Dim … Bright … Brilliant: Auto Dealership LED Lighting

Jay Davis
VP Business Development
Pacific Energy Concepts
Portland, OR
360-571-3200
Jay@PECNW.com

#NADA2016

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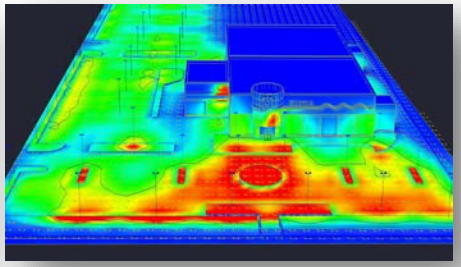
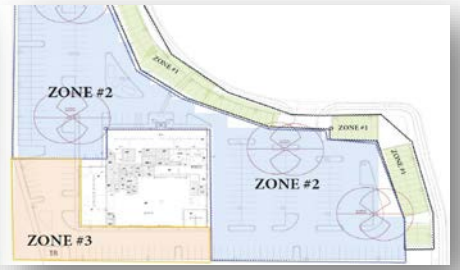
Panel Introduction

- **Eric Iversen, AICP**
  - [Lithia Motors] *Director Of Real Estate*
- **Tyler Rauber**
  - [CREE Lighting] Western Sales Manager -Automotive
- **Keith Scott**
  - [Pacific Energy Concepts] Founder and President
- **Jay Davis**
  - [Pacific Energy Concepts] VP Business Development

Agenda/Objective

- Define the key metrics required to make an informed capital investment lighting retrofit or new construction decision for your dealership.
- Share why comprehensive /properly designed/ custom engineered lighting project's yield far greater long term energy costs savings and merchandising benefits.





Facility Image Upgrades: Group Discussion

- Clean
- Modern
- Inviting
- Prosperous
- Active
- Engaging
- Ect…

Facility Image Upgrades: Group Discussion

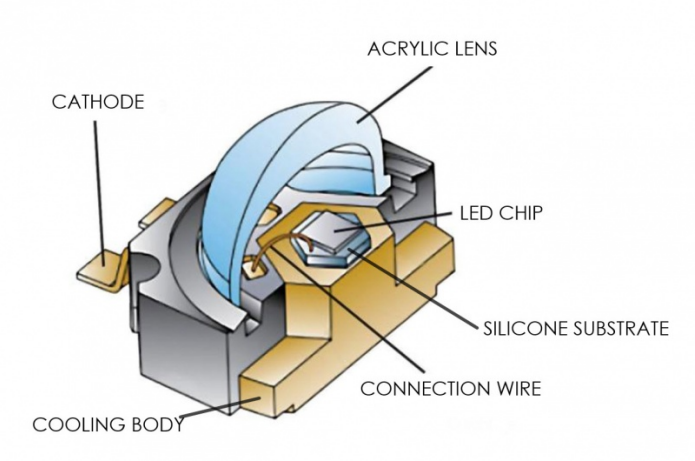
- Dull / Dim
- Tired
- Outdated
- Aged
- Stale
- Old

Facility Image Upgrades: Group Discussion

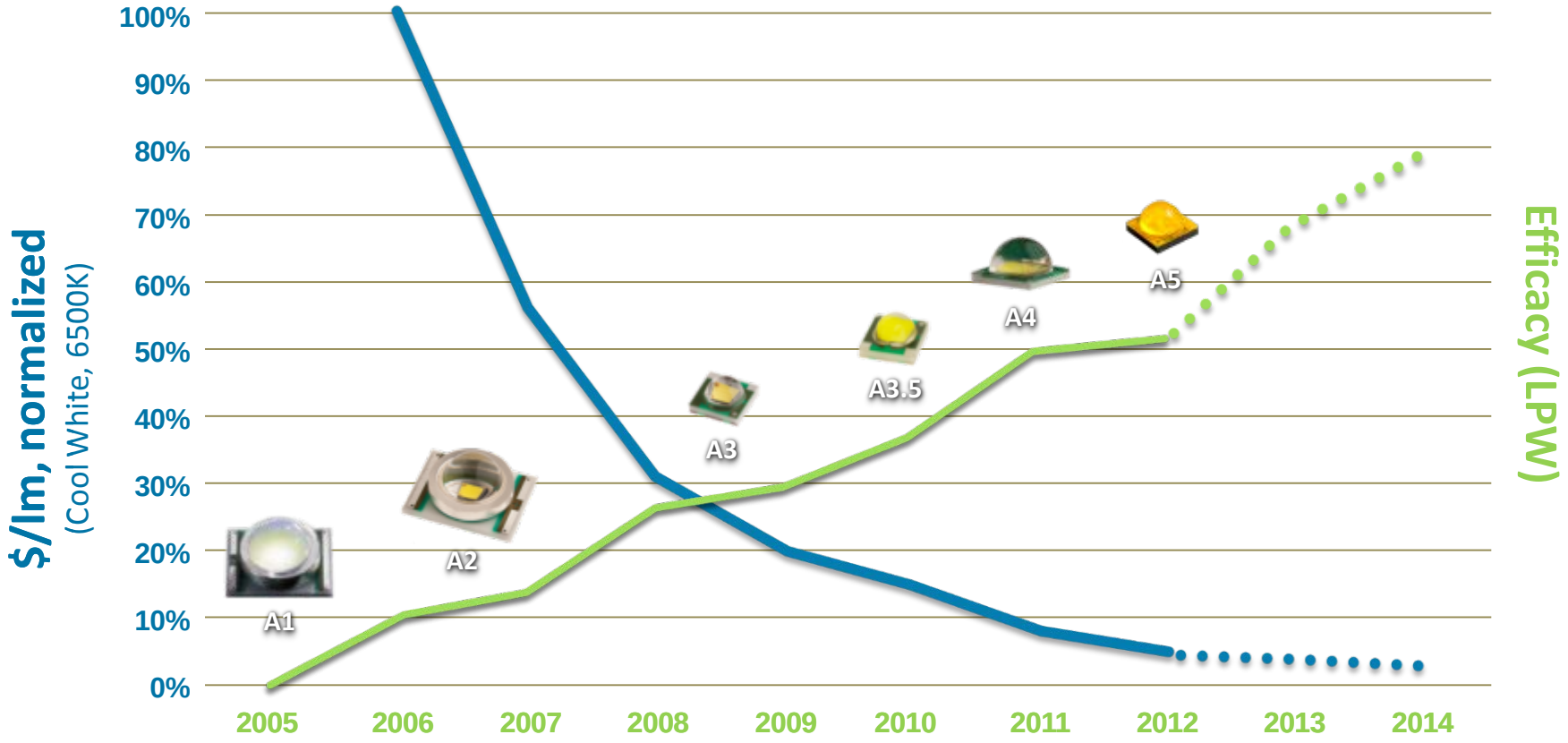
- DIM…LEDS?

What is an LED?

- "In the simplest terms, a light-emitting diode (LED) is a semiconductor device that emits light when an electric current is passed through it."



Rapid Generational Improvements in Chips



Efficacy: Lumens produced, per watt of energy consumed

A whole new market was born…














#ATD2016

LED VS LED

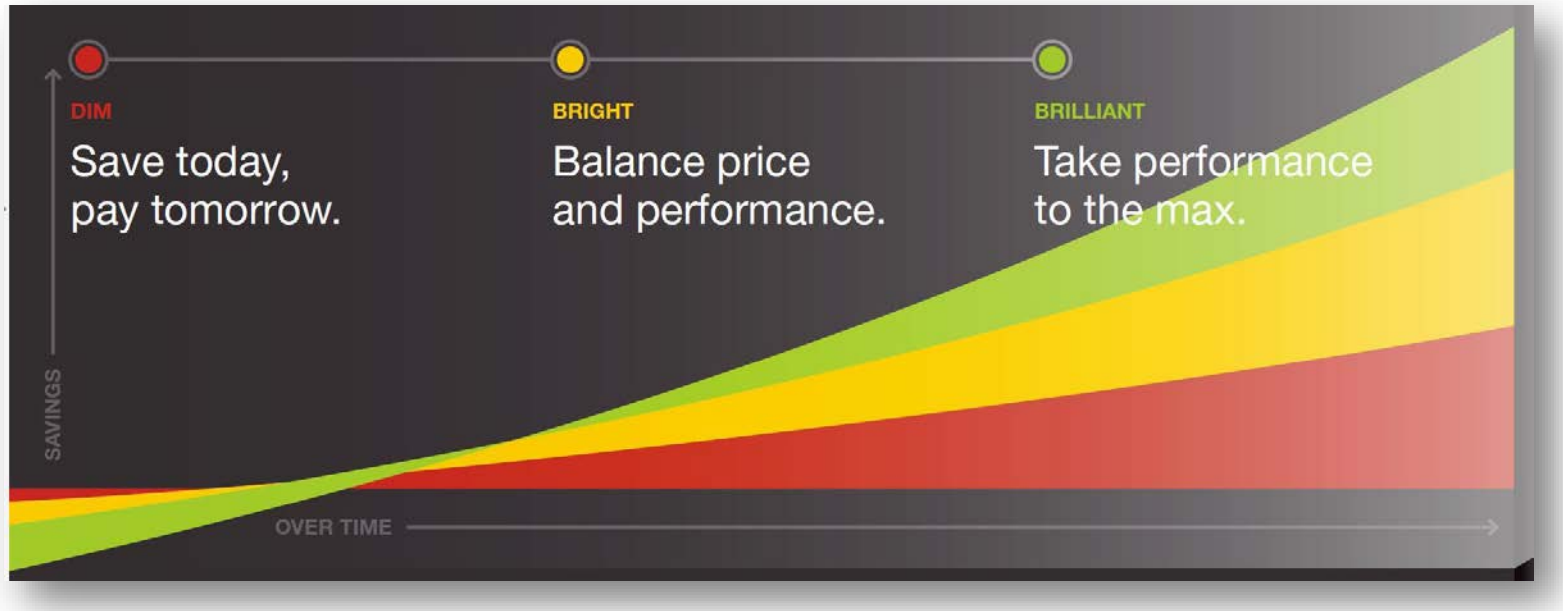
Blue / Dark / Glare

White / Bright / Uniform

…Not All LEDs are created equal

The Lighting Spectrum

There are a wealth of options available to you when making a lighting selection. Not all lighting is created equal.



What Makes Sense to your business?

Dim Analysis

Photo from Jerry Maguire courtesy of TriStar Pictures

Dim Analysis → Dim Result

- Price based analysis only
- Performance of the lighting system is not evaluated
- Quick Return on Investment
- Lowest upfront cost wins

DIM: Save today, pay tomorrow

- Low performing fixtures
- Limited warranty / short lifespan
- May or may not be an improvement over existing light levels
- Over LED buy in: “Anything LED will be an improvement over what we have now.”

…It really does not matter: “It’s all the same.”

DIM: Save today, pay tomorrow

- Bid [A] vs Bid [B] vs Bid [C]
- Race to the bottom.
- Lowest upfront cost wins

Not sure if it is an apples to apples or apples to oranges comparison

Energy Savings: 90% Reduction in Wattage

(2) 1000W METAL HALIDE
(2) 400W METAL HALIDE

(3) 100W LED Area Light's

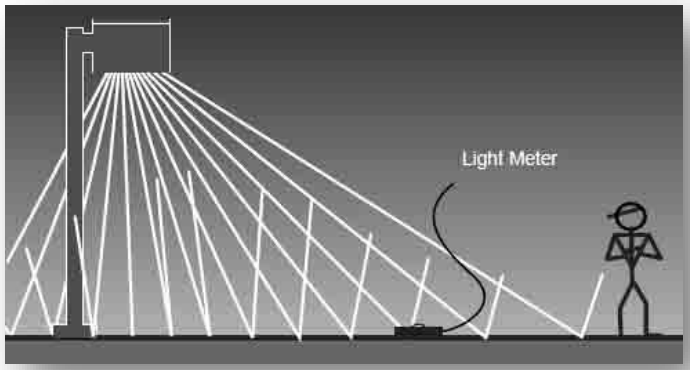
Energy Savings? Yes
Light level Improvement…? No one ever checked

Bright Analysis

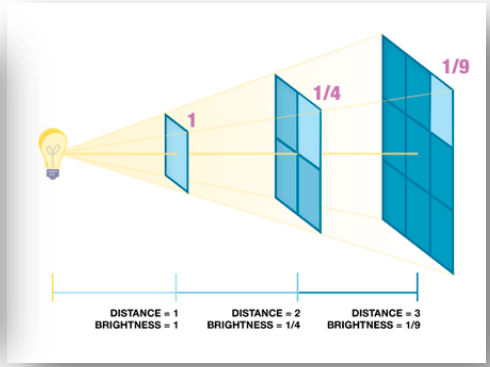
Photo from Jerry Maguire courtesy of TriStar Pictures

How to quantify performance?

- Footcandle: a measurement of light at an illuminated object.

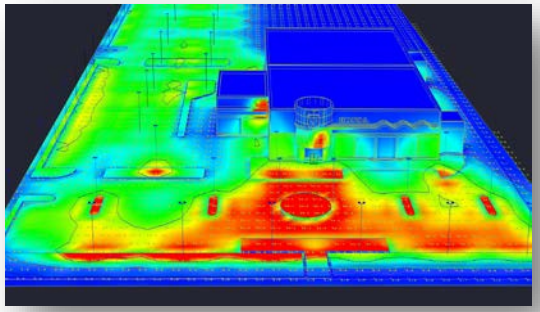


"A unit of illuminance or illumination, equivalent to the illumination produced by a source of one candle at a distance of one foot and equal to one lumen incident per square foot."
Abbreviation: FC.



Bright Analysis → Bright Result

- Driver → Price + Performance based analysis
- Existing Footcandle readings are recorded to form a “baseline” of what is existing
- An intelligent design is created that will be both a cost savings and light level improvement



BRIGHT: Balance price and performance

- High-performing fixtures
- Warranty backed by internationally recognized brands
- Intelligently designed / photometric analysis
- Improvement over existing/incumbent system

Illuminating Engineering Society (IES)

- The Illuminating Engineering Society of North America (IES) is the authoritative reference on the science and application of lighting.

"The IES seeks to improve the lighted environment by bringing together those with lighting knowledge and by translating that knowledge into actions that benefit the public."

IES Light Level Recommendations

- Exterior
- Showroom
- Office
- Parts
- Service
- Ect…

Flashlight Showdown: [A] Vs [B]

Flashlight [A]

- Price
- Wattage
- Lumen Output
- Warranty
- Quality

Flashlight [B]

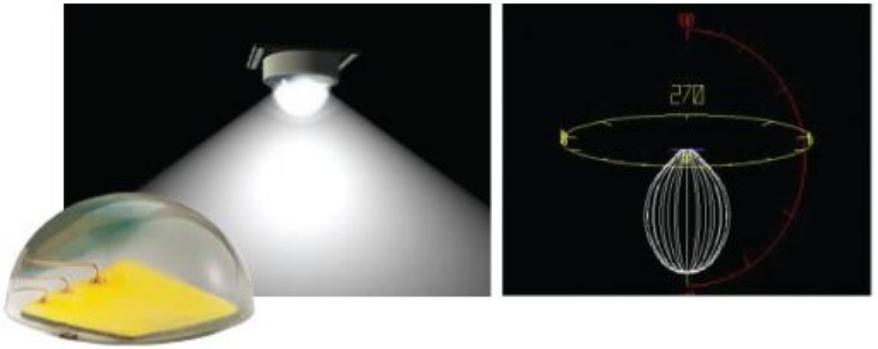
- Price
- Wattage
- Lumen Output
- Warranty
- Quality

…Exactly The SAME

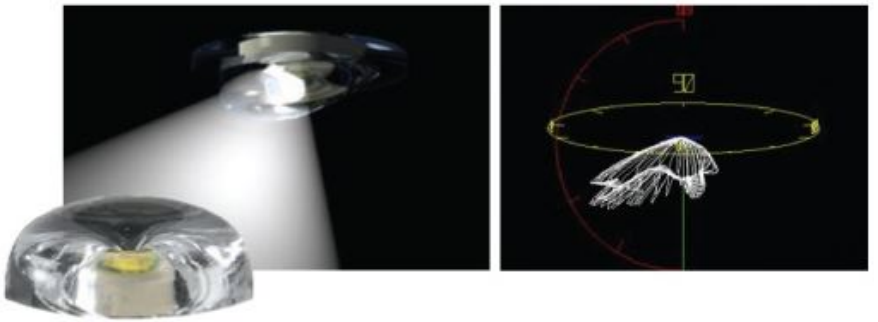
Optic Technology (Grain Control of your Light)

- Allows you to direct the light:
  - Where you want it
  - How you want it
  - Not where you don't
- 20+ Optical configurations

Bare LED Package



Optic Refractor Control



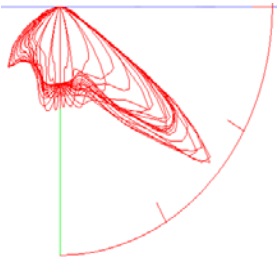
Optics at Work

- Maximize the light where you want it
- Improves uniformity (Even lighting throughout)
- Increased contrast along the front line
- Allows us to deliver higher light levels while consuming less energy.

Illuminating Engineering Society (IES)

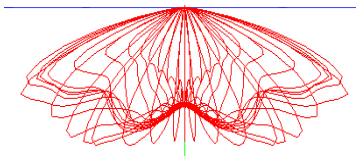
- An **IES file** is a text **file** that describes the intensity of a light source at points on a spherical grid.
- It provides photorealistic lighting effects in rendered images than other types of light distribution.

Elevation View - Side



Type II Short

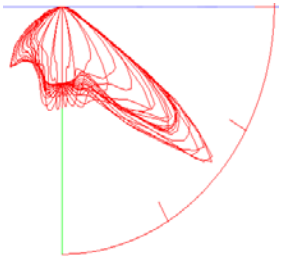
Elevation View - Front



Type II Short

Traditional Frontline Options

Elevation View - Side



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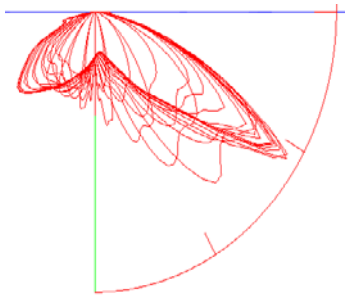
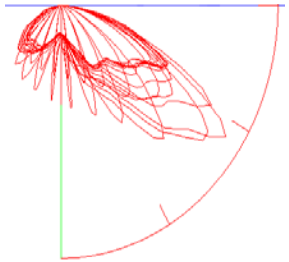
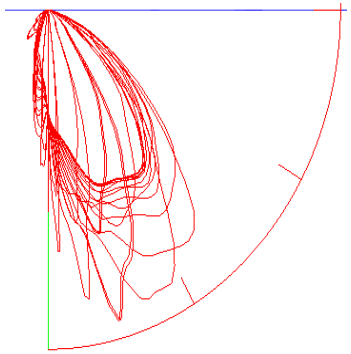


Type III Medium

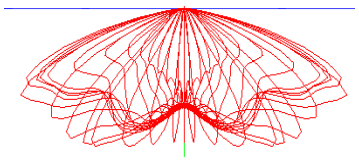


Type IV Medium

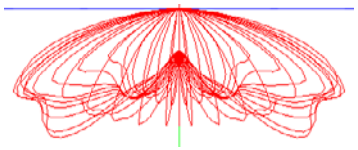


Frontline Optic

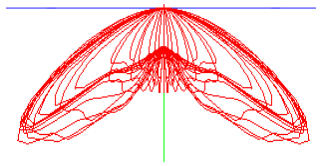
Elevation View - Front



Type II Short



Type III Medium



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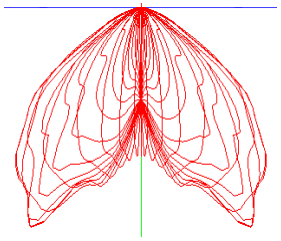


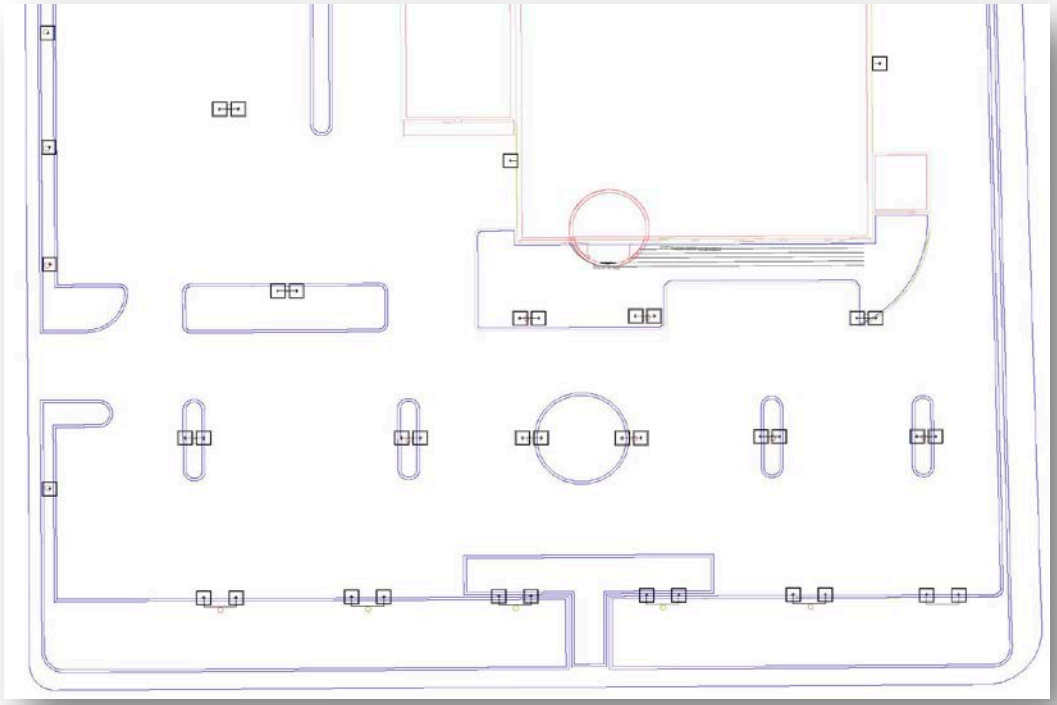
Frontline Optic

Performance Analysis

- Onsite Visit: Establish pole location's, Heights, existing wattage and footcandle readings

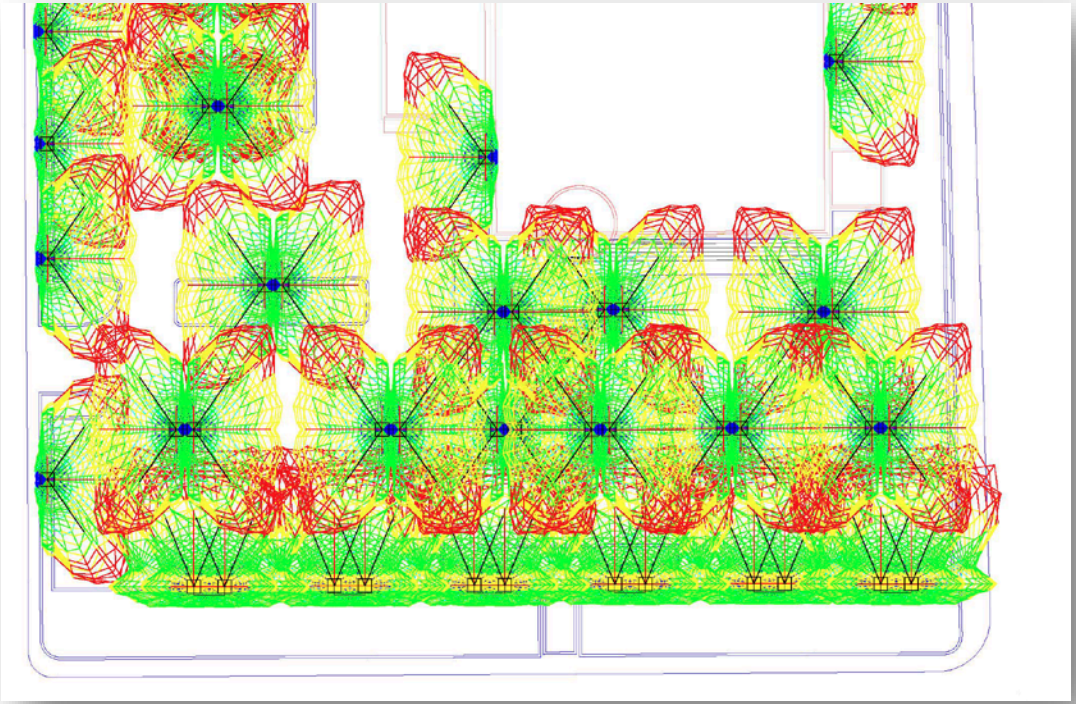
Performance Analysis

- Build out 3D to scale facility. Plot fixture locations and mounting height's



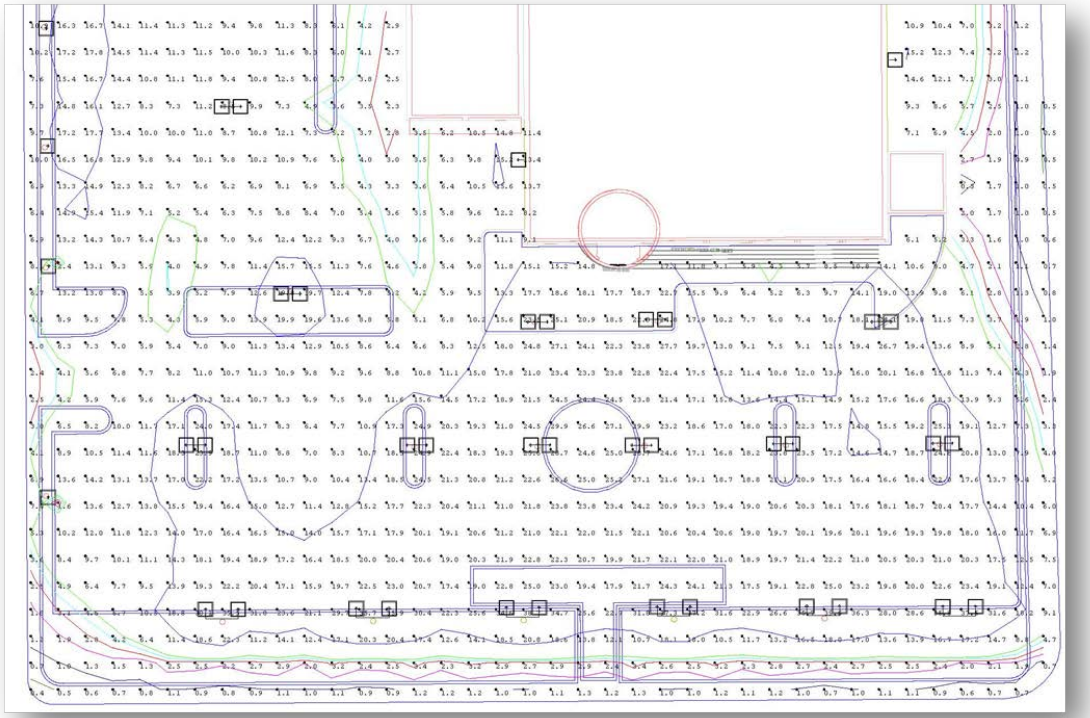
Performance Analysis

- Locate and orient (luminaire) IES files
- “Paint the space with light”



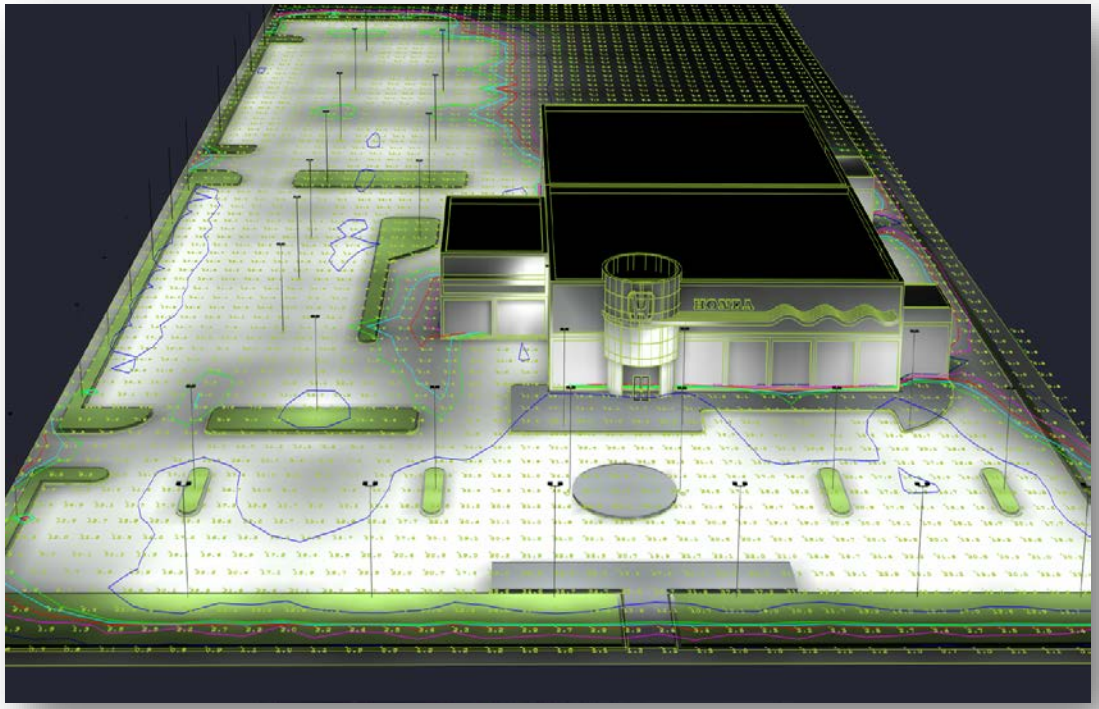
Performance Analysis

- Calculate footcandle point-by point photometric analysis. (Projected light levels)



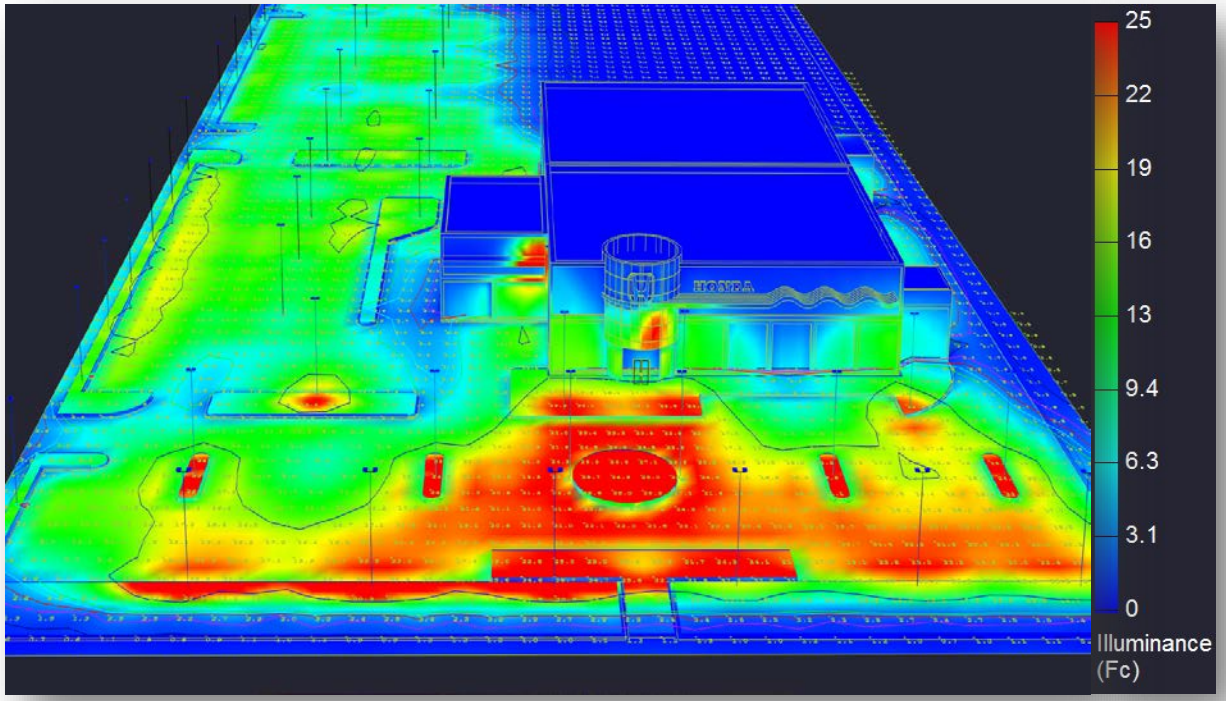
Performance Analysis

- Render 3D calculations with point by point overlay. “Test drive the system”



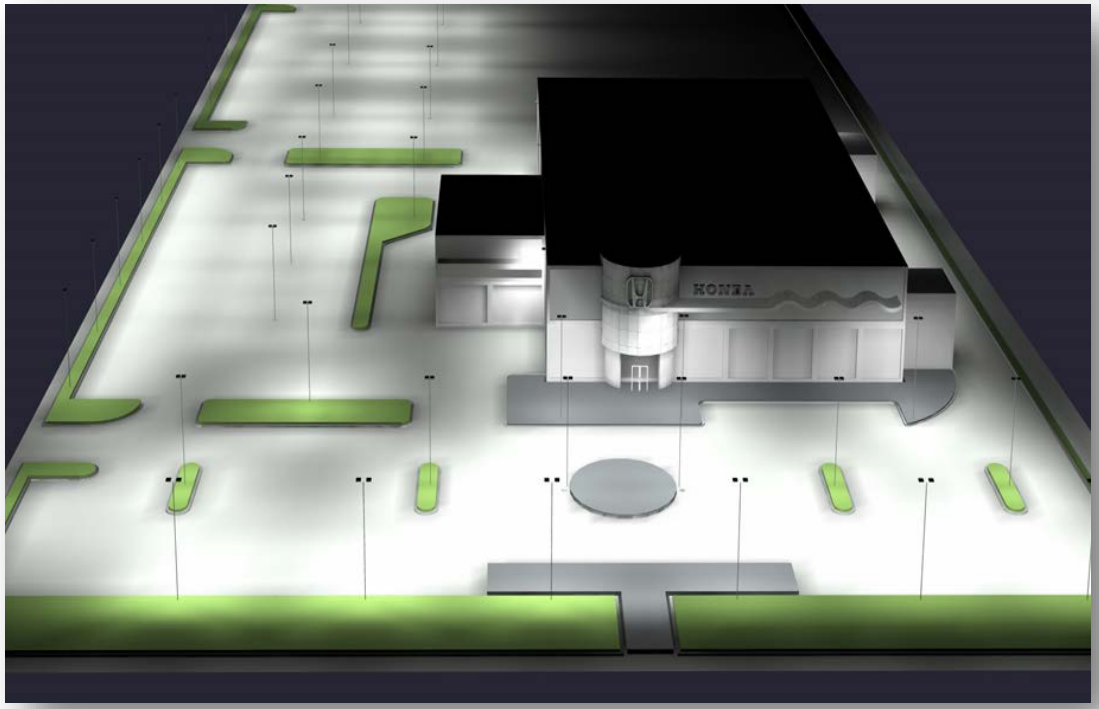
Performance Analysis

- Apply pseudo overlay to help identify uniformity or problem areas to modify the design.

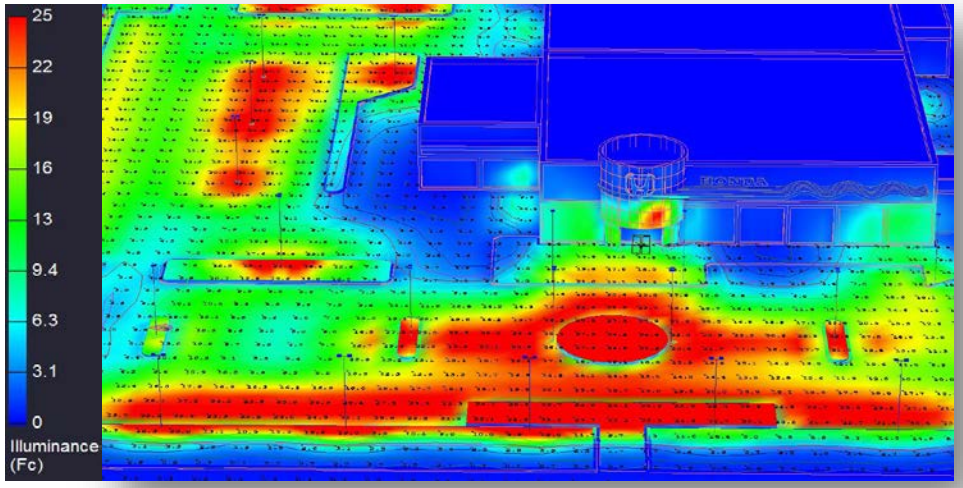


Performance Analysis

- Remove calculation points and take a look at the end result.

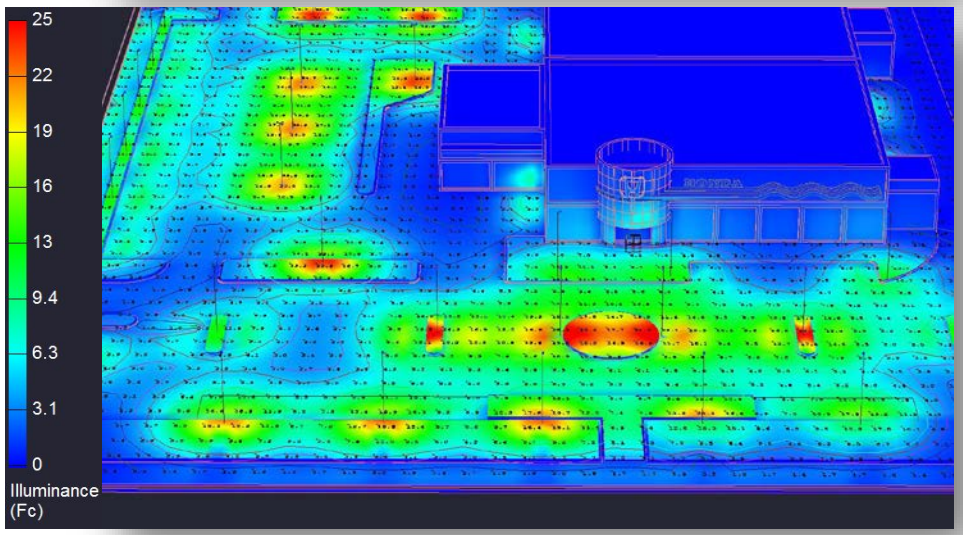


Performance Analysis



Statistical Analysis
Front Line- **300w** LED (Manufacturer A)

Illuminance (Fc)
Average = 25.84
Maximum = 32.2
Minimum = 20.3
Avg/Min Ratio = 1.27
Max/Min Ratio = 1.58

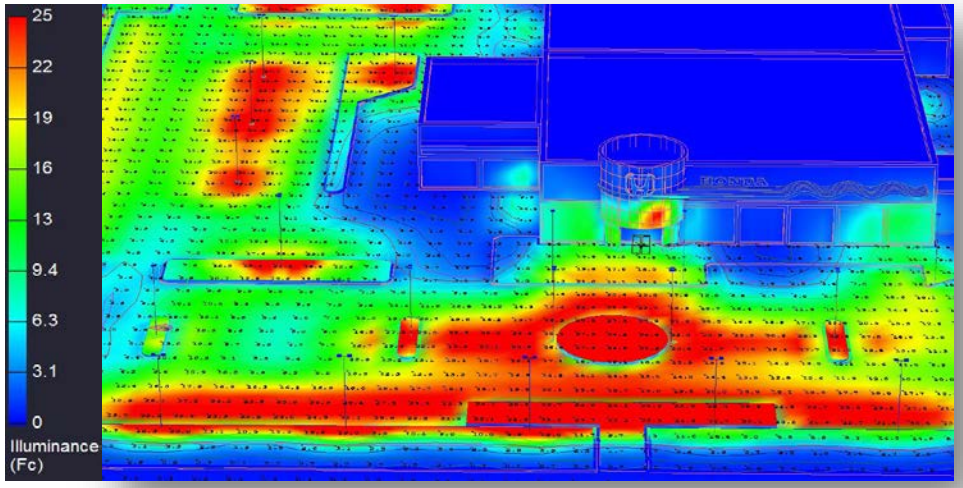


Statistical Analysis
Front Line- **378w** LED (Manufacturer B)

Illuminance (Fc)
Average = 11.03
Maximum = 20.4
Minimum = 5.5
Avg/Min Ratio = 2.01
Max/Min Ratio = 3.71

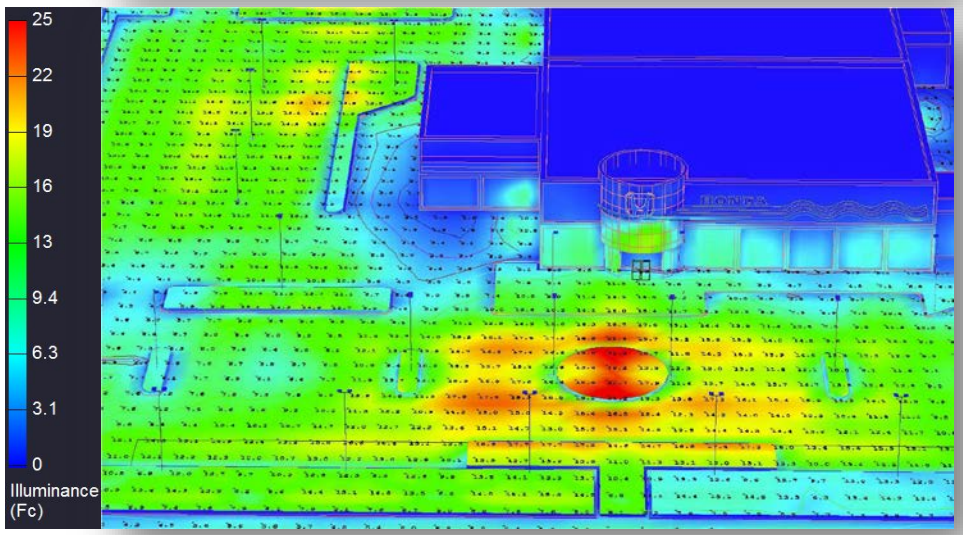
The light dramatically drops off between poles. 5.5FC would be a 50%+ footcandle reduction from existing HID baseline.

Performance Analysis



Statistical Analysis
Front Line- **300w** LED (Manufacturer A, Optic AF)

Illuminance (Fc)
Average = 25.84
Maximum = 32.2
Minimum = 20.3
Avg/Min Ratio = 1.27
Max/Min Ratio = 1.58



Statistical Analysis
Front Line- **300w** LED (Manufacturer A, Optic 4)

Illuminance (Fc)
Average = 13.83
Maximum = 17.7
Minimum = 10.0
Avg/Min Ratio = 1.38
Max/Min Ratio = 1.77

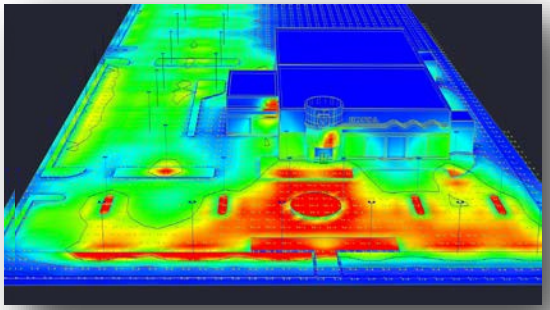
Both options have the same:
-Wattage/ Energy Savings
-Lumen Output
-Fixture Price
-Warranty
...However, they yield dramatically different results.

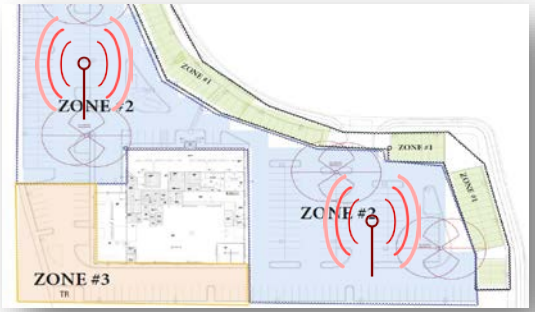
Brilliant Analysis:

Photo from Jerry Maguire courtesy of TriStar Pictures

BRILLIANT: Take performance to the max

- All solutions offered with ‘Bright’ level
- Optimized lighting controls (Motion controls / Dimming)
- Energy monitoring
- High CRI / Efficacy / Lumen Maintenance Factor





BRILLIANT: Take performance to the max

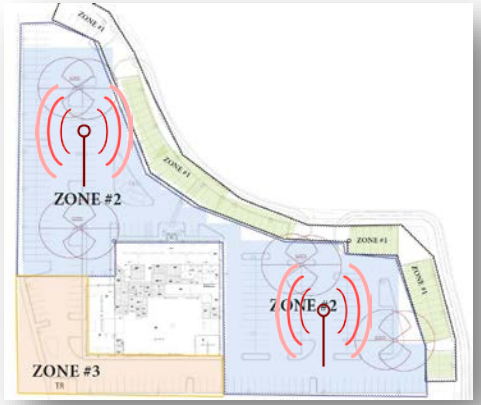
- Driver → Performance + total cost of ownership
- All impacts offered with 'Bright' level
- Maximum long-term ROI
- Premier light levels and aesthetics
- Maximum long term flexibility/scheduling

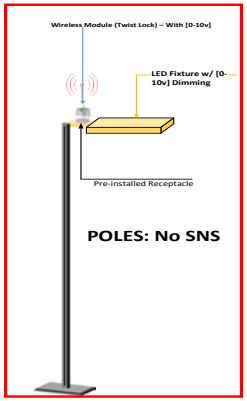
Lighting Controls

– Wireless simplicity has arrived…

Wireless Exterior Lighting Controls

- Maximize Light Output (When Needed)
- Decrease Energy Consumption
- Measure / Meter / Report
- Detect , Diagnose & Failure





Wireless Exterior Lighting Controls

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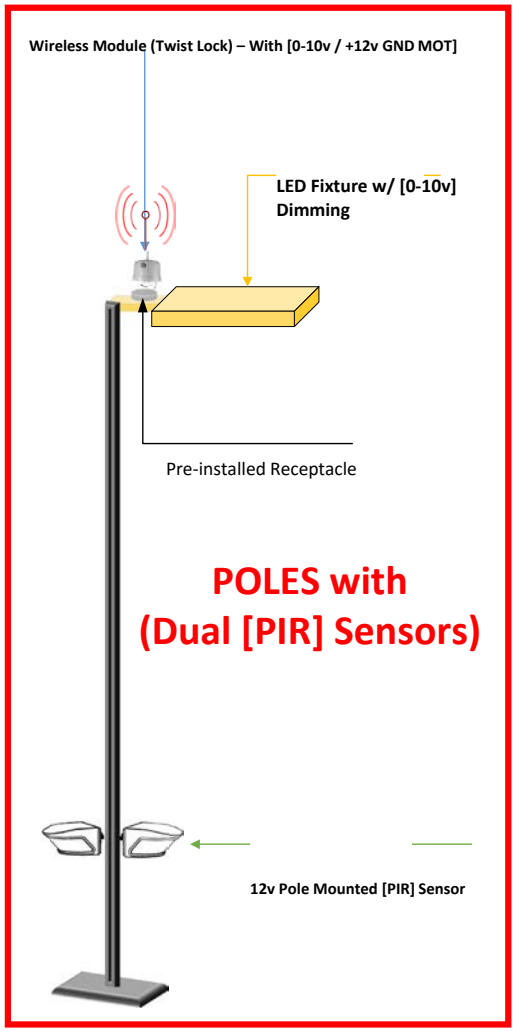
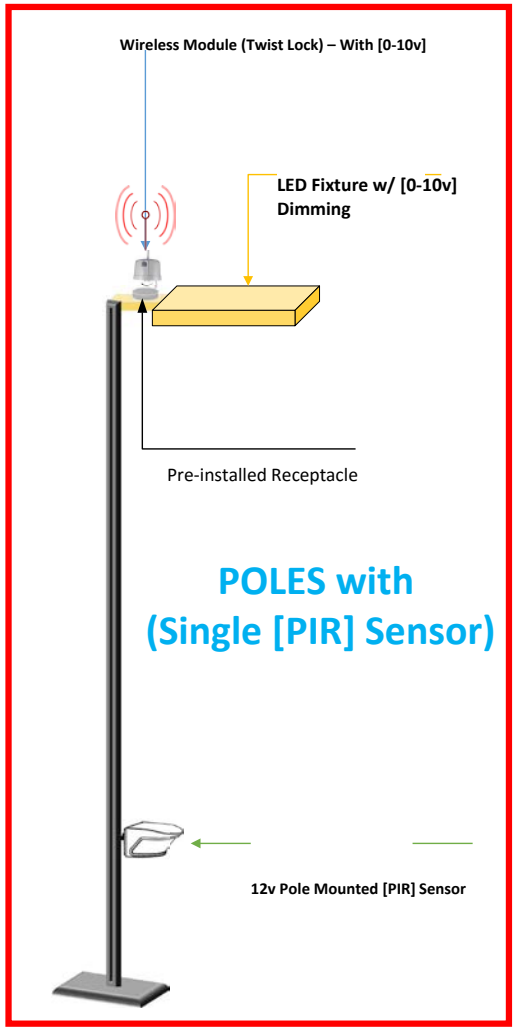
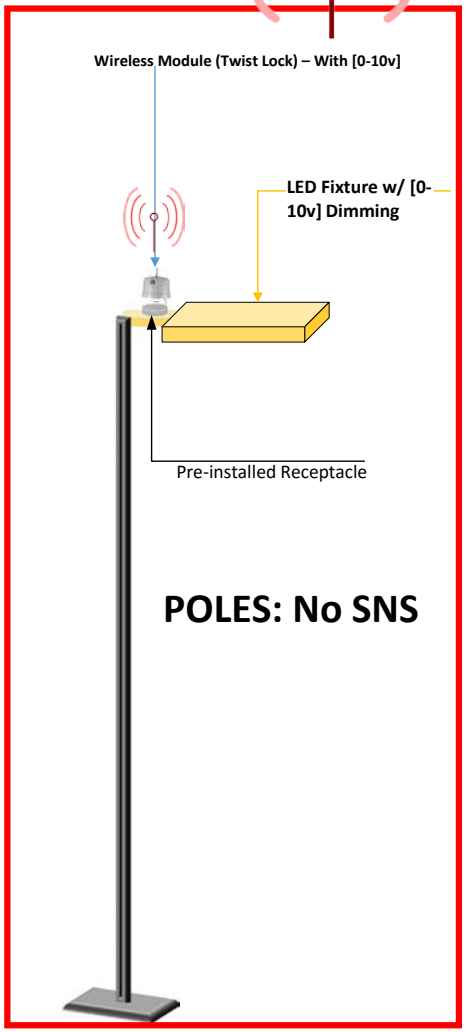
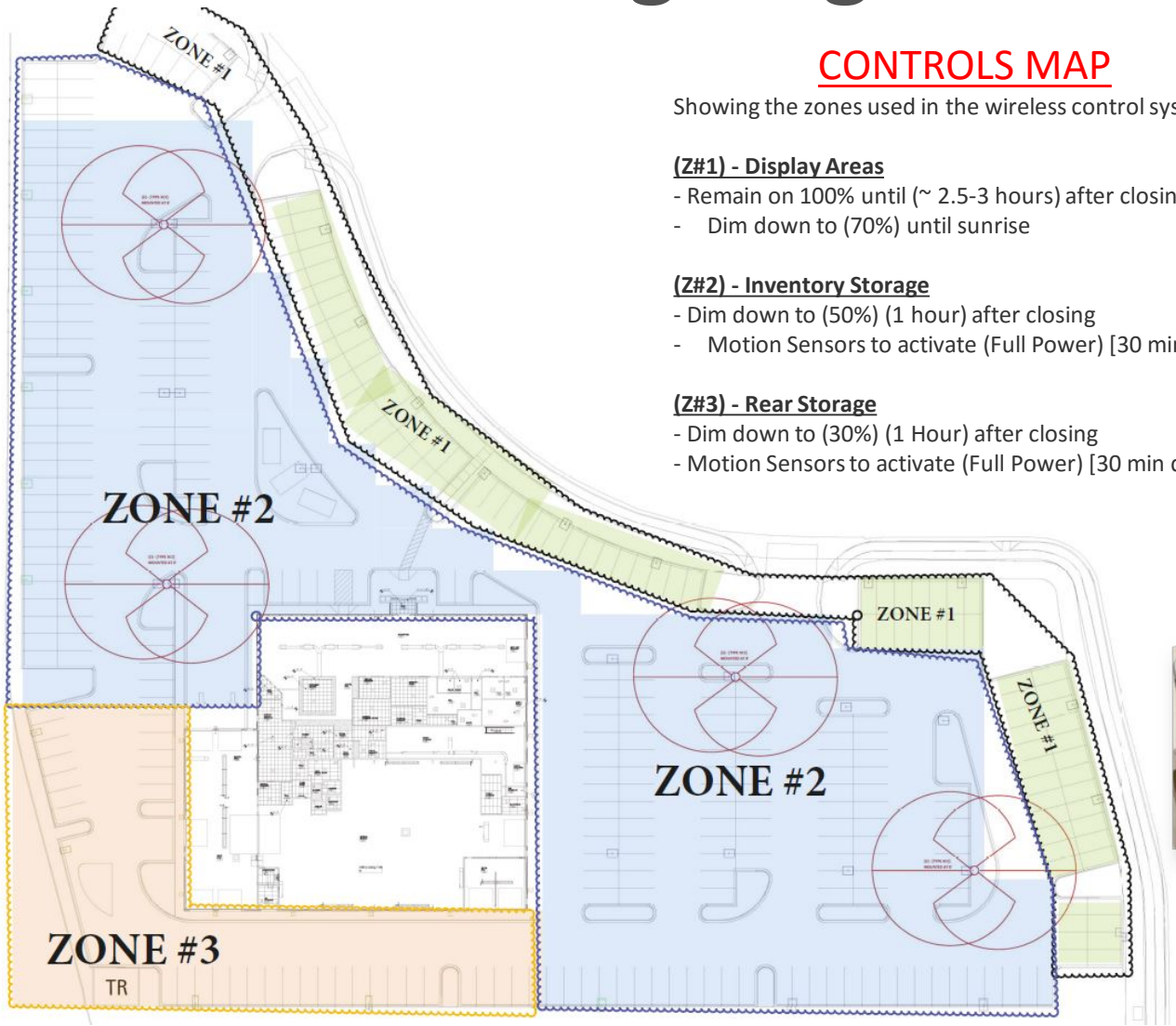
Wireless Exterior Lighting Controls







Wireless Exterior Lighting Controls



CONTROLS MAP

Showing the zones used in the wireless control system:

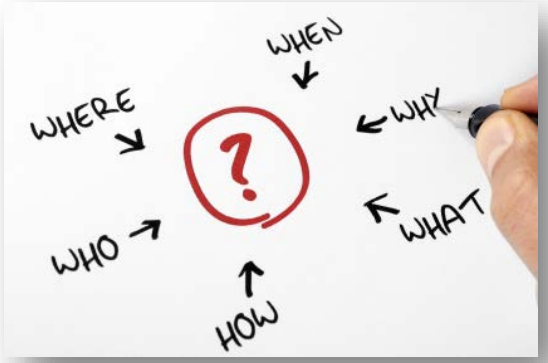
(Z#1) - Display Areas
- Remain on 100% until (~ 2.5-3 hours) after closing
- Dim down to (70%) until sunrise

(Z#2) - Inventory Storage
- Dim down to (50%) (1 hour) after closing
- Motion Sensors to activate (Full Power) [30 min delay]

(Z#3) - Rear Storage
- Dim down to (30%) (1 Hour) after closing
- Motion Sensors to activate (Full Power) [30 min delay]

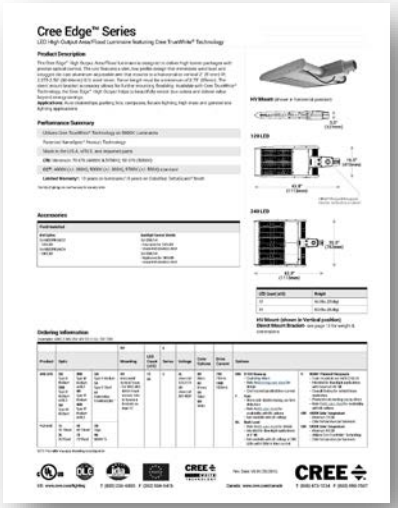
Cut Sheet's: Before We Begin

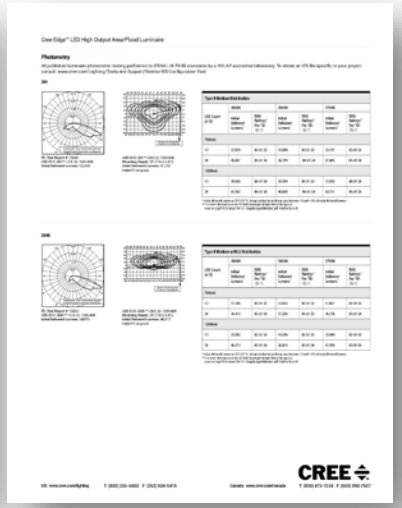
- Who is the manufacturer?
- How long has the manufacturer been in business?
  - Is the warranty listed for longer than the manufacturer has been in business?
- Where are the products made?
- Have the products been installed at a facility you can go see?
- Can you see and hold a sample fixture to asses quality and construction?
  - Is this just an LED in a box?



Cut Sheet: Key Terms (See Handout)

- *Efficacy*
- *CRI*
- *LM-70*
- *Kelvin Color*
- *Warranty*
- *Lumen Maintenance Factor (LMF)*
- *EPA Rating*
- *Voltage*
- *Factory Control Options*
- *0-10V Dimming*
- *Drive Current*
- *DLC and UL Listed*
- *Optic Configurations*
- *IES Files*
- *EPA Rating*



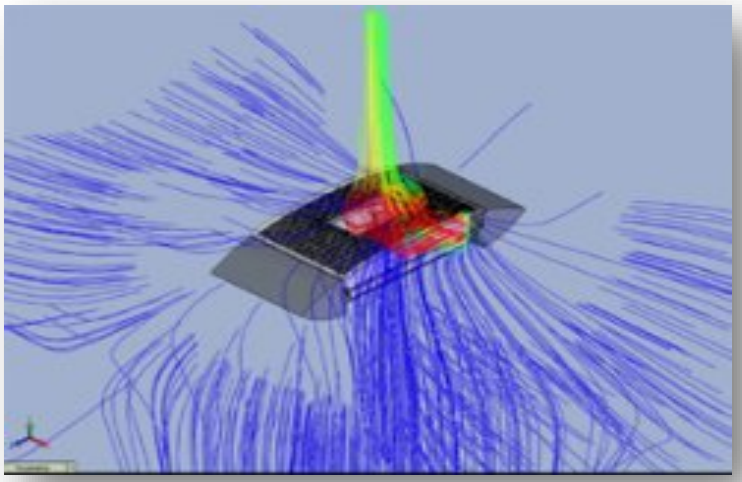


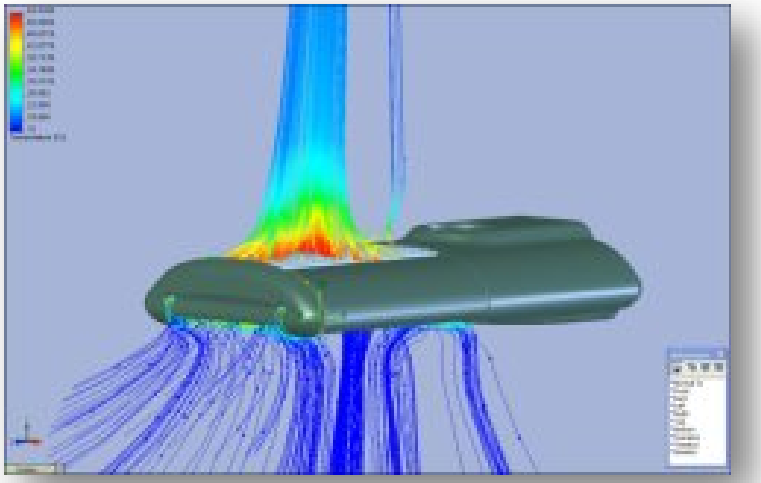
Color Rendering Index (CRI)

Color Temperature

Thermal Management

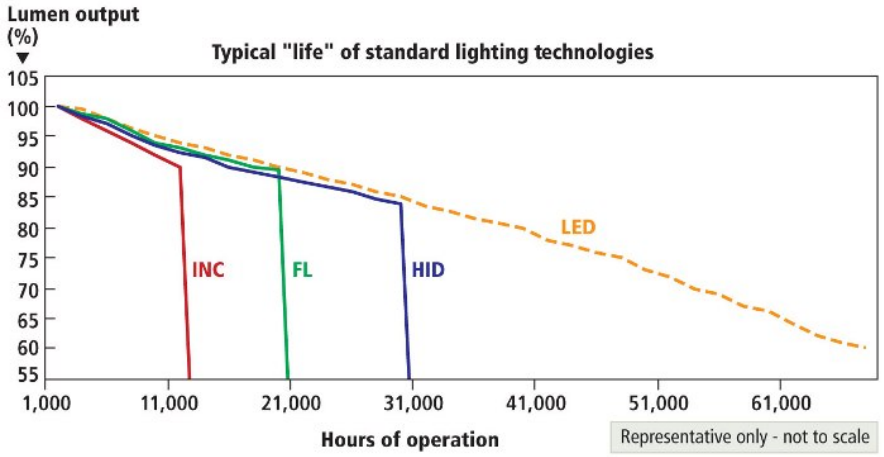
Heat sinks efficiently draw heat away from the LED chip package within a vented housing, maximizing both performance and reliability





Useful Life (L70)

- Lumen maintenance is a prediction of the number of hours an LED will operate before it fades below a useful level of intensity.
- Currently, lumen maintenance reporting assumes that dropping below 70% of initial lumen output is the end-of-life for the emitter.
  - » Hence, L70 predicts when the LED reaches 70% of initial lumen output.



LED Magazine December 2011

Lighting Warranties – What to Look For

With the extended lifetimes of LED lighting, you need to have a warranty to match.

Some of the vital elements:

- Lighting components
- Electronics such as drivers
- Paint and finish
- Lumen Depreciation
- Kelvin color

AND

Make sure the company you're dealing with can back it up!

Meet Jim: Auto Dealership Owner

- Received a bid from a local lighting supply house to retrofit all of his exterior lights to LED.
- Attended NADA session:
  - Dim / Bright / Brilliant
- Empowered to complete a comprehensive performance based analysis evaluating multiple lighting options

Jim's Bid Analysis: Upfront Cost

DIM: $135,560

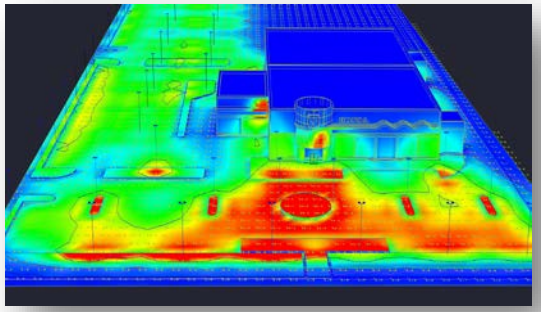
Capital Investment

Investment	
Materials	Included
Installation Labor	Included
Services (See Acceptance Page)	Included
System Investment (Plus Applicable Taxes)	$ 135,560
Less: Projected Rebates/Incentives	– -
Net System Investment	**$ 135,560**
Annual Cash Flow Benefit	
Annual Energy Savings	$ 34,469
Projected Annual Maintenance Savings[1]	$ 5,170
Total Annual Savings	$ 39,639
Pre-Tax Return on Investment (Based on Energy Savings)	
Pre-Tax Payback Period (Years)	3.42
Pre-Tax ROI	29%

BRIGHT: $169,445

Capital Investment

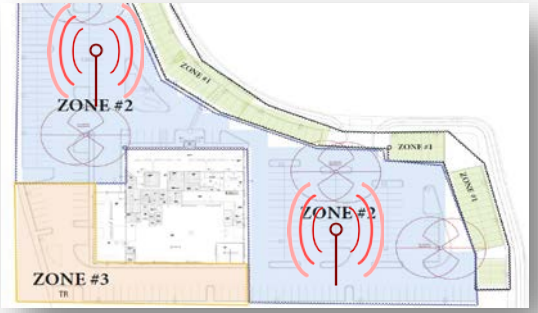
Investment	
Materials	Included
Installation Labor	Included
Services (See Acceptance Page)	Included
System Investment (Plus Applicable Taxes)	$ 169,445
Less: Projected Rebates/Incentives	– -
Net System Investment	**$ 169,445**
Annual Cash Flow Benefit	
Annual Energy Savings	$ 39,743
Projected Annual Maintenance Savings[1]	$ 5,170
Total Annual Savings	$ 44,913
Pre-Tax Return on Investment (Based on Energy Savings)	
Pre-Tax Payback Period (Years)	3.77
Pre-Tax ROI	27%



BRILLIANT: 188,293

Capital Investment

Investment	
Materials	Included
Installation Labor	Included
Services (See Acceptance Page)	Included
System Investment (Plus Applicable Taxes)	$ 188,293
Less: Projected Rebates/Incentives	– -
Net System Investment	**$ 188,293**
Annual Cash Flow Benefit	
Annual Energy Savings	$ 46,059
Projected Annual Maintenance Savings[1]	$ 5,170
Total Annual Savings	$ 51,229
Pre-Tax Return on Investment (Based on Energy Savings)	
Pre-Tax Payback Period (Years)	3.68
Pre-Tax ROI	27%



Jim's Cashflow Analysis

DIM: + $260,834

Year	Cash Flow	Year	Cash Flow
Year 1	$ (95,921)	Year 6	$ 102,276
Year 2	$ (56,281)	Year 7	$ 141,915
Year 3	$ (16,642)	Year 8	$ 181,555
Year 4	$ 22,997	Year 9	$ 221,194
Year 5	$ 62,637	Year 10	$ 260,834

BRIGHT: + $279,685

Year	Cash Flow	Year	Cash Flow
Year 1	$ (124,532)	Year 6	$ 100,033
Year 2	$ (79,619)	Year 7	$ 144,946
Year 3	$ (34,706)	Year 8	$ 189,859
Year 4	$ 10,207	Year 9	$ 234,772
Year 5	$ 55,120	Year 10	$ 279,685

BRILLIANT: + 323,997

Year	Cash Flow	Year	Cash Flow
Year 1	$ (137,064)	Year 6	$ 119,081
Year 2	$ (85,835)	Year 7	$ 170,310
Year 3	$ (34,606)	Year 8	$ 221,539
Year 4	$ 16,623	Year 9	$ 272,768
Year 5	$ 67,852	Year 10	$ 323,997

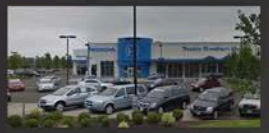
The Future for Jim looks Bright…
Or better stated: BRILLIANT

THE

WAY OF LIGHT

for Auto Dealers

ENERGY ASSESMENT

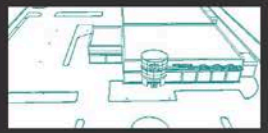


Complete on-site visit to assess existing technologies, lighting needs, and project objectives.

CREATE FACILITY OUTLINE

Generate specialized models to scale, designed as an interactive blueprint.

FINALIZE FACILITY OUTLINE



Use lighting design software to assemble data and finalize the facility outline

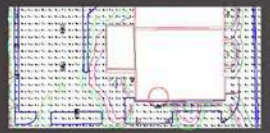
APPLY 3D SURFACES

Perform on-site verification to account for three-dimensional surfaces and pole locations.

ENERGY AUDIT

Compile infrastructure data, measure building dimensions, and verify existing light levels.

LOCATE & ORIENT FIXTURES

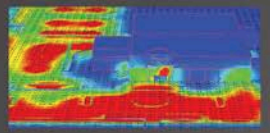


Lighting technology positions fixtures, determines projected light levels, and tests optical variations.

PHOTOMETRICS

Run 3D photometric analysis – which verifies optics, wattage, and target light levels.

LIGHT LEVEL ANALYSIS/ FINAL SELECTION



"Try before you buy" by comparing proposed light levels to existing system.

INSTALLATION

Oversee project from start to finish, including delivery, installation, and warranty claims.

PEC Proverb:

You do not turn your lights on to save money. You turn your lights on to sell cars.

Questions?

Dim … Bright … Brilliant: Auto Dealership LED Lighting

Jay Davis
VP Business Development
Pacific Energy Concepts
Portland, OR
360-571-3200
Jay@PECNW.com

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