

Lighting for security

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Cargo theft on the rise

Mr. Michael Schuler, Supervisory Special Agent for the FBI based in Washington, DC assigned to the Major Theft Unit gave some very disturbing figures pertaining to cargo theft worldwide at a recent American Society for Industrial Security (ASIS) Convention.

He stated that cargo theft worldwide exceeds US\$30-50 billion in losses annually. Mr. Schuler feels this number is greatly understated because many cargo crimes go unreported. The good news for ports and terminals may be that the vast majority of cargo losses occur outside of the seaport.

Some U.S. port areas hit the hardest in the past 5 years have been Newark/New York, Miami and Long Beach/Los Angeles, with recent increases seen in San Jose, San Francisco, Memphis and Chicago. He noted that cargo theft is an international problem that is on the rise.

Perception is reality

The installation of security lighting no matter what type of facility, port, terminal, loading area, storage or even a ships water line, creates the perception of security for the protection of people and property.

Taken directly from the Illuminating Engineers of North America (IESNA) Handbook on Safety and Security Lighting, there are some very straightforward principals to follow:

- Integrate light into the total security system and thereby facilitate the effectiveness of other security devices or procedures. Illuminate objects, people, and places to allow observation and identification and thereby physically reduce criminal concealment.

- Use illumination to deter criminal acts by creating a fear of detection, identification, and apprehension.
- Reduce the fear of crime for the innocent by enhancing a perception of security.
- It is very important to note that the application/design of security lighting in and around ports and terminal must be done with great care as to not interfere with navigational aids. Keeping in mind that security lighting is only one segment of a total security system.
- This article is not intended to make a lighting designer out of the reader but to assist in raising the right questions and concerns pertaining to a given application and the selection of a professional lighting designer as may be needed for new construction or upgrade of an existing facility.

Controlled areas

Areas such as storage yards, container terminals, large open areas, and docks are typically illuminated through the use of floodlighting or roadway fixtures on poles 10m (30') or more in height. In some specific locations such as very large open areas larger 30m (90-100'), towers are also used with an array of four to five, 1,000-1,500 watt metal halide area style fixture associated with a motorised lowering device to facilitate service. These tall light towers, as they are some time referred to have come under fire from organisations such as "The Dark Skies Organization". This is due in part to the light pollution that can be produced from these tall poles. Many municipalities have put legislation into place or are pending, which will limit pole heights to 10m (30') for all areas other than public roadways.



Illuminate objects, people, and places to allow observation and identification and thereby physically reduce criminal concealment.

These requirements can dramatically affect the number of poles required, installation, energy and maintenance costs.

Lighting definitions used

The following definitions are used in this article that a reader may or may not be familiar with, and are being provided to help the reader better understand the content.

Illuminances: Light arriving at a surface, expressed in lumens per unit area, 1 lumen per square foot equals 1 foot-candle, while 1 lumen per square metre equals 1 lux.

Lumen: The unit of measure produced by a lamp source

CRI: Colour Rendering Index, is any lamps ability to render colours accurately.

Recommended average illuminances

Recommended Illuminances for ports and terminals would typically fall under the following categories:

Large Open Areas	5-20 Lx (0.05-2 fc)
Buildings/Containers	5-20 Lx (0.05-2 fc)
Perimeter Fence	5 Lx (0.05fc)
Entrances	100 Lx (10fc)
Gatehouses	30 Lx (30fc)

The above recommended illuminance values were taken directly from the IESNA designer's handbook and are for reference only. Actual application requirements such as obstacles (containers, buildings, trees, or topography) must be factored in along with operational costs. As a guide, an average-to-minimum illuminance ratio of 8:1 should be achieved for the areas noted. Existing ambient light that may be natural (moon light), or artificial light from other properties may need to be overcome to allow for maximum contrast and improved visibility of a given area.

Lighting technology

There are three basic lamp technologies at our disposal, each having their own pros and cons.

Incandescent

Pros: Instant on, low initial cost, compact size, good CRI, works in cold temperatures, no ballast or transformer required to operate.
Cons: Short lamp life, subject to vibration, low lumens per watt.

Fluorescent

Pros: Instant on, mid range initial cost, good CRI, good lumens per watt, long lamp life.
Cons: linear shape in most cases, requires large fixtures, reduced lumen output in cold temperatures and will not light at all in very low temperature applications. Does not project well due to the linear shape.

High Intensity Discharge

Pros: Good Lumens per watt, compact point source allows for good control in a fixture, full lumen output in low temperature conditions, long lamp life, and not dramatically effected by vibration.
Cons: Slow start and re-strike time, poor CRI (except Metal halide), most expensive initial cost.

Light Emitting Diodes

The industry is seeing wider applications for Light Emitting Diodes (LED) than every before. But not in the area of lighting outdoors, they are being used in beacon lights, automotive industry, traffic signals, and interior/exterior signs. Their current intensity and size have limited their use for general area lighting.



Use illumination to deter criminal acts by creating a fear of detection, identification, and apprehension.

Right lamp for the application

Now that we have reviewed the three major lamp families we will focus on the use of the High Intensity Discharge lamps, which consisting of: Mercury, Metal Halide, High Pressure Sodium, and Low Pressure Sodium and their application for interior/exterior security/general lighting.

Mercury lamps are typically no longer used due to their poor colour and high lumen depreciation over the life of the lamp. High and Low Pressure Sodium lamps have improved lamp life and lumen depreciation is good over the life of the lamp, has good lumens per watt, but has a very poor CRI. These lamps are commonly used in large open areas, in, on and around container handling dockside as well as on board ships where colour is not a critical issue.

Metal Halide lamp technology on the other hand has dramatically improved in recent years with the introduction of Pulse Start Metal Halide. This lamp source has reduced start/re-strike time by two to four minutes, has improved longevity, has good lumens per watt, all while producing bright visible white light. This lamp source works very well with black and white as well as colour security cameras, and aids in identifying proper colours of a vehicle, container labels, or ship identification markings.



A lighting system is only one tool in the toolbox of good security. It must be combined with other devices, guards, etc.

Fixture type and rating for the application

With a few specific lamp types selected, High Pressure Sodium and Metal halide, we will now place that lamp source in the right fixture for the application.

For large general open container storage areas or similar use areas, we typically would use the high mast light towers mentioned earlier, with an array of high bay style fixtures with 1,000 watt metal halide or high pressure sodium lamps. If more directional control of the visible light is needed, we would use flood lighting style fixtures which are manufactured with different distribution patterns I thru V. Type I distribution would be used when a very narrow light beam or pattern with all light directed forward and none behind the fixture is needed, where as type V distribution would be used when a very wide pattern of light is needed.

Fixtures will carry several ratings or approvals for the application or atmosphere that they are being used in. All fixtures should carry a Underwriters Laboratory (UL), CSA or other similar rating depending on country of manufacturing. Ratings must be considered when fixtures are to be used in ports or any area near water including salt water. International Protection (IP) is a method of rating how well an electrical enclosure (light fixture) is sealed to keep out foreign objects, dust, and moisture. This rating system has been used worldwide for years everywhere except the U.S., which has now adopted this same rating system. All fixture and electrical component manufactures, which produce fixtures for marine use, will reflect these ratings. A two digit numbering system will designate what level of protection the fixture is rated for.

Security lighting summary

With many readers being International Maritime Organization (IMO) members and signatories to SOLAS amendments for improved port security, you are aware of the importance of good, state of the art, dependable lighting.



Storage yards, container terminals, large open areas, and docks are typically illuminated through the use of floodlighting or roadway fixtures on poles.

Remember a lighting system is only one tool in the toolbox of good security. When combined with other devices, guards, etc. the goal is the same:

Deter – Discourage – And Prevent

- Disable – physically and psychological.
- Ensure illusion of life – light and sound.
- Project light away from supervision – human or video.
- Guard against supervisor losing dark adaptation.

Always consult with a licensed professional in the field of security, lighting and electrical that is well versed in all electrical codes, light encroachment laws, energy codes and maritime requirements that may apply before attempting to construct new or modify an existing lighting system.

ABOUT THE AUTHOR

Michael J. Walls, CLMC, LC, CLEP holds a degree in Architectural Drafting and Design from Columbus State Community College, is Co-Founder and Owner of Master Lighting Service, a full service lighting design, installation and service company serving all of Ohio.

Mr. Walls holds certifications from the International Association of Lighting Management Companies (NALMCO), and was instrumental in the development and teaching of the Certification program (CLMC) for that organisation. He also holds the credentials of Lighting Certified, and Certified Lighting Energy Professional.

Mr. Walls is a past President of NALMCO and as an Ambassadors Club member for NALMCO he keeps the industry informed of developments in the security arena through his involvement in the American Society for Industrial Security (ASIS).

He has been an active member of the Illuminating Engineers of North America (IESNA) since 1983, most recently serving on the Dirt Depreciation Committee that just completed a 10 year study, which culminated in the writing of the IESNA publication RP-36-03, Planned Indoor Lighting Maintenance.

ABOUT THE ORGANISATIONS

The International Association of Lighting Management Companies (NALMCO) is an organisation of lighting management and related companies who are committed to promoting professional lighting management techniques, the benefits of quality lighting and to fostering the expansion of the lighting management industry in a professional and ethical manner for the benefit of its members and end users.

The Illuminating Engineers of North America (IESNA) is the recognised technical authority on illumination. For over ninety years its objective has been to communicate information on all aspects of good lighting practice to its members, to the lighting community, and to consumers through a variety of programmes, publications, and services. The strength of the IESNA is its diversified membership: Engineers, architects, designers, educators, students, contractors, distributors, utility personnel, manufacturers, and scientists, all contributing to the mission of the Society: To advance knowledge and disseminate information for the improvement of the lighted environment to the benefit of society.

ENQUIRIES

Additional information on the topic of port security and security lighting can be found at:

www.securitymanagement.com

www.iesna.org

www.asisonline.org

Lighting Contractor Information for the US can be obtained at:

www.nalmco.org