RECENT RESEARCH ON EXPOSED BASE PLATE CONNECTIONS WITH STRATEGIC ANCHOR YIELDING

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ABSTRACT

Baseplate connections are a critical load transfer component in buildings, non-building structures and nonstructural components, not only under service (gravity and live) loading, but also particularly under earthquake loading. Exposed base plate connections, a common style adopted in construction, derive their lateral cyclic strength from the various components of the connection (base plate, anchors, grout, etc). Although there is nominal consensus regarding certain features of their behavior and basic design guidance when calculating their resistance to seismic loading, the degree of initial fixity, ultimate strength, and the post-yield behavior of typical baseplate connections have been shown to significantly influence not only connection performance but also overall system behavior. As a result, and for simplicity, column bases are commonly modeled as either perfectly pinned or perfectly fixed. Such simplifying assumptions are in part due to the paucity of full-scale test data documenting the linear and nonlinear range of response of base connections, particularly considering the broad range of possible detailing considerations. A recent research program at UC San Diego included material, component, and dynamic system-level tests coupled with complementary high fidelity finite element modeling to investigate the seismic behavior of these critical connections. A key emphasis of this overall study was to offer insight into the conditions when such connections can be utilized as inelastic fuses and thus lead to strategically improved seismic performance of the superstructure they support.

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