



# ***LIGHTNING RISK ASSESSMENT***

## ***SAMPLE FOR*** ***HEALTHCARE*** ***FACILITIES***



***Based on National Fire Protection Assoc.***

***NFPA Standard # 780 Annex L***

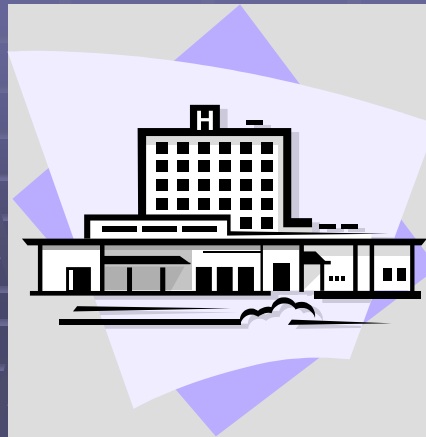
Sample Building Dimensions

(For a rectangular structure)

Length = 100 ft. (30.4m)

Width = 40 ft. (12.2m)

Height = 30 ft. (9.1m)



Equivalent Collective area for rectangular structure (Sample)

$$A_e = (LW) + 6H(L+W) + \pi 9H^2$$

$$A_e = 5076.86 \text{ square meters or}$$

$$A_e = 0.00508 \text{ square km}$$



Yearly average Flash Density (Ng)

(average per National Lightning Detection Network data map)

$$N_g = 4$$

Table C1 – Environmental Coefficient (Relative structure location for Sample where 3 \* height = 90 ft.)

Structure located in area containing structures of the same height or taller within a distance of 3h = 0.25

Structure surrounded by smaller structures within a distance of 3h = 0.5

Isolated structures, no other structures located within a distance of 3h = 1.0

Isolated structure on a hilltop = 2.0

$$C_1 = 1.0$$

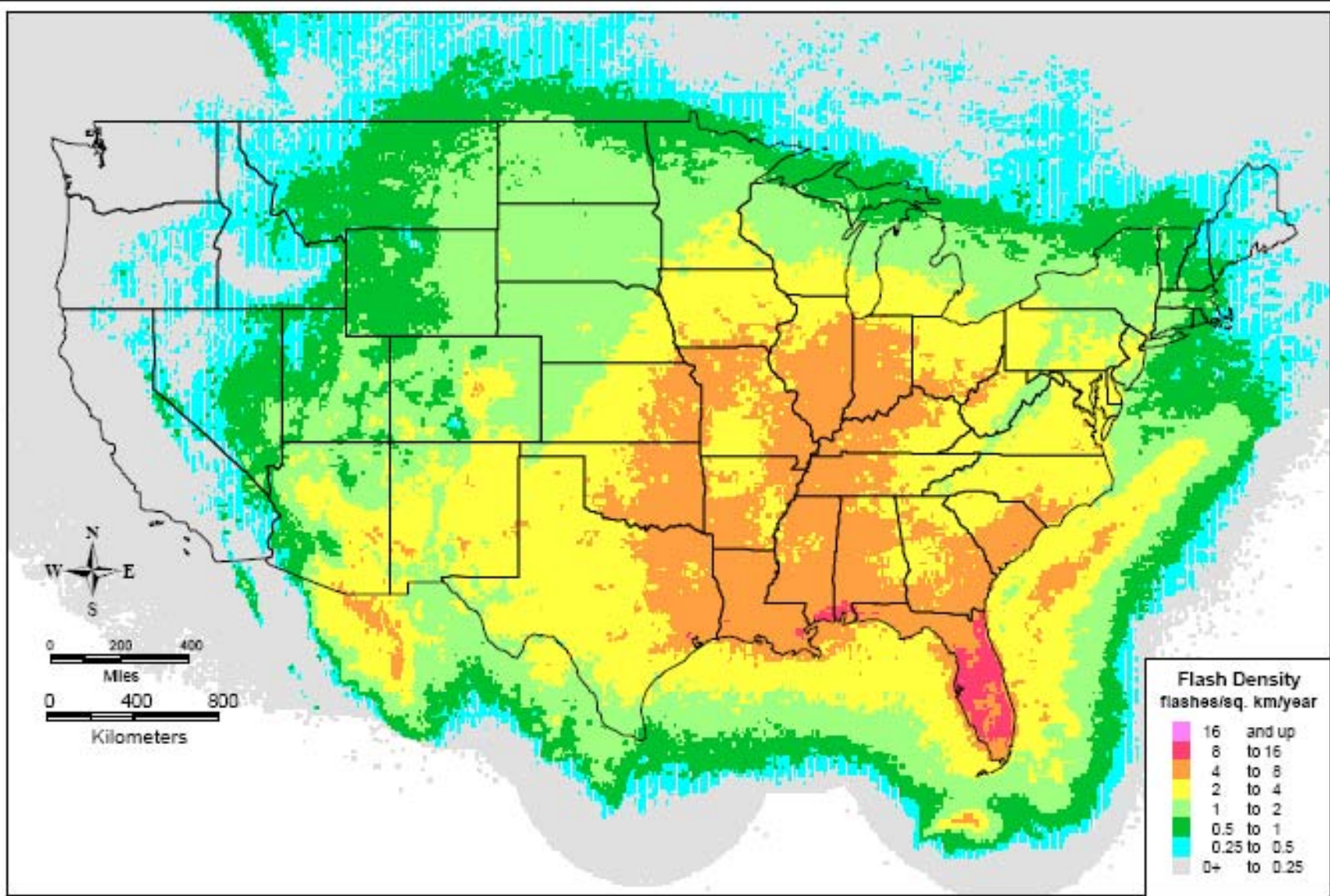


Expected lightning stroke frequency to the structure (Sample)

$$N_d = (N_g) (A_e)(C_1)$$

$$N_d = 0.02031$$





Lightning data source: U.S. National  
Lightning Detection Network  
This report generated using  
Vaisala FALCON software

## 1990 - 2004 Flash Density Map

10 kilometer grid

Jan 1, 1990 00:00:00 GMT  
To  
Dec 31, 2004 23:59:59 GMT

**Table C2 – Structural Materials Coefficient**

<u>Structural Framing</u>	<u>Metal</u>	<u>Roof</u>	
		<u>Non-metallic</u>	<u>Flammable</u>
<u>Metal</u>	<u>0.5</u>	<u>1.0</u>	<u>2.0</u>
<u>Nonmetallic</u>	<u>1.0</u>	<u>1.0</u>	<u>2.5</u>
<u>Flammable</u>	<u>2.0</u>	<u>2.5</u>	<u>3.0</u>

**C2 = 1.0**



**Table C4 – Structure Occupancy Coefficient**

*Unoccupied = 0.5*

*Normally occupied = 1.0*

*Difficult to evacuate or risk of panic = 3.0*

**C4 = 3.0**



**Table C3 – Structure Contents Coefficient**

*Low value and nonflammable = 0.5*

*Standard value and nonflammable = 1.0*

*High value, moderate flammability = 2.0*

*Exceptional value, flammable, computers, electronics = 3.0*

*Exceptional value, irreplaceable cultural items = 4.0*



**C3 = 3.0**



**Table C5 – Lightning Consequence Coefficient**

*Continuity of facility services not required, no environmental impact = 1.0*

*Continuity of facility services required, no environmental impact = 5.0*

*Consequences to the environment = 10.0*

**C5 = 5.0**



**Tolerable lightning frequency to the structure (Sample)**

*where C = (C2) (C3) (C4) (C5)*

**C = 45**

*Nc = 1.5 (0.001) / C*

**Nc = 0.000033**





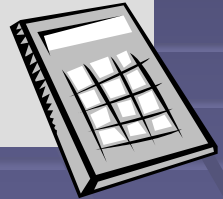
## *Risk evaluation for Healthcare structure (Sample)*

If  $N_d < \text{or} = N_c$ , Lightning Protection may be optional

If  $N_d > N_c$ , Lightning Protection should be installed

$$N_d = 0.02031$$

$$N_c = 0.000033$$



$$\underline{N_d > N_c}$$

A Lightning Protection System  
should be installed

