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Agenda

1. Outdoor Lighting Design Considerations

2. Study of Equivalent Lighting
Outdoor Lighting Design Considerations
Four Key Reasons for Outdoor Lighting

1. **Safety:**
   - Protecting people from things including safe working conditions, safe passage and identification of hazards or obstructions.

2. **Security:**
   - Security lighting is intended to protect people and property from criminal activities.

3. **Wayfinding:**
   - Illuminating ones location, destination and means to get there from your current location.

4. **Aesthetics**
   - Designers raise the attractiveness of a design and assess what kind of emotions the lighting should evoke.
Why Outdoor Lighting

Separating the Two Issues

Safety:
Protecting people from things. This includes creating safe working conditions, safe passage and easy identification of hazards or obstructions.

Security:
Security lighting is intended to protect people and property from criminal activities.
Trip and Fall Hazards

+ Sufficient light required to show contrast

Hidden Objects

+ Vertical illumination is key to prevent injury
Safety

- Full spectrum color helps identify colors and objects
5-8.1.1

Illumination of means of egress shall be provided in accordance with this section for every building and structure where required in Chapters 8 through 30.

Means of Egress – A means of egress is a continuous and unobstructed way of exit travel from any point in a building or structure to a public way and consists of three separate and distinct parts: (a) the exit access, (b) the exit, and (c) the exit discharge.

Exit Discharge – That portion of a means of egress between the termination of an exit and the public way.

Public Way – Any street, alley, or other similar parcel of land essentially open to the outside air, deeded, dedicated, or otherwise permanently appropriated to the public for public use and having a clear width and height of not less than 10 ft.
700-16 Emergency Illumination

Emergency lighting systems shall be so designed and installed that the failure of any individual lighting element, such as the burning out of a light bulb, cannot leave in total darkness any space that requires emergency illumination.

Methods of Meeting Life Safety Code

• Building mounted using emergency battery pack or backup generator
• Pole mounted using generator-powered LED or secondary quartz source
• Bollards placed alongside the means of egress
Security

Security of Property and Persons

- Lighting alone, will not deter nor displace criminal activity.
  - Never heard: "Look at that well lit parking lot! I guess I can’t break in so I better go get a job."

- Effectively deterring crime entails increasing…
  - The time needed to perform a criminal act and then to escape
  - The probability of detection
  - The probability of apprehension
Does more light always mean better security? NO!

- There have been no studies that have implicitly linked higher levels of light to higher levels of security.
- However, it is universally understood that in most every case lighting adds to the *perception* of security.
- This perception of security results in increased occupants, meaning higher probability of detection and apprehension.

Providing lighting for the perception of security

- Requires more light than just lighting for safety
- Concerned with vertical footcandles for facial recognition
- Need to see details at greater distances
Security

**Surveillance cameras**
- Increase probability of detection
- Requires uniform lighting

**Security fences**
- Increases time needed to commit crime

Outdoor Applications and Design
Security

How not to light a guard shack
- Guards visible from outside
- Guards visibility is reduced

How to properly light a guard shack
- Task lighting illuminates desk inside without offering view in
- Brightest area is façade, only darkness behind
- Could add lattice grid on window
Wayfinding
Outdoor Applications and Design

Wayfinding

Achieving Success

+ **Illuminate where you are**
  + Whether coming from a parking lot or building, sufficient light must exist so you can navigate to the path.

+ **Illuminate where you are going**
  + Occupant comfort increases when the destination is lit.
  + Homing beacon

+ **Illuminate the path to get there**
  + Low light levels (safety) are sufficient to lead the occupant safely to their destination.
Floodlighting

+ **In-Grade / Ground Mounted**
  + May be In-Grade, or mounted above ground on stakes
  + Color can be used as an accent to architecture
  + Color quality can be a critical consideration
  + Distribution flexibility is a critical requirement
Floodlighting

+ Building / Pole Mounted
  + Maintenance on high wattage luminaire is #1 concern
  + LED Efficacy masks lower CU
  + Instant Re-strike a benefit in rec/sports applications
  + Principally a total cost of ownership solution
Study of Equivalent Lighting
We all struggle to find equivalent performance:

- between HID and LED products
- between different LED products

Designers have often used HID lamp wattage to determine equivalency.

LED wattage is not a sufficient determinant on light output!

Many rely on manufacturer’s recommendations and crossover tables.

But this gets difficult when manufacturers don’t use consistent criteria on their marketing!
Try a Google search of “400 watt Metal Halide Equivalent”

LED Wall Pack Light – 400W Metal Halide Equivalent - 12 LEDs - 40 Watt High Output LEDs

The LEDWP-400 LED Wall Pack Light offers high light output from a compact form factor and is designed to provide a more durable and long lived alternative to halogen and metal halide units. This 40 watt LED light produces illumination comparable to a 400 watt metal halide unit without the high heat, fragile construction, or high energy costs of incandescent lighting.

The LEDWP-400 LED wall pack light from Larson Electronics produces a long flood beam of light while drawing only 40 watts @ .45 amps at 120 VAC. The light assembly consists of twelve LEDs paired with high purity specular optics to produce a light output comparable to that of a 400 watt metal halide. This LED wall pack is designed to withstand demanding conditions and is waterproof, vapor proof, and built to resist the damaging effects of an outdoor environment.
### Equivalency

#### Specifications / Additional Information

**LEDWP-400 Wall Pack Light**

- **Lamp Type:** LED
- **Dimensions:** W-8 1/2", D-3 1/8", H-6 3/8"
- **Weight:** 4.5 Lbs.
- **Watts:** 40
- **Lumens:** 1462
- **Voltage:** 110~277 Volts AC
- **Lighting Configuration:** Flood
- **Mounting:** Adjustable Bracket
- **Wiring:** Pigtail
- **Amps:** .45
- **Beam:** 120' length x 60' width
- **Weight:** 4.5 lbs

**LEDWP-400 Features**

- Waterproof/Vapor Proof
- Operates on Standard 110-277 VAC
- Impact/Vibration Resistant Construction
- 50,000 Hour LED Life
- ETL Approved for Wet Locations
## MH Lumens and Life

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<th>Initial Lumens</th>
<th>Mean Lumens</th>
<th>Rated Life</th>
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<td>175W Vertical</td>
<td>13,500</td>
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<tr>
<td>1000W Horizontal</td>
<td>100,500</td>
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HID Equivalency 400W MH = 16,800

Outdoor Applications and Design

**HID Equivalency**

400W Metal Halide DSX1 with 60 LED @ 1000 mA

- **Lumens**
  - Initial Vertical Lumens
  - Initial Horizontal Lumens
  - Mean Lumens
  - Luminaire Efficiency
  - Maintained Delivered Lumens

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<tr>
<th>T/L</th>
<th>Initial Vertical Lumens</th>
<th>Initial Horizontal Lumens</th>
<th>Mean Lumens</th>
<th>Luminaire Efficiency</th>
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<td>New</td>
<td>400W Metal Halide</td>
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<td>36,000</td>
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<td>After 6,000 hours</td>
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<tr>
<td></td>
<td>DSX1 with 60 LED @ 1000 mA</td>
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<td>16,800</td>
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<td>After 50,000 hours</td>
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</table>

- **After 6,000 hours**
  - 400W Metal Halide
  - DSX1 with 60 LED @ 1000 mA

- **After 50,000 hours**
  - 400W Metal Halide
  - DSX1 with 60 LED @ 1000 mA
Metal Halide Lighting

55% lumen output at end of life

Remember, this is only 15,000 hours (less than 3.5 years)
Longevity

**LEGEND**
- 400W Metal Halide
- Original ALX
- Lithonia Lighting D-Series @ 700mA
- Lithonia Lighting D-Series @ 1000mA

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<td>Lumen Maintenance Factor</td>
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Outdoor Applications and Design
Equivalency

<table>
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<tr>
<th><strong>HID LIGHTING</strong></th>
<th><strong>LED LIGHTING</strong></th>
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<tbody>
<tr>
<td>High Wattage</td>
<td>65+% Energy Savings</td>
</tr>
<tr>
<td>Hot Spots (Poor Uniformity)</td>
<td>Excellent Uniformity</td>
</tr>
<tr>
<td>High Averages / Low Mins</td>
<td>Lower Averages</td>
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Outdoor Applications and Design
Acuity PMD Parking Lot
Before (250W MH, 295W)
Acuity PMD Parking Lot

Dimming to 45% Power

144 Input Watts (50% Savings)

64 Input Watts (78% Savings)
Acuity PMD Parking Lot

Before vs. Dimmed LED

295W Input Watts

64 Input Watts
(78% Savings)
Two Equivalent Solutions

**HID Lighting**
- 460W
- 17,000 mean lumens
- 15,000 lamp life
- $200 per year

**Finesse Solution**
- 140W (69% savings)
- 11,000 lumens
- 100,000 hr life
- Save $140 per year

**Equal Light Solution**
- 209W (55% savings)
- 21,000 lumens
- 100,000 hr life
- Save $105 per year
Thank You