39th IABSE Symposium – *Engineering the Future*
September 21-23 2017, Vancouver, Canada

Improving seismic performance of the non-structural light steel framing systems using sliding bolted connections

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Abstract

Non-structural façade systems are very sensitive to damage because the shake intensities that cause damage in these systems are much lower than those for structural components. A proper detailing and configuration of the connections between non-structural system and primary structure can be crucial to reach a good global behaviour of the both non-structural components and structural system.

At the present study structural systems of a high rise building and non-structural facade are completely being isolated by means of proposed friction-slip mechanism/connections. The sliding bolted connection is placed between exterior light steel framing façade and primary structure such that sliding occurs parallel to the lateral load resisting movement plane. The effectiveness of the proposed connection in responding lateral force demand is evaluated by a series of finite element (FE) study on moment resisting frames equipped with the friction-slip connection.

The FE study results exhibit that the sliding bolted joint is able to carry inelastic deformation higher than maximum inter story movement of the special moment frames.

The numerical results exhibited that the large portion of plastic deformation is dissipated by the connection while the entire CFS members remain elastic. As a consequence, this type of connection can be very ductile and performs in a very desirable manner. The comparison of results indicated that depending on the section geometry, the inelastic bending capacity of CFS beams with slip-critical connection can improved and reach M_p.

Key Words: Non-structural facade, Slip-friction connections, Inter story drift, Lateral resisting system, Light steel framing system

https://doi.org/10.2749/vancouver.2017.1811
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