

## 1. PHOTOMETRIC DATA CALCULATIONS

- a. PERIMETER (P) – Total Distance Around a given space

$$P = A + B + C + D$$

- b. AREA (A) – Length (L) times Width (W) of a given space.

$$A = L \times W$$

- c. LIGHT LOSS FACTOR (LLF)-

LLD = Lamp Lumen Depreciation (provided by Mfgr)

LDD = Luminaire Dirt Depreciation

CU = Coefficient of Utilization

$$LLD \times LDD = LLF$$

- d. LAMP LUMENS – Initial per Luminaire

Lamp Lumens X # Lamps per Luminaire = Total Lumens per Luminaire

- e. FOOTCANDLES (FC) –per Luminaire.

Fixture lumens x CU x LLF = FC per Luminaire

Area of Space

- a. Foot candles (FC) per luminaire

FC per luminaire = (Fixture Lamp Lumens)(CU)(LLF) / Area

FC are produced by each fixture

- b. AVERAGE LUMINAIRE LEVEL (ALL)

FC per Luminaire x # Luminaires in Space = Average Luminaire Level (ALL)

- c. CEILING CAVITY HEIGHTS (Hcc)

Hcc = Distance from Ceiling to Fixture

- d. ROOM CAVITY HEIGHT (Hrc)

Hrc = Distance from Fixture to work plane or Floor Cavity height.

e. **FLOOR CAVITY HEIGHT (Hfc)**

Hfc = Distance from Floor to the work plane.

f. **Ceiling Cavity Ratios**

There are three cavity ratios:

- Ceiling cavity ratio (CCR)
- Room cavity ratio (RCR)
- Floor cavity ratio (FCR)

The **cavity ratio formula** is:  $\frac{5h(L + W)}{L \times W}$

**2. RETROFIT FORMULAS**

a. **Watts Saved = Wattage Existing System – Wattage of Proposed System**

b. **Annual Dollars Saved**

$$\frac{\text{Watts Saved} \times \text{Annual Burn Hours} \times \text{kWh rate}}{1000} = \text{Total \$ Saved}$$

c. **Return on Investment (ROI)**

$$\frac{\text{Annual Savings}}{\text{System Cost}} = \text{ROI}$$

d. **Simple Payback (yrs.) without Utility Rebate**

$$\frac{\text{System Cost}}{\text{Annual Savings}} = \text{Payback (yrs.)}$$

e. **Simple Payback (yrs.) with Utility Rebate**

$$\frac{(\text{System Cost} - \text{Utility Rebate})}{\text{Annual Savings}} = \text{Payback (yrs.)}$$