

# CCI Notes

2/3

## Track Lighting

### Introduction

Track lighting is perhaps the most flexible system for museums and galleries. This is not to say that the fluorescent tube should not be used; each system has its advantages and disadvantages.

### Installation

The position of the track is important in order to avoid glare, unwanted reflections, and undue emphasis of the surface features of the object. The light beam should be at an angle of  $60^\circ$  to the horizontal. The distance between the light fixture and the wall (distance  $D$  in Figure 1) will depend on the ceiling height ( $H$ ). Assuming a typical adult eye level of 160 cm, the distance can be calculated using the following formula, with all measurements in centimetres:

$$D = (H - 160) \times 0.577.$$

For example, for a three-metre ceiling (300 cm),

$$\begin{aligned} D &= (300 - 160) \times 0.577 \\ &= 81 \text{ cm.} \end{aligned}$$

This optimum distance should be carefully observed because it gives good illumination for objects of moderate size. However, when large objects are exhibited on walls, the top of the object ends up being very close to the lamp if this formula is followed.

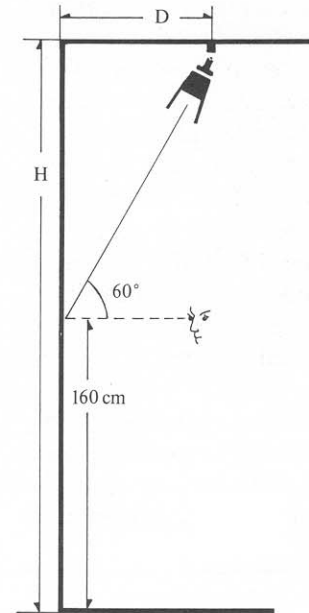


Figure 1

In these situations, at least an extra 30 cm should be added to the calculated distance.

The most flexibility will be offered by a double track system where the tracks are 60 cm to 90 cm apart. An alternative to this is a single track with short, regular sections perpendicular to the main track.

The bulb should be slightly recessed in the fixture. This will eliminate direct glare while not impeding the light beam.

## Light Level Reduction

To reduce the amount of damage done to objects by illumination during display, it is important to be able to adjust the lighting levels. Each length of track should be equipped with a dimmer control. If this proves to be too expensive, at least one dimmer for each wall section is recommended. Once the light levels have been adjusted for a particular exhibition, a piece of tape should be placed over the lever or knob of the dimmer to prevent accidental changes.

Whenever the output of an incandescent lamp is reduced by dimming, the light becomes more yellow. This undesirable tendency can be reduced by using the Daylite Fluro-Spray Floodlight (R-40) manufactured by Duro-Test Electric Ltd. The advantage of this lamp is that it can be dimmed to about half intensity before its light becomes as yellow in appearance as that of ordinary floodlights at full power.

There are several ways to reduce the illumination levels on art objects and artifacts. One of the most effective is to reduce the number of lamps in the

system. Changing the type of lamps should also be considered; spotlights can be replaced by floodlights or by lamps of lower wattage (see Table 1). It should be noted that the lower the wattage, the more yellow the light.

The location of the lamp relative to the object will also have a direct bearing on the light level. Two factors are involved: the distance between the lamp and the object, and the angle of incidence of the light beam on the surface of the object.

Table 1 lists the illumination levels of various lamps at different distances. As can be seen, a small increase in the distance will drastically reduce the light level. This Table also illustrates the differences in intensity between lamps of various types, and can be used to choose the type of lamp to be installed in a display area.

Table 2 shows that reduced lighting levels can be achieved by increasing the angle at which the light strikes the object. Angles greater than 60° will accentuate surface detail and texture, an effect which may be undesirable in some displays.

## Further Reading

Bergeron, André, ed. *L'éclairage dans les institutions muséales*. Québec: Musée de la civilisation et Société des musées québécois, 1992.

Canadian Conservation Institute. *Daylite Fluro-Spray Floodlight*. CCI Notes 2/2. Ottawa: Canadian Conservation Institute, 1983.

Illuminating Engineering Society. *IES Lighting Handbook: The Standard Lighting Guide*. New York: Illuminating Engineering Society, 1972.

Lafontaine, Raymond H. *Environmental Norms for Canadian Museums, Art Galleries and Archives*. Technical Bulletin No. 5. Ottawa: Canadian Conservation Institute, 1981.

**TABLE 1**  
Variation of Light Intensity (in Lux) with Distance for Selected Lamps

Lamp	Distance from Lamp						
	120 cm	150 cm	180 cm	210 cm	240 cm	270 cm	300 cm
150 W spot (R-40)		3200	1900	1300	1050	850	
75 W spot (R-30)		850	620	450	350	280	230
150 W flood (R-40)		590	425	320	250	205	175
75 W flood (R-30)	200	130	95	70	55	45	
Fluro-Spray 150 W (R-40)	200	130	95	75	60	50	

**TABLE 2**  
Reduction in Light Intensity with Angle of Incidence

Angle*	0°	10°	20°	30°	40°	50°	60°
Percentage Reduction	0%	1.5%	6%	13.4%	23.4%	35.7%	50%

\* Angle between the light beam and a line perpendicular to the surface of the object.

Copies are also available in French.

Texte également publié en version française.

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