

## History of WSD and USD Design methods

“From the early 1900s until the early 1960s, nearly all reinforced concrete design in the United States was performed by the working-stress design method (also called allowable-stress design or straight-line design). In this method, frequently referred to as WSD, the dead and live loads to be supported, called working loads or service loads, were first estimated. Then the members of the structure were proportioned so that stresses calculated by a transformed area did not exceed certain permissible or allowable values.

After 1963, the ultimate-strength design method rapidly gained popularity because (1) it makes use of a more rational approach than does WSD, (2) it uses a more realistic consideration of safety, and (3) it provides more economical designs. With this method (now called strength design), the working dead and live loads are multiplied by certain load factors (equivalent to safety factors), and the resulting values are called factored loads. The members are then selected so they will theoretically just fail under the factored loads. In 1956, the ACI Code for the first time included ultimate-strength design, as an appendix, although the concrete codes of several other countries had been based on such considerations for several decades. In 1963, the code gave ultimate-strength design equal status with working-stress design; the 1971 code made the method the predominant method and only briefly mentioned the working-stress method. From 1971 until 1999, each issue of the code permitted designers to use working-stress design and set out certain provisions for its application.

Beginning with the 2002 code, however, permission is not included for using the method.” (Design of Reinforced Concrete by Jack C. McCormac and Russell H. Brown)