

# DELTA Snapshots

## Compact Fluorescent Retrofit for Incandescent Downlights Issue 3

Incandescent downlights are frequently retrofitted with compact fluorescent (CFL) lamps and reflector kits for energy savings and longer lamp life. This application features a CFL retrofit kit that is both easy to install and provides a look and light distribution similar to the original incandescent downlight.

### Application Profile

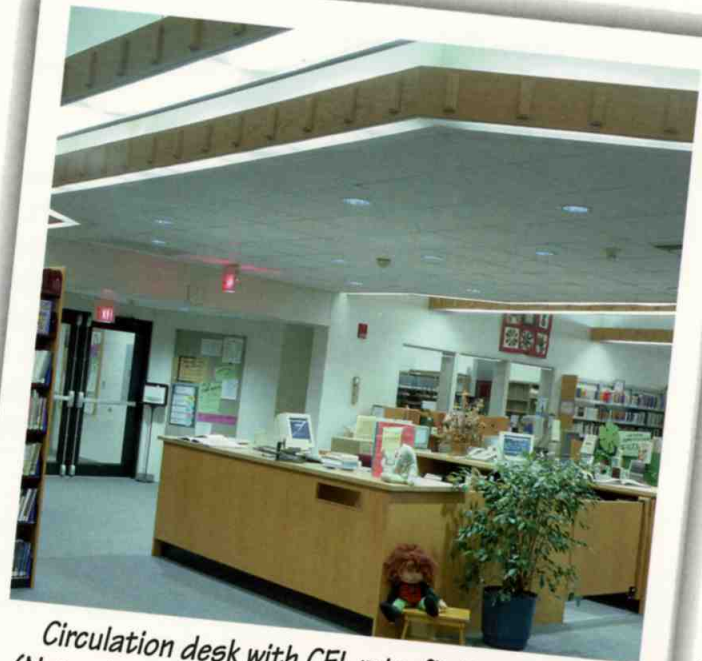
The Voorheesville Public Library is an 8500 ft<sup>2</sup> facility with an annual circulation of over 106,000 books and materials. The ceiling above the central circulation desk drops to a height of 9' and houses (11) 150-W R40 lamp incandescent downlights. These lamps provided acceptable illuminance, but the staff found the projected heat uncomfortable. The library had tried two retrofit options: first, 90-W halogen PAR38/FL lamps, which were too hot and produced spotty light patterns; second, 20-W screwbase CFL with integral reflectors, which produced uncomfortable high-angle glare and light levels that were too low. (A lamp or luminaire that appears glaring when viewed from a distance is producing high-angle glare.) The library settled for a composite solution of (4) 150-W R40 lamps and (7) CFL reflector lamps (see photo below).

In 1997, the library retrofitted all eleven downlights with a new 20-W CFL retrofit kit, which uses an innovative material. The kits solved the heat problem and gave the library staff the illuminance they needed without distracting glare.



*Circulation desk before retrofit. (Note the obvious high-angle glare from the CFL reflector lamps.)*

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*Circulation desk with CFL retrofit kits in place. (Note the downlights with improved glare control.)*

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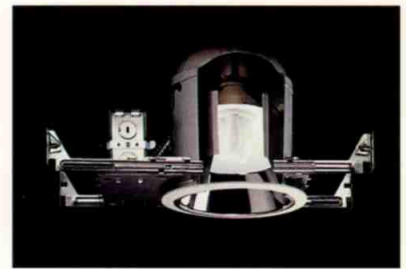
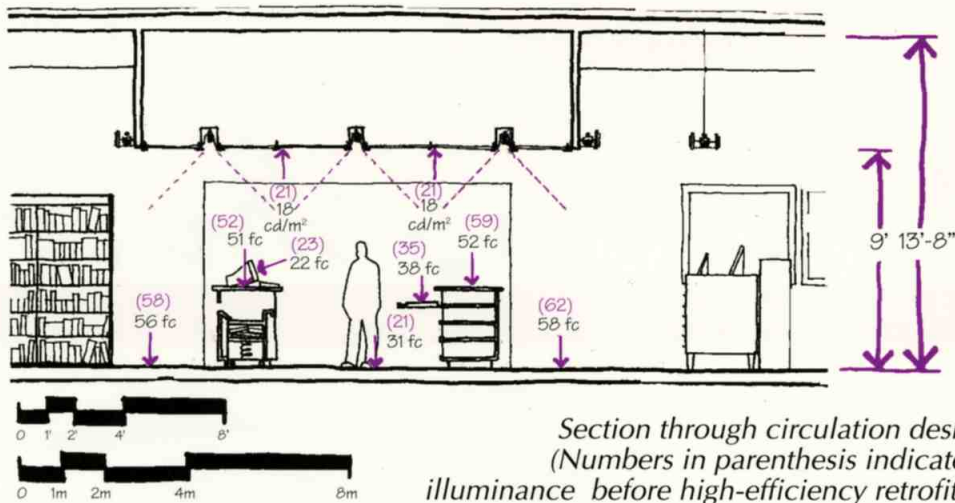
### Lighting Objectives

- Maintain sufficient illuminance for reading small print
- Reduce heat from downlights for circulation desk staff
- Reduce high-angle glare for library staff and patrons
- Reduce energy use and relamping frequency

### Lamps, Luminaires, and Energy

This high-efficiency retrofit kit consists of a metal reflector and a separate self-ballasted CFL lamp. It can be installed in a 6" aperture incandescent downlight with either a 15- or 20-W screwbase CFL "amalgam" lamp. (The amalgam permits a high lumen output over a wide range of temperatures inside the downlight.) The separate reflector has a top section lined with a durable, 98% reflectance, matte white material. The view of the bare lamp is obscured, because the lamp and white reflector are very similar in brightness. The lower specular aluminum reflector controls the high-angle glare. This installation reduced the circulation desk lighting power to 220 W, compared to 1650 W for the original installation and 740 W for the composite system.





Cutaway view of installed high-efficiency retrofit kit

## Design Highlights

**Illuminance:** The high-efficiency retrofit kit decreased the average desktop illuminance by only 4 fc (7%) compared to the composite incandescent and CFL installation. Under the center downlight, illuminance increased by 10 fc (47%) above the illuminance delivered by the reflector CFL.

**Visual Comfort:** This retrofit kit optical system was designed to concentrate more lumens straight downward and minimize lumens emitted above 45° from nadir, resulting in less high-angle glare.

**Installation and Maintenance:** Spring clips make the kit easy to install in the existing housing of 6" aperture downlights. The screwbase CFL has a rated life of 10,000 hours and is replaced without removing the retrofit reflector. Using a CFL reduces labor costs and frequency of lamp replacement compared to an incandescent lamp rated at 2000 hours.

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**Voorheesville Public Library**  
**Sponsor: W. L. Gore & Associates, Inc.**

**Voorheesville Public Library**  
**Voorheesville, NY**  
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**Lamps:** Philips  
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