Load Combination as per ASCE 7-05 also IBC 2012-same

Since various loads may act on a structure simultaneously, load combinations should be evaluated to determine the most critical design condition.

Factored Load Combinations for Determining Required Strength U in ACI Code (ACI Section 9.2)

Factored load combinations for determining required strength *U* in the ACI Code

Condition[a]	Factored Load or Load Effect *U*
Basic[b]	$U = 1.2D + 1.6L$
Dead plus fluid[b]	$U = 1.4(D + F)$
Snow, rain, temperature, and wind	$U = 1.2(D + F + T) + 1.6(L + H) + 0.5(L_r \text{ or } S \text{ or } R)$
	$U = 1.2D + 1.6(L_r \text{ or } S \text{ or } R) + (1.0L \text{ or } 0.8W)$
	$U = 1.2D + 1.6W + 1.0L + 0.5(L_r \text{ or } S \text{ or } R)$
	$U = 0.9D + 1.6W + 1.6H$
Earthquake	$U = 1.2D + 1.0E + 1.0L + 0.2S$
	$U = 0.9D + 1.0E + 1.6H$

[a] Where the following represent the loads or related internal moments or forces resulting from the listed factors: D = dead load; E = earthquake; F = fluids; H = weight or pressure from soil; L = live load; L_r = roof live load; R = rain; S = snow; T = cumulative effects of temperature, creep, shrinkage, and differential settlement; W = wind.

[b] The ACI Code includes F or H loads in the load combinations. The "basic" load condition of $1.2D + 1.6L$ reflects the fact that most buildings have neither F nor H loads present and that $1.4D$ rarely governs design.

In the above table, the combination which gives the highest factored load, governs.

ASCE 7-16 (to be released in July 2017): Minimum Design Loads and Associated Criteria for Buildings and Other Structures

Safety Provisions of the ACI Code

Load factors are applied to the loads, and a member is selected that will have enough strength to resist the factored loads. In addition, the theoretical strength of the member is reduced by the application of a resistance factor.

Therefore, Nominal Strength × Strength Reduction Factor ≥ Load × Load Factors

IBC 2012- International Building Code

1605.2 Load combinations using strength design or load and resistance factor design. Where strength design or load and resistance factor design is used, buildings and other structures, and portions thereof, shall be designed to resist the most critical effects resulting from the following combinations of factored loads:

$1.4(D + F)$ **(Equation 16-1)**

$1.2(D + F) + 1.6(L + H) + 0.5(L_r \text{ or } S \text{ or } R)$ **(Equation 16-2)**

$1.2(D + F) + 1.6(L_r \text{ or } S \text{ or } R) + 1.6H + (f_1 L \text{ or } 0.5W)$ **(Equation 16-3)**

$1.2(D + F) + 1.0W + f_1 L + 1.6H + 0.5(L_r \text{ or } S \text{ or } R)$ **(Equation 16-4)**

$1.2(D + F) + 1.0E + f_1 L + 1.6H + f_2 S$ **(Equation 16-5)**

$0.9D + 1.0W + 1.6H$ **(Equation 16-6)**

$0.9(D + F) + 1.0E + 1.6H$ **(Equation 16-7)**

where:

f_1 = 1 for places of public assembly live loads in excess of 100 pounds per square foot (4.79 kN/m^2), and parking garages; and 0.5 for other live loads.

f_2 = 0.7 for roof configurations (such as saw tooth) that do not shed snow off the structure, and 0.2 for other roof configurations.