IJARSCT

International Journal of Advanced Research in Science, Communication and Technology

International Journa ISSN: 2581-9429

International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal

Volume 5, Issue 5, June 2025



Seismic Behavior of Castellated Steel Beams: A Comparative and Parametric Review of Web Opening Effects

Samruddhi Hari Patil¹ and Rohit Rajendra Kurlapkar²

Department of Civil Engineering^{1,2}

K. E. Society's, Rajarambapu Institute of Technology, Rajaramnagar (Islampur), Sangli, Uran : smarudhipatil1010@gmail.com and rohit.kurlapkar@ritindia.edu

Abstract: Castellated steel beams are increasingly favored in modern structural systems for their reduced weight, efficient material use, and accommodation of building services. Featuring web openings of varied shapes and sizes, they are ideal for long-span steel-framed buildings. While extensive research exists on their static and flexural behavior, studies on their seismic performance remain limited. This review evaluates how web opening geometry, including shape, size, and spacing, impacts seismic parameters such as lateral displacement, base shear, inter-story drift, and fundamental time period. Comparative studies between castellated and conventional beams under seismic loads are notably scarce, and no standardized seismic design guidelines currently exist for these systems. The review identifies critical research gaps and emphasizes the need for further dynamic analyses to support performance-based seismic design. By consolidating current findings, this study aims to guide future research efforts and promote the safe and effective use of castellated beams in earthquake-resistant steel structures.

Keywords: Castellated steel beams (CSBs), Seismic performance, Steel structures, Web opening geometry, Earthquake-resistant design



