Exterior Building Color & Material Samples

Color Drawdowns

Archaeological Resources

Airport Vicinity Development Checklist

Parking Study

Trip Generation Comparison

Parking Master Plan

Introducing

TLC for LED™

Total Light Control™

Commitment to Excellence
GUARANTEED FOR 25 YEARS
Affordable Quality Foundation to Rooftop

musco Lighting

We Make It Happen

4-UP-2017
3/14/2017

TLC *for* LED™
Total Light Control™

Continuing the commitment to excellence…
Keeping good lighting affordable…
Guaranteed for 25 years, from foundation to poletop.

Light-Emitting Diode (LED) is a new tool but the issues for sports lighting are the same. For nearly a decade, the Musco Team has been testing the LED light source and applying it on projects where it was the best choice. While LED saved energy, for a typical recreational facility the hours of operation weren't great enough to offset the higher cost.

We've researched LED's distinctive challenges and advantages and applied our knowledge of light control to the unique characteristics of the diode, assuring the quality of lighting for which Musco is known.

We've paired our expertise in controlling light with the advancing output of LED to the point where we're confident it's a cost-effective option to consider for recreational facilities.

The result is a system that makes Musco's great lighting even better.

Better for players…
who want to perform their best and be able to track the entire flight of the ball.

Better for neighbors…
who don't want glare in or around their homes or lights left on when not in use.

Better for the night sky…
with bright, uniform light directed onto the field and not spilling above it.

Better for your budget…
an affordable system that's built to last and control operating costs.

And…you can mark maintenance off your list for 25 years!

The Musco Team looks for the best combination of issues to achieve a solution to meet your needs—from structures, to quality of on-field light, to off-site impact, to energy and costs.


Control
from foundation to poletop...
from the light source to the field,
preserving the night sky...
assuring the results you expect,
day 1... year 1... and for 25 years.

Still Light-Structure System™...

5 Easy Pieces™ complete from foundation to poletop.

Our Light-Structure System™ has delivered long-term performance for thousands of customers around the world.

Lights, structures, and electrical components are engineered to work together. This assures the designed lighting gets in place and stays there over the life of the system, while also maintaining and protecting the operating environment so the components continue to function.

We've included features like easy to reach remote drivers, integrated grounding, and surge protection to ensure the longevity of the LED's sensitive electronic components.

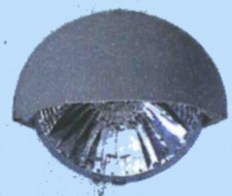
The Light-Structure System™ adapts to support both LED and metal halide light sources.

25 years of proven performance

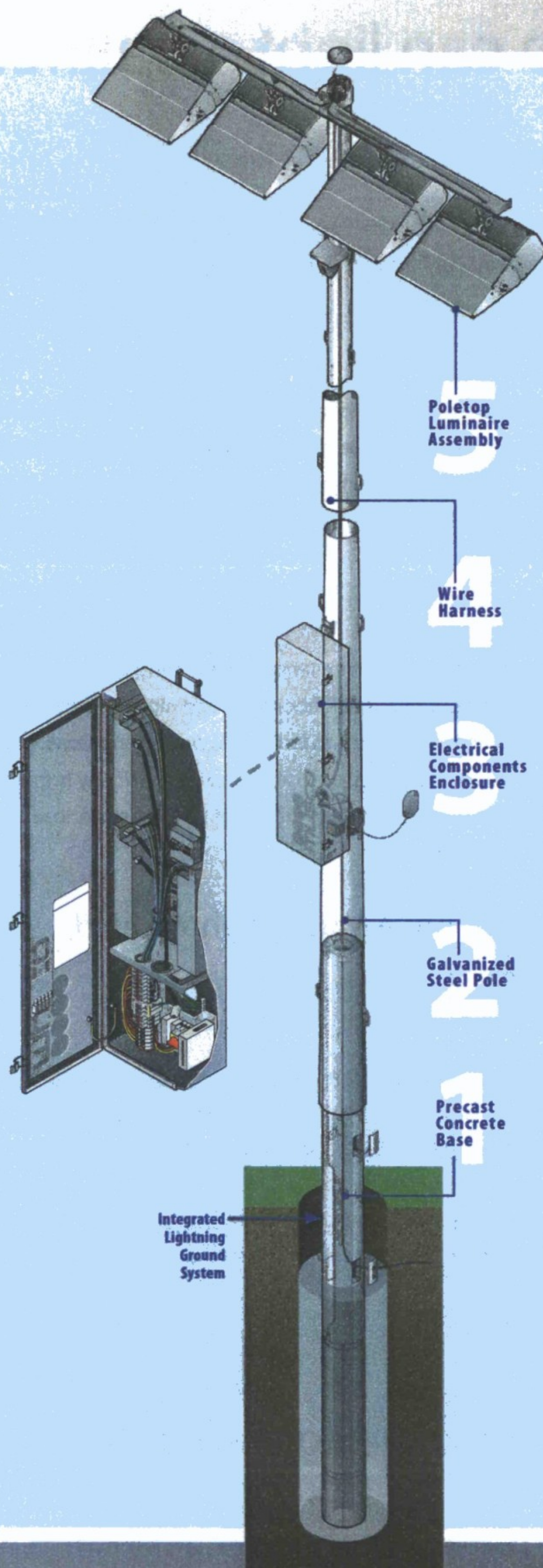
Control from the foundation to the poletop.

Two light source options

TLC *for* LED™
Total Light Control™



Green Generation•Lighting.
Metal Halide Light Source



"LEDs must be carefully integrated into lighting fixtures. The efficiency of a poorly designed fixture that uses even the best LEDs will be only a fraction of what it would be if the fixture were well-designed, and the design can also affect lumen maintenance."

— U.S. Department of Energy
/eere/ssl/led-basics

Musco can light a ballfield better than ever..

We create controlled light, not floodlights.

An LED floodlight is a serious step backward when it comes to the quality of light on your field. It may flood light into the neighborhood, into the night sky, and into the eyes of players.

New Tool

LED brings many benefits and new opportunities, but it's a tool, not a solution. Controlling the LED's intense, "rifle shot" of light is challenging. But with Total Light Control—TLC for LED™, we're able to achieve things never before possible—from pinpoint precision, to instant on/off, to varying light levels for different needs and sports presentation theatrics.

Same Issues

The key issues in sports lighting haven't changed: generating light, projecting it onto the target, keeping it out of the neighborhood and night sky, and creating an operating environment that allows it to last in real world conditions. Musco is able to carve out the area to be lighted and dramatically cut off any impact on the surrounding area. We use more of the light produced by the fixture, lose less light, and don't abuse the neighborhood.

San Diego Padres Petco Park · San Diego, California, USA

When you walk onto a Musco-lighted field, it just looks better.

"When you stand at home plate and look out to center field, there's no glare, but the field is totally bright and you see how the white of the ball pops, it looks amazing."

— **Tyson Kimm**
Vice President of Perfect Game USA,
a major tenant at LakePoint Sports Community

LakePoint Sports Community · Emerson, Georgia, USA

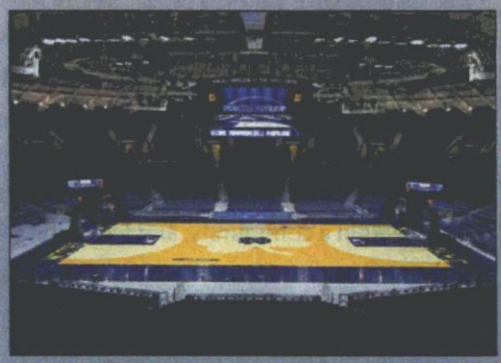
Control from the light source to the field.

. . for players, fans, and TV cameras.

Theatrics and special effects enhance fan and TV experience.

Mount Rushmore - Keystone, South Dakota, USA

Pinpoint control from 1,100 feet away highlights the target area while preserving surrounding darkness.



University of Notre Dame - Notre Dame, Indiana, USA

Sensational event lighting with dimming saves energy for high-usage, multi-use venues.

Players enjoy quality lighting, no glare, and better ability to track the entire flight of the ball.

The neighbors will love it.

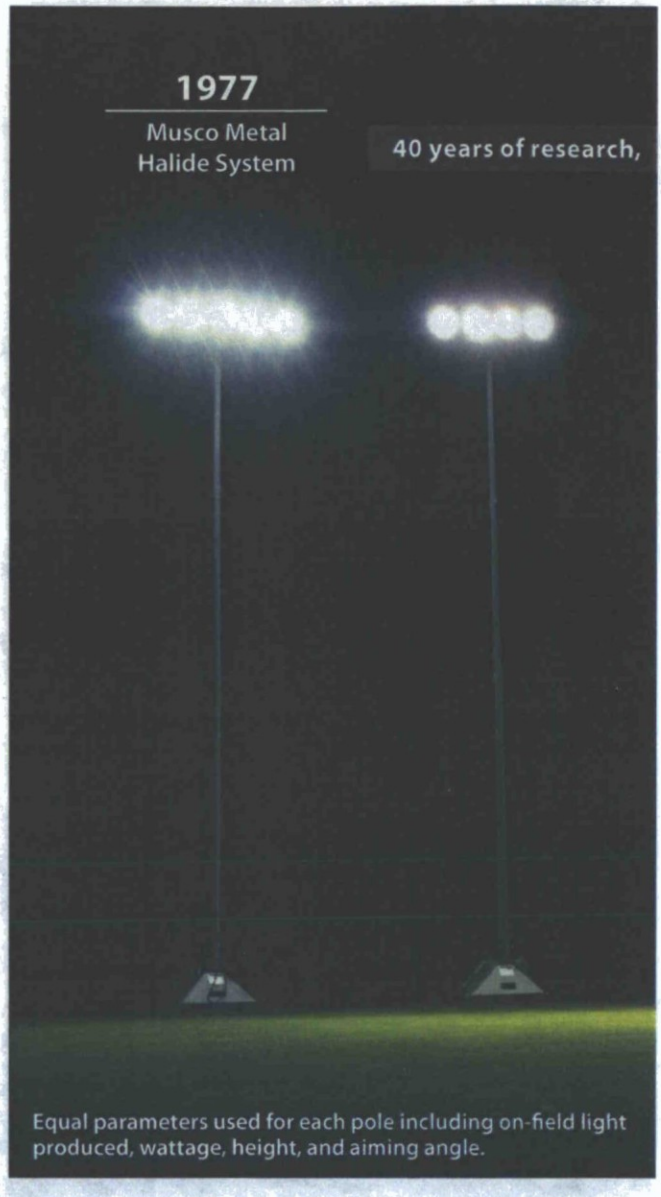
Musco cares as much about preserving darkness as it does about creating light.

Emitting light is easy. But LED fixtures that can't effectively control the light being emitted brings the unintended consequences of glare for players and neighbors, and wasteful spill into the night sky.

With Musco's Total Light Control—TLC for LED™, we've taken LED to a level of performance and precision never before seen in sports lighting. It means no disruptive glare into nearby homes and the preservation of dark skies above.

And it opens up new opportunities for where fields can be located within a community, and for existing fields that, until now, weren't able to install lights because of community push back.

Control preserving the night sky.



Equal parameters used for each pole including on-field light produced, wattage, height, and aiming angle.

"Glyndon Park is in a naturally wooded residential area. We didn't want to illuminate the homes of neighbors in the area. I initially wasn't supportive of putting in traditional lights. The product Musco has developed allows us to light this field, yet light nothing else around it."

— Cathy Salgado,
Parks and Recreation Director, Vienna, VA

Glyndon Park Little League, Vienna, Virginia

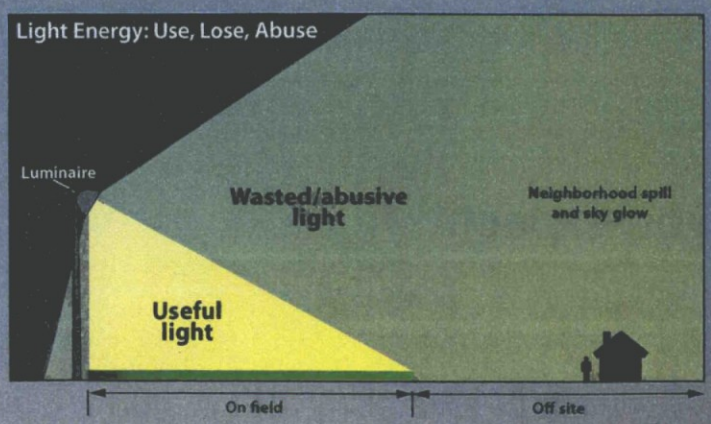
increasing efficiency and decreasing environmental impact.

Today

Musco LED System

Today

Other Luminaire Manufacturer LED



And, your field is always ready to play.

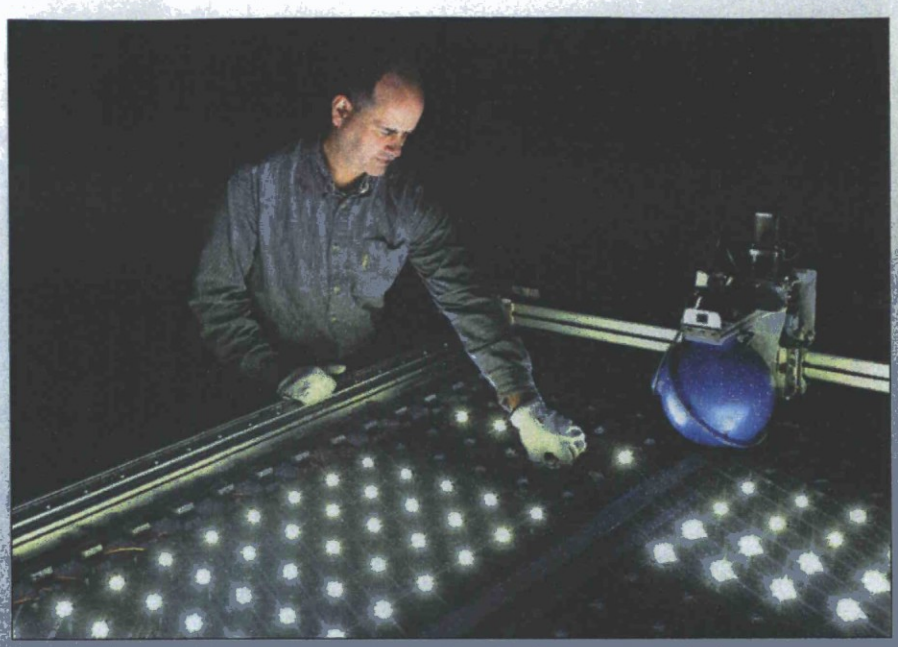
Here's a look at what the Musco Team has done in the last year as a partner in service to customers like you...

- Turned lights on and off remotely for more than 4 million games and events
- Conducted routine inspections and maintenance at over 11,000 fields
- Taken more than 350,000 calls, answering questions and helping with scheduling
- Carried out group lamp replacements on more than 40,000 metal halide fixtures
- Traveled enough miles servicing fields to circle the equator 33 times

And here's what our customers enjoy for 25 years...

Peace of mind for 9,125 days *knowing that if a problem arises, we'll be there, and a budget with virtually* ***zero dollars spent on maintenance,*** ***increased staff productivity*** *resulting from not having to worry about managing your lights, plus* ***restful nights,*** *free from midnight calls from unhappy neighbors about lights left on.*

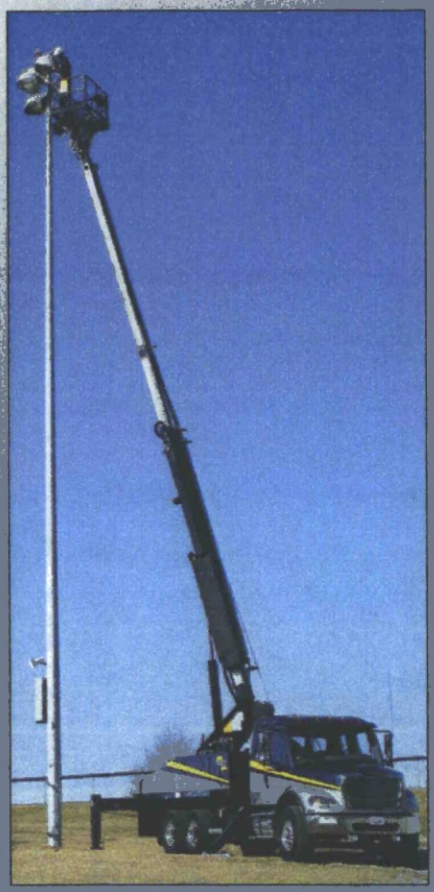
Control assuring the results you expect.



We do the R&D to create it. We customize and apply solutions to your facility.

"Musco called to let us know there was an issue before we knew we had a problem."

— **Stephen Cooke, CPRP, CYSA**
Greenvill County Recreation Athletics Manager, Taylors, SC



We're on the road to support it for 25 years.

We provide 24–7 Control-Link® support to monitor and operate your facility.

From metal halide to LED,

Musco's Light-Structure System™ performs

in real world conditions ***for 25 years, guaranteed.***

We Make It Happen.

Control

from foundation to poletop...

from the light source to the field,
preserving the night sky...

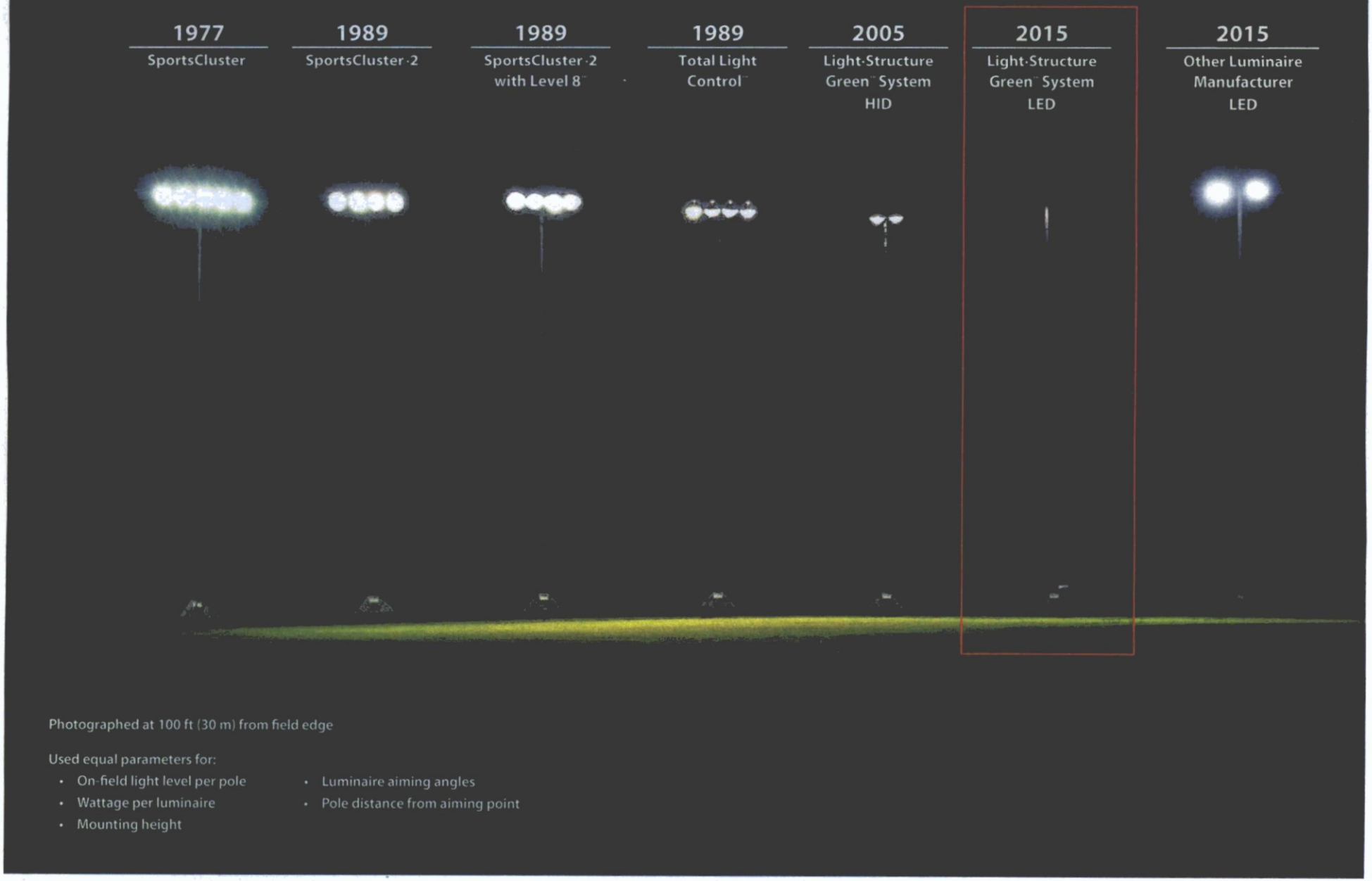
assuring the results you expect,
day 1... year 1... and for 25 years.

musco Lighting

We Make It Happen

What Matters in Lighting Technology

Light Control

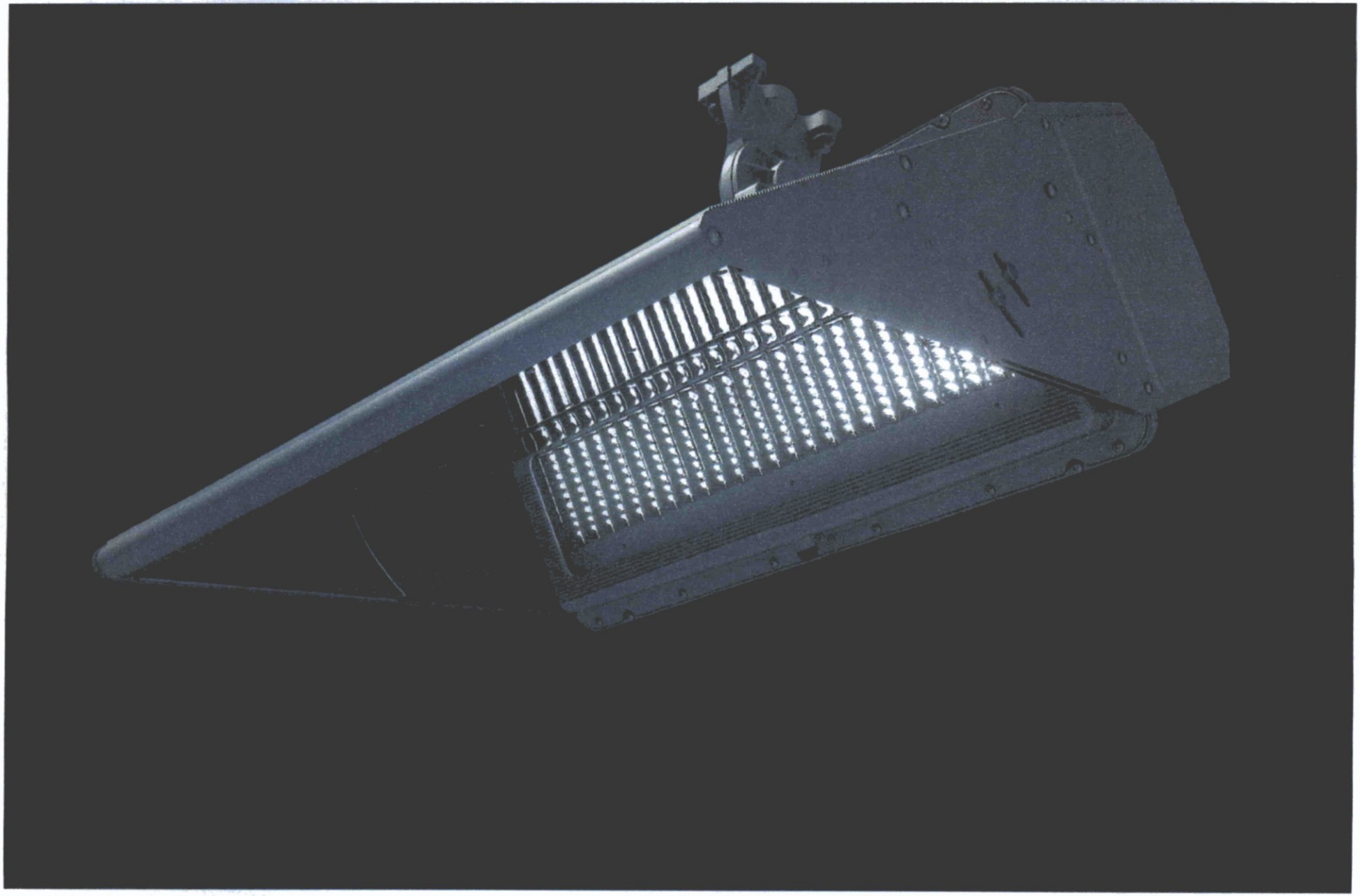


Photographed at 100 ft (30 m) from field edge

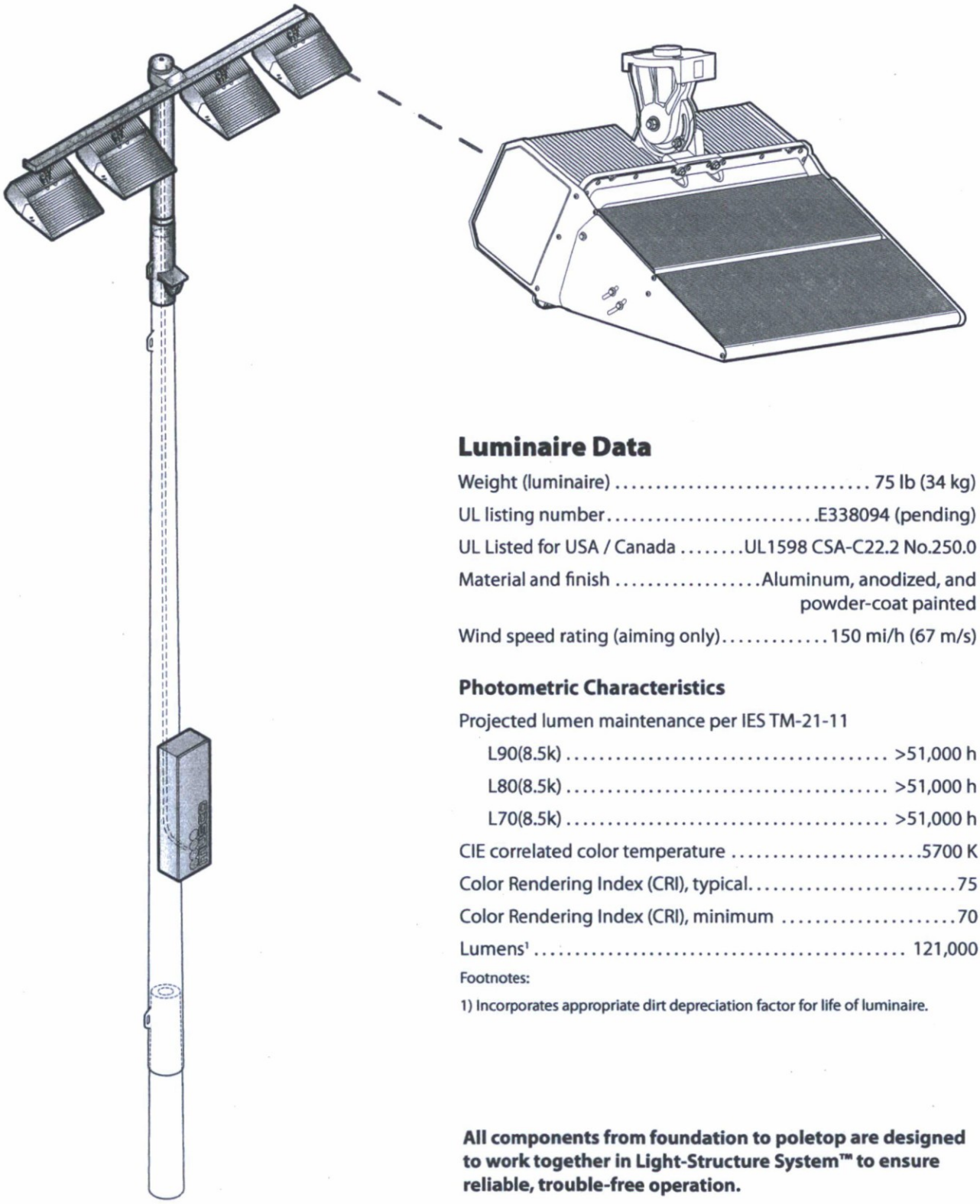
Used equal parameters for:

- On-field light level per pole
- Wattage per luminaire
- Mounting height
- Luminaire aiming angles
- Pole distance from aiming point

Total Light Control™ — LED-1150 Luminaire Component



Luminaire and Driver Components – TLC-LED-1150



Luminaire Data

Weight (luminaire) ..... 75 lb (34 kg)

UL listing number ..... E338094 (pending)

UL Listed for USA / Canada UL1598 CSA-C22.2 No.250.0

Material and finish ..... Aluminum, anodized, and powder-coat painted

Wind speed rating (aiming only) ..... 150 mi/h (67 m/s)

Photometric Characteristics

Projected lumen maintenance per IES TM-21-11

L90(8.5k) ..... >51,000 h

L80(8.5k) ..... >51,000 h

L70(8.5k) ..... >51,000 h

CIE correlated color temperature ..... 5700 K

Color Rendering Index (CRI), typical 75

Color Rendering Index (CRI), minimum 70

Lumens[1] 121,000

Footnotes:

1) Incorporates appropriate dirt depreciation factor for life of luminaire.

All components from foundation to poletop are designed to work together in Light-Structure System™ to ensure reliable, trouble-free operation.

Luminaire and Driver Components – TLC-LED-1150

Driver Data

Electrical Data

Rated Wattage[1]

- Per driver ..... 1,150 W
- Per luminaire ..... 1,150 W

Number of luminaires per driver 1

Starting (inrush) current ..... <40 A, 256 µ

Fuse Rating ..... 15 A

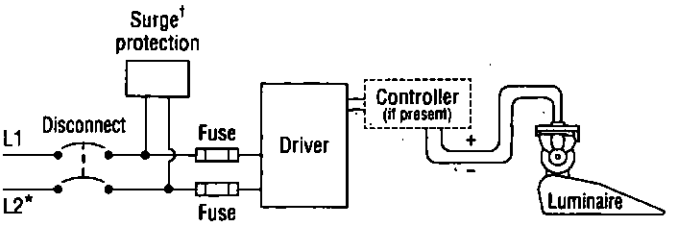
UL ambient temperature rating ..... 50°C (122°F)

Efficiency 95%

Dimming mode ..... optional

- Range, energy consumption 15-100%
- Range, light output 20-100%

Typical Wiring



* If L2 (com) is neutral then not switched or fused.
† Not present if indoor installation.

	200 Vac 50/60 Hz	208 Vac 60 Hz	220 Vac 50/60 Hz	230 Vac 50 Hz	240 Vac 50/60 Hz	277 Vac 60 Hz	347 Vac 60 Hz	380 Vac 50/60 Hz	400 Vac 50 Hz	415 Vac 50 Hz	480 Vac 60 Hz
Max operating current[2]	7.26 A	6.98 A	6.60 A	6.31 A	6.05 A	5.24 A	4.18 A	3.82 A	3.63 A	3.50 A	3.03 A

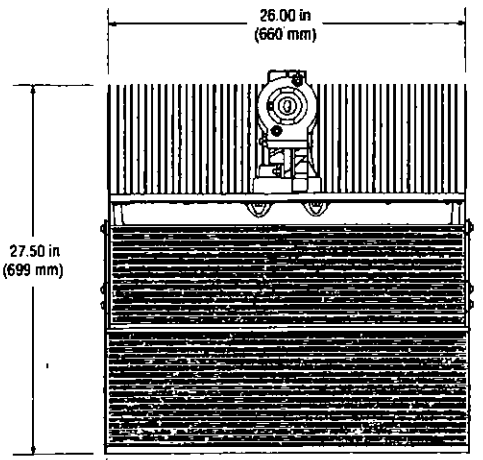
Footnotes:

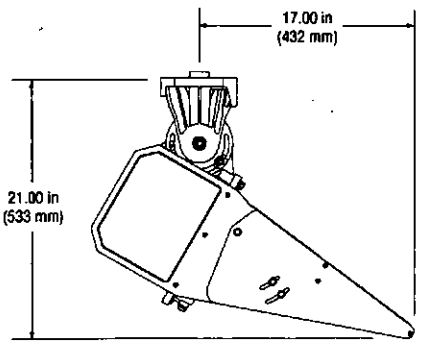
1) Rated wattage is the power consumption, including driver efficiency losses, at stabilized operation in 25° C ambient temperature environment.

2) Operating current includes allowance for 0.90 minimum power factor, operating temperature, and LED light source manufacturing tolerances.

Notes

1. Use thermal magnetic HID-rated or D-curve circuit breakers.
2. See Musco *Control System Summary* for circuit information.



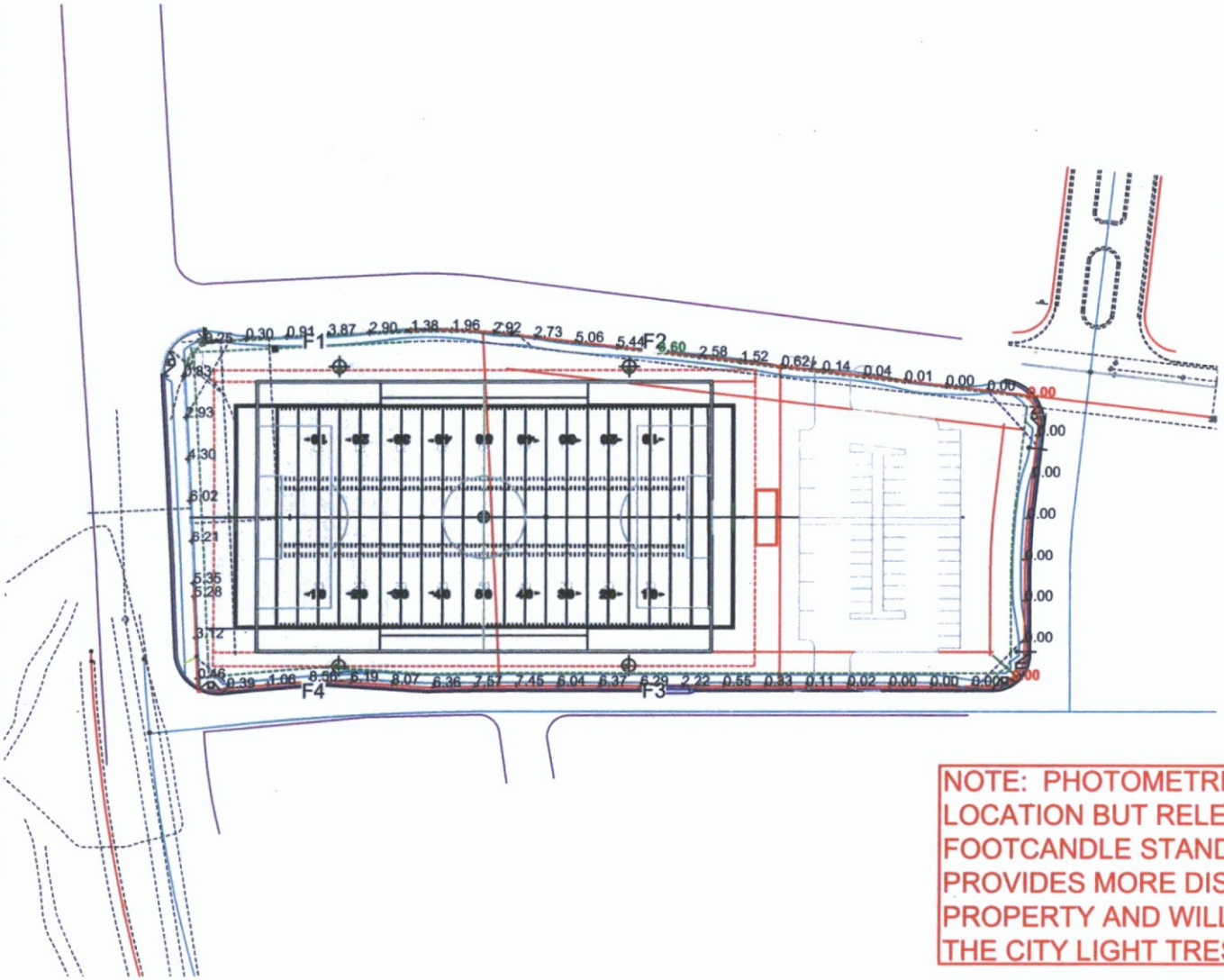


Light-Structure Green™ – LED Light Source Lakepoint Sports Complex · Emerson, Georgia, USA

	Musco: what can be	What often is
	TOTAL LIGHT CONTROL — TLC FOR LED ™	PRIOR HID LIGHT SOURCE
	LIGHT LEVEL	
PROPOSED SPORTS SURFACE LIGHTING	100/70 horizontal footcandles (1000/700 lux) 1.5:1/2:1 uniformity, infield/outfield	75/50 horizontal footcandles (750/500 lux) 2:1/3:1 uniformity, infield/outfield
	ENERGY CONSUMPTION	
	128.80 kW	226.80 kW

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	F1-F4	70'	-	20'	LED 5700K - 75 CRI	2	0	2
				70'	LED 5700K - 75 CRI	11	11	0
4	TOTALS					52	44	8



SCALE IN FEET 1 : 120

0' 120' 240'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

MY PROJECT

Name:	**Great Hearts Academy North Scottsdale**
Location:	Scottsdale,AZ

GRID SUMMARY

Name:	**Parcel Property Line**
Spacing:	30.0'
Height:	3.0' above grade

MAINTAINED ILLUMINATION

SUMMARY	HORIZONTAL FOOTCANDLES
	Entire Grid
Scan Average:	2.559
Maximum:	8.60
Minimum:	0.00
No. of Points:	56

LUMINAIRE INFORMATION	
Luminaire Type:	216 LED
Design Usage Hours:	10,000 hours
Design Lumens:	63,600
Avg Tilt Factor:	1.000
Add'l Non-Rec LLF:	1.000
Recoverable LLF:	1.000
Total LLF:	1.000
No. of Luminaires:	44
Avg KW:	26.27 (26.27 max)

Field Measurements: Illumination measured in accordance with the IESNA LM-5-04 and CIBSE LG4. Individual values may vary. See the Warranty document for details.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **Musco Control System Summary** for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the ballast and structures located within 3 feet (1m) of design locations.

NOTE: PHOTOMETRICS ARE FROM PRIOR SITE LOCATION BUT RELEVANT FROM A RELEVATIVE FOOTCANDLE STANDPOINT. THE NEW SITE LOCATION PROVIDES MORE DISTANCE FROM ADJACENT PROPERTY AND WILL EXCEED THE REQUIREMENTS OF THE CITY LIGHT TRESPASS CODE.

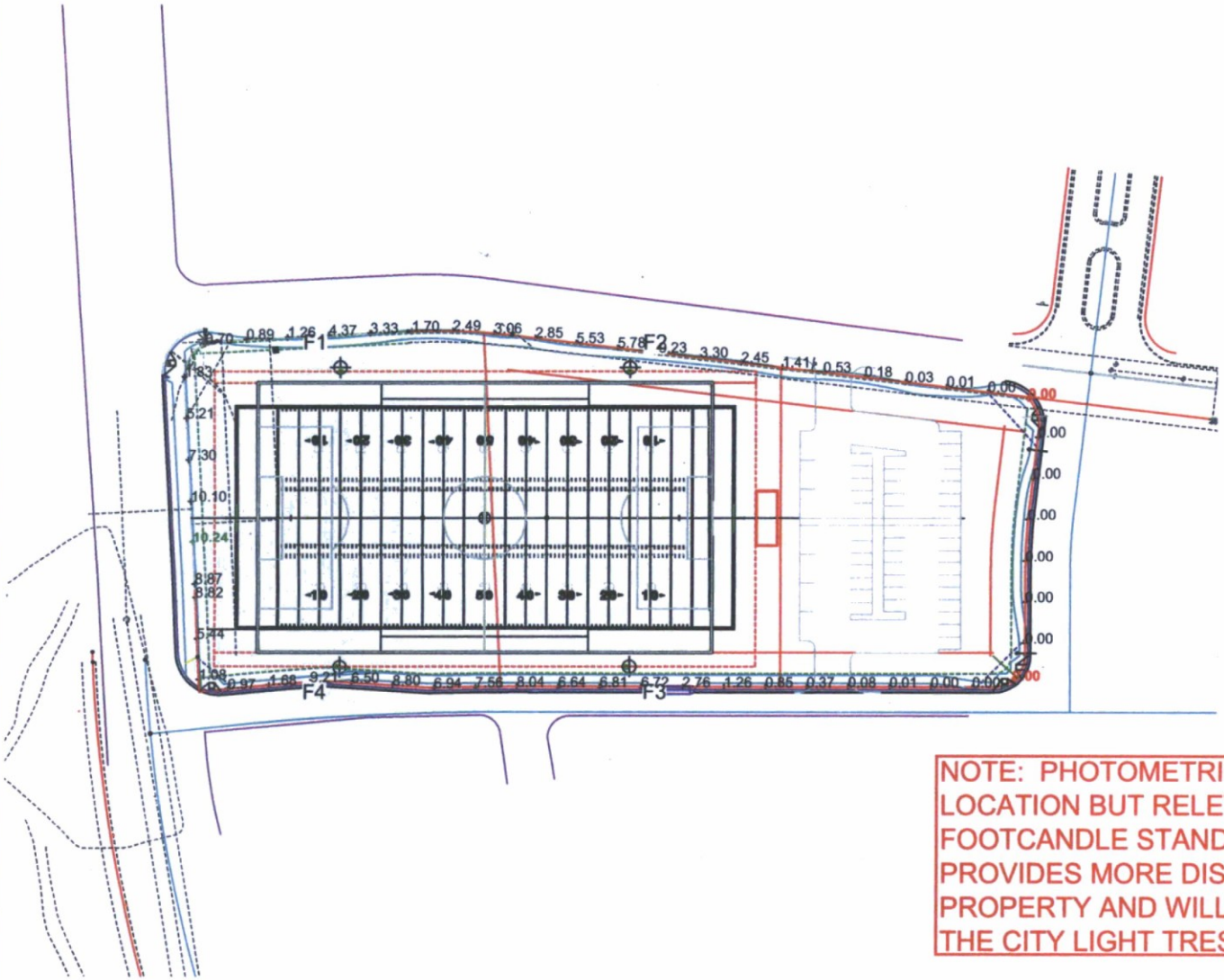
ENGINEERED DESIGN

By:	**Treana Drost**	
File # / Date:	176677B_spill	25-Jan-16

ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	F1-F4	70'	-	20'	LED 5700K - 75 CRI	2	0	2
				70'	LED 5700K - 75 CRI	11	11	0
4	TOTALS					52	44	8



SCALE IN FEET 1 : 120

0' 120' 240'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

MY PROJECT

Name:	**Great Hearts Academy North Scottsdale**
Location:	Scottsdale,AZ

GRID SUMMARY

Name:	**Parcel Property Line**
Spacing:	30.0'
Height:	3.0' above grade

MAINTAINED ILLUMINATION

SUMMARY	MAX VERTICAL FOOTCANDLES
	Entire Grid
Scan Average:	3.271
Maximum:	10.24
Minimum:	0.00
No. of Points:	56

LUMINAIRE INFORMATION	
Luminaire Type:	216 LED
Design Usage Hours:	10,000 hours
Design Lumens:	63,600
Avg Tilt Factor:	1.000
Add'l Non-Rec LLF:	1.000
Recoverable LLF:	1.000
Total LLF:	1.000
No. of Luminaires:	44
Avg KW:	26.27 (26.27 max)

Field Measurements: Illumination measured in accordance with the IESNA LM-5-04 and CIBSE LG4. Individual values may vary. See the Warranty document for details.

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ENGINEERED DESIGN

By:	**Treana Drost**	
File # / Date:	176677B_spill	25-Jan-16

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Pole				Luminaires				
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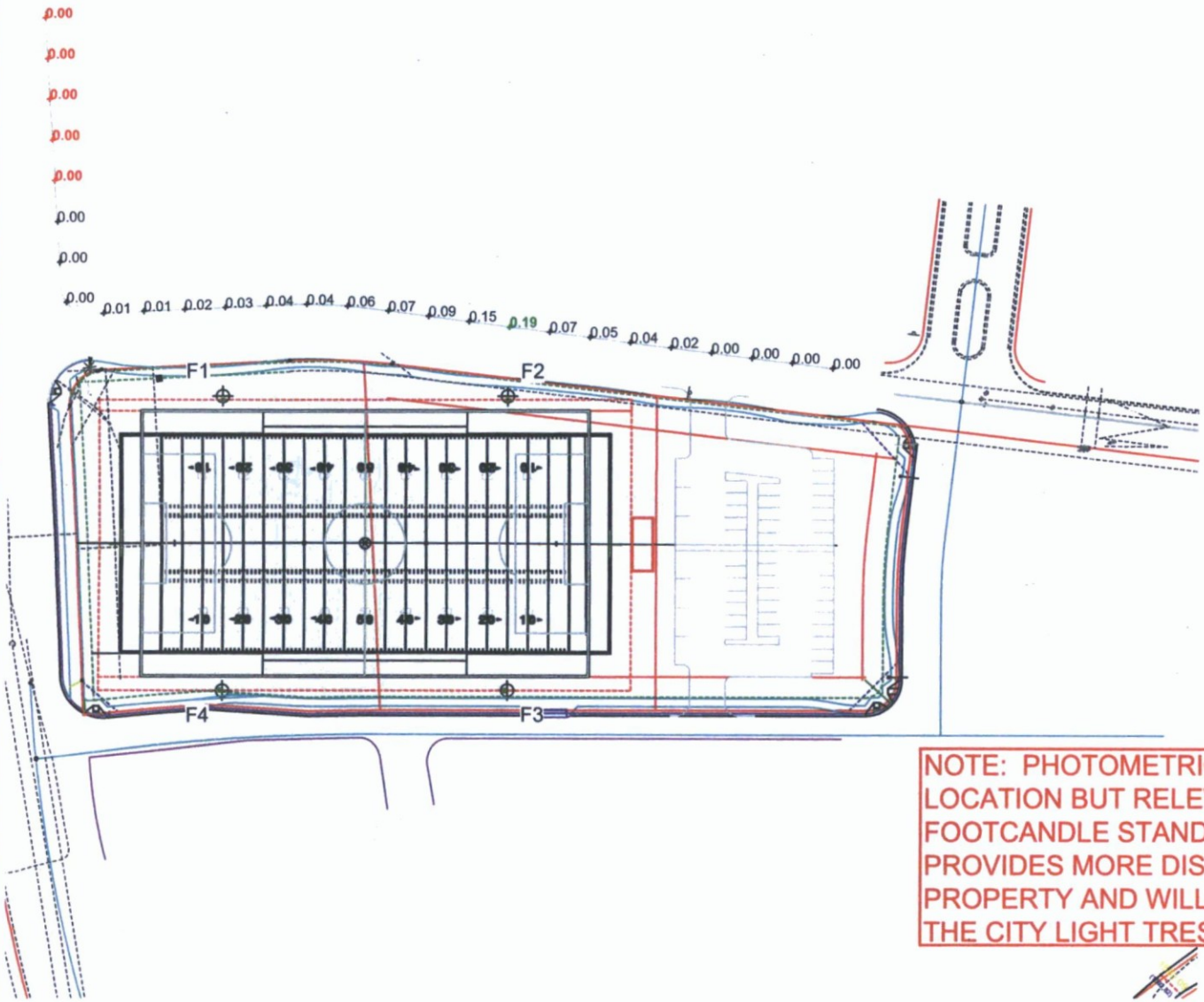
				70'	LED 5700K - 75 CRI	11	11	0
4	TOTALS					52	44	8



SCALE IN FEET 1 : 120

0' 120' 240'

Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

MY PROJECT

Name:	**Great Hearts Academy North Scottsdale**
Location:	Scottsdale,AZ

GRID SUMMARY

Name:	**East Residential Spill**
Spacing:	30.0'
Height:	3.0' above grade

MAINTAINED ILLUMINATION

SUMMARY	HORIZONTAL FOOTCANDLES
	Entire Grid
Scan Average:	0.034
Maximum:	0.19
Minimum:	0.00
No. of Points:	27
LUMINAIRE INFORMATION	
Luminaire Type:	216 LED
Design Usage Hours:	10,000 hours
Design Lumens:	63,600
Avg Tilt Factor:	1.000
Add'l Non-Rec LLF:	1.000
Recoverable LLF:	1.000
Total LLF:	1.000
No. of Luminaires:	44
Avg KW:	26.27 (26.27 max)

Field Measurements: Illumination measured in accordance with the IESNA LM-5-04 and CIBSE LG4. Individual values may vary. See the Warranty document for details.

Electrical System Requirements: Refer to Amperage Draw Chart and/or the **Musco Control System Summary** for electrical sizing.

Installation Requirements: Results assume +/- 3% nominal voltage at line side of the ballast and structures located within 3 feet (1m) of design locations.

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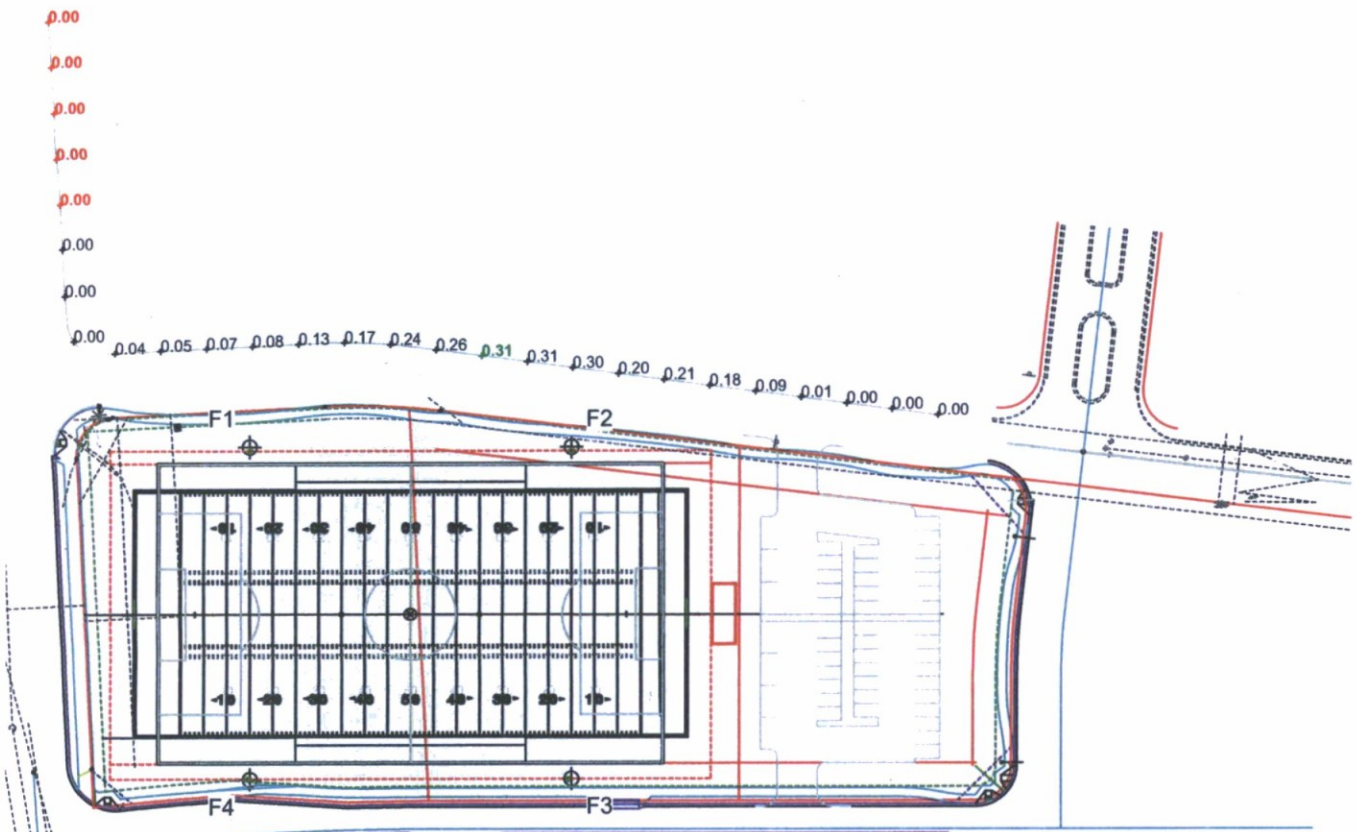
ENGINEERED DESIGN

By:	**Treana Drost**	
File # / Date:	176677B_spill	25-Jan-16

ILLUMINATION SUMMARY

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
4	F1-F4	70'	-	20'	LED 5700K - 75 CRI	2	0	2
				70'	LED 5700K - 75 CRI	11	11	0
4	TOTALS					52	44	8



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0' 120' 240'

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MY PROJECT

Name:	**Great Hearts Academy North Scottsdale**
Location:	Scottsdale,AZ

GRID SUMMARY

Name:	**East Residential Spill**
Spacing:	30.0'
Height:	3.0' above grade

MAINTAINED ILLUMINATION

SUMMARY	MAX VERTICAL FOOTCANDLES
	Entire Grid
Scan Average:	0.098
Maximum:	0.31
Minimum:	0.00
No. of Points:	27

LUMINAIRE INFORMATION	
Luminaire Type:	216 LED
Design Usage Hours:	10,000 hours
Design Lumens:	63,600
Avg Tilt Factor:	1.000
Add'l Non-Rec LLF:	1.000
Recoverable LLF:	1.000
Total LLF:	1.000
No. of Luminaires:	44
Avg KW:	26.27 (26.27 max)

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ENGINEERED DESIGN

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File # / Date:	176677B_spill	25-Jan-16

ILLUMINATION SUMMARY