Earthquake Resistant Sustainable Steel Green Buildings made of Wide Flange Rolled Sections

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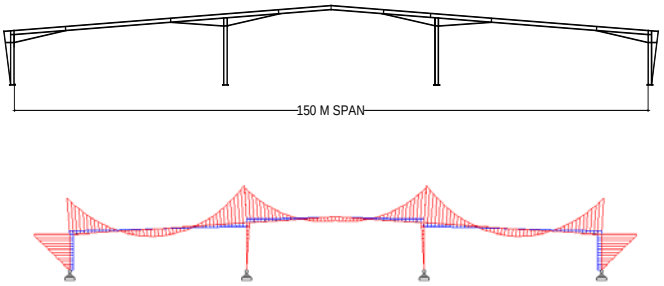
STRUCTURAL STEEL is a very ductile material with high strength carrying capacity and so is very useful to make earthquake resistant buildings. It is a homogeneous material also. The member section and the structural system can be made very efficient for economical design. As the steel is recyclable and reused it is a green material. The embodied energy for the efficiently designed steel structure is less than the RC structure. For sustainable green building steel is the best material nowadays. Moreover, pre-engineered and pre-fabricated faster construction methodologies help the development work to complete within the stipulated time. Usage of wide flange rolled sections made the steel construction world easier.

In this work large span steel PEB warehouse has been made with knee connections at heavy moment locations. One 150m overall span PEB warehouse frame @6m spacing has been analyzed in FEM software with two intermediate supports @50m c/c distances and high wind pressure corresponding to 47m/sec wind speed. After this analysis WPB 900x300x251.6 kg/m wide flange rolled section is used as the basic member with knee connections for larger moments at continuous supports.

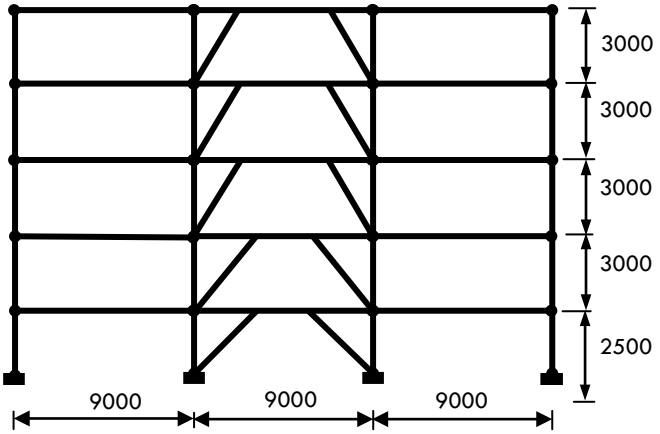
Again, one G+4 multistoried building frame has been analyzed using EBF stability bracing systems for earthquakes with large column free areas. The bottom two stories of column are made of UC 305x305x118 + 2 WEB PL. 100x10 THK. Top portion of column is made of UC 305x305x97. Composite beams are made of UB 305x165x46 + 3000x200 THK slab connected with shear connectors and pinned at end joints. Link beams are made of ISMB 300 (Grade Fe 540B) connected with moment connections at end. Bracing members are made of star angle 2-L 130x130x12. The frames are subject to earthquake force of Zone IV of IS: 1893 – 2016. Response spectrum analysis is done for the frames in FEM software. Base shear attraction is much less.

The results are indicating towards steel building technologies with more green effects by economy in use of materials and energy efficient low carbon emission manufacturing process.

Images



Large Span PEB Warehouse made of Wide Flange Rolled Sections and Knee connections



G+4 Steel Building made of Wide Flange Rolled Sections with Composite Construction and EBF Stability systems

Recent Publications

1. Technical literature of AISC Seismic Design Manual
2. Technical brochures of Wide Flange Rolled Steel Sections manufacturers.



Biography

Arup Saha Chaudhuri from Kolkata, India did his Graduation and Post-graduation in Civil and Structural Engineering respectively from Indian Institute of Engineering Science and Technology, Shibpur and Doctorate degree from Indian Institute of Technology Bombay in India. He has 23 years of Industrial, Research and Teaching experience in Steel and RCC structural engineering, Earthquake engineering and Technological structural design engineering. He has total 36 nos. of research publications in national and international journals and conferences.

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Notes/Comment