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Warehouse Design

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ABSTRACT
in this paper comparison is made on the basis of soil strata. Various responses are taken for the comparison. STAAD PRO software is used for analysis. PEB structure is used for analysis in staad pro software.

KEYWORDS: *PEB, STAAD-PRO, soil strata*

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I. INTRODUCTION

PEB structure it is different type of section. Whose cross section is not throughout the same. Has section changes according to its bending stresses. This type of section is not cast in situ it is a prefabricated section and is ordered to factory according to site requirement. Mostly PEB section is used not only for economy purpose but also for saving material. in this paper Tapered I section is used for analysis. This leads to the utilization of non-prismatic rigid frames with slender elements.

Till today for steel structure construction large column are used whose area of cross section is throughout the same. But if we use some advance software, we can reduce the cost of structure. And also, we overcome the material losses. Today ETABS, ANSYS STAAD PRO etc. these are the advance software in market. Forr construction of PEB structure required very less time because of it is a prefabricated stections. All the parts of structure are easily erected and also very fast constructed with the help of nut-bolts.

Because of its prefabricated structure its leads to optimization of structure. In its undaunted turn of events, the development business has found, imagined and built up various advances, frameworks and items, one of them being the idea of Pre-engineered Buildings. Steel is a material which has high Strength per unit mass. Thus it is utilized in development of structures with large column free space. The logical sounding term pre-built structures appeared during the 1960s. The structures were pre-built in light of the fact that they depend upon standard building plans for set number arrangements. These structures are for the most part hand crafted metal structure to fill the specific needs of client.

II. METHODOLOGY

For analysis purpose different soil conditions whichever is given in IS456 used in STAAD software. As per IS456 the Soft, Medium, Hard Strata with Varying foundation supports Based on displacement and weight ratio optimized structure were found.

III. DESIGN OF WAREHOUSE WITH PEB

A. Problem Statement:

For analysis purpose twenty and forty-meter PEB structure is modelled with following properties. In this PEB (steel structure) structure horizontal distance is 20m and length is 80m while height is 8m. in this 80 m length column spacing is kept 4 m centre to centre. Slope is 1:10. Material Input and Site Data.

Structural Steel grade	– FE345
Wind speed, Vb	39 m/sec
Structure class	C
Terrain category	2
Risk coefficient K1	1
Topography k3	1
Terrain factor k2	0.93
Seismic Zone	III
Response reduction factor-	5
Importance factor-	1

Load combinations as per AISC:

*Strength Combinations

1.	DL+LL
2	DL+EQX
3	DL+EQZ
4	DL+0.75(LL+EQX)
5	DL+0.75(LL+EQZ)
6	DL+WLP
7	DL+WLS
8	DL+WPP
9	DL+WPS
10	DL+0.75(LL+WLP
11	DL+0.75(LL+WLS)
12	DL+0.75(LL+WPP)
13	DL+0.75(LL+WPS)

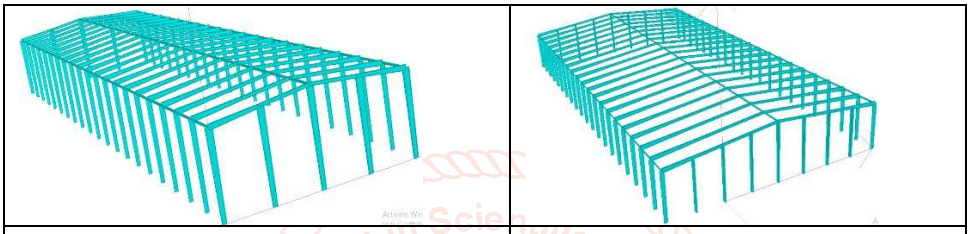
*Serviceability Combinations

1)	1.0(DL)+0.8(LL+EQX)
2)	1.0(DL)+0.8(LL+EQZ)
3)	1.0(DL)+0.8(LL+WLP)
4)	1.0(DL)+0.8(LL+WLS)

* Loadings

Below table shows loading

Weight of sheet	0.0456Kn/sq.m
Weight of purlin	0.06 Kn/sq.m
Total	0.11Kn/Sqm
Live Load	57 Kg/m
Roof slope	1:10
V(Wind speed)	39 m/s
Vz	36.27 m/s
PZ	0.79 Kn/sq.m



20M Span 3D Elevation | 40M Span 3D Elevation

Fig.1. Section geometries of Pre-engineered building warehouse. (All dimensions are in m)

B. Closure:

As per previous papers for comparison purpose one ratio is consider i.e, length to area ratio. Few research is carried out on innovative Pre-engineered building column section. It is need to be developing innovative Pre-engineered building column section to enhance its strength and durability. Paper includes the optimized design of Pre-engineered building structure.

Table 1.

Models With Fixed Supports		Lateral Deflection along Length (mm)	Lateral Deflection along Width (mm)	Vertical Deflection (mm)	Total Tonnage (Ton)
Warehouse PEB structure with 20 m Span	Hard	90.50	18.32	91.42	51.2
	Medium	93.77	17.65	88.83	52.7
	Soft	89.91	17.11	87.28	53.6
Warehouse PEB structure with 40 m Span	Hard	44.53	20.09	206.15	106.3
	Medium	53.62	24.59	251.56	115.2
	Soft	51.68	24.03	240.83	115.8
Warehouse PEB structure with 60 m Span	Hard	38.09	25.13	271.68	222.9
	Medium	47.20	24.05	259.36	235.3
	Soft	48.86	23.93	257.42	241.9
Warehouse PEB structure with 80 m Span	Hard	56.88	20.19	256.49	522.7
	Medium	82.12	21.06	258.00	555.9
	Soft	82.30	21.41	263.20	593.4

Following below are the Results.

Models With Pinned Supports		Lateral Deflection along Length (mm)	Lateral Deflection along Width (mm)	Vertical Deflection (mm)	Total Tonnage (Ton)
Warehouse PEB structure with 20 m Span	Hard	5.32	50.69	88.95	73.4
	Medium	5.09	47.85	86.74	75.2
	Soft	4.86	50.69	90.74	79.5
Warehouse PEB structure with 40 mSpan	Hard	18.25	28.26	245.39	175.1
	Medium	21.17	28.41	226.17	177.5
	Soft	21.29	27.13	215.55	178.3
Warehouse PEB structure with 60 m Span	Hard	30.06	45.43	369.62	327.2
	Medium	35.86	43.05	342.13	336.9
	Soft	33.99	41.71	327.83	342.4

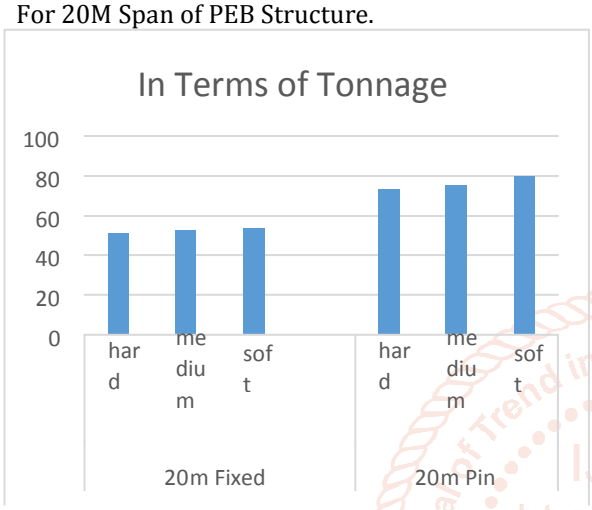
Warehouse PEB structure with 80 m Span	Hard	57.47	39.31	402.76	765.1
	Medium	78.93	42.09	411.83	799.2
	Soft	79.29	42.50	414.20	813.0

The following are the main objectives of this project:

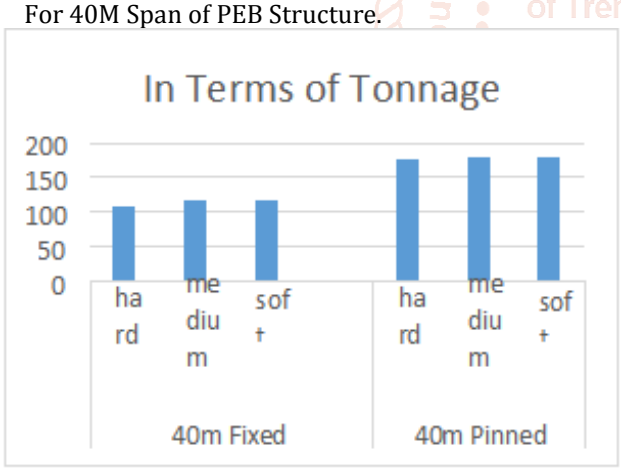
1. Analysis of pre engineering building with different soil strata also different support conditions.
2. Investigate behaviour of Pre Engineering Building structure for various span such as 80 m, 60 m, 40 m, 20 m and with different soil strata. .
3. To develop design guidelines for pre engineering building system.

Following below are the Results in Graphical Form.

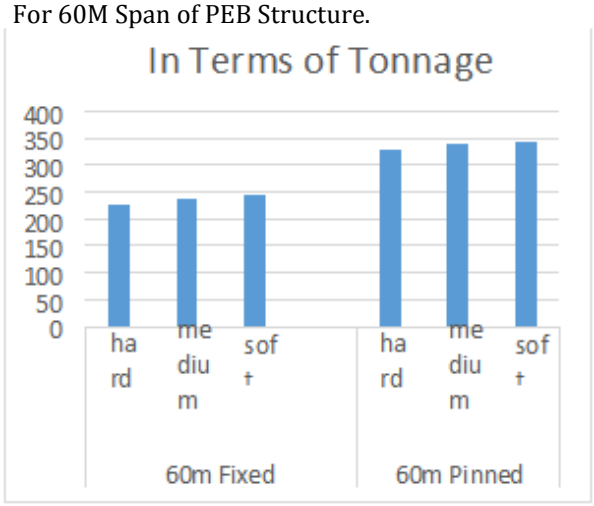
1. For 20M Span of PEB Structure.



2. For 40M Span of PEB Structure.



3. For 60M Span of PEB Structure.



In past examinations, investigate is completed uniquely on customary and PEB steel structures. Likewise all examinations are carried on the correlation of the two kinds. Be that as it may, there is absence of research on various kind of help and soil layers impact on the tightened areas. Likewise, when all is said in done for development and structure of pre-built structure a most extreme expense is required, however there was no any ideal plan or types are accessible to lessen the expense. Henceforth there will be streamlining of product house structure according to various soil layers.

IV. CONCLUSION

1. Based on extreme solidarity to weight proportion, Column 4 was seen as generally proficient..
2. It was discovered that for the majority of imaginative sections greatest diversion were seen at the mid length of the segment.
3. Among nine distinctive imaginative virus framed steel segment segments, it is seen that clasping mode relies upon sectional geometry, stiffeners, centroid and segment length.

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