



Eco Development LED Lighting Project Case Studies

DEPARTMENT OF REHABILITATION

General Benefits of LED Conversion

- Improved Safety and Visibility through enhanced optics and better CRI
- Increased Site Lighting with higher foot-candles, more consistency, and even controls
- Reduced Energy Costs by utilizing longer lasting and more efficient fixtures
- Lower Maintenance Costs as LED fixtures typically last for over 20 years
- Sustainability by lowering energy usage while minimizing light pollution
- Greater Asset Management through monitoring and metering capabilities
- Utilizing Controls to customize the lighting solution



Sample Project Highlights

Load Reduction: 178.94 kW	kW Hours Saved: 783,774 / Yr	Energy Cost Savings: \$70,000	Fixtures Installed: 153	Fixtures Eliminated: 22	Wattage Reduction: 68%
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HOLOPHANE
LEADER IN LIGHTING SOLUTIONS

Prison Equipped with Holophane LED Lighting

Project Description

In the Spring of 2018, Eco Development was tasked with finding a solution for a local elementary school. The goal was to increase the foot candles in the gymnasium area while still saving energy.

After conducting a field audit at the school and holding several discussions with the staff, it was clear that there was an opportunity to eliminate some fixtures from the existing layout. The school's gymnasium contained 30 400-watt metal halide fixtures. Eco Development teamed up with Holophone to use the Phuzion General (PHG), which was perfect for this solution. The PHG, with an 18,000-lumen package only requires 131 watts to function. This allowed Eco to eliminate 15 of the original 30 fixtures while increasing the foot candles from 25 to 50. We also reduced the wattage by over 600%, going from 13,950 watts to just 1,965 watts total, making this an extremely successful project.

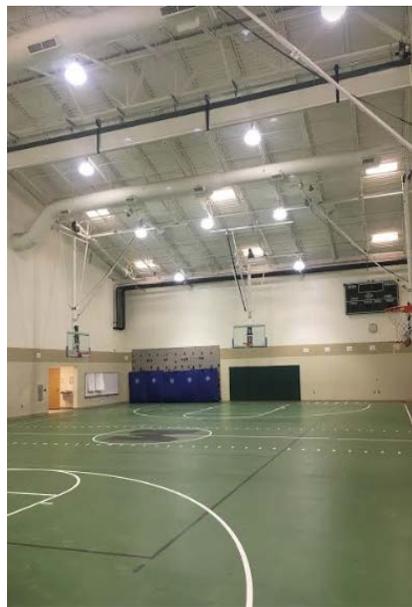


Elementary School Gymnasium

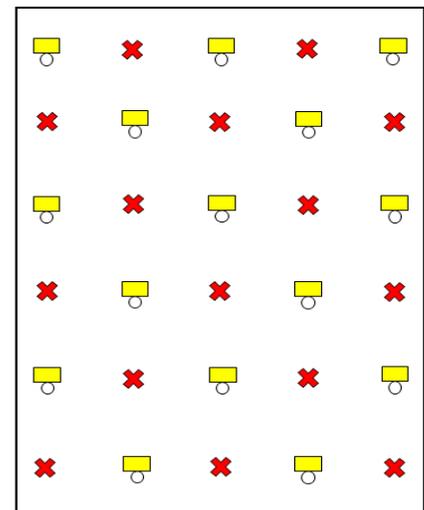
LED Fixtures Installed: 15	Kilowatts Reduced: 11.99	Kilowatt Hour Savings: 45,738	Total Annual Savings: \$6,047.55	Annual ROI: 37.66
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Before: 30 Fixtures



After: 15 Fixtures



	New LED Fixture
	Fixture was removed

New Lighting Layout

AK STEEL

LED Project: Middletown, OH

April 2016

Project Description

Not all environments pertaining to lighting are created equal and AK Steel presents one of the most rugged. When considering viable lighting solutions in AK Steel extreme heat, dust, vibration, and very high mounting heights are just a few of the considerations. Eco Development partnered with Graybar to find the best lighting solution for the Middletown location.

After much research and thorough field testing, we selected the Phuzion Industrial High Bay from Holophane Lighting. It was the best performing and most reliable fixture that was tested. We specified it with a 30,000 Lumen 5K package. Even after eliminating roughly 30% of existing fixtures, foot candles were increased, sometimes, upwards of 200%. Mounting heights for this installation ranged from 40' to 65'.

This project qualified for very substantial Energy Rider discounts through an exemption program offered through PUCO. Eco Development conducted all of the pre and post analyses to qualify for these lucrative rate reductions. These types of programs are only available to very large energy users.



Green Coil Storage: Before & After

Fixtures Installed: 1245	Fixtures Eliminated: 362	Wattage Reduction: 74%	Load Reduction: 993.71 kW	kW Hours Saved: 8.7 Million / Yr	Energy Savings: \$2.93 M
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Left: East Processing during installation. Shows disparity of existing and new.

Right: Hot Roll Processing during installation. Front is existing and back is complete.

KAO BRANDS

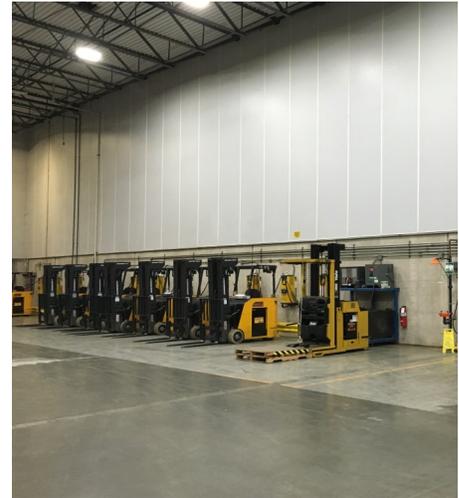
LED Project: Port Union, OH

February 2016

Project Description

Kao Brands, USA occupies an expansive facility where it conducts warehousing and distribution operations. The existing fixtures in this terminal were 6-lamp T8 and T5 linear florescent high bays. They were delivering 17-Foot Candles to the floor from a 34' mounting height. The objective of this project was to replace the existing fixtures with a more efficient, longer last solution while not sacrificing delivered light.

Eco Development proposed and installed 95W and 140W LED high bays with occupancy sensors and used the existing circuitry and wiring to minimize costs. The new solution drastically reduced energy consumption while actually increasing foot candles. After completing installation, foot candles in the aisles were raised to 20-23 and in the open areas, near the docks, foot candles now range from 34-42. The new solution will be virtually maintenance free for over 10-years.



LED Solution

Fixtures Installed: 1087	Wattage Reduction: 59%	Load Reduction: 138 kW
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Project Savings

Energy Savings: \$123,000 / Yr	Maintenance Savings: \$14,620 / Yr	Return on Investment: 1.60 Years
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“We are very happy with the work Eco Development did at our Port Union, OH facility. The terminal is much brighter and safer. The LED Solution looks great and our savings are incredible!”

- Robert Humbarger, Facilities Director

ONTRAC

LED Project: Commerce, CA

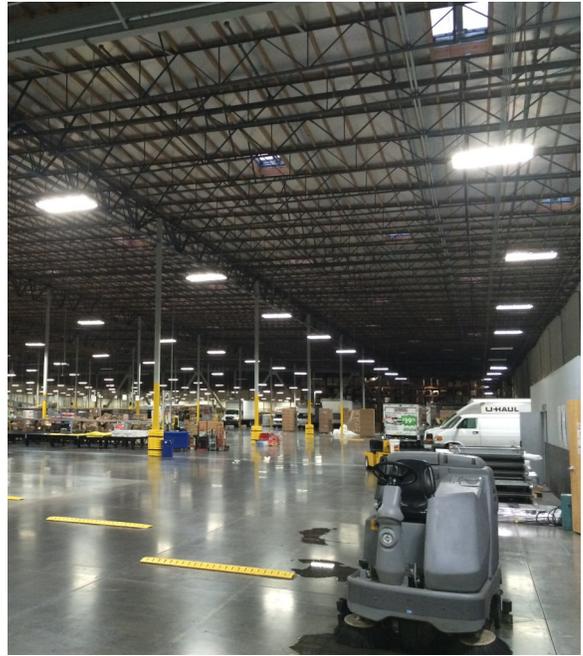
April 2015

Project Description

OnTrac is an express courier company which operates out of 37 states. It utilizes terminal facilities, such as this one in Commerce, CA for package sorting and distribution. The goal of this project was to decommission the existing 6-lamp T5 high bays and replace them with more efficient, longer lasting LEDs.

Eco proposed a 24,819 Lumen LED high bay from ILP for the task. This fixture combines the needed Lumens for the existing layout and mounting height of 32' and the necessary controls technology for Title 24 Compliance in California. Eco has experienced great success with this fixture in environments such as OnTrac - Commerce.

Upon completion, the new LED fixtures deliver 34-42 foot candles to the floor with a lighting power density of only 0.184 (previously 0.307). They will serve this facility virtually maintenance free for the next 10-plus years.



Fixtures Installed: 307	Hours Saved: 19%	Wattage Reduction: 42.5%	Load Reduction: 66.31 kW	Energy Savings: \$51,272 / Yr	Cash on Cash Return: 31%
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This project required a substantial exterior package for the building grounds as well as the loading docks. Eco replaced existing 400W and 1000W HID Wall Mounted Floods with Holophane Mongoose LED Floods. The Mongoose is powerful and versatile, which makes it perfect for these types of applications. Separate optics packages were used for the grounds and general purpose lighting and a higher lumen package was used for the loading docks.

Case Study: Licking Heights School District

Project Overview



HVAC Contractor	Bruner Corporation
Property Type	Elementary School
Project Goals	Reduce energy costs; Fix uneven heating
Before Duct Sealing	55% Leakage of treated air
After Duct Sealing	2% Leakage of treated air
Results	Reduced leakage by 27,350+ CFM Reduced energy bill by \$45,000/year Eliminated uneven heating issues

Project Description

The new superintendent at Ohio's Licking Heights school district thought the costs for heating and cooling all of its school buildings were high, but one elementary school stood out. Its energy bills were double that of a similar school in the district, and the building was plagued by uneven heating. To keep warm, students and teachers in the far wing of the building often wore hats and coats during class.

An energy audit revealed that, like most U.S. buildings, each school was losing 30% or more of treated air through leaks in the ductwork. West Elementary School was particularly problematic, losing over 50% of treated air. Several solutions were compared, but aerosol duct sealing proved to be a superior choice with a lower cost, limited disruption, and strong guarantee. The entire project was conducted over the winter holidays. When the teachers and students returned, all of the classrooms were warm and comfortable.

With the ductwork effectively sealed, the district estimates that it will save \$45,000 each year on utility costs. The school also received a rebate of over \$27,000 through an energy savings program offered by the school's utility company. The district is now looking at having its 4 other schools sealed as well.

Testimony

"I am always skeptical about claims that sound too good to be true, so when I first heard about AeroSeal, it was originally, in my mind, the least appealing option. But after doing some research and learning about its use at other education facilities including an Ohio State University dormitory, it quickly became the solution of choice. In the end, this was one of the smoothest projects we've ever had done at this school. It came in within budget and on time. The results met every expectation and then some." - *Dr. Philip Wagner, Superintendent, Licking Heights School District*

Case Study: Nemours Children's Clinic



Project Overview

HVAC Contractor	Carrier Corporation
Property Type	11-story outpatient medical facilities
Project Goals	Improve airflow; reduce the risk of nosocomial infections
Before Duct Sealing	Total system leakage: 4,912 CFM*
After Duct Sealing	Total system leakage: 723 CFM
Results	85% reduction in leakage

* Cubic feet per minute

Project Description

There had been so many retrofits and extensions to the ventilation system at Nemours Children's Clinic in Jacksonville, FL, engineers weren't sure where their airflow problems were coming from. What they did know was that negative pressure and inadequate ventilation throughout the 30+ year old building could support the spread of nosocomial infections. Taking control of the situation involved sealing the leaks in the exhaust shafts located on each floor, then sealing the main shaft running the length of the 11-story building.

Duct sealing throughout the entire clinic took less than 30 days to complete. Improvement in the exhaust system's efficiency was immediate and obvious. With the ductwork effectively sealed from the inside, engineers were able to accurately analyze the system and upgrade it with regulating dampers and other flow-adjusting technologies. Now, the building's exhaust system is optimized at all times. The bottom floors are as well-ventilated as those on the top. Most importantly, the air being exhausted is coming from the rooms and common areas that need it; contaminated air is being removed from the building. As a bonus, the clinic is able to run its exhaust fan at a fraction of the power that was previously needed, saving the clinic substantially on energy costs.

Duct Sealing Technology

- Developed at Lawrence Berkeley National Laboratory in 1994
- Research was partially funded by the EPA and the U.S. Department of Energy
- The only duct sealant technology that is applied from the inside of the duct system
- Delivered as a non-toxic aerosol mist that seeks out and plugs leaks
- Proven to be 95% effective at sealing air duct leaks

Case Study: Precision Strip, Inc.



Project Overview

Annual Savings	\$42,657.74
Simple Payback	3.51 years
Real Payback	3.06 years
5-Year Cost of Ownership Savings	\$271,788.71

Project Description

At the Precision Strip, Inc facility, Eco Development removed 585 HID HiBay fixtures, ranging from 275 watts to 575 watts per fixture. Eco reformatted the lighting layout to the most energy-efficient distribution, creating 5 uniform rows for each of the 3 bays retrofitted. The installed fixtures were 6-lamp, T5 HiBay fixtures, equipped with motion sensing technology. The new fixtures and improved layout provide a uniform 51 footcandles throughout the facility, while also reducing the energy costs of the lighting by 25%. Lastly, the T5 solution is rated for 40,000 hours of life, with very little light degradation.

Historical Saving Averages

The following savings numbers are averages of warehouse lighting retrofits by Eco Development:

Wattage Reduction	Hours Reduction	Project Payback	Annual Maintenance Cost Reduction	Annual Cost of Ownership Reduction	kW Reduction
64%	22%	1.86 years	\$32,145	\$12.50/fixture	46.7