

DELTA

Demonstration and Evaluation of Lighting Technologies and Applications • Lighting Research Center

# DELTA Portfolio

Lighting Case Studies

Volume 1, Issue 1



A&P Food Market  
Old Lyme, Connecticut

**Type:**  
Retail Supermarket

**Site Sponsor:**  
The Connecticut Light  
and Power Company



# Project Profile

A&P Food Market in Old Lyme, CT is a 43,000 square foot (4,000 square meter) grocery store that includes a produce section, deli, bakery and florist. When the store was under construction in 1991, the specified lighting included T12 fluorescent lamps and magnetic ballasts. The Connecticut Light and Power Company (CL&P), as part of its energy efficiency program, encouraged A&P to install the more efficient T8 fluorescent lamps with electronic ballasts. The new lighting was designed to be efficient and to demonstrate A&P's concern for environmental issues and energy conservation. Most importantly, the new lighting allows A&P to display merchandise more effectively and maximize comfort for both customers and employees. Incandescent lighting is not used within the store; even accent lighting is delivered with double-ended compact metal halide and compact fluorescent sources. The total connected lighting power density in the store is 2.1 W/ft<sup>2</sup> compared to 2.5 W/ft<sup>2</sup>, which is the maximum lighting power density prescribed by ASHRAE/IES Standard 90.1-1989. The maximum connected load is never fully reached because automatic controls shut down lighting during nighttime shopping hours and also switch off lights near windows during daylight hours.



*Grocery aisle with valance lighting*

## ● *Lighting Objectives*

- To make the store look bright, attractive and open.
- To make the merchandise look appealing and easy to examine. Fine print on packaging should be readable, and the color of produce and meats should look natural.
- To minimize distractions within the store so that customers' eyes are attracted to the merchandise.
- To provide lighting that is comfortable by reducing glare for customers and employees.
- To lower light levels and further reduce energy costs during the evening when customers' eyes are used to the darkness outside.
- To allow A&P to save on energy bills and to help CL&P with its energy efficiency goals.

**The store has accomplished these objectives and has received enthusiastic response from customers, management, employees and CL&P.**



## ▲ *Lighting and Control Features*

- ▲ **Natural colors.** Lamps with warm color and good color rendering properties are used to light the products.
- ▲ **Clean, bright space.** Wall washing and light-colored finishes are used throughout the store. Bright ceilings are created with uplights mounted on top of the grocery gondolas.
- ▲ **Minimal glare and discomfort.** Most lamps within luminaires are shielded from a person's direct view.
- ▲ **Energy efficiency.** T8 lamps with electronic ballasts are the primary source of illumination within the store.
- ▲ **Accent lighting for specialty areas.** Double-ended compact metal halide lamps are used for accent lighting in the florist area, bulk goods department, bakery and special displays. Compact fluorescent lamps are used for displays at the ends of some aisles.
- ▲ **Automatic controls.** Store lighting is controlled by a computerized energy management system (EMS), that automatically changes lighting within the store according to the time of day and available daylight.
- ▲ **Control flexibility.** Lighting controls can be reprogrammed to respond to specific store maintenance or cleaning requirements, or to reduce peak demand when necessary.
- ▲ **Planned maintenance.** A maintenance schedule allows for lamp replacement and cleaning at regular intervals.

## *From the DELTA Program Manager*



**Naomi Miller:**

*When I visited the A&P store in Old Lyme for the first time, my initial impressions were how comfortable the store felt for shopping, and how attractive the products looked. I then looked at the lighting system and realized that energy-efficient equipment*

*had been used throughout the store and integrated beautifully into the store design.*

*I had several opportunities to speak with the head of the project design team, Richard Sokolnicki. He is the Vice President of Planning and Design at A&P Corporate Planning and Design. He explained that the original design intent was to create a soft, pleasing environment instead of a glaring, promotional one. Fluorescent lighting concealed by valances in the grocery aisles helps reduce distracting ceiling clutter that can be created by hanging lights or bright strip-lights on the ceiling. The look is softened with fluorescent uplighting that few people would even notice, but which makes the space feel large and cheerful.*

*Anthony Pashalian is A&P's Corporate Utility Specialist. He is especially proud of the Old Lyme store because it successfully saves energy and helps keep the store's utility overhead low. (Lighting normally constitutes 15-20% of a supermarket's total electrical usage.) He believes that what has been accomplished at the Old Lyme store reflects effective teamwork among the design staff, engineering staff, EMS managers, and maintenance planners. They all collaborated with CL&P to reduce energy consumption without compromising design or ease of maintenance.*

*The store has been in service since 1991, and still looks new, thanks to lighting and controls maintenance contracts as well as to an attentive store manager and staff. It is an excellent example of how energy efficiency and lighting quality can work hand in hand.*

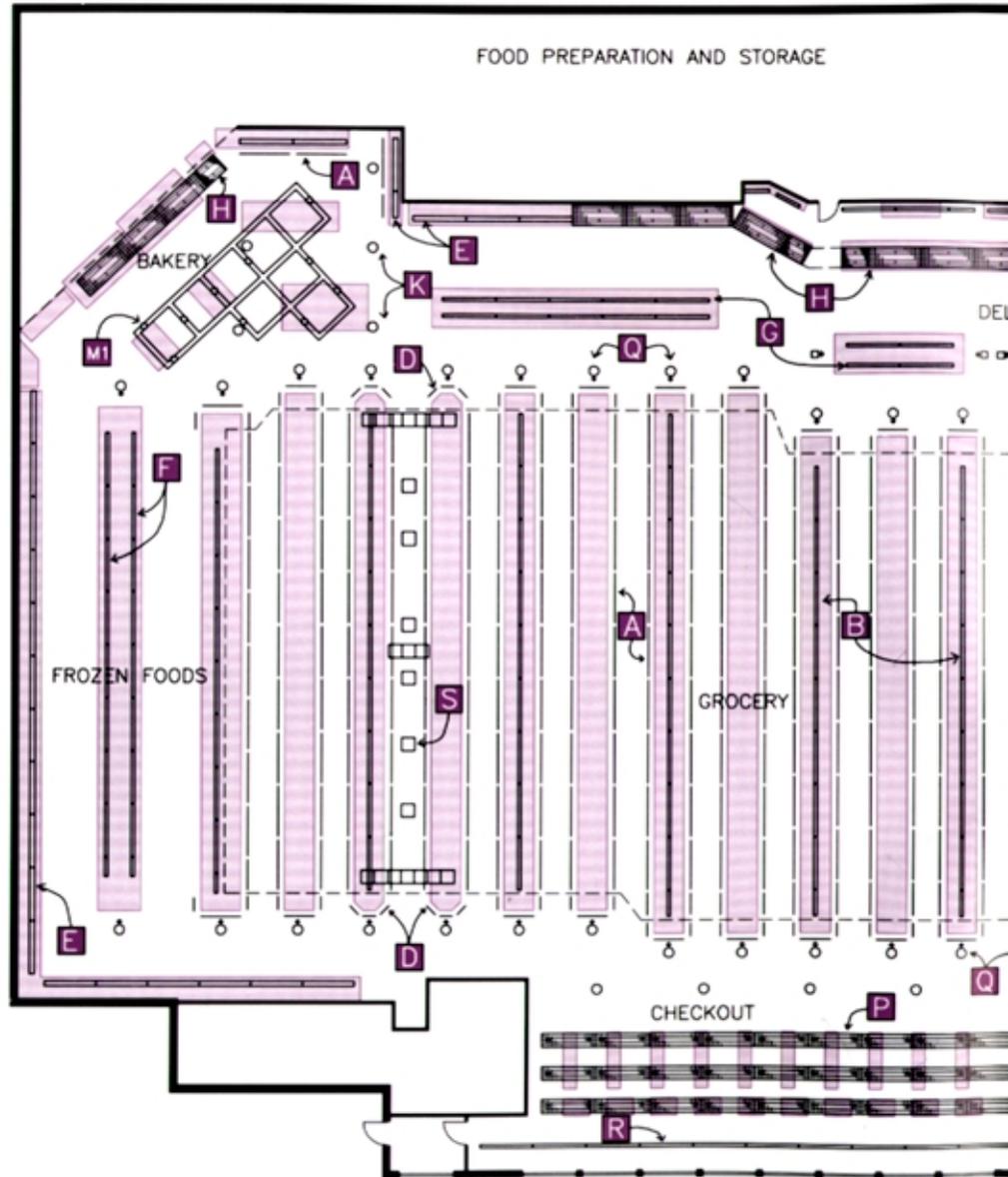


# Techniques

## Project Specifications

Principal light sources used are T8 rapid-start lamps in 4' (1220 mm) and 2' (610 mm) lengths, all with a color rendering index (CRI) of 70 and a correlated color temperature (CCT) of 3000 K (warm). All 4' lamps are operated on reduced-harmonics electronic ballasts for energy efficiency and reduced flicker. Rapid-start compact fluorescent lamps with magnetic ballasts are used for lighting shelf displays at the end of some gondolas. Both 70-W and 150-W double-ended compact metal halide lamps with magnetic ballasts are used for accent lighting. Several unusual fluorescent lamps are used in food cases, to accommodate the low temperatures found in freezers. These lamps are specified by the case manufacturer. Case lighting is not included in the lighting power densities reported here.

The plan to the right shows the major areas of the store and the locations of the primary luminaires.



**A** Striplight with two fluorescent lamps in cross section, mounted to gondola valance. Lamps: F32T8/RE730 and F17T8/RE730.

**B** Inverted industrial luminaire with white reflectors, two fluorescent lamps in cross section. Mounted on top of gondola spines in alternate rows and directed upward to the ceiling. Lamps: F32T8/RE730.

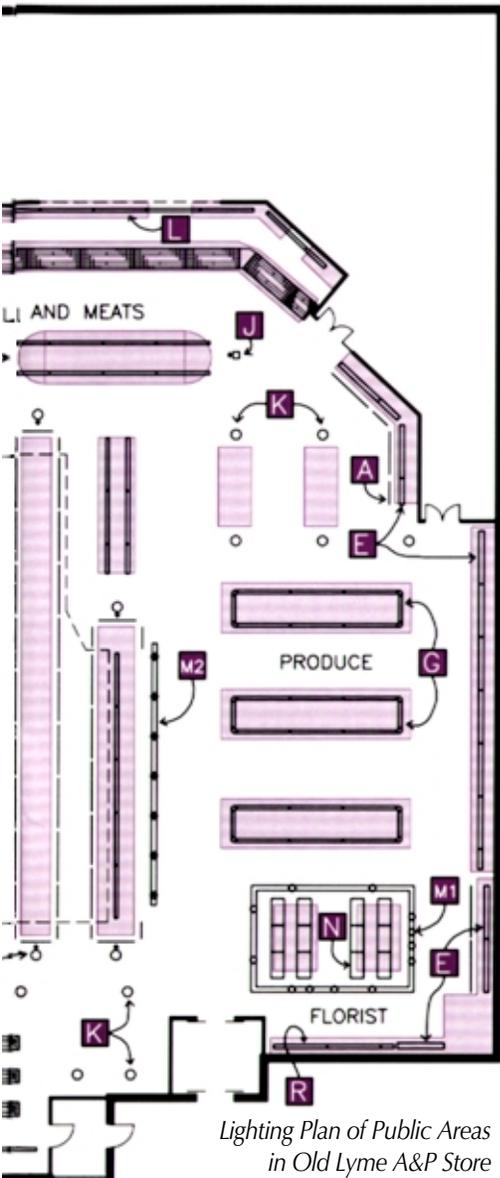
**C** Refrigerated cases with built-in fluorescent lamps, specified by case manufacturer. Many lamps and ballasts are designed for low-temperature operation. Not shown on plan.

**D** Striplight with compact fluorescent lamp, mounted under front edge of display shelves. Lamp: FT39/T5/RE830 or FT18/T5/RE830.

**E** Inverted industrial luminaire with white reflectors, two fluorescent lamps in cross section. Mounted on top of perimeter valance to wash perimeter walls. Lamps: F32T8/RE730.

**F** Linear extruded aluminum square tube luminaire with two fluorescent lamps in cross section. Semi-specular aluminum parabolic baffles. Pendant-mounted above refrigerated cases. Lamps: F32T8/RE730.

**G** Linear 6" (150 mm) diameter extruded aluminum tube with two fluorescent lamps in cross section. Semi-specular aluminum



Lighting Plan of Public Areas in Old Lyme A&P Store

parabolic baffles. Pendant-mounted over produce bins.  
Lamps: F32T8/RE730.

**H** Dropped architectural soffit above deli and bakery service counters. Two industrial luminaires with white reflectors mounted to interior of soffit with two fluorescent lamps in cross section. Specular parabolic egg-crate louver (1-1/2" x 1-1/2" x 1"

[38 x 38 x 25 mm] cell size) to control glare. Lamps: F32T8/RE730.

**J** Monopoint track light with one 70-W double-ended compact metal halide lamp, surface-mounted to ceiling. Lamp: HQI-DE70/WDX.

**K** Semi-recessed, adjustable eyeball downlight with 150-W double-ended compact metal halide lamp. Lamp: HQI-DE150/WDX.

**L** Linear 6" (150 mm) square downlight with two fluorescent lamps in cross section, ceiling-mounted at rear wall of deli. K12 prismatic lens. Lamps: F32T8/RE730.

**M1** Configurations of 6" (150 mm) diameter extruded aluminum tubes with recessed track, pendant-mounted in florist and bakery areas. Track lights house one 70-W double-ended compact metal halide lamp and are equipped with black egg-crate louver to control glare. Lamp: HQI-DE70/WDX.

**M2** 6" (150 mm) diameter extruded aluminum tube with recessed track, pendant-mounted in bulk goods area. Track lights house one 150-W double-ended compact metal halide lamp. Lamp: HQI-DE150/WDX.

**N** 2'x4' recessed troffer with four fluorescent lamps and specular parabolic louver (same as type H) to control glare. Lamps: F32T8/RE730.

**P** Job-built suspended luminaires with two high-output fluorescent lamps in cross section, downlighting the checkout area. Specular parabolic egg-crate louvers (same as type H) to control glare. Lamps: F72T12H0/WW.

**Q** Stem-mounted adjustable accent light with one 150-W double-ended compact fluorescent lamp for grocery display. Lamp: HQI-DE150/WDX.

**R** Linear 6" (150 mm) square extruded aluminum up/downlight with two fluorescent lamps in cross section. Semi-specular aluminum parabolic baffles in downlight aperture. Pendant-mounted at front window in checkout area. Lamps: F32T8/RE730.

**S** 2'x2' recessed troffer with three fluorescent lamps, located above health and beauty aisle. Specular parabolic louver (same as type H). Lamps: F17T8/RE730.

#### Wattage

Input wattages for luminaires include ballast watts and are estimated from manufacturers' published literature. All calculations were based on the following values:

##### T8 fluorescent lamps

- F32T8 (4'): 114 W per 4-lamp ballast
- F32T8 (4'): 62 W per 2-lamp ballast
- F17T8 (2'): 43 W per 2-lamp ballast

##### T12 high-output fluorescent lamps

- F72HO (6'): 160 W per 2-lamp ballast

##### FT rapid-start fluorescent lamps

- FT39/T5 (16"): 52 W per 1-lamp ballast
- FT18/T5 (10"): 17.5 W per 1-lamp ballast

##### Double-ended compact metal halide lamps

- HQI-DE70: 80 W per 1-lamp ballast
- HQI-DE150: 185 W per 1-lamp ballast

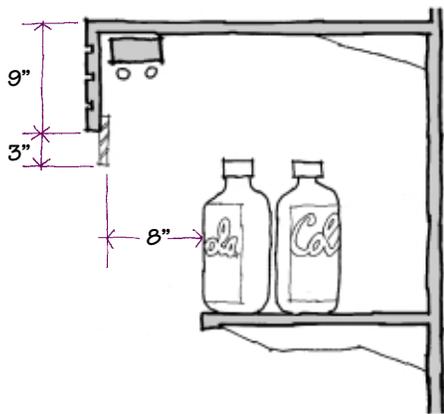


# Details

**Grocery aisles** The conventional way to light grocery aisles is with ceiling-mounted fluorescent striplights. This is not an efficient use of energy and results in glare and distraction for customers. The grocery gondolas in this A&P store are lit with striplights concealed behind a fascia mounted to the gondolas (type A, p. 4). Additional lighting is provided by industrial striplights mounted on top of alternate gondolas and directed toward the ceiling (type B). This provides a pleasing brightness to the store without glare. During evening hours, when customers are accustomed to lower



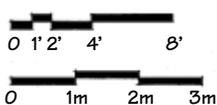
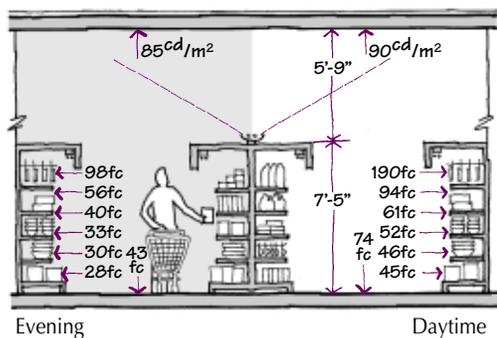
Frozen foods



Gondola valance detail

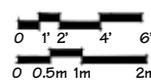
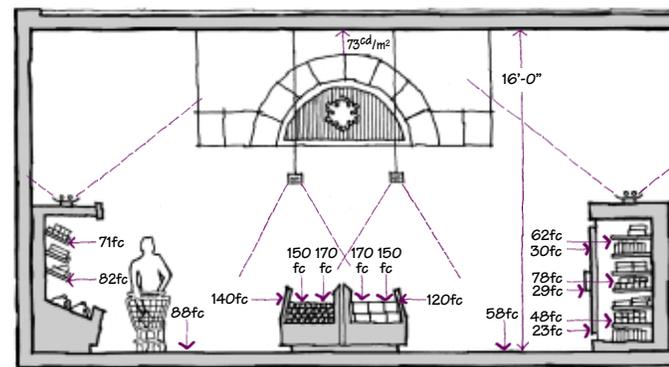
light levels, one row of lamps in the valance is switched off to help meet the objective to save energy. A cross section through a typical aisle with a detail of the valance lighting is shown to the left.

During daylight hours, the lighting system produces an average vertical illuminance of 190 footcandles (fc) (2000 lux [lx]) on the top shelf and 45 fc (480 lx) on the bottom shelf with horizontal illuminances on the floor averaging 74 fc (800 lx). During the evening, the average vertical illuminance is 98 fc (1100 lx) on the top shelf and 28 fc (300 lx) on the bottom shelf, with horizontal illuminances on the floor averaging 43 fc (460 lx). (The distribution of illuminances is shown on the gondola cross section to the left.) This lighting system produces high light levels suitable for reading small print on packages.



Grocery aisles in section

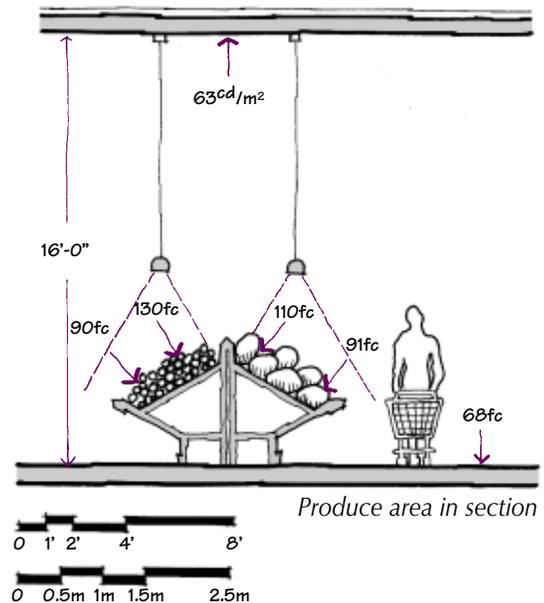
**Frozen foods** In the frozen foods section, the walls are uplighted with luminaires mounted at the top of freezer and refrigerator cases (type E), which makes the space feel bright and open without the distraction of glaring luminaires. Linear pendant luminaires with parabolic louvers (type F) are used to light foods in the low cases. Special low-temperature fluorescent strip lighting built into the vertical cases provides most of the lighting for these goods.



Frozen foods in section



Produce area



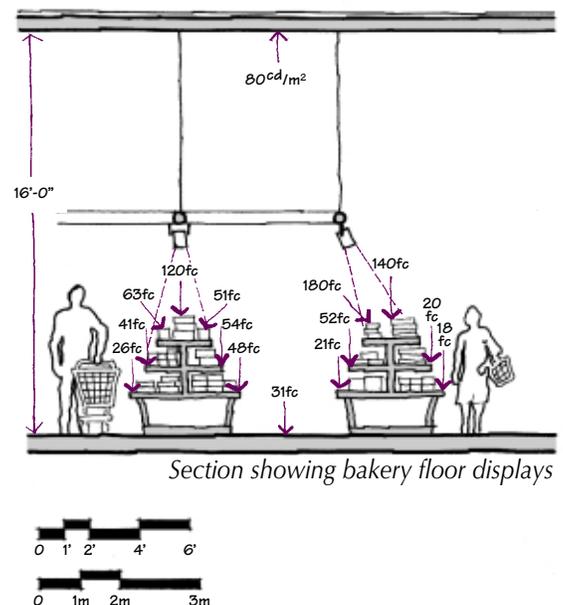
The lighting in the case areas of this store is well designed. Freezer cases with glass doors pose a special lighting problem. Illuminances inside the case must exceed those outside the case, otherwise reflections will make the products difficult to see. The ratio of inside to outside illuminance is at least 1.6 to 1, making the products inside the cases easy to see.

**Produce** Lighting is especially important for scrutinizing fresh produce. Fruits and vegetables lend themselves to a visually dramatic scene, and the lighting heightens this effect by concentrating light onto the produce itself rather than onto the floor and ceiling. Downlighting is provided by linear fluorescent pendants (type G) above the produce bins as well as by lighting built into the wet cases along the wall. A small amount of uplight is provided on the walls by inverted fluorescent industrial luminaires (type E) mounted above the wet cases. Special lamps are used in the wet cases (3000 K, 80 CRI). They successfully bring out the color of the produce.

**Bakery** The lighting over the service counter of the bakery area is similar to the lighting over the deli counter (type H).

Over the baked goods display racks a decorative track system is configured from an extruded aluminum tube suspended above the floor. Hanging from this track are nine 70-W double-ended compact metal halide track lights with 3/4" x 3/4" (19 x 19 mm) black cube louvers for glare control (type M1). These lights produce strong highlights on some of the merchandise to attract the customer. The lighting creates strong patterns of light and shadow, however, and some merchandise is located in the dark areas between the beams of light, where it is harder to see. Four 150-W double-ended compact metal halide downlights (type K) provide a low level of ambient lighting, but do

not eliminate shadows on some products. The ratio of maximum to minimum illuminance varies as much as 10 to 1 on one bread display rack. The visual difficulties which arise from this non-uniformity could be mitigated with increased ambient lighting or by using track heads with a slightly wider beam spread.





# Details

**Deli** The service counter is the main focus of the deli department. Meats, cheeses, and prepared foods are displayed inside refrigerated cases, and sliced or packaged to order. Reflections on the glass case fronts are a common problem in supermarkets, because the reflections obscure the items inside. In this store, special care was taken to select low-brightness luminaires and to locate them at angles that would not reflect images in the glass. Horizontal illuminance inside the case (from case-mounted T8 lamps) is approximately 1.6 times the illuminance on the glass. Lights above the deli counter are concealed inside an architectural soffit (type H). A specular parabolic egg-crate louver cuts down on glare for the customer. A linear fluorescent luminaire with a prismatic lens, surface-mounted to the ceiling next to the wall behind the counter, washes the wall with light (type L). This keeps the deli area looking clean and bright.

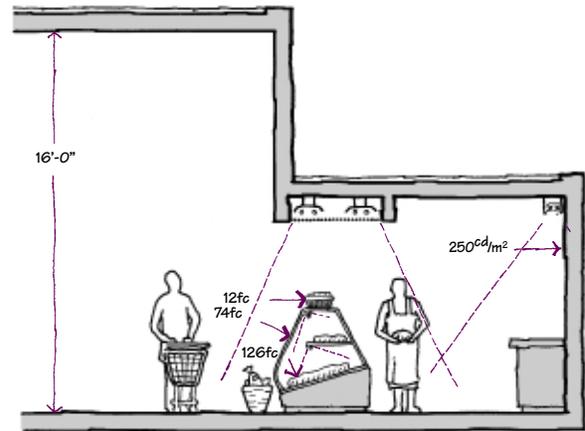
**Bulk goods** The bulk goods aisle contains various products in large quantities. The bulk goods area is lighted with 70-W double-ended compact metal halide track lights similar to those used in the display area of the bakery but without glare-control louvers (type M2). The lighting results in an average vertical illuminance of 95 fc (1000 lx) on the goods 6' (2 m) above the floor, and an average vertical illuminance of 18 fc (190 lx) on the goods 1' (0.3 m) above the floor. The track lights produce very uneven illumination, however. At several positions, vertical illuminances exceed 500 fc (5000 lx), and there is insufficient ambient light from the adjacent grocery and produce sections to overcome the perception of spottiness.



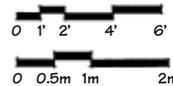
The photo above, from another store, illustrates a common problem in case lighting. The white stripe is the reflection of a fluorescent lamp that obscures the view of the food.



The A&P deli case was designed to minimize reflections on the case glass.



Deli counter in section



Bulk goods

**Florist** The merchandise in the florist area of the store is lighted primarily by thirteen 70-W double-ended compact metal halide track lights with black cube louvers, mounted on a rectangular array of decorative tubing above the floor (type M2). These lights are aimed at floral arrangements on two kiosks within this area. Twelve recessed luminaires, each with four T8 lamps (type N), provide general light. Additional ambient light is provided by uplighting from industrial fluorescent striplights mounted above the display cases against the walls (type E).



Florist area

During both daytime and evening, horizontal illuminances on the kiosks average 90 fc (970 lx) and range from 67 to 130 fc (720 to 1400 lx). Illuminances on the floor between the two display kiosks in this area are 77 fc (830 lx) during the day and 67 fc (720 lx) at night. The large number of luminaires contributes to the high, uniform illuminances in this area; however, the track lights are an especially troublesome source of glare for shoppers.

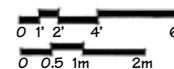
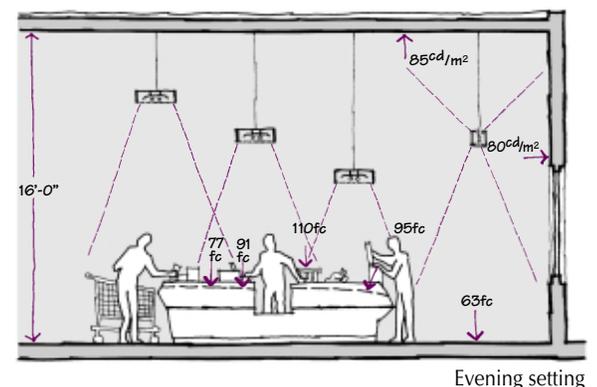
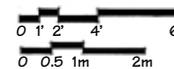
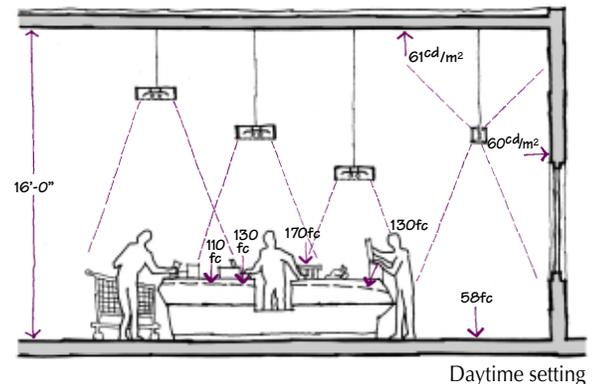
**Checkout** The checkout area, comprised of conveyor, register and produce scale, is lighted by a combination of electric lights and daylight. Three rows of luminaires (type P), each containing two high output T12 fluorescent lamps and small cell louvers, produce a horizontal illuminance of 130 fc (1400 lx) on the register areas during the daytime and 91 fc (980 lx) during the evening. The two rows of luminaires near the windows are automatically switched off during daylight hours.

A row of two-lamp T8 square tube up/downlights near the windows was operated only during evening hours to brighten the walls near the windows (type R). During the DELTA evaluation, it became obvious

that operating these lamps during the day prevents these walls from appearing dark relative to the windows. This change has since been implemented. These luminaires use semi-specular parabolic louvers on the bottom side and a prismatic lens on top. When this row of luminaires is on, the luminance of the wall adjacent to the window is 51 cd/m<sup>2</sup>. Eight adjustable 150-W double-ended compact metal halide downlights (type Q) are also used opposite the register area for lighting displays of magazines, candy and other products.

The light levels are sufficient for cashiers to read coupons, price tags, bar codes and the keys of the cash register. The louvers on the overhead luminaires eliminate glare and contribute to visual comfort in this area.

**Neon signs** Throughout the store, decorative neon signs are used to identify departments. They add color variety but only consume 4 to 8 watts per linear foot.



Section showing checkout area electric lighting conditions



# Project Evaluation

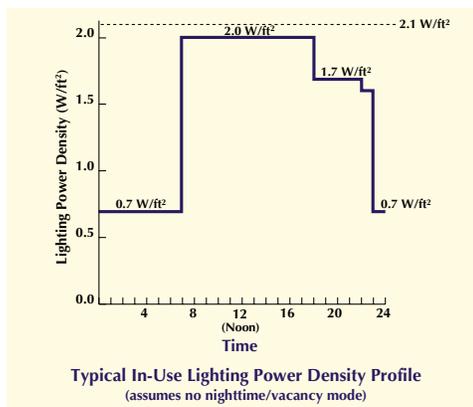
## Energy Impact

### Lighting Power Densities (LPDs) Based on Total Connected Loads

Section	Area (ft <sup>2</sup> )	LPD (W/ft <sup>2</sup> )
Total store	43,139	2.1
Grocery aisles/bulk goods	13,376	3.2
Frozen foods	3,062	1.6
Produce	2,098	1.5
Deli/meats	4,498	2.1
Bakery	1,541	2.1
Florist	1,080	3.0
Checkout	2,853	2.9
Food prep/storage	14,631	1.1

$$W/ft^2 = 10.76 W/m^2$$

The lighting and controls system meets the objective of energy conservation. The actual in-use power density for the entire store is 2.0 W/ft<sup>2</sup> during daytime hours and 1.7 W/ft<sup>2</sup> during evening hours, and it falls to 0.7 W/ft<sup>2</sup> when the store is closed for restocking, and to 0.1 W/ft<sup>2</sup> when the store is closed and vacant. The total connected LPD for the entire store is 2.1 W/ft<sup>2</sup> (which compares favorably to 2.7 W/ft<sup>2</sup> stipulated by the state building codes at the time of construction). An energy management system (EMS) controls the lighting so that manual switching, while possible, is not required.



$$W/ft^2 = 10.76 W/m^2$$

**Controls** The EMS installed in this store is tied in to the A&P Corporate Headquarters as well as Division Headquarters in Springfield, Massachusetts. Lighting control changes can be programmed from within the store or from a remote location, but normally the store manager contacts an energy management specialist in Springfield for any needed changes. There is a service contract with the controls equipment manufacturer for maintenance on the system, and the contractor checks the equipment on a regular basis. Should there be a failure in the control system, the lights fail on, so that the store never appears dark.

One added capacity an EMS brings is the ability to respond to utility demand problems rapidly. On extremely cold winter days or very hot summer days, utilities may ask businesses to reduce their electric loads to avoid a power shortage. A&P can reduce the lighting to the lower evening levels within minutes of this request. In some areas, the utility customer who agrees to interrupted or reduced loads may get a lower electricity rate.

The EMS is programmed to produce four principal lighting modes in the store. These modes are:

▲ **Daytime.** All lighting in the store is switched on, except for one row of lamps in the downlights above the checkout area, where daylight from adjacent windows contributes significant illumination. The daytime mode of operation begins at 7 a.m. when the store opens, and ends at sunset, at a time determined by a roof-mounted photocell.

▲ **Evening.** Beginning at sunset, half the lamps in the grocery aisle valances are switched off, and all the lamps in the luminaires in the checkout area are switched on. This mode of operation continues until the store closes at 11 p.m.

▲ **Nighttime/Restocking.** After 11 p.m., all accent lighting, neon tubing and most wall uplights are switched off. This mode allows restocking and cleaning operations to take place, and usually lasts until the store opens at 7 a.m.

▲ **Nighttime/Vacancy.** On the rare occasions that the restocking and cleaning operations are completed before the 7 a.m. opening, the maintenance crews leave the building, and all lighting in the store is switched off, except for the uplights above the grocery aisles. These luminaires provide a low ambient light level for security.

This controls schedule, which reduces light levels in the store during evening hours, results in significant energy savings compared to keeping all lights on full throughout business hours. DELTA estimates that over 100 kWh per day are conserved using this lighting control system.

*“The best part of the lighting in this store is that I don’t have to switch off 75 breakers when I go home at night.”*  
-night store manager



## Environmental And Economic Analyses

By using T8 lamps in the main store areas for the general illumination rather than T12 lamps, and by using an energy management strategy designed to reduce light levels during the evening when customers are more adapted to the dark, A&P Old Lyme is able to achieve significant energy and cost savings. In addition, planned maintenance at regular intervals (complete relamping occurs every 30 months with spot relamping performed every 45 days) allowed A&P during the design phase to plan for lower initial illuminances throughout the store with no sacrifice to maintained illuminance levels.

The initial lighting cost was \$27,500 higher than it would have been with conventional T12 lamps and magnetic ballasts. The energy management system controls added \$21,000 to the initial cost. The total translates to \$1.12 per square foot (\$12 per square meter). These incremental costs were paid for with incentives from The Connecticut Light & Power Company's Energy Conscious Construction Program. Even without incentives, these investments would pay back in less than three years. DELTA estimates that the annual energy reduction from the lighting and controls is nearly 280,000 kWh (including savings from the air-conditioning system). This translates into an annual savings of \$16,700 when compared to a conventional lighting system with simple switching. (Rather than compare this store to a conventional store with all lights burning 24 hours a day, DELTA assumed the conventional store's lighting would have been switched to half level during stocking and cleaning [11 p.m. to 7 a.m.]

According to estimates used by CL&P, reduced energy usage for this store will annually result in lower power plant emissions of 222 fewer tons of CO<sub>2</sub>, 1.5 fewer tons of SO<sub>2</sub>, 0.4 ton less of NO<sub>x</sub> compounds, and 0.1 ton less of particulates into the atmosphere. These compounds directly contribute to problems such as global warming, acid rain and smog.

## Customer Response

The success of a supermarket is measured in sales, and sales depend on customer attitudes. DELTA surveyed 112 A&P customers for their impressions of the lighting system in the store. The survey questions asked them to evaluate the attractiveness, comfort and ability to see in the store, and to compare this store with other typical supermarkets. They were also asked about the lighting in individual departments.

*"The lighting in the entire store is excellent, and as I have cataracts, I'd complain if it weren't."*

-customer

People were very satisfied with the lighting in the store: 98% agreed that it was attractive, 99% agreed that it was easy to see merchandise and 96% agreed that the lighting

was comfortable. Some 63% stated that the lighting was better or much better than lighting in other supermarkets, 34% that it was about the same, and less than 3% that the lighting was worse. Survey results from specific departments showed that there were differences in the ratings among the store areas. Although all areas were judged to be satisfactory, the grocery aisles and the frozen food section were identified as the places that were the most attractive and comfortable, and where it was easiest to see merchandise.

*"I think this lighting is attractive and sufficient without being overbearing. I have always been able to see merchandise without taking out my glasses to read labels."*

-customer

The bakery and the florist areas were least satisfactory. When asked to rank areas from best to worst lighting quality, the grocery aisles and the produce aisles were judged best, while the bakery and bulk foods aisle were judged the poorest. Written comments from customers most often mentioned glare and extreme brightness in the florist and bakery areas as problems, and a desire for more uniform lighting in the produce section.

Many also noted how comfortable the lighting is in the store, and mentioned how easy it is to read labels in the grocery aisles. There were no significant differences in customers' impressions, whether they were questioned during the day (8 a.m. to 2 p.m.) or evening (5 p.m. to 11 p.m.).

*"The lighting is more comfortable and relaxing than in other stores."*

-customer

### Percentages of People Who Agreed That the Lighting is:

Area of Supermarket	Attractive	Comfortable	Easy to See
Overall Store	98%	99%	96%
Grocery aisles	95%	96%	96%
Frozen Foods	96%	93%	96%
Produce	93%	91%	89%
Deli/Meats	93%	91%	95%
Bakery	87%	85%	85%
Bulk Goods	92%	93%	97%
Florist	87%	86%	92%
Checkout	90%	92%	96%

**Staff Response** The DELTA team interviewed members of the staff at this store to learn whether they believe the lighting is effective for displaying goods, for selling goods and for stocking cases and shelves. In addition, DELTA wanted to know about any maintenance, glare or color problems, or anything the staff would change about the lighting.

The staff and management were overwhelmingly satisfied with the lighting. Overall, the lighting in the grocery aisles was reported as making the products on the shelves look appealing with little glare. Many employees felt the lighting integrated into the store fixturing made the store look clean and neat. The staff also reported that the energy management system was effective at changing light levels in the store and provided adequate light for store maintenance and cleaning. They reported that customers noticed the switch between lighting modes, but that the customers had not complained about it.

Only a few maintenance issues were mentioned by staff and management. Although the double-ended compact metal halide track lights were effective for displays, such as egg-washed bread in the bakery area, some of these lamps burned out quickly. Several fluorescent lamps above the deli counter also were reported to flicker. These concerns, however, are mitigated by the effective service of the contracted lighting maintenance company, according to staff. The store manager reported that he rarely had to concern himself with the store lighting.

Several employees who worked in the food preparation areas said that some of the areas involving critical visual tasks, such as meat trimming and dishwashing, should have higher light levels. Some of the track lighting in the bakery area, especially where a few luminaires with tightly focused light beams were



Customer survey

used in a low-overhead configuration, made the bakery displays appear dark and dull.

Some deli employees observed that the fluorescent lighting in the prepared food and sausage cases does not switch off at night, and may be contributing to the discoloration of certain salads and meats. They have learned to cover the sensitive food with opaque plastic wrap to minimize exposure when the deli is not open.

In general, the staff and management are very pleased with the lighting in this store. Many of the employees who had worked in other supermarkets stated that the lighting in the Old Lyme store was a great improvement over conventional lighting, because it makes the store look pleasant and feel comfortable.

***"In trying to meet our energy goals, we discovered that we could also help an important customer meet its goals for cost savings and lighting quality."*** -Peter Morante, Northeast Utilities

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**Program Manager:** Naomi Miller

**Program Director:** Russell P. Leslie

**Evaluation Team Leader:** Peter Boyce

**Publication Manager:** Judith Block

**Research Associate:** John Bullough

**Evaluation Team:** Neil Eklund,

Kimberly Daley and Robert Strobel

**Technical Assistance:** Krystof Pavek and

Xin Wang

**CREDITS**

**A&P Corporation:**

Utility Specialist: Anthony Pashalian

Designer: Richard Sokolnicki

Engineers: David Tomicki and

Mary Upham

Director of Engineering: Maurice Lindfors

Director of Maintenance: Richard Lyons

Energy Manager: Judith Andersen

**Northeast Utilities System:**

DELTA Project Contact: Peter Morante

CL&P Project Representative:

Brian G. Roth

ECC Project Administrator:

William J. Knapp

Corporate Communications:

Peter Chamalian

**Maintenance:**

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For publications ordering information write or fax:

Lighting Research Center, Rensselaer Polytechnic Institute, Troy, New York 12180-3590 • FAX (518) 276-2999

