

## Chapter 10 Commentary

### COMPOSITE STEEL AND CONCRETE STRUCTURE DESIGN REQUIREMENTS

The 1994 Edition of the *NEHRP Recommended Provisions* included a new chapter on composite steel and concrete structures. The Provisions have been updated and incorporated in Part II of the 1997 Edition of the *AISC Seismic Provisions*. This edition of the *NEHRP Recommended Provisions* includes by reference Part II of the *AISC Seismic Provisions (1997)*, together with the underlying AISC-LRFD (1999) and ACI-318 (1999) standards. Part II of the *AISC Seismic Provisions* provides definitions for composite systems consistent with the system designations in Table 5.2.2 and specifies requirements for the seismic design of composite systems and components.

In general, available research shows that properly detailed composite elements and connections can perform as well, or better, than structural steel and reinforced concrete *components*. However, due to the lack of design experience with certain types of composite *structures* in high seismic risk areas, usage of composite systems in *Seismic Design Categories* D and above requires documentation (substantiating evidence) that the proposed system will perform as intended by Part II of the *AISC Seismic Provisions* and implied by the *R* values in Table 5.2.2. It is intended that the substantiating evidence consist of a rational analysis that considers force transfer between structural steel, reinforced concrete and composite elements and identifies locations in the *structure* required to sustain inelastic deformations and dissipate seismic energy. Design of composite members and connections to sustain inelastic deformations shall be based on models and criteria substantiated by test data. For many composite *components*, test data and design models are available and referenced in the commentary to the *AISC Seismic Provisions – Part II (1997)*.