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"A Comparative Study between the Pre-Engineered Building and Conventional Steel Building"

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ABSTRACT: This paper mainly focuses on the PEB concept and CSB concept. The Pre-Engineered Building (PEB) concept is a new conception of single-story industrial building construction. This methodology is versatile due to its lightweight and economical construction. This concept has many advantages over the Conventional Steel Building (CSB) concept of buildings with roof trusses. In this work, an industrial building of length 21m and width is 83m. The slope of roof trusses is taken as 5.71degree. Eave height is 6m. These structures have been analyzed and designed by using STAAD pro v8i to compare the PEB and conventional steel truss. PEB design is based on the American code AISC 360:10 and CSB design is based on the Indian code IS800:2007. Loads considered in the analysis are dead load, live load, and wind load along with the various combinations as specified in IS800:2007 and AISC. Dead load is taken based on IS: 875 (Part 1)-1987. Live load is taken based on IS: 875(Part-2)-1987. Wind load is taken based on IS: 875 (Part 3)-2015 The structure is located at savner in the Nagpur district.

KEYWORDS: Pre-Engineered Building (PEB), Conventional steel building (CSB), Structure analysis and Design, wind load, tapered sections, STAAD PRO V8i

I. INTRODUCTION

PEB is modern technology introduced in steel structures. The steel industry is growing rapidly in almost all parts of the world. The use of steel structures is not only economical but also eco-friendly at a time when there is a threat of global warming. Here, the "economical" word is stated considering time and cost. Time is the most important aspect, steel structures (Pre-fabricated) are built in a very short period and one such example is Pre Engineered Buildings. If we go for regular steel structures, the time frame will be more, and also cost will be more, and both together i.e. time and cost, make it uneconomical. Steel concrete composite construction technique offers several advantages like increased load carrying capacity and stiffness, saving in weight of steel, reduction in the cost of the foundation, and most importantly a large saving in construction time. Thus in pre-engineered buildings, the total design is done in the factory, and as per the design, members are pre-fabricated and then transported to the site where they are erected in a time less than 6 to 8 weeks.

1.1 Concept Of Conventional Steelbuilding

Nowadays, steel is used worldwide due to its ductility and flexibility properties. Conventional steel buildings (CSB) are small rise steel buildings with roofing structures of truss with roof coverings. Steel roof trusses are normally used for industrial buildings, workshop buildings, warehouses, and even residential buildings. The selection criterion of roof truss also includes the slope of the roof, fabrication and transportation methods, aesthetics, climatic conditions, etc.

1.2 Concept Of Pre-Engineered Building

PEB is a rigid jointed plane frame from hot-rolled or cold-rolled sections. The pre-Engineered Building concept involves the steel building systems which are predesigned and prefabricated. Pre-Engineering Building is a combination of the tapered built-up section and cold-formed section material. Pre-Engineered steel structures are fabricated or created necessity in the plant itself. The production of structural members is done on customer requirements. The production of structural members is done to customer requirements. The section's sizes depend on the