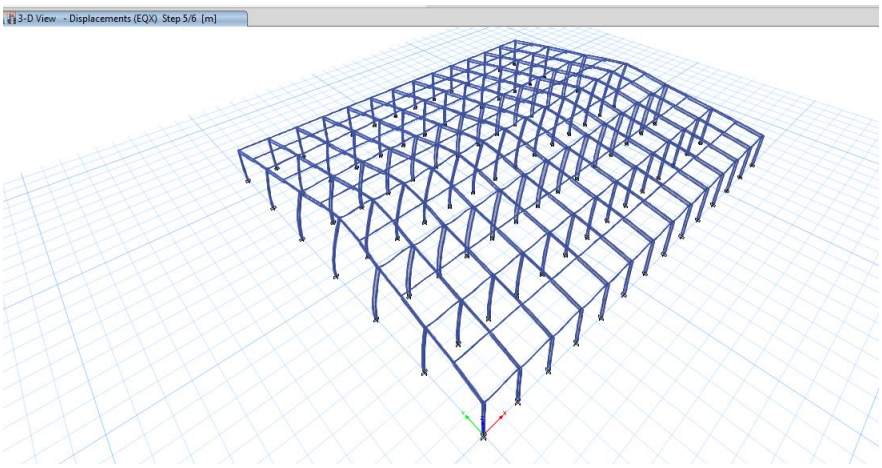

Fig 3.5 deformation under Eq Load

3.3 MOMENT

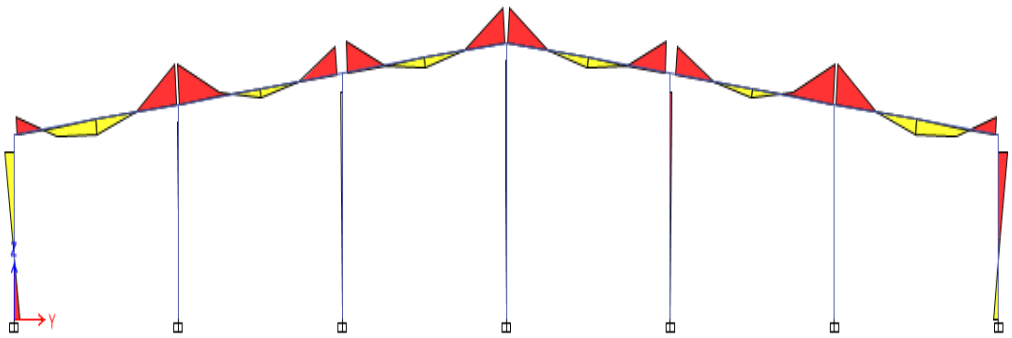

Fig 3.6 Moment under Dead Load

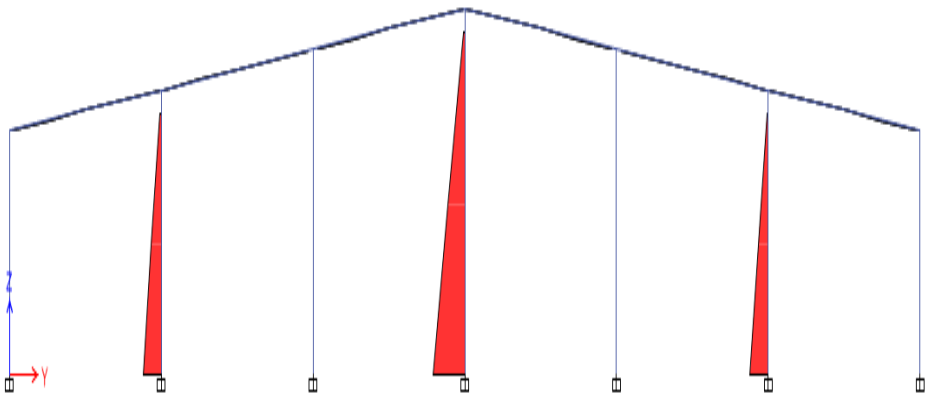

Fig 3.7 Moment under Eq Load

3.4 DISPLACEMENT

The displacement is one of the parameter considered under current analysis process. Joint displacement is obtained by running modal analysis of both PEB and CSB. The isolated period and the elastic base stiffness characterize a base isolated structure.

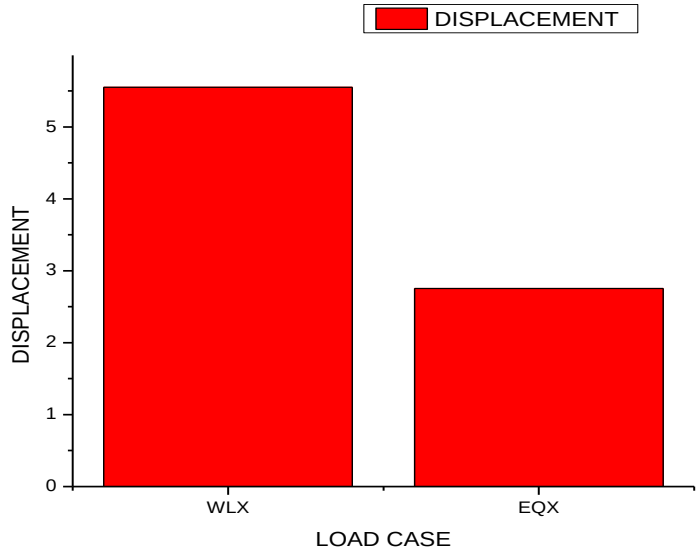

FIG 3.10 DISPLACEMENT CSB

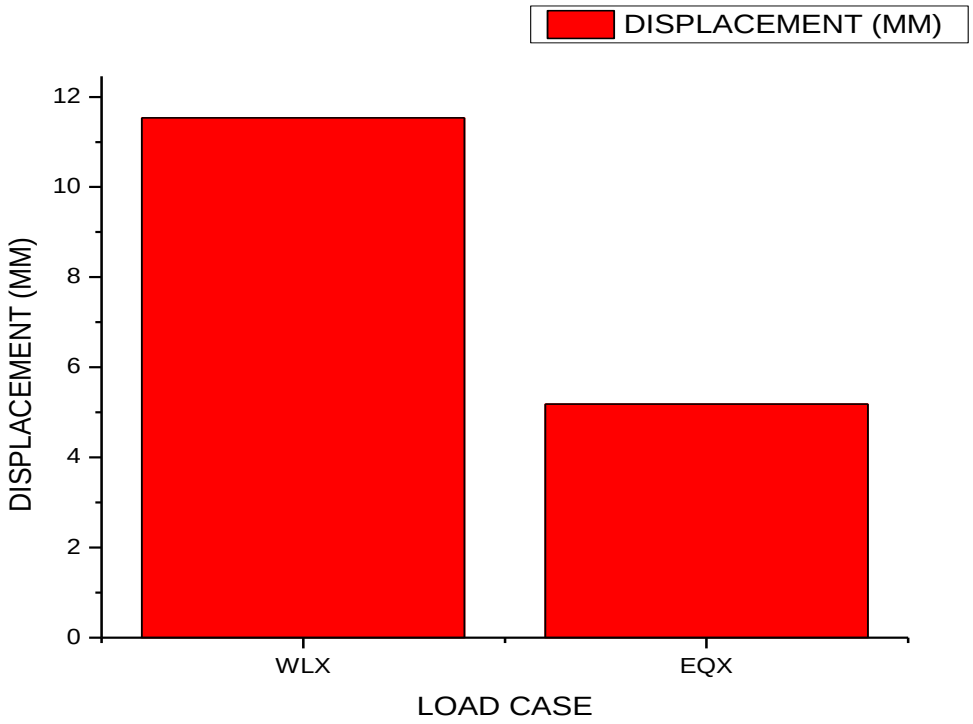

FIG 3.11 DISPLACEMENT PEB

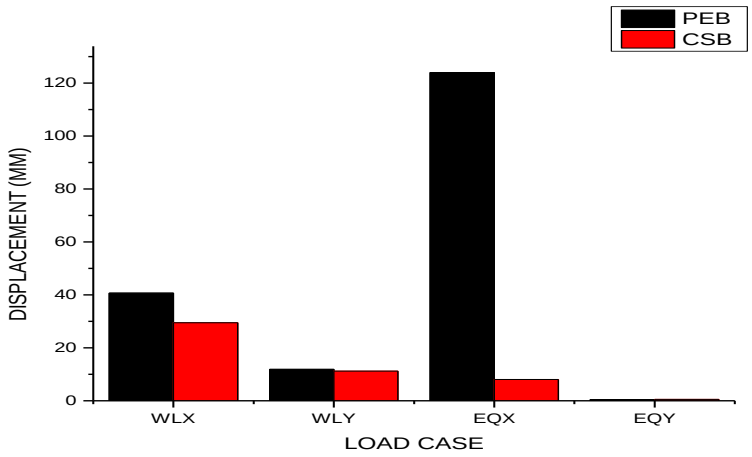

FIG 3.12 DISPLACEMENT COMPARISON

3.5 STEEL CALCULATION

Table 3.1 steel calculations for CSB

Profile	Length (m)	Weight (KG)
BEAM 900	1266.3293	141707.84
COLUMN-500	739.3785	88792.28
COLUMN-1000	336	77008.58
ISB49.5*49.5*4.5	1294.54	8083.63
		Total =315592.33

Table 3.2 steel calculations for PEB

Profile	Length (m)	Weight (KG)
COLUMN-500	739.3785	88792.28
COLUMN-1000	336	77008.58
ISB49.5*49.5*4.5	1294.54	8083.63
BEAM-500-900	633.3425	50362.11
BEAM-900-500	633.0217	50334.59
		Total = 274581.19

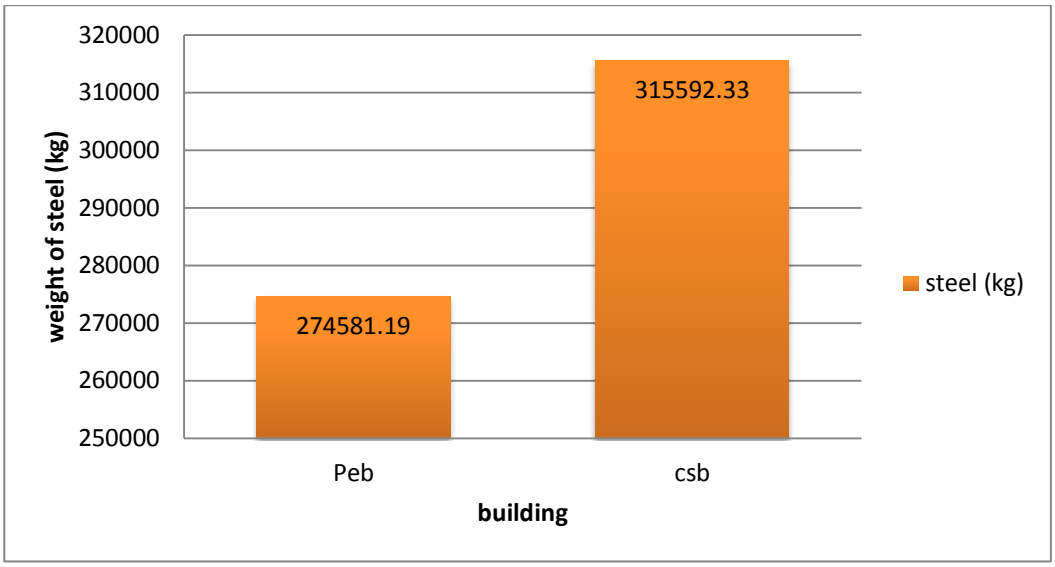

FIG 3.17 WEIGHT OF STEEL COMPARISON

CONCLUSION

- Steel is such a versatile material that every object we see in our daily life has used steel directly or indirectly. There is no viable substitute to steel in construction activities.
- Steel remains and will continue to remain logical and wide choice for construction purpose, environmentally also, as much of the steel used is recycled.
- Steel building offers more design and architectural flexibility for unique or conventional styling. Its strength and large clear spans mean the design is not constrained by the need for intermediate support walls.
- As your requirements changes over the years, you can reuse, relocate, & modify the structure.
- Pre-engineered Metal building concept forms an unique position in the construction industry in view of their being ideally suited to the needs of modern Engineering Industry.
- It would be the only solution for large industrial enclosures having thermal and acoustical features. The major advantage of metal building is the high speed of design and construction for buildings of various categories.

REFERENCE

1. Vivek thakre and Mr Lakshmikanth viragade
2. C. M. Meera (June 2013). Pre-engineered building design of an industrial warehouse. International journal of engineering sciences & emerging technologies. Volume 5 Issue 2

3. Aijaz Ahmad Zende, Prof. A. V. Kulkarni, Aslam Hutagi (Feb 2013) . Comparative Study of Analysis and Design of Pre-Engineered- Buildings and Conventional Frames. IOSR Journal of Mechanical and Civil Engineering, Volume 5
4. Jatin D. Thakar, 2 Prof. P.G. Patel. Comparative study of pre-engineered steel structure by varying width of structure. International journal of advanced engineering technology, volume 4, issue 3
5. S.D. Charkha1 and Latesh S (June 2014). Economizing Steel Building using Pre-engineered Steel Sections. International journal of research in civil engineering , architecture & design, volume 2 , issue 2
6. Dr. N. Subramanian (2008), "Pre-engineered Buildings Selection of Framing System, Roofing and Wall Materials", The Master builder, pp. 48-6.
7. J. Witzany, T. C˘ ejka & R. Zigler
8. Shrunkhal V Bhagatkar, Farman Iqbal Sheikh, Bhanu Prakash Gupta and Deepak Kharta
9. IS: 800 - 2007:- General Construction in Steel - Code of Practice.