



# Coffee Break Training - Fire Protection Series

## Building Construction: Structural Design Loads

No. FP-2015-27 July 7, 2015

**Learning Objective:** The student will be able to describe the various loads that affect building construction.

**G**ravity is a powerful enemy of building construction. Its force, among others, must be counteracted by adequate structural designs to prevent buildings from collapsing.

The structural engineer is responsible for submitting a design that addresses the forces that are called “loads.” Loads are the environmental and operational stresses to which a building will be subject during its existence. There are various loads that the engineer must consider. The following table describes some of these loads based on the definitions of model building codes.



The structural engineer must assess the various loads that affect the integrity of a building design. The structural framing must resist those loads.

### Structural Design Loads

Load	Definition
Dead load	The combined weight of construction materials and equipment attached to a building, including but not limited to permanent structural elements, cranes, electric services, heating, ventilating and air conditioning, and fire protection systems.
Impact load	The load from kinetic features such as elevators, cranes, moving machinery or vehicles.
Live load	Loads resulting from the routine use and occupancy of the building, including but not limited to furniture, occupants, storage or portable equipment. Environmental loads are not included in the live load calculations.
Live load (roof)	Loads produced on roofs by maintenance operations, equipment and materials or movable objects such as humans or planters.
Environmental load	Stresses on a building or structure caused by earthquake, routine soil migration, snow, rain, wind or flood. Environmental loads do not include the dead load. Snow, rain, flood, lateral soil movement and earthquake loads are geographic- and site-dependent. For example, wind load resistance requirements in hurricane zones differ from those in a desert. Likewise, snow loads in mountainous areas may not be an influence in tropical zones.

For more information, consider enrolling in the National Fire Academy (NFA) course “Fire Inspection Principles” (R/N0220). Information and applications can be obtained at <http://apps.usfa.fema.gov/nfacourses/catalog/details/47>. The course is available at the NFA in Emmitsburg, Maryland, or through your state fire service training agency.



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