

The prime objectives of this study were to investigate the manner in which structural steel buildings may fail and to evaluate the strength of these connections relative to the strength of the beam and column elements.

Subobjectives of this research were to acquire some knowledge as to the relative types of construction associated with facilities identified with fallout shelters, examine the extent to which steel frames are used in the basic structure of fallout shelters, document the strength characteristics of structural steel since 1900 to date, and finally review structural steel design codes for the period 1900 to date.

A review was made of the literature describing actual building failures, with emphasis on structural steel frame structures. Building failures resulting from earthquake shock as well as an example of full scale testing of destruction were evaluated.

A statistical sampling of U.S. fallout shelters was made with respect to such selected items as the year of construction, type of structural frame, number of stories, floor area, and general construction characteristics. Equations were selected and developed by which the stresses in various steel connection elements may be computed. Connections were examined in accordance with the classifications of simple, semirigid, and rigid. A computer analysis was made of a "typical" ten-story frame building.

Sensitivity analyses were made by comparing a range of peak overpressures and the maximum ductility ratios prepared for selected frames.