

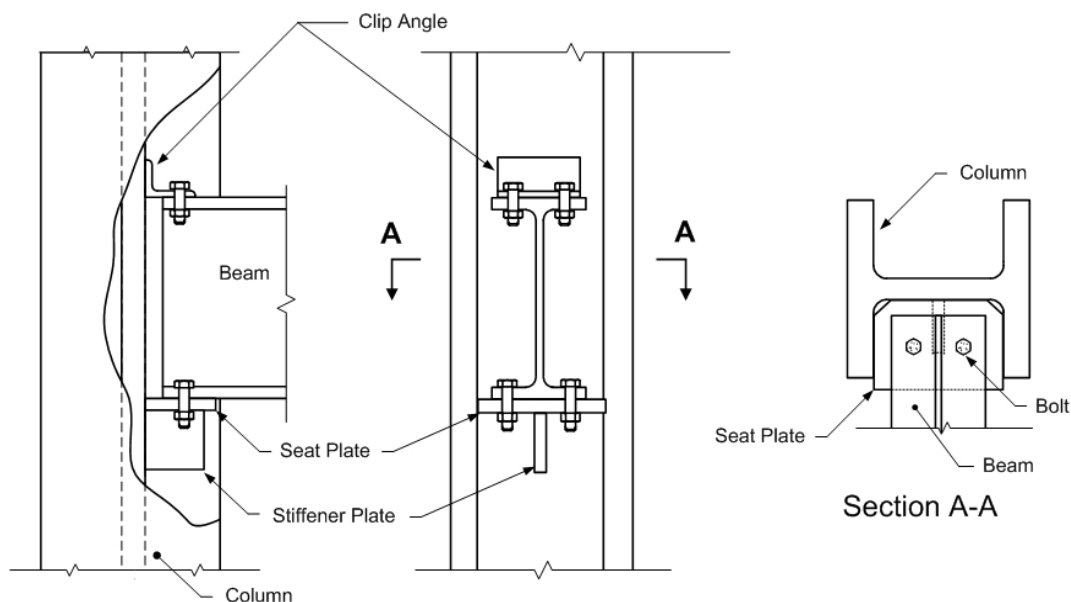
is attached with shear studs is restrained due to its in-plane stiffness, the shear studs will fail and the floor beam will have little resistance to thermal expansion or to lateral-torsional buckling.

In those locations where there is asymmetric framing of the floor beams into the girders, an absence of shear studs on the girders combined with the failure of shear studs on the floor beams, leads to a floor system which has little restraint to free thermal expansion and little resistance to lateral-torsional buckling.

8.7.5 Seats Used for Floor System Connections

Floor beams and girders that framed into exterior columns, and in some instances, girders that framed into interior columns, had seated connections. For example, the girder that framed between interior Column 79 and exterior Column 44 had such connections at both ends.

Seat connections to exterior columns where the floor beam framing was perpendicular to the exterior moment frame were as shown in Figure 8–20. Where the floor beam framed into an exterior column at a skew angle, the seat angle was replaced by a plate. Figure 8–21 shows the seat connection at Column 79 that supported the girder spanning to Column 44 on the exterior. The details of the connections of the other two girders that framed into Column 79 are not shown.



Based on fabrication shop drawings (Frankel 1985)

Figure 8–20. Seat connection at exterior column on the north face.

In a seated connection, the beam or girder was supported by the seat, which was welded to the column. Bolts were installed that fasten the beam or girder to the seat for erection purposes. These erection bolts did not carry any gravity load; rather, they were installed to insure that the beam or girder was held in place during erection. NIST found no evidence that the girders or beams in WTC 7 were welded to the seats. In a similar way, an angle or plate was bolted to the top flange to prevent the beam or girder from twisting, but there was little restraint to bending in the plane of the beam.