

COMBINING  
ENERGY EFFICIENCY  
AND QUALITY DESIGN

A *knowhow*<sup>™</sup>  
CASE STUDY

demonstrating lighting

# 75 NORTH BEACON STREET

Recent lighting upgrades play a major role in the upscale atmosphere of the professional offices of Loughran & Corbett Attorneys, Inc. The law firm of nine occupies the main office of the two-story office building located on North Beacon Street, Watertown, Massachusetts.

Building owner Bernard T. Loughran Jr., Esquire, a principal of Loughran & Corbett, had wanted to upgrade the office's older lighting design. His goals were to provide a professional, pleasant, well-lit environment for attorneys, staff members and clients, and to reduce electrical utility bills.



The firm's law library, which doubles as the main conference area, is a hard-to-light, deep space.

The existing lighting consisted of a mixture of old T-12 fluorescent lamps and high-wattage incandescent lamps. Installing newer technology could easily lower electrical bills. Though energy conserving lighting products are now common, not all products are appropriate for all applications.

Local utility NSTAR Electric, a DesignLights<sup>™</sup> Consortium member, and lighting contractor DMJM+HARRIS, applied principles from the *Office Lighting Knowhow*<sup>™</sup> Series to lower energy bills and improve lighting quality. The new lighting solution pleases employees and tenants alike.



## PROBLEMS OVERCOME

The existing lighting was simply outdated, and suffered from many of the characteristic disadvantages of older technology. The lighting needed a significant upgrade to improve the work environment and overall look of the 3,500 square foot law office.

The existing 2 by 4-foot recessed troffers had been installed with a mixture of white plastic "egg crate" diffusers and acrylic lenses, now yellowed and stained from age. The deteriorated fixtures, fitted with four T-12 lamps each, produced an average light level of only 40 foot-candles. Light levels throughout the different spaces were uneven. Glare and overhead reflections on computer screens contributed to the sense of poor lighting. The light had an unflattering quality because of the poor color rendering of the T-12 lamps. Their standard magnetic ballasts caused a perceptible and distracting flickering of the lamps.

The firm's law library, which doubles as the main conference area, is a hard-to-light, deep space. With the lighting turned off, only 10-12 foot-candles reached the rear of the room from the large window at the other end. The acrylic lensed fixtures that lit the space directed most of their light to the top half of the wall. More light was needed to illuminate the conference table. Minimal downward light is particularly challenging for those with less than perfect eyesight.





In the stairwells and hallways, incandescent PAR 75-watt recessed downlights, on 8-foot centers, burned out frequently. Incandescent R40 floodlights in the front and rear parking lots likewise consumed too much energy and were cumbersome to change. Two 20-watt incandescent lamps over-lit the exit signs.

### LIGHTING QUALITY

Even when lighting cannot be completely re-designed, the principles of the *Office Lighting Knowhow™ Series* guide can be used to improve energy efficiency, while providing bright, uniform light with reduced glare.

Lighting levels on the law-library conference table now reach 70 foot-candles through the combination of the new parabolic luminaires

and natural light from the window. This high light level is appropriate for studying the fine text of law volumes.

Computer screen glare was significantly reduced where parabolic troffers replaced the older lensed troffers. The fixtures provide high light levels and efficiently distribute the light from the three T-8 lamps. The semi-specular and parabolic shaped louvers reduce glare and shield the lamps at low viewing angles.

The T-8 lamps on instant-start, electronic ballasts no longer flicker as the older T-12 lamps did. This adds to the greater level of visual comfort. Aesthetically, the parabolic fixtures upgrade the interior design of the law office by complementing new ceiling tiles and highlighting the décor of dark stained furniture, woodwork, wall hangings and paintings.

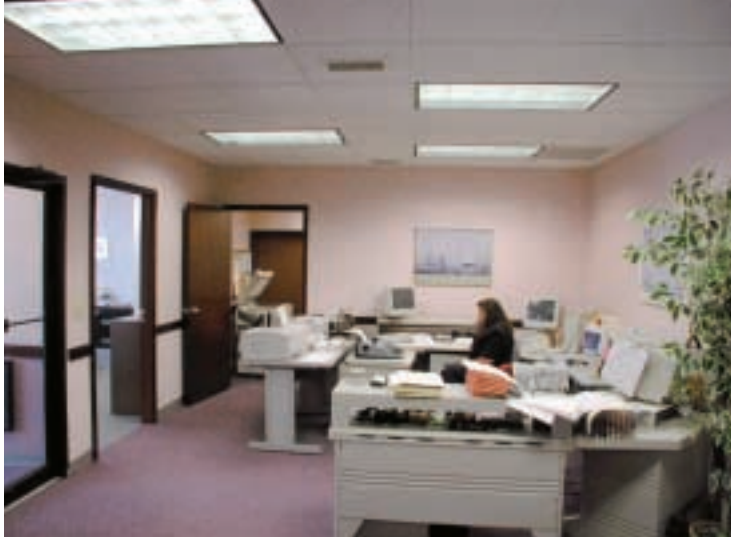
### QUALITY LIGHTING SOLUTION

Altering the layout of the lighting system was determined to be too disruptive to the daily work schedule of the law offices. The best solution for all involved was to replace existing fixtures with energy efficient alternatives.

Lighting engineers, DMJM+HARRIS replaced Loughran & Corbett's older 2 by 4 troffers with 18-cell parabolic luminaires holding three T-8 lamps each. The old layout has the new luminaires on 4-foot centers in individual offices.

Luminaires in the lobby area were re-positioned for better efficiency above the receptionist's desk.

QUALITY INDICATORS	RATING		
	ACCEPTABLE	GOOD	EXCELLENT
Control of Direct and Reflected Glare			✓
Light on Walls and Ceilings		✓	
Fixture Location Related to People			✓
Light Patterns and Uniformity			✓
Daylighting Integration		✓	
Color Rendering and Color Temperature			✓
Lighting Controls and Flexibility		✓	
Quantity of Light on Horizontal Surfaces (fc)			✓



COMBINING  
ENERGY EFFICIENCY  
AND QUALITY DESIGN

In the stairwell and hallway, 20-watt compact fluorescent lamps with reflectors replaced the incandescent PAR 75W recessed downlights. Compact fluorescents replaced the 12 incandescent R40 floodlights lighting the parking areas, and increased the light output.

2-watt LED's with battery backup replaced the 40-watt exit signs. The chance of lamp failure is slim, since LED'S lack a filament. In addition to saving energy, the new stairwell, parking lot and exit lighting reduce the maintenance costs associated with the need to change lamps frequently.

## IMPRESSIONS

Employees say the light is brighter, yet softer, with richer colors that bring out the quality of the office's carpeting, furniture, wall hangings and paintings. "The new lighting accomplishes the professional, pleasant, well lit work space that Mr. Loughran wanted," says Debra Boyajian, office manager. Compared to the varied light levels of the old fixtures, the new lighting is pleasingly consistent and uniform, "As you look down the hall or into a room, it all looks pretty much the same," she continues.

Mr. Loughran was so pleased with the results he has convinced the other tenants to upgrade their lighting. "The style of the new lighting complements the décor in each office and provides a more modern and efficient appearance. In addition, it saves on energy bills for the entire building—which I like best."

## AND NOW THE NUMBERS

The parabolic fixture replacements deliver 30 percent more light throughout the law office. Average light on work surfaces increased from 40 to 70 foot-candles. Power consumption of the average 2 by 4 fixture fell from 180 to 88 watts. The T-8 lamps improved color rendering to 74—a big improvement from the T-12's color rendering index (CRI) of 65.

Electricity demand has dropped by 5.5 kW with 1.5 watts saved per square foot. DMJM+HARRIS estimate a 40% reduction in energy costs. This dramatic reduction below previous lighting expenses occurs because of the 25% drop in lamp quantity, and the use of T-8 and compact fluorescent instead of T-12 and incandescent lamps. Loughran & Corbett Attorneys, Inc. should see a saving of \$1,740 each year from their investment.



"We're all very pleased with the quality of the lighting. It makes the offices brighter and gives a natural light look. The new fixtures better disperse light throughout the work area and reduce glare. Our administrative assistants notice less glare on computer monitors."

*Bernard T. Loughran, Jr.,  
Principal,  
Loughran & Corbett  
Attorneys, Inc.*

### COSTS

Total fixtures and lamps	\$3,692
Total installation labor	\$2,460
Installed system cost	\$6,152
Materials per square foot	\$1.05
Installation labor per square foot	\$0.70
Total cost per square foot	\$1.75

### SAVINGS

Demand reduction	5.5 KW
Watts saved per square foot	1.5 W/SF
Annual utility cost savings <sup>1</sup>	\$1,740

<sup>1</sup>Based on 3,160 hours per year usage and local utility rate of \$0.10 per kilowatt-hour.



## PROJECT SUMMARY

<b>Utility:</b>	NSTAR Electric
<b>Utility Representative:</b>	Cherie Miles
<b>Customer:</b>	75 North Beacon Street Realty Trust
<b>Facility:</b>	Loughran & Corbett Attorneys, Inc.
<b>Location:</b>	Watertown, Massachusetts
<b>Space:</b>	Office
<b>Area:</b>	3,500 square feet
<b>Ceiling Height:</b>	8 feet
<b>Fixtures Used:</b>	2 by 4 18-cell, 3 T-8 lamp parabolic troffers (Eastern, Columbia) Recessed 20-watt compact fluorescents downlights (Sylvania)
<b>Light Levels Achieved:</b>	Average of 70 footcandles on work surfaces
<b>Lighting Power Density:</b>	1.56 watts per square foot
<b>Lighting Specifier:</b>	Alan Marrocco of DMJM+HARRIS
<b>Installing Contractor:</b>	DMJM+HARRIS

## THE LIGHTING KNOWHOW™ SERIES

The DesignLights™ Consortium publishes the *knowhow™ Series* for office, small retail, classroom and industrial/warehouse lighting. This *demonstrating lighting knowhow™ Case Study* highlights a specific installation of lighting that showcases quality, comfort and efficient use of energy. With members located throughout the Northeast and the Mid-Atlantic, the DesignLights™ Consortium is “a regional collaboration seeking to influence naturally occurring lighting events towards quality, comfort and efficiency.” The DLC includes among its members many electric utilities as active participants, as well as several other interested stakeholders. The DLC created these case studies with the intention of helping contractors and lighting specialists sell and deliver the benefits of high quality, energy efficient lighting to their customers in the commercial building market.

### Efficiency Vermont

#### Long Island Power Authority

#### National Grid

- Massachusetts Electric
- Narragansett Electric
- Granite State Electric
- Nantucket Electric

#### Northeast Energy Efficiency Partnerships, Inc.

### Northeast Utilities

- The Connecticut Light and Power Company
- Western Massachusetts Electric Company

#### New York State Energy Research and Development Authority

#### NStar Electric

#### United Illuminating Company

#### Unitil

- Fitchburg Gas and Electric Light Company



Prepared by Weller & Michal Architects Inc. with WV Engineering Associates PA.  
Technical writing by Robert S. Seeley. Photography by George Leisey. Graphic Design by Braden Printing, Inc.

Disclaimer: These studies are provided for information purposes only. Neither the Sponsoring Agents nor any of their employees or sub-contractors makes any warranty, expressed or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any data, information, method, product or process disclosed in this document, or represents that its use will not infringe any privately owned rights, including, but not limited to, patents, trademarks or copyrights.