Roof Dead Load

Roof Dead Load Components from ASCE C3.1 - 1a

20 Gauge Metal Decking	= 2.5 psf
2” of Fiberboard Thermal Insulation	= 3 psf
Bituminous, Gravel-Covered Waterproof Membrane	= 5.5 psf
Drop Ceiling	= 1 psf
Suspended Steel Channel System	= 2 psf
HVAC System	= 4 psf
Lighting Components	= 2 psf
Selected Roof Decking	= 1.46 psf

$$RoofDeadLoadNoSelectedDecking := 17.5\ psf$$

$$TotalRoofDeadLoad := 18.96\ psf$$

Floor Dead Load

Floor Dead Load Components from ASCE C3.1 - 1a

1-½” Terrazzo Tile	= 19 psf
Drop Ceiling	= 1 psf
Suspended Steel Channel System	= 2 psf
HVAC System	= 4 psf
Lighting Components	= 2 psf
Selected Floor Decking + 3.5" slab of concrete	= 26 psf + 2.14 psf

$$FloorDeadLoadNoSelectedDecking := 28\ psf$$

$$TotalFloorDeadLoad := 56.14\ psf$$

Parapet Dead Load

Parapet Dead Load Components from ASCE C3.1 - 1a

(2) Wythes CMU (125 pcf), 8" thick, 24" o.c. grout	= 102 psf
4" Clay Brick Wythe	= 39 psf

$$ParapetDeadLoad := 141\ psf$$

Snow Load

Snow Load ASCE Figure 7.2-1

$Pg := 35\ psf$

Roof Snow Load Coefficients ASCE 7.3 - 7.4

$Ce := 1.2$

$Ct := 1$

$Is := 1.1$ Category III

Snow Load Calculations

$SnowLoad := .7 \cdot Pg \cdot Ce \cdot Ct \cdot Is = 32.34\ psf$ $Smin := 20\ psf \cdot Is = 22\ psf$

Live load for Ground Floor

Ground Floor Live Loads ASCE Figure 4.3-1

Ballroom Stage	= 150 psf
Assembly Area	= 100 psf
Bathrooms	= 60 psf
Storage	= 125 psf

$TotalLiveLoad := 435\ psf$ $MaxLiveLoad := 150\ psf$

Roof Live load

Due to the assumption that if a snow load is greater than 20 psf that the roof live load can be ignored. In this instance this rule will be applied because the calculated snow load is 23.1 psf.

Wind load

Wind Pressure

$kzt := 1$

$Vwind := 130\ mph$

Taken from ASCE 7-16 Table 26.5-1C assuming a Risk Category III.

Velocity Pressure

Horizontal Pressures

$Va := 26.8\ psf$

$Vb := -13.9\ psf$

$Vc := 17.8\ psf$

$Vd := -8.2\ psf$

Vertical Pressures

$Ve := -32.2\ psf$

$Vf := -18.3\ psf$

$Vg := -22.4\ psf$

$Vh := -14.2\ psf$

With an assumption of Exposure B and a flat roof the velocity pressures can be found in ASCE 7-16 Table 28.5-1.

Adjustment Factor

$\lambda := 1.0$

Taken from ASCE 7-16 Table 28.5-1 with an Exposure of B and a mean height of 20 ft.

Wind Loads

Horizontal Loads

$Pa := Va \cdot \lambda \cdot kzt = 26.8\ psf$

$Pb := Vb \cdot \lambda \cdot kzt = -13.9\ psf$

$Pc := Vc \cdot \lambda \cdot kzt = 17.8\ psf$

$Pd := Vd \cdot \lambda \cdot kzt = -8.2\ psf$

Vertical Loads

$Pe := Ve \cdot \lambda \cdot kzt = -32.2\ psf$

$Pf := Vf \cdot \lambda \cdot kzt = -18.3\ psf$

$Pg := Vg \cdot \lambda \cdot kzt = -22.4\ psf$

$Ph := Vh \cdot \lambda \cdot kzt = -14.2\ psf$

Windward Loads

$Wa := Pa \cdot 1.5 = 40.2\ psf$

$Wb := Pb \cdot 1.5 = -20.85\ psf$

$Wc := Pc \cdot 1.5 = 26.7\ psf$

$Wd := Pd \cdot 1.5 = -12.3\ psf$

Leeward Loads

$Wa := Pa \cdot -1 = -26.8\ psf$

$Wb := Pb \cdot -1 = 13.9\ psf$

$Wc := Pc \cdot -1 = -17.8\ psf$

$Wc := Pc \cdot -1 = -17.8\ psf$

$WindNS := (428\ plf \cdot 10\ ft) + (643.2\ plf \cdot 2\ ft) - (428.8\ plf \cdot 2\ ft) = 4.709\ kip$

$WindEW := (469\ plf \cdot 10\ ft) + (703.5\ plf \cdot 2\ ft) - (469\ plf \cdot 2\ ft) = 5.159\ kip$