*Presented to:*

# City of Key West Retrofit

Ball Field Lighting Project
Key West, Florida
May 26, 2011

Clayton Sterling Complex - #141839
Dewitt Roberts Softball - #141846
George Mira Football - #141847
Rosa Hernandez Softball - #141845
Pepe Hernandez Park - #150167
Nelson English Park - #146480

*Submitted by:*


## Musco Sports Lighting, LLC

2107 Stewart Road
PO Box 260
Muscatine, Iowa 52761
Local Phone: 563-263-2281
Toll Free: 800-756-1205
Fax: 800-374-6402

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City of Key West Retrofit
Ball Field Lighting Project
Key West, FL

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# Tab A

# SUBMITTAL CHECKLIST

## Design Submittal Data Checklist and Certification

*All items listed below are mandatory, shall comply with the specification, and be submitted 10 days prior to bid.*

| Tab | Item | Description |
|---|---|---|
| **A** | Letter/ Checklist | Listing of all information being submitted must be included on the table of contents. List the name of the manufacturer's local representative and his/her phone number. Signed submittal checklist to be included. |
| **B** | On Field Lighting Design | Lighting design drawing(s) showing:<br>a. Field Name, date, file number, prepared by, and other pertinent data<br>b. Outline of field(s) being lighted, as well as pole locations referenced to the center of the field (x & y),or homeplate for baseball/softball fields. Illuminance levels at grid spacing specified<br>c. Pole height, number of fixtures per pole, as well as luminaire information including wattage, lumens and optics<br>d. Height of meter above field surface<br>e. Summary table showing the number and spacing of grid points; average, minimum and maximum illuminance levels in foot candles (fc); uniformity including maximum to minimum ratio, coefficient of variance and uniformity gradient; number of luminaries, total kilowatts, average tilt factor; light loss factor.<br>f. If bidding constant light, refer to Section 1.2, A, 2 of this specification.<br>g. Alternate manufacturers shall provide both initial and maintained light scans using a maximum 0.70 Light Loss Factor to calculate maintained values. |
| **C** | Off Field Lighting Design | Lighting design drawing showing initial horizontal spill light levels along the boundary line (100 Ft) in footcandles. Horizontal levels shall be at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at horizontal per section 1.2, A. |
| **D** | Life Cycle Cost Calculation | Document life cycle cost calculations as defined in the specification. Identify energy costs for operating the luminaires, maintenance cost for the system including spot lamp replacement, and group relamping costs as called for in Section 1.3, H. All costs should be based on 10 years. |
| **E** | Luminaire Aiming Summary | Document showing each luminaire's aiming angle and the poles on which the luminaries are mounted. Each aiming point shall identify the type of luminaire. |
| **F** | EECBG Grant Data | Submit documents/data per the requirements of www.eecbg.energy.gov:<br>a. Jobs created and/or retained<br>b. Life Cycle Cost Savings Analysis detailing energy kW reduction<br>c. Carbon dioxide ($CO_2$) emission reduction<br>d. Signed statement from company officer stating manufacturer meets "Buy American" provision of the ARRA. |
| **G** | Control & Monitoring | Manufacturer shall provide written definition and schematics for automated control system to include monitoring. They will also provide examples of system reporting and access for numbers for personal contact to operate the system. |
| **H** | Performance Guarantee | Provide performance guarantee including a written commitment to undertake all corrections required to meet the performance requirements noted in these specifications at no expense to the owner. Light levels must be guaranteed per specification for 10 years. |
| **I** | Warranty | Provide written warranty information including all terms and conditions. |
| **J** | Project References | Manufacturer to provide a list of project references of similar projects completed within the past three years. Reference Section 1.2, A, 2, a. |
| **K** | Product Information | Complete set of product brochures for all components, including a complete parts list, and UL Listings. |
| **L** | Non-Compliance | Manufacturer shall list all items that do not comply with the specifications. |
| **M** | Compliance | Manufacturer shall sign off that all requirements of the specifications have been met at that the manufacturer will be responsible for any future costs incurred to bring their equipment into compliance for all items not meeting specifications and not listed in item N – Non-Compliance. |
| **N** | Delivery | Manufacturer shall supply an expected delivery timeframe from receipt of approved submittals and complete order information, per section 1.6, A. |

I understand that the information supplied herein shall be used for the purpose of complying with the specifications for City of Key West Retrofit Ball Field Lighting. By signing below I agree that all requirements of the specifications have been met and that the manufacturer will be responsible for any future costs incurred to bring their equipment into compliance for all items not meeting specifications and not listed in the Non-Compliance section.

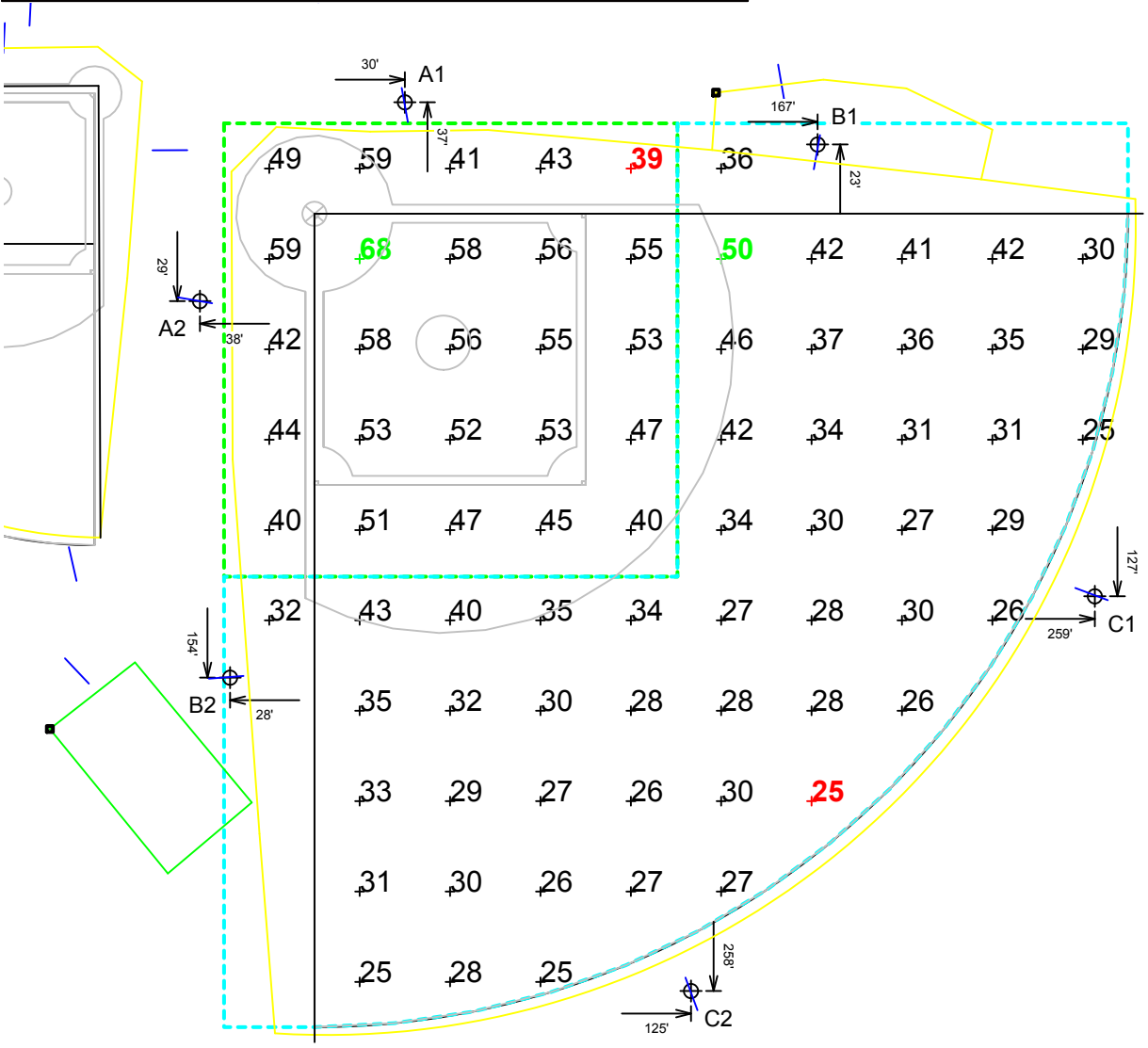
**Manufacturer:** **Musco Sports Lighting, LLC** **Signature:** _____

**Contact Name:** **Jennifer Thompson** **Date:** **May 26, 2011**

# Tab B

## EQUIPMENT LIST FOR AREAS SHOWN

| Pole | | | | Luminaires | | | | |
|---|---|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 2 | A1-A2 | 60' | - | 60' | 1500W MZ | 5 | 5 | 0 |
| 1 | B1 | 65' | -2' | 63' | 1500W MZ | 7 | 7 | 0 |
| 1 | B2 | 65' | -1' | 64' | 1500W MZ | 7 | 7 | 0 |
| 1 | C1 | 63' | -2' | 61' | 1500W MZ | 3 | 3 | 0 |
| 1 | C2 | 63' | -3' | 60' | 1500W MZ | 3 | 3 | 0 |
| 6 | ← TOTALS → | | | | | 30 | 30 | 0 |




SCALE IN FEET 1 : 60

0' 60' 120'

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

MUSCO GREEN GENERATION LIGHTING™

GUARANTEED PERFORMANCE

# ILLUMINATION SUMMARY

## Field A

Clayton Sterling Complex-Key West Retrofit
Key West,FL

**Field A**

· Size: 270'/270'/270' - basepath 90'
· Grid Spacing = 30.0' x 30.0'
· Values given at 3.0' above grade

· Luminaire Type: Green Generation
· Rated Lamp Life: 5,000 hours
· Avg Lumens/Lamp: 134,000

**CONSTANT ILLUMINATION HORIZONTAL FOOTCANDLES**

| | Infield | Outfield |
|---|---|---|
| No. of Target Points: | 25 | 50 |
| Average: | 50.5 | 31.9 |
| Maximum: | 68 | 50 |
| Minimum: | 39 | 25 |
| Avg/Min: | 1.29 | 1.29 |
| Max/Min: | 1.75 | 2.04 |
| UG (Adjacent Pts): | 1.43 | 1.42 |
| CV: | 0.15 | 0.19 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 30 |
| Avg KW over 5,000: | 46.92 |
| Max KW: | 51.0 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

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

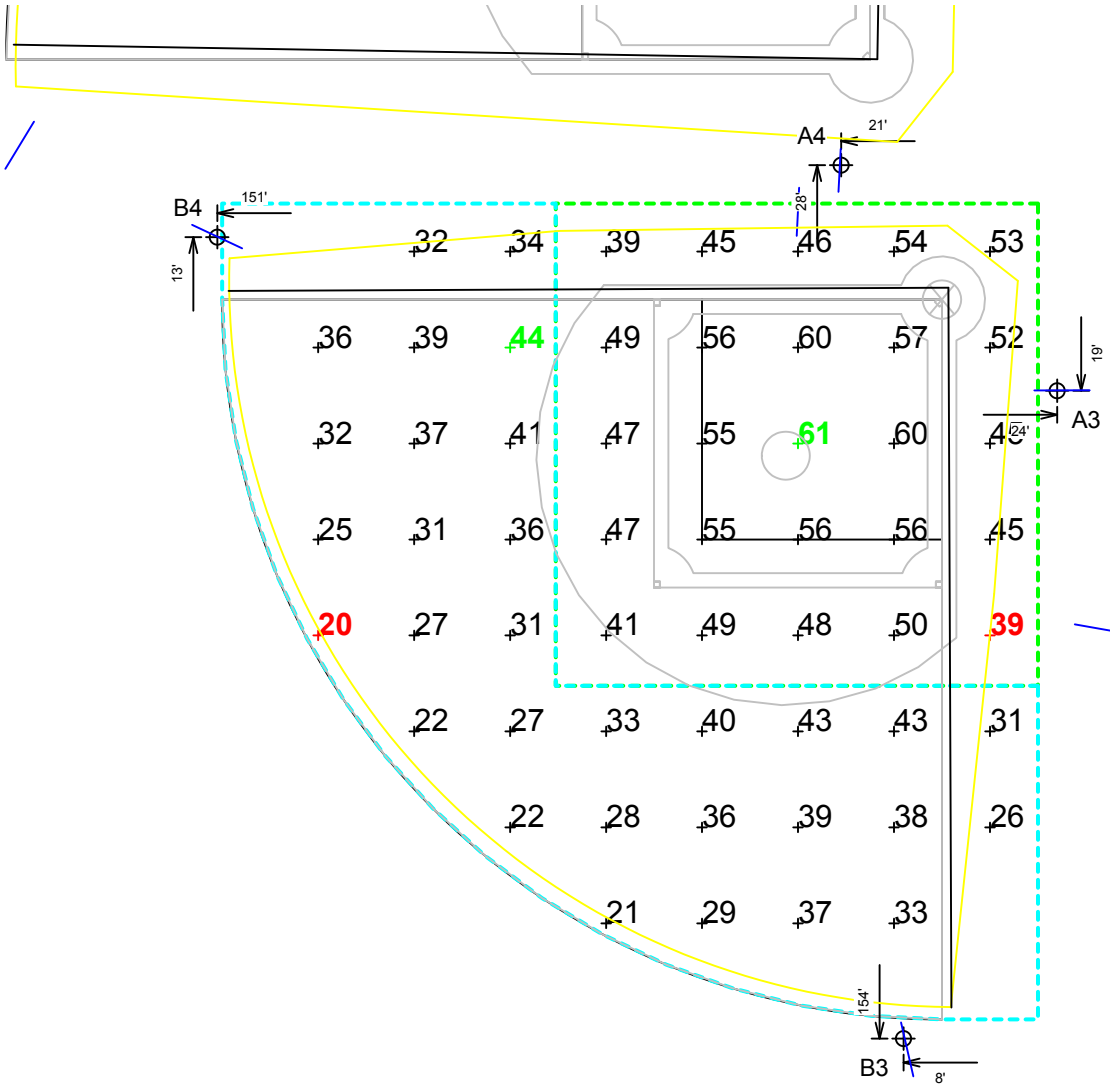
**Installation Requirements:** Results assume +/- 3% nominal voltage at line side of the ballast and structures located within 3 feet (1m) of design locations.

By: Joel Stout

File #: 141839R1 Date: 05-Jan-11

## EQUIPMENT LIST FOR AREAS SHOWN

| Pole | | | | Luminaires | | | | |
|---|---|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 2 | A3-A4 | 60' | - | 60' | 1500W MZ | 3 | 3 | 0 |
| 1 | B3 | 60' | -2.8' | 57.2' | 1500W MZ | 3 | 3 | 0 |
| 1 | B4 | 60' | -2' | 58' | 1500W MZ | 3 | 3 | 0 |
| 4 | ← TOTALS → | | | | | 12 | 12 | 0 |




SCALE IN FEET 1 : 40

0' 40' 80'

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

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# ILLUMINATION SUMMARY

**Field B**

Clayton Sterling Complex-Key West Retrofit
Key West,FL

**Field B**

· Size: 150'/150'/150' - basepath 60'
· Grid Spacing = 20.0' x 20.0'
· Values given at 3.0' above grade

· Luminaire Type: Green Generation
· Rated Lamp Life: 5,000 hours
· Avg Lumens/Lamp: 134,000

**CONSTANT ILLUMINATION HORIZONTAL FOOTCANDLES**

| | Infield | Outfield |
|---|---|---|
| No. of Target Points: | 25 | 31 |
| Average: | 50.6 | 32.8 |
| Maximum: | 61 | 44 |
| Minimum: | 39 | 20 |
| Avg/Min: | 1.29 | 1.62 |
| Max/Min: | 1.55 | 2.17 |
| UG (Adjacent Pts): | 1.34 | 1.50 |
| CV: | 0.13 | 0.21 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 12 |
| Avg KW over 5,000: | 18.77 |
| Max KW: | 20.4 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

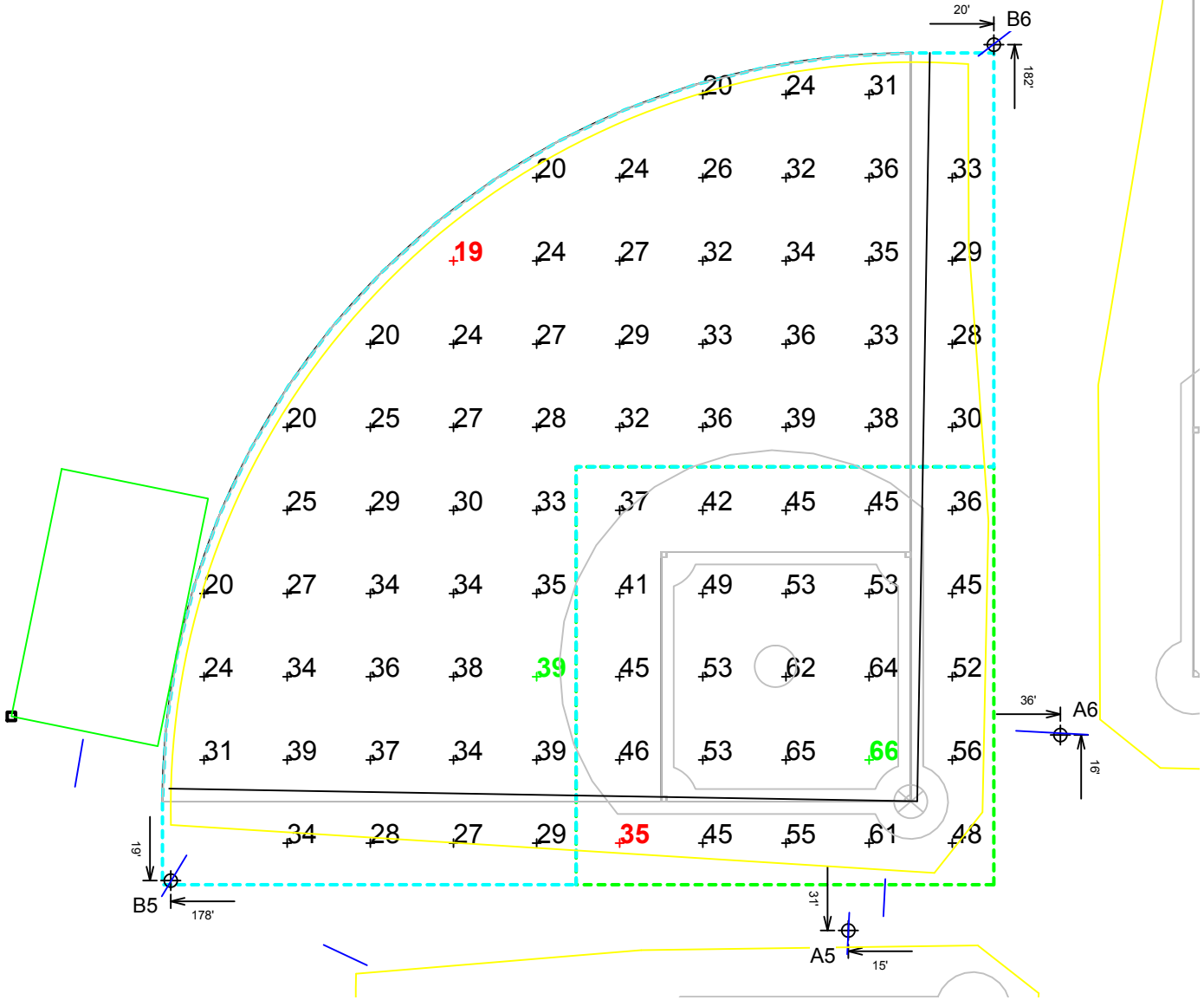
**Electrical System Requirements:** Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

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

By: Joel Stout

File #: 141839R1 Date: 05-Jan-11

| EQUIPMENT LIST FOR AREAS SHOWN | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pole | | | | Luminaires | | | | |
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 2 | A5-A6 | 60' | - | 60' | 1500W MZ | 3 | 3 | 0 |
| 1 | B5 | 60' | -1.9' | 58.1' | 1500W MZ | 4 | 4 | 0 |
| 1 | B6 | 60' | -1.6' | 58.4' | 1500W MZ | 4 | 4 | 0 |
| 4 | ← TOTALS → | | | | | 14 | 14 | 0 |




SCALE IN FEET 1 : 40

0' 40' 80'

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

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# ILLUMINATION SUMMARY

## Field C

Clayton Sterling Complex-Key West Retrofit
Key West,FL

**Field C**

- Size: 180'/180'/180' - basepath 60'
- Grid Spacing = 20.0' x 20.0'
- Values given at 3.0' above grade

| | |
|---|---|
| · Luminaire Type: | Green Generation |
| · Rated Lamp Life: | 5,000 hours |
| · Avg Lumens/Lamp: | 134,000 |

**CONSTANT ILLUMINATION**
**HORIZONTAL FOOTCANDLES**

| | Infield | Outfield |
|---|---|---|
| No. of Target Points: | 25 | 56 |
| Average: | 50.1 | 30.1 |
| Maximum: | 66 | 39 |
| Minimum: | 35 | 19 |
| Avg/Min: | 1.41 | 1.55 |
| Max/Min: | 1.86 | 2.04 |
| UG (Adjacent Pts): | 1.29 | 1.40 |
| CV: | 0.18 | 0.19 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 14 |
| Avg KW over 5,000: | 21.9 |
| Max KW: | 23.8 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

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

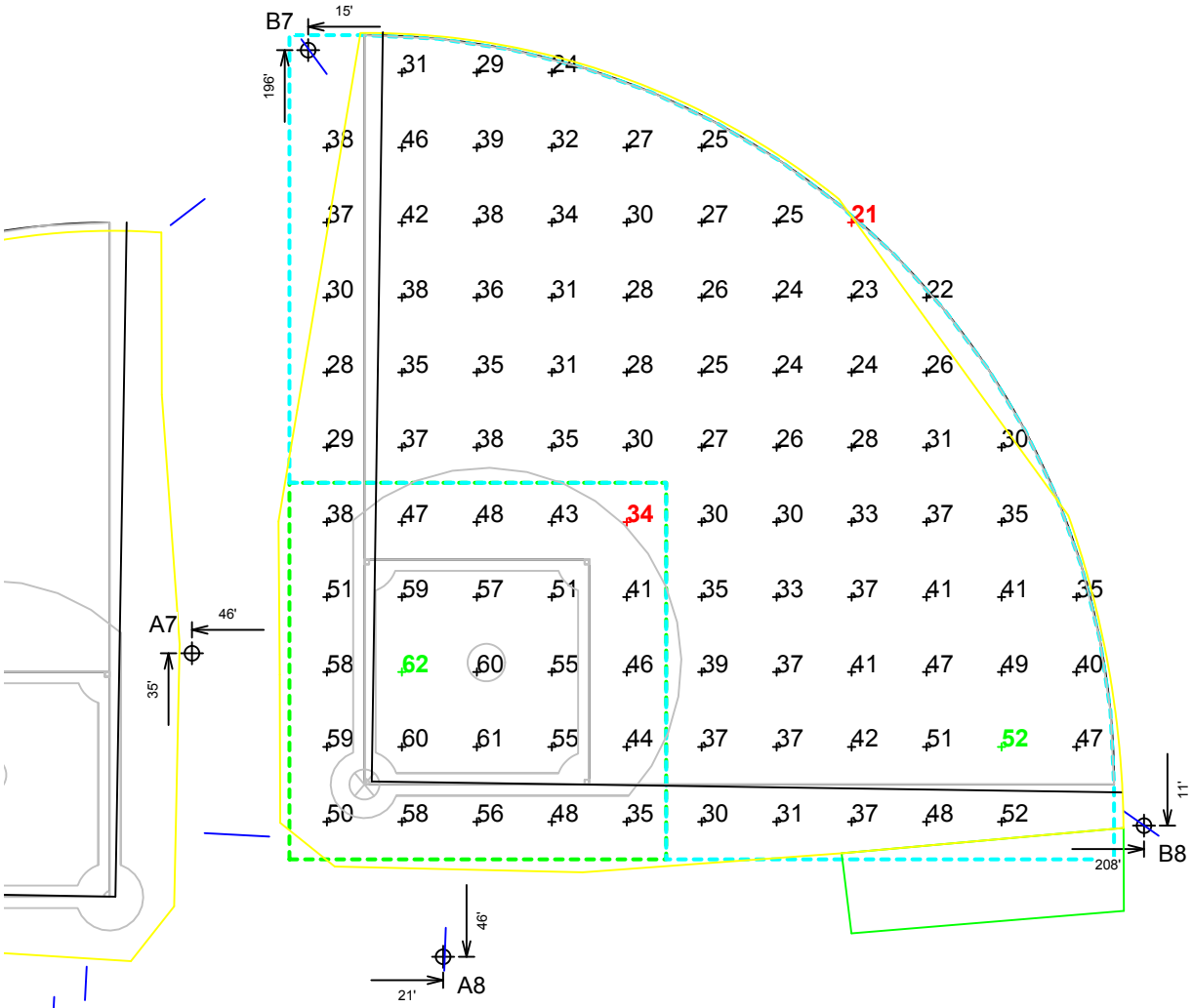
**Installation Requirements:** Results assume +/- 3% nominal voltage at line side of the ballast and structures located within 3 feet (1m) of design locations.

By: Joel Stout

File #: 141839R1 Date: 05-Jan-11

## EQUIPMENT LIST FOR AREAS SHOWN

| Pole | | | | Luminaires | | | | |
|---|---|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 2 | A7-A8 | 60' | - | 60' | 1500W MZ | 3 | 3 | 0 |
| 1 | B7 | 60' | -2.4' | 57.6' | 1500W MZ | 6 | 6 | 0 |
| 1 | B8 | 60' | -2.4' | 57.6' | 1500W MZ | 7 | 7 | 0 |
| 4 | ← TOTALS → | | | | | 19 | 19 | 0 |




SCALE IN FEET 1 : 50

0' 50' 100'

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

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# ILLUMINATION SUMMARY

## Field D

Clayton Sterling Complex-Key West Retrofit
Key West,FL

**Field D**

- Size: 200'/200'/200' - basepath 60'
- Grid Spacing = 20.0' x 20.0'
- Values given at 3.0' above grade

- Luminaire Type: Green Generation
- Rated Lamp Life: 5,000 hours
- Avg Lumens/Lamp: 134,000

**CONSTANT ILLUMINATION**
**HORIZONTAL FOOTCANDLES**

| | Infield | Outfield |
|---|---|---|
| No. of Target Points: | 25 | 73 |
| Average: | 51.0 | 33.9 |
| Maximum: | 62 | 52 |
| Minimum: | 34 | 21 |
| Avg/Min: | 1.49 | 1.59 |
| Max/Min: | 1.80 | 2.45 |
| UG (Adjacent Pts): | 1.37 | 1.47 |
| CV: | 0.17 | 0.22 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 19 |
| Avg KW over 5,000: | 29.72 |
| Max KW: | 32.3 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

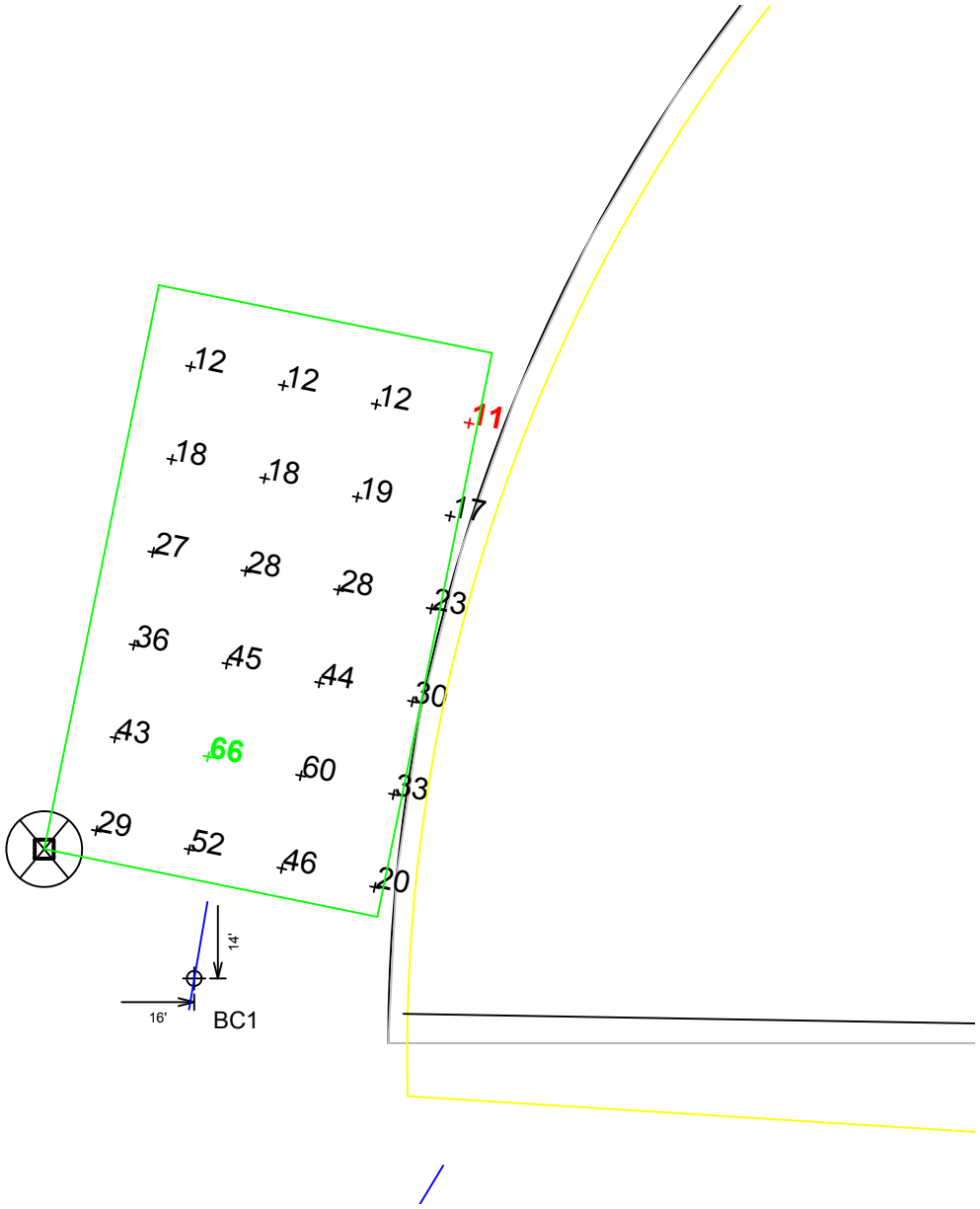
**Electrical System Requirements:** Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

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

By: Joel Stout

File #: 141839R1 Date: 05-Jan-11

| EQUIPMENT LIST FOR AREAS SHOWN | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pole | | | | Luminaires | | | | |
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 1 | BC1 | 25' | 2.76' | 27.76' | 1000W MZ | 2 | 2 | 0 |
| 1 | ← TOTALS → | | | | | 2 | 2 | 0 |




SCALE IN FEET 1 : 20

0' 20' 40'

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

GREEN GENERATION LIGHTING™

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# ILLUMINATION SUMMARY

## Batting Cage 1

Clayton Sterling Complex-Key West Retrofit
Key West,FL

**Batting Cage 1**

· Grid Spacing = 10.0' x 10.0'
· Values given at 2.8' above grade

| | |
|---|---|
| · Luminaire Type: | Green Generation |
| · Rated Lamp Life: | 12,000 hours |
| · Avg Lumens/Lamp: | 88,000 |

**CONSTANT ILLUMINATION**
**HORIZONTAL FOOTCANDLES**

| | Entire Grid |
|---|---|
| No. of Target Points: | 24 |
| Average: | 30.4 |
| Maximum: | 66 |
| Minimum: | 11 |
| Avg/Min: | 2.67 |
| Max/Min: | 5.81 |
| UG (Adjacent Pts): | 2.31 |
| CV: | 0.52 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 2 |
| Avg KW over 12,000: | 2.24 |
| Max KW: | 2.6 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

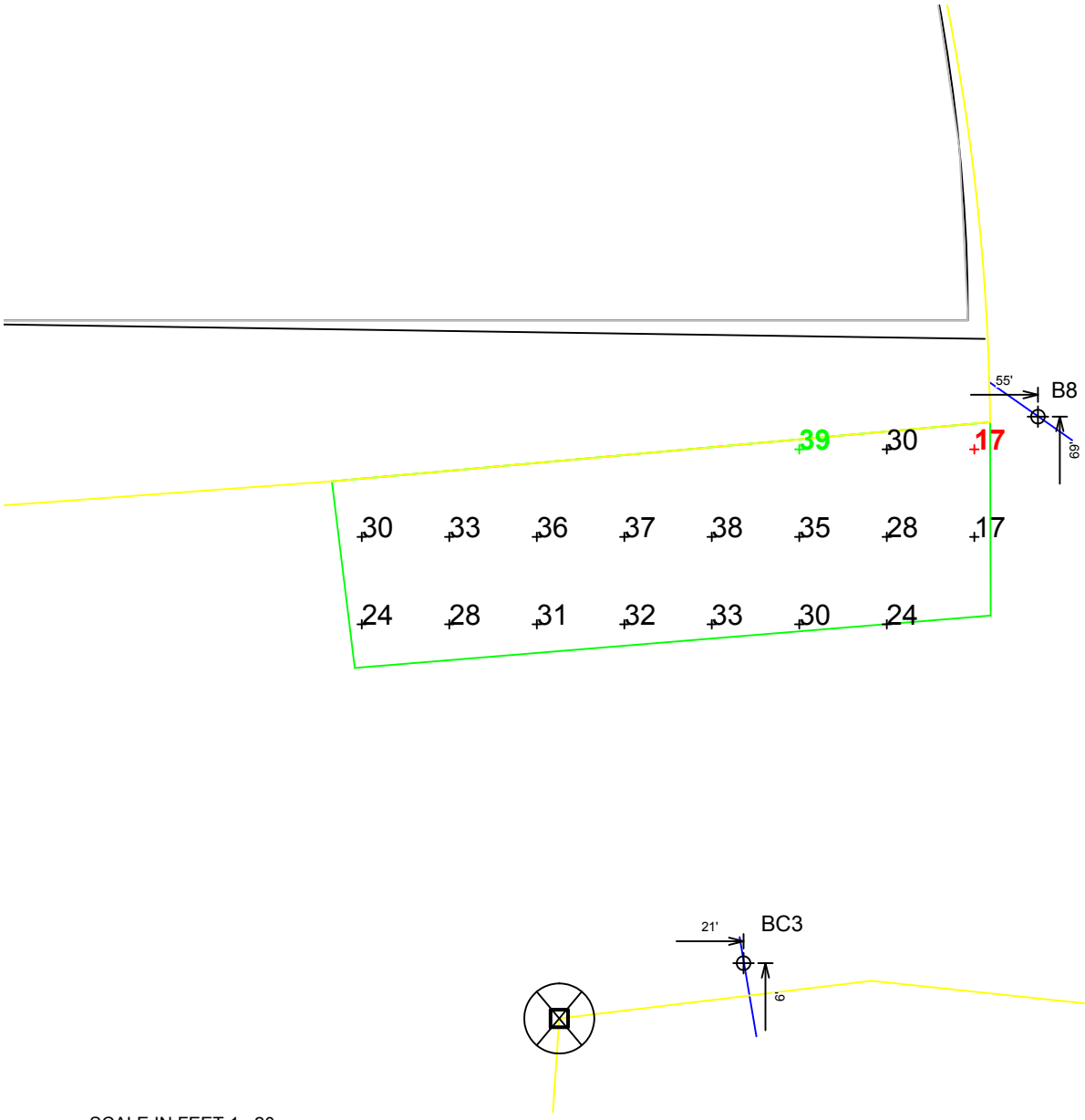
**Electrical System Requirements:** Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

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

By: Joel Stout

File #: 141839R1 Date: 05-Jan-11

| EQUIPMENT LIST FOR AREAS SHOWN | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pole | | | | Luminaires | | | | |
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 2 | A7-A8 | 60' | - | 60' | 1500W MZ | 3 | 3 | 0 |
| 1 | B7 | 60' | -2.4' | 57.6' | 1500W MZ | 6 | 6 | 0 |
| 1 | B8 | 60' | -2.4' | 57.6' | 1500W MZ | 7 | 7 | 0 |
| 4 | ← TOTALS → | | | | | 19 | 19 | 0 |

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# ILLUMINATION SUMMARY

## Batting Cage 4

Clayton Sterling Complex-Key West Retrofit
Key West,FL

**Batting Cage 4**

· Grid Spacing = 10.0' x 10.0'
· Values given at -0.3' above grade

| | |
|---|---|
| · Luminaire Type: | Green Generation |
| · Rated Lamp Life: | 5,000 hours |
| · Avg Lumens/Lamp: | 134,000 |

**CONSTANT ILLUMINATION**
**HORIZONTAL FOOTCANDLES**

| | Entire Grid |
|---|---|
| No. of Target Points: | 18 |
| Average: | 30.1 |
| Maximum: | 39 |
| Minimum: | 17 |
| Avg/Min: | 1.76 |
| Max/Min: | 2.27 |
| UG (Adjacent Pts): | 1.74 |
| CV: | 0.21 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 19 |
| Avg KW over 5,000: | 29.72 |
| Max KW: | 32.3 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

**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.

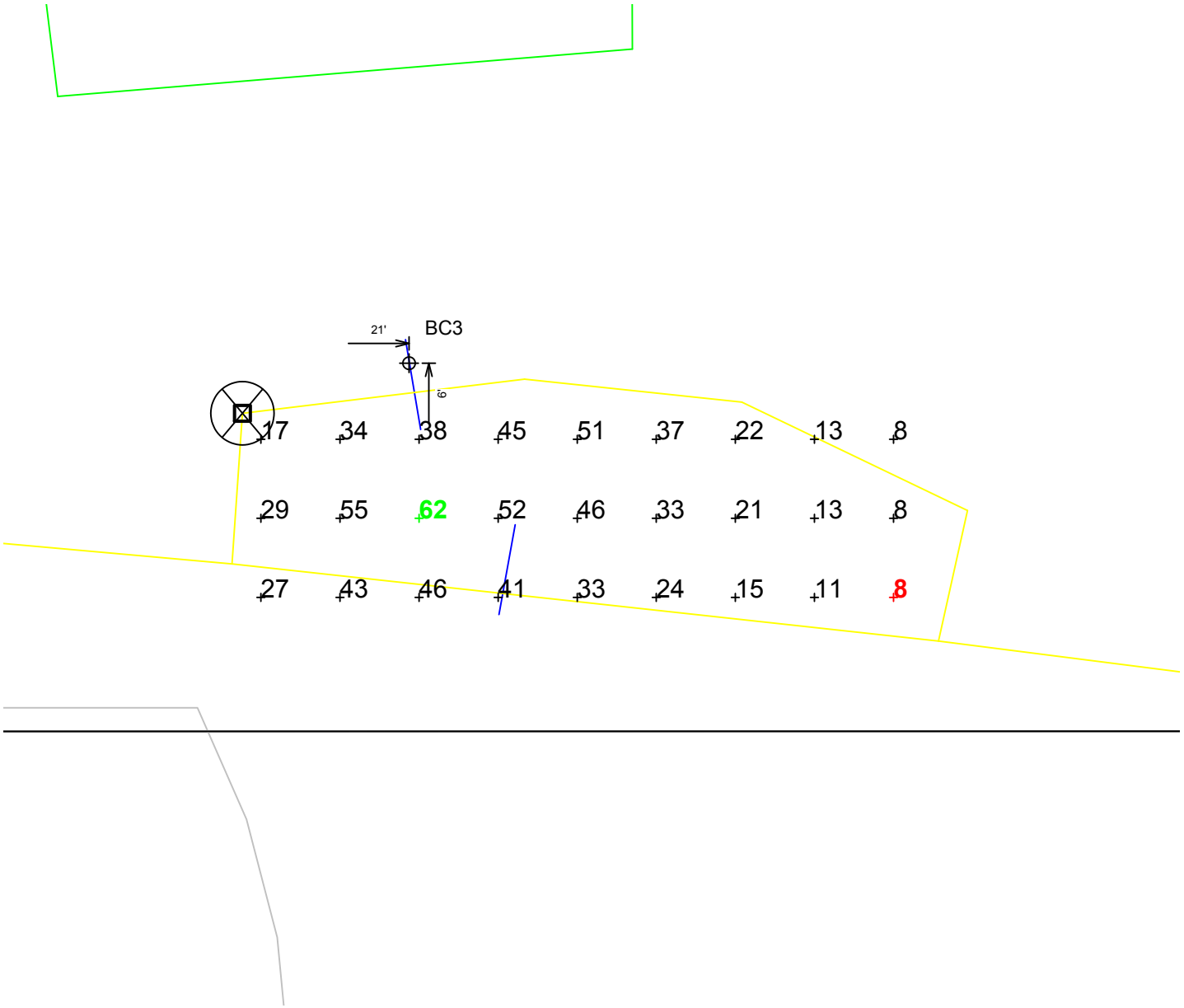
Pole location(s) ⊕ dimensions are relative to 0,0 reference point(s) ⊗

By: Joel Stout

File #: 141839R1 Date: 05-Jan-11

## EQUIPMENT LIST FOR AREAS SHOWN

| Pole | | | | Luminaires | | | | |
|---|---|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 1 | BC3 | 25' | 1.77' | 26.77' | 1500W MZ | 2 | 2 | 0 |
| 1 | ← TOTALS → | | | | | 2 | 2 | 0 |




SCALE IN FEET 1 : 20

0' 20' 40'

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

MUSCO GREEN GENERATION LIGHTING™

GUARANTEED PERFORMANCE

# ILLUMINATION SUMMARY

## Batting Cage 3

Clayton Sterling Complex-Key West Retrofit
Key West,FL

**Batting Cage 3**

· Grid Spacing = 10.0' x 10.0'
· Values given at -0.3' above grade

· Luminaire Type: Green Generation
· Rated Lamp Life: 5,000 hours
· Avg Lumens/Lamp: 134,000

**CONSTANT ILLUMINATION**
**HORIZONTAL FOOTCANDLES**

| | Entire Grid |
|---|---|
| No. of Target Points: | 27 |
| Average: | 30.8 |
| Maximum: | 62 |
| Minimum: | 8 |
| Avg/Min: | 4.03 |
| Max/Min: | 8.11 |
| UG (Adjacent Pts): | 1.96 |
| CV: | 0.52 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 2 |
| Avg KW over 5,000: | 3.13 |
| Max KW: | 3.4 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

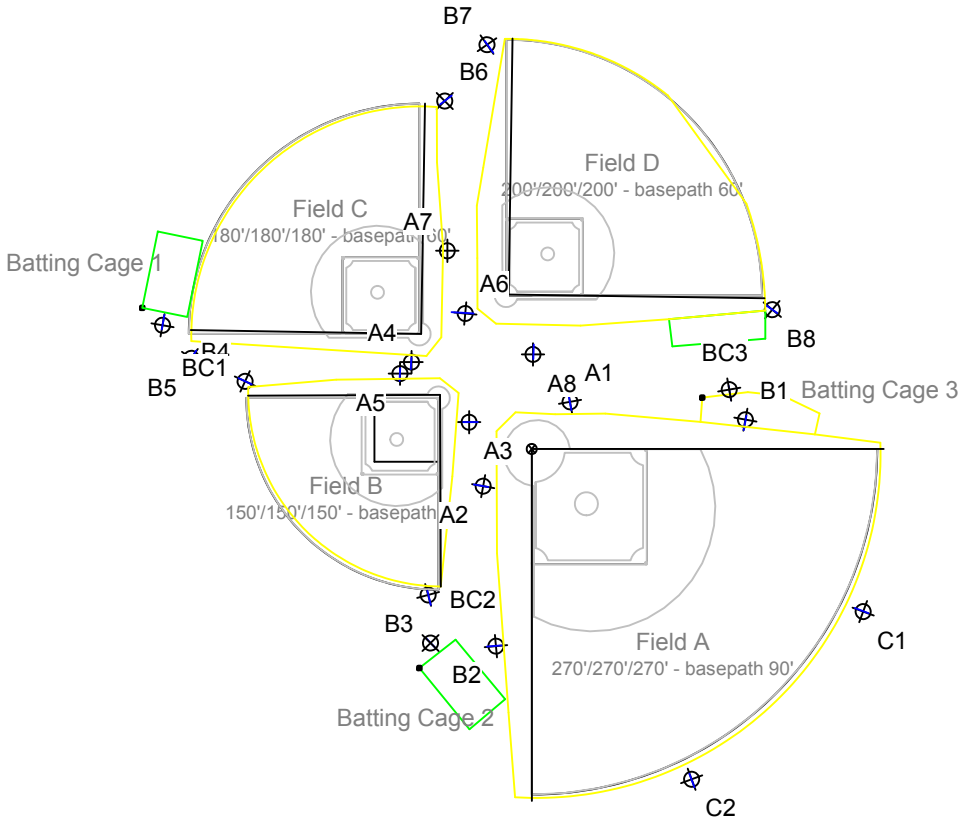
**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

**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.

By: Joel Stout

File #: 141839R1 Date: 05-Jan-11




SCALE IN FEET 1 : 150

0' 150' 300'

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

GREEN GENERATION LIGHTING™

**GUARANTEED PERFORMANCE**

# EQUIPMENT LAYOUT

**Clayton Sterling Complex-Key West Retrofit**
Key West,FL

**INCLUDES:**

- Batting Cage 1
- Batting Cage 2
- Batting Cage 3
- Field A
- Field B
- Field C
- Field D

**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.

## EQUIPMENT LIST FOR AREAS SHOWN

| Pole | | | | Luminaires | | |
|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE |
| 2 | A1-A2 | 60' | - | 60' | 1500W MZ | 5 |
| 6 | A3-A8 | 60' | - | 60' | 1500W MZ | 3 |
| 1 | BC1 | 25' | 2.76' | 27.76' | 1000W MZ | 2 |
| 1 | BC3 | 25' | 1.77' | 26.77' | 1500W MZ | 2 |
| 1 | BC2 | 25' | 2' | 27' | 1000W MZ | 2 |
| 1 | B1 | 65' | -2' | 63' | 1500W MZ | 7 |
| 1 | B2 | 65' | -1' | 64' | 1500W MZ | 7 |
| 1 | B3 | 60' | -2.8' | 57.2' | 1500W MZ | 3 |
| 1 | B4 | 60' | -2' | 58' | 1500W MZ | 3 |
| 1 | B5 | 60' | -1.9' | 58.1' | 1500W MZ | 4 |
| 1 | B6 | 60' | -1.6' | 58.4' | 1500W MZ | 4 |
| 1 | B7 | 60' | -2.4' | 57.6' | 1500W MZ | 6 |
| 1 | B8 | 60' | -2.4' | 57.6' | 1500W MZ | 7 |
| 1 | C1 | 63' | -2' | 61' | 1500W MZ | 3 |
| 1 | C2 | 63' | -3' | 60' | 1500W MZ | 3 |
| 21 | ← TOTALS → | | | | | 81 |

## SINGLE LUMINAIRE AMPERAGE DRAW CHART

| Ballast Specifications (.90 min power factor) | Line Amperage Per Luminaire (max draw) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Single Phase Voltage | 120 (60) | 208 (60) | 220 (60) | 240 (60) | 277 (60) | 347 (60) | 380 (60) | 415 (60) | 480 (60) |
| 1500 watt MZ | 15.0 | 8.6 | 7.7 | 7.5 | 6.5 | 5.1 | 4.7 | - | 3.7 |
| 1000 watt MZ | 11.4 | 6.5 | 5.8 | 5.8 | 4.9 | 4.0 | 3.6 | - | 2.9 |

By: Joel Stout

File #: 141839R1 Date: 05-Jan-11



Print Date (05/Jan/2011) & Time (16:11)

## EQUIPMENT LIST FOR AREAS SHOWN

| Pole | | | | Luminaires | | | | |
|---|---|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 2 | A1-A2 | 50' | - | 50' | 1500W MZ | 3 | 3 | 0 |
| 2 | B1-B2 | 50' | - | 50' | 1500W MZ | 7 | 7 | 0 |
| 1 | C1 | 50' | - | 50' | 1500W MZ | 4 | 4 | 0 |
| 1 | C2 | 50' | -2' | 48' | 1500W MZ | 4 | 4 | 0 |
| 6 | ← TOTALS → | | | | | 28 | 28 | 0 |

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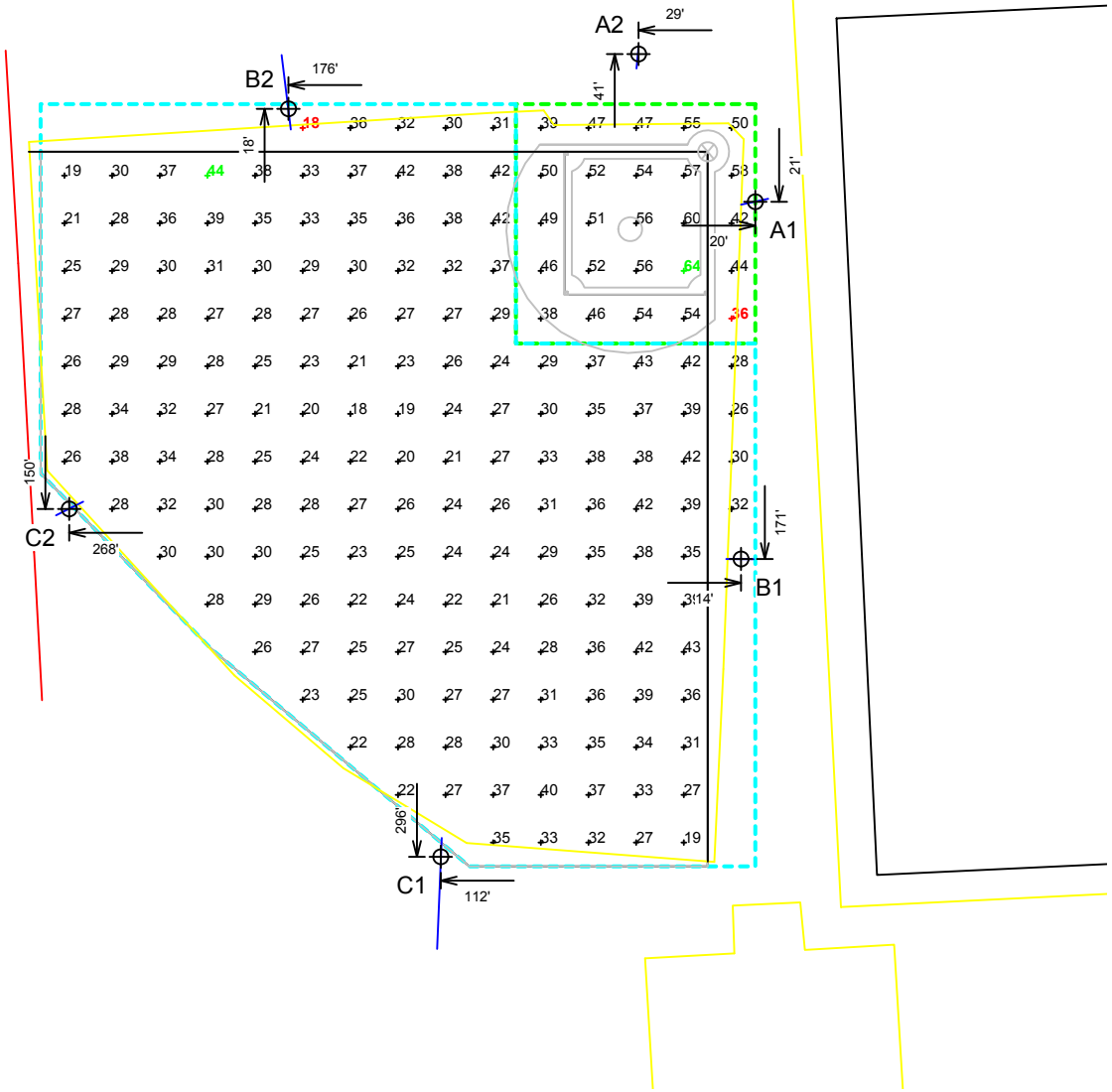
**GUARANTEED PERFORMANCE**




SCALE IN FEET 1 : 80

0' 80' 160'

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

## ILLUMINATION SUMMARY

### Softball

Dewitt Roberts Softball-Key West Retrofit
Key West,FL

**Softball**

· Size: Irregular 300.0' / 295.0' / 280.0'
· Grid Spacing = 20.0' x 20.0'
· Values given at 3.0' above grade

· Luminaire Type: Green Generation
· Rated Lamp Life: 5,000 hours
· Avg Lumens/Lamp: 134,000

**CONSTANT ILLUMINATION**
**HORIZONTAL FOOTCANDLES**

| | Infield | Outfield |
|---|---|---|
| No. of Target Points: | 25 | 166 |
| Average: | 50.3 | 30.1 |
| Maximum: | 64 | 44 |
| Minimum: | 36 | 18 |
| Avg/Min: | 1.39 | 1.66 |
| Max/Min: | 1.77 | 2.45 |
| UG (Adjacent Pts): | 1.48 | 1.98 |
| CV: | 0.14 | 0.20 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 28 |
| Avg KW over 5,000: | 43.79 |
| Max KW: | 47.6 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

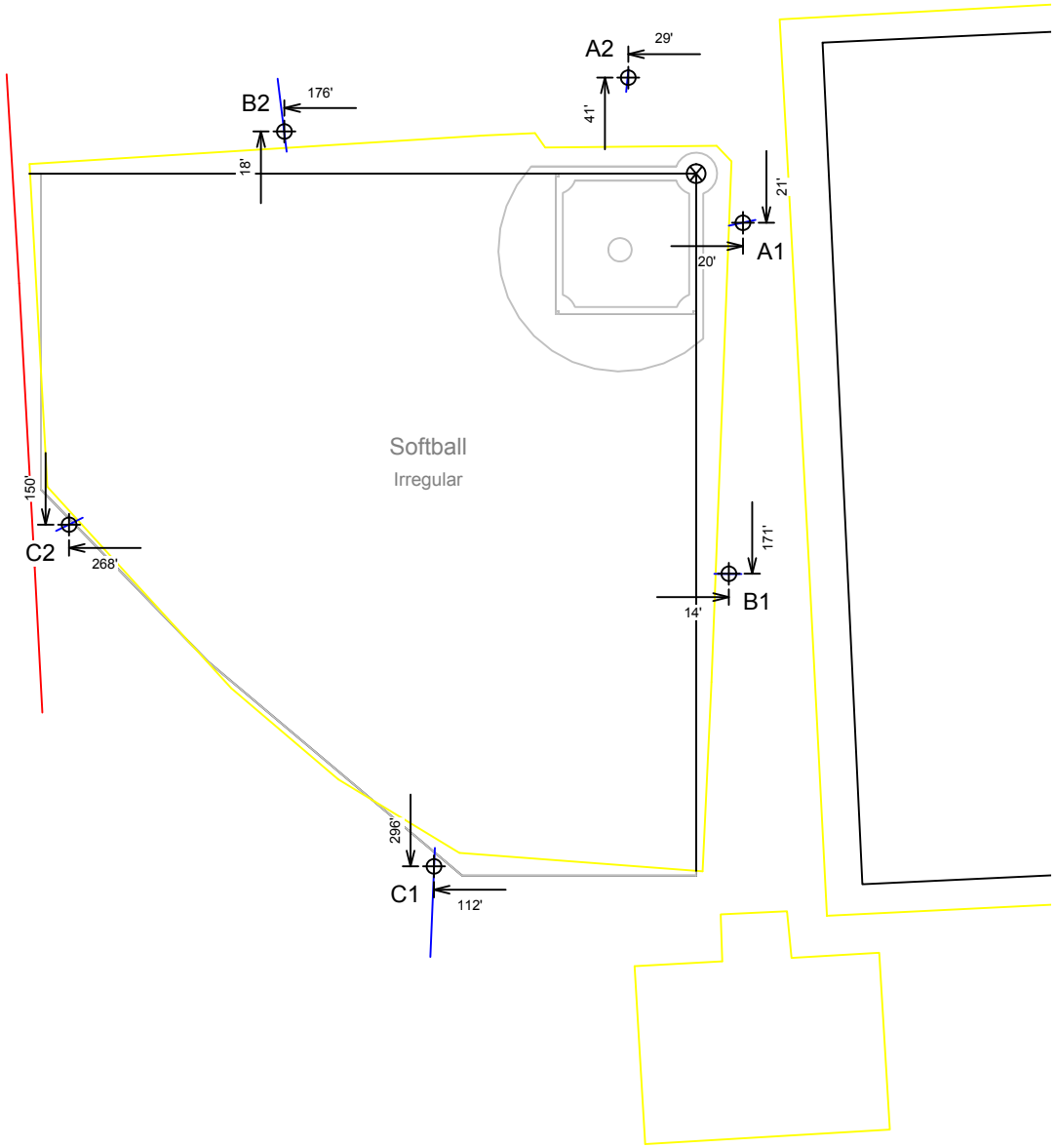
**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

**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.

By: Joel Stout

File #: 141846R1 Date: 04-Jan-11




SCALE IN FEET 1 : 80

0' 80' 160'

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

GREEN GENERATION LIGHTING™

**GUARANTEED PERFORMANCE**

# EQUIPMENT LAYOUT

**Dewitt Roberts Softball-Key West Retrofit**
Key West,FL

**INCLUDES:**
· Softball

**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.

## EQUIPMENT LIST FOR AREAS SHOWN

| Pole | | | | Luminaires | | |
|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE |
| 2 | A1-A2 | 50' | - | 50' | 1500W MZ | 3 |
| 2 | B1-B2 | 50' | - | 50' | 1500W MZ | 7 |
| 1 | C1 | 50' | - | 50' | 1500W MZ | 4 |
| 1 | C2 | 50' | -2' | 48' | 1500W MZ | 4 |
| 6 | ← TOTALS → | | | | | 28 |

## SINGLE LUMINAIRE AMPERAGE DRAW CHART

| Ballast Specifications (.90 min power factor) | Line Amperage Per Luminaire (max draw) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Single Phase Voltage | 120 (60) | 208 (60) | 220 (60) | 240 (60) | 277 (60) | 347 (60) | 380 (60) | 415 (60) | 480 (60) |
| 1500 watt MZ | 15.0 | 8.6 | 7.7 | 7.5 | 6.5 | 5.1 | 4.7 | - | 3.7 |

By: Joel Stout

File #: 141846R1 Date: 04-Jan-11



Print Date (04/Jan/2011) & Time (09:29)

## EQUIPMENT LIST FOR AREAS SHOWN

| Pole | | | | Luminaires | | | | |
|---|---|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 3 | F1-F2, F5 | 50' | - | 50' | 1500W MZ | 5 | 5 | 0 |
| 1 | F3 | 50' | - | 50' | 1500W MZ | 4 | 4 | 0 |
| 1 | F4 | 50' | 1.3' | 51.3' | 1500W MZ | 4 | 4 | 0 |
| 5 | ← TOTALS → | | | | | 23 | 23 | 0 |

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# ILLUMINATION SUMMARY

**Football**
George Mira Football-Key West Retrofit
Key West,FL

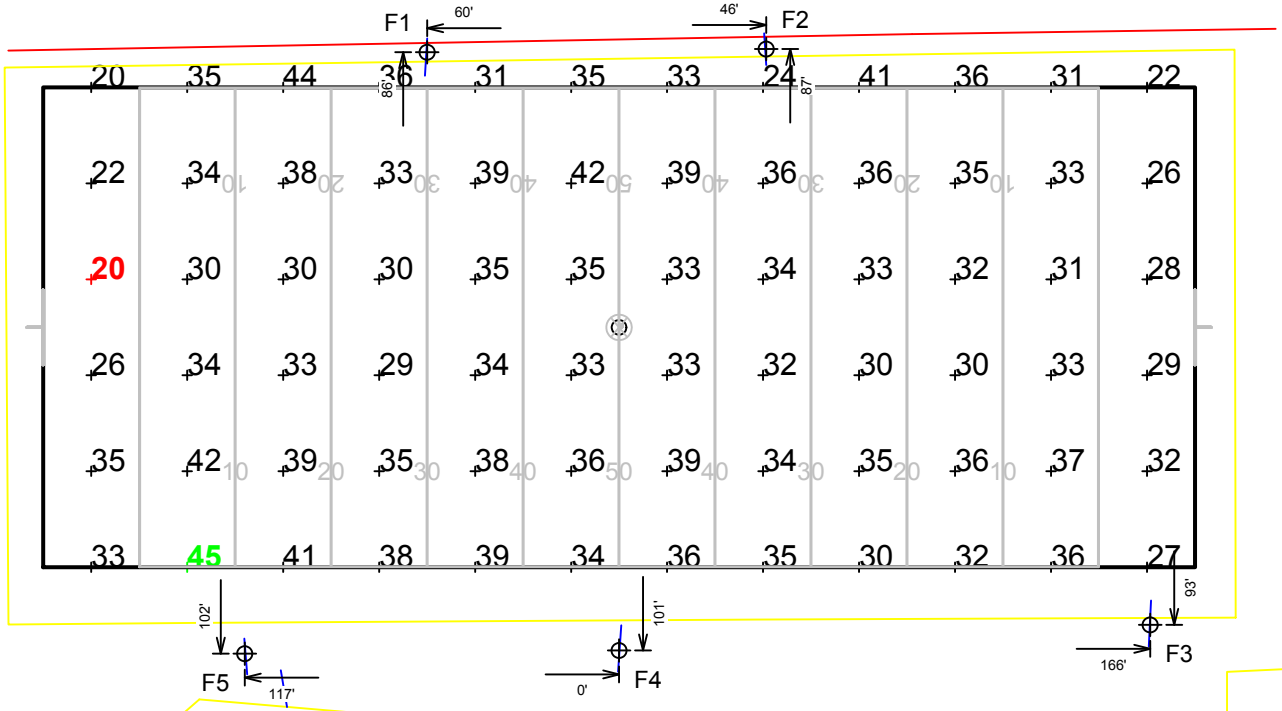
**Football**
· Size: 360' x 150'
· Grid Spacing = 30.0' x 30.0'
· Values given at 3.0' above grade

· Luminaire Type: Green Generation
· Rated Lamp Life: 5,000 hours
· Avg Lumens/Lamp: 134,000

**CONSTANT ILLUMINATION**
**HORIZONTAL FOOTCANDLES**

| | Entire Grid |
|---|---|
| No. of Target Points: | 72 |
| Average: | 33.4 |
| Maximum: | 45 |
| Minimum: | 20 |
| Avg/Min: | 1.67 |
| Max/Min: | 2.26 |
| UG (Adjacent Pts): | 1.76 |
| CV: | 0.15 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 23 |
| Avg KW over 5,000: | 35.97 |
| Max KW: | 39.1 |




SCALE IN FEET 1 : 60
0' 60' 120'

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

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

**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.

By: Joel Stout

File #: 141847R1 Date: 04-Jan-11

GUARANTEED PERFORMANCE

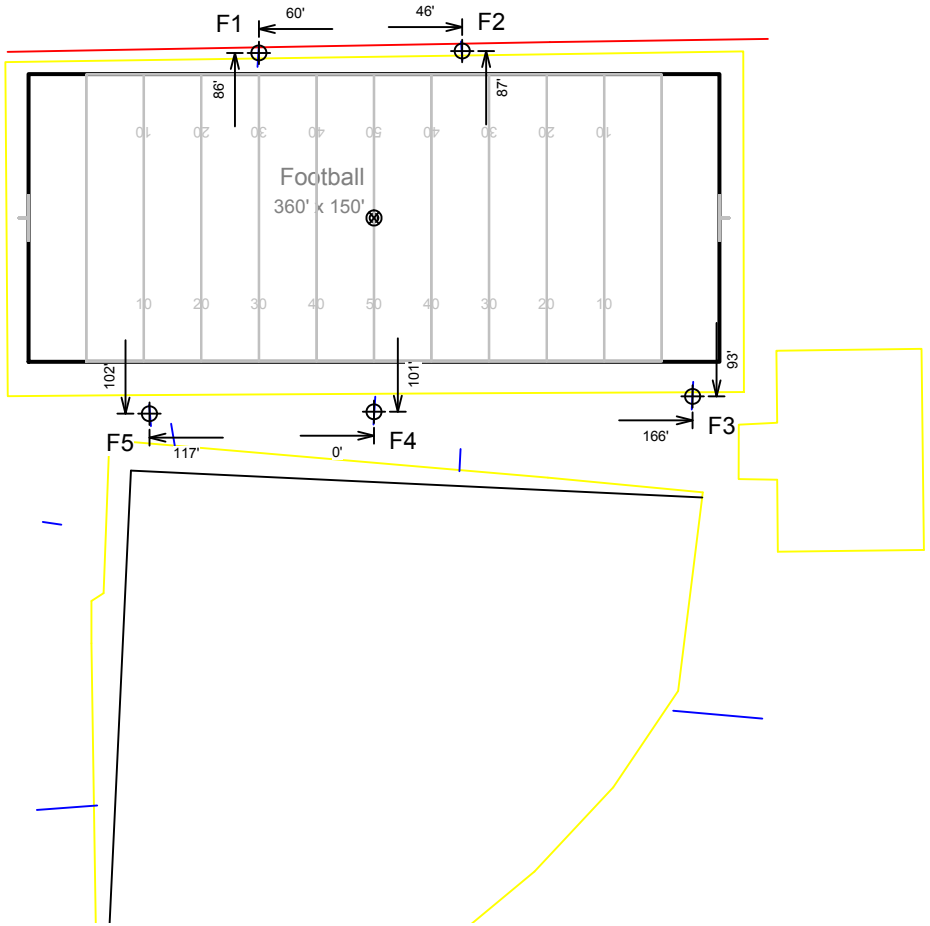
# EQUIPMENT LAYOUT

**George Mira Football-Key West Retrofit**
Key West,FL

**INCLUDES:**
· Football

**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.




**EQUIPMENT LIST FOR AREAS SHOWN**

| Pole | | | | Luminaires | | |
|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE |
| 3 | F1-F2, F5 | 50' | - | 50' | 1500W MZ | 5 |
| 1 | F3 | 50' | - | 50' | 1500W MZ | 4 |
| 1 | F4 | 50' | 1.3' | 51.3' | 1500W MZ | 4 |
| 5 | ←TOTALS→ | | | | | 23 |

**SINGLE LUMINAIRE AMPERAGE DRAW CHART**

| Ballast Specifications (.90 min power factor) | Line Amperage Per Luminaire (max draw) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Single Phase Voltage | 120 (60) | 208 (60) | 220 (60) | 240 (60) | 277 (60) | 347 (60) | 380 (60) | 415 (60) | 480 (60) |
| 1500 watt MZ | 15.0 | 8.6 | 7.7 | 7.5 | 6.5 | 5.1 | 4.7 | - | 3.7 |

SCALE IN FEET 1 : 100

0' 100' 200'

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

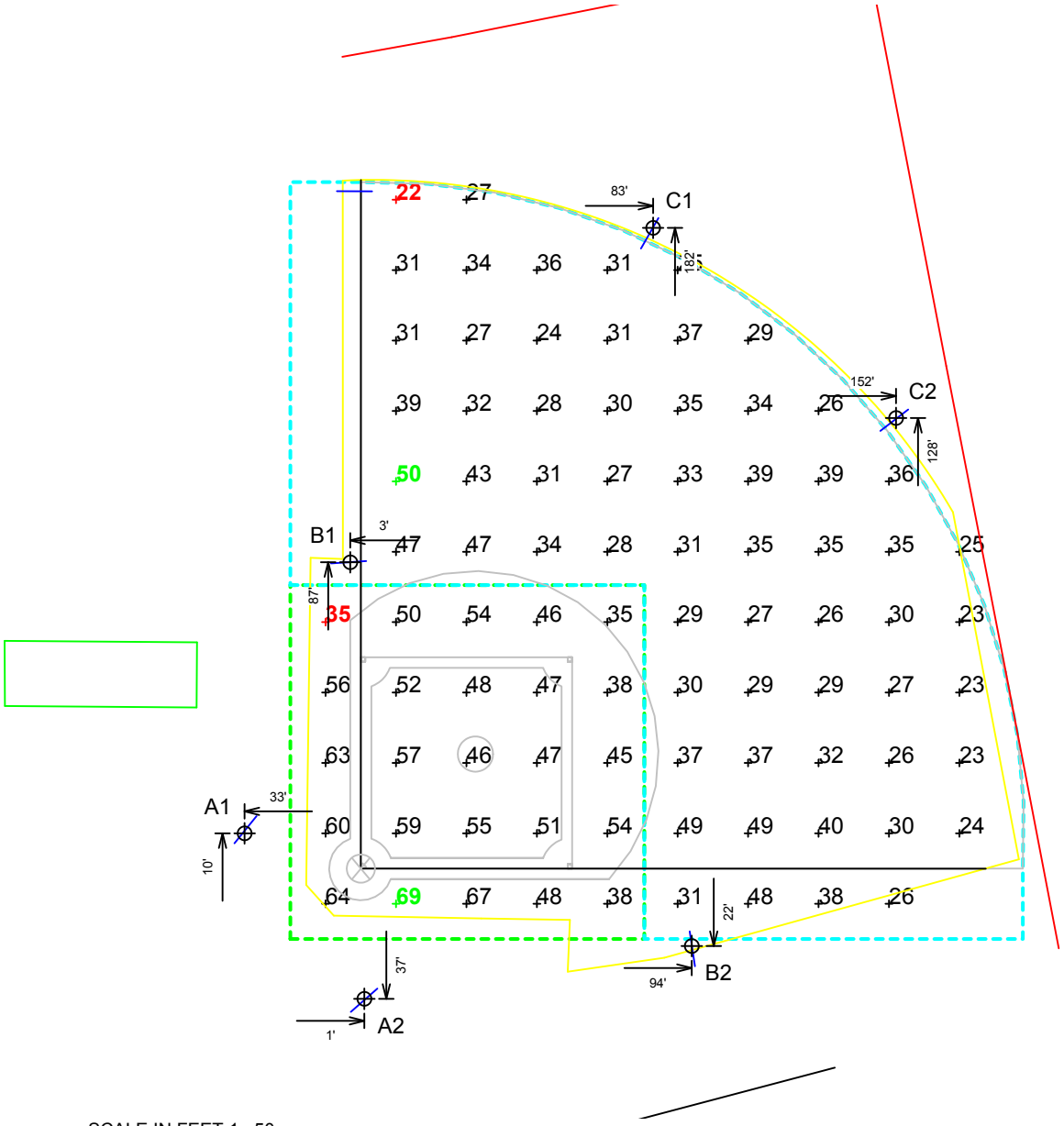
By: Joel Stout

File #: 141847R1 Date: 04-Jan-11



Print Date (04/Jan/2011) & Time (08:20)

| EQUIPMENT LIST FOR AREAS SHOWN | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pole | | | | Luminaires | | | | |
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 4 | A1-A2 B1-B2 | 45' | - | 45' | 1500W MZ | 3 | 3 | 0 |
| 2 | C1-C2 | 45' | - | 45' | 1500W MZ | 2 | 2 | 0 |
| 6 | ← TOTALS → | | | | | 16 | 16 | 0 |




SCALE IN FEET 1 : 50

0' 50' 100'

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

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# ILLUMINATION SUMMARY

## Girls Softball

Rosa Hernandez Softball-Key West Retrofit
Key West,FL

**Girls Softball**

· Size: 195'/195'/188' - basepath 60'
· Grid Spacing = 20.0' x 20.0'
· Values given at 3.0' above grade

· Luminaire Type: Green Generation
· Rated Lamp Life: 5,000 hours
· Avg Lumens/Lamp: 134,000

**CONSTANT ILLUMINATION HORIZONTAL FOOTCANDLES**

| | Infield | Outfield |
|---|---|---|
| No. of Target Points: | 25 | 61 |
| Average: | 51.2 | 32.6 |
| Maximum: | 69 | 50 |
| Minimum: | 35 | 22 |
| Avg/Min: | 1.45 | 1.50 |
| Max/Min: | 1.96 | 2.29 |
| UG (Adjacent Pts): | 1.59 | 1.56 |
| CV: | 0.18 | 0.22 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 16 |
| Avg KW over 5,000: | 25.02 |
| Max KW: | 27.2 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

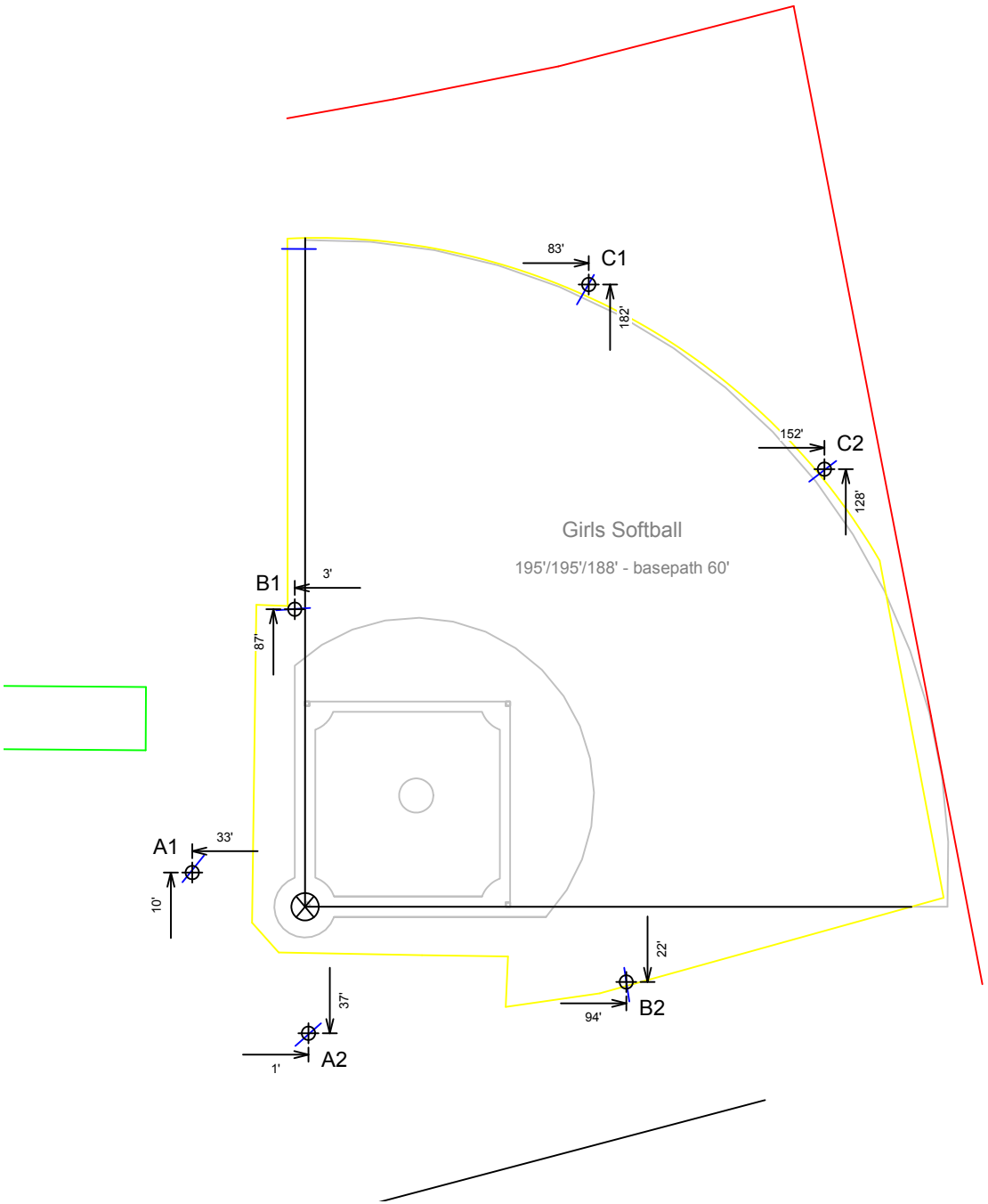
**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

**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.

By: Joel Stout

File #: 141845R1 Date: 04-Jan-11




SCALE IN FEET 1 : 50

0' 50' 100'

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

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# EQUIPMENT LAYOUT

**Rosa Hernandez Softball-Key West Retrofit**
Key West,FL

**INCLUDES:**
· Girls Softball

**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.

**EQUIPMENT LIST FOR AREAS SHOWN**

| Pole | | | | Luminaires | | |
|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE |
| 4 | A1-A2<br>B1-B2 | 45' | - | 45' | 1500W MZ | 3 |
| 2 | C1-C2 | 45' | - | 45' | 1500W MZ | 2 |
| 6 | ←TOTALS→ | | | | | 16 |

**SINGLE LUMINAIRE AMPERAGE DRAW CHART**

| Ballast Specifications (.90 min power factor) | Line Amperage Per Luminaire (max draw) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Single Phase Voltage | 120 (60) | 208 (60) | 220 (60) | 240 (60) | 277 (60) | 347 (60) | 380 (60) | 415 (60) | 480 (60) |
| 1500 watt MZ | 15.0 | 8.6 | 7.7 | 7.5 | 6.5 | 5.1 | 4.7 | - | 3.7 |

By: Joel Stout

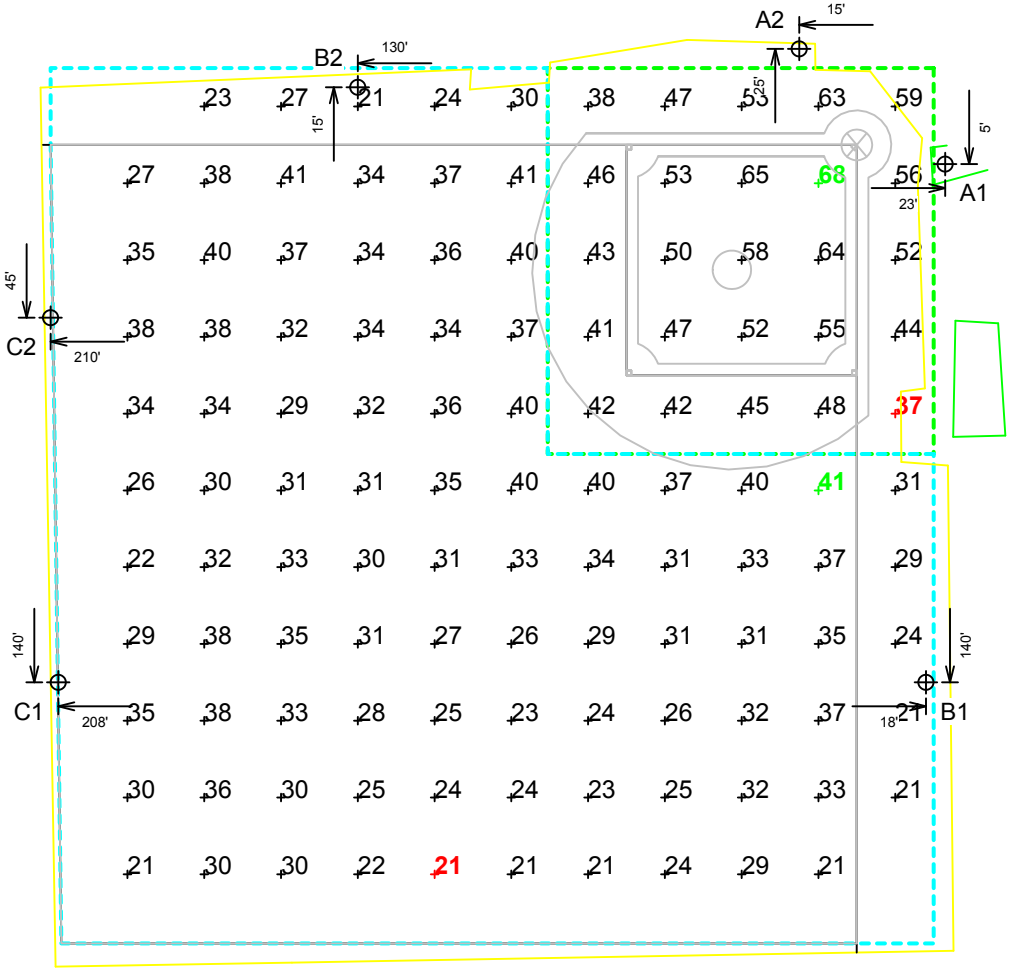
File #: 141845R1 Date: 04-Jan-11



Print Date (04/Jan/2011) & Time (08:51)

## EQUIPMENT LIST FOR AREAS SHOWN

| Pole | | | | Luminaires | | | | |
|---|---|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 5 | A1-A2, B2 C1-C2 | 60' | - | 60' | 1500W MZ | 3 | 3 | 0 |
| 1 | B1 | 60' | - | 60' | 1500W MZ | 4 | 4 | 0 |
| 6 | ← TOTALS → | | | | | 19 | 19 | 0 |




SCALE IN FEET 1 : 50

0' 50' 100'

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

GREEN GENERATION LIGHTING™

**GUARANTEED PERFORMANCE**

# ILLUMINATION SUMMARY

## Multi Purpose

Pepe Hernandez Park EECBG Key West
Key West,FL

**Multi Purpose**

· Size: Irregular 208.0' / 293.0' / 210.0'
· Grid Spacing = 20.0' x 20.0'
· Values given at 3.0' above grade

· Luminaire Type: Green Generation
· Rated Lamp Life: 5,000 hours
· Avg Lumens/Lamp: 134,000

**CONSTANT ILLUMINATION HORIZONTAL FOOTCANDLES**

| | Infield | Outfield |
|---|---|---|
| No. of Target Points: | 25 | 94 |
| Average: | 50.7 | 30.9 |
| Maximum: | 68 | 41 |
| Minimum: | 37 | 21 |
| Avg/Min: | 1.38 | 1.49 |
| Max/Min: | 1.84 | 1.98 |
| UG (Adjacent Pts): | 1.31 | 1.77 |
| CV: | 0.17 | 0.19 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 19 |
| Avg KW over 5,000: | 29.72 |
| Max KW: | 32.3 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

**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.

By: Joel Stout

File #: 150167R1 Date: 04-Jan-11

GUARANTEED PERFORMANCE

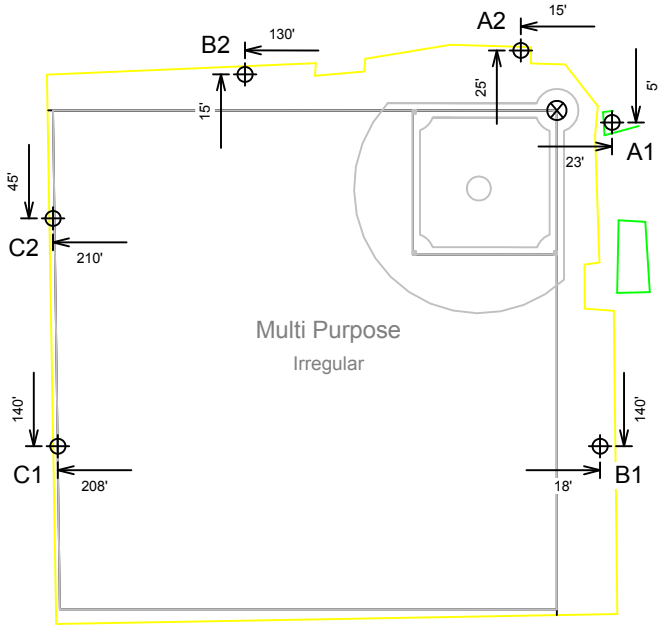
# EQUIPMENT LAYOUT

**Pepe Hernandez Park EECBG Key West**
Key West,FL

**INCLUDES:**
· Multi Purpose

**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.




**EQUIPMENT LIST FOR AREAS SHOWN**

| Pole | | | | Luminaires | | |
|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE |
| 5 | A1-A2, B2 C1-C2 | 60' | - | 60' | 1500W MZ | 3 |
| 1 | B1 | 60' | - | 60' | 1500W MZ | 4 |
| 6 | ←TOTALS→ | | | | | 19 |

**SINGLE LUMINAIRE AMPERAGE DRAW CHART**

| Ballast Specifications (.90 min power factor) | Line Amperage Per Luminaire (max draw) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Single Phase Voltage | 120 (60) | 208 (60) | 220 (60) | 240 (60) | 277 (60) | 347 (60) | 380 (60) | 415 (60) | 480 (60) |
| 1500 watt MZ | 15.0 | 8.6 | 7.7 | 7.5 | 6.5 | 5.1 | 4.7 | - | 3.7 |

SCALE IN FEET 1 : 80

0' 80' 160'

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

By: Joel Stout

File #: 150167R1 Date: 04-Jan-11

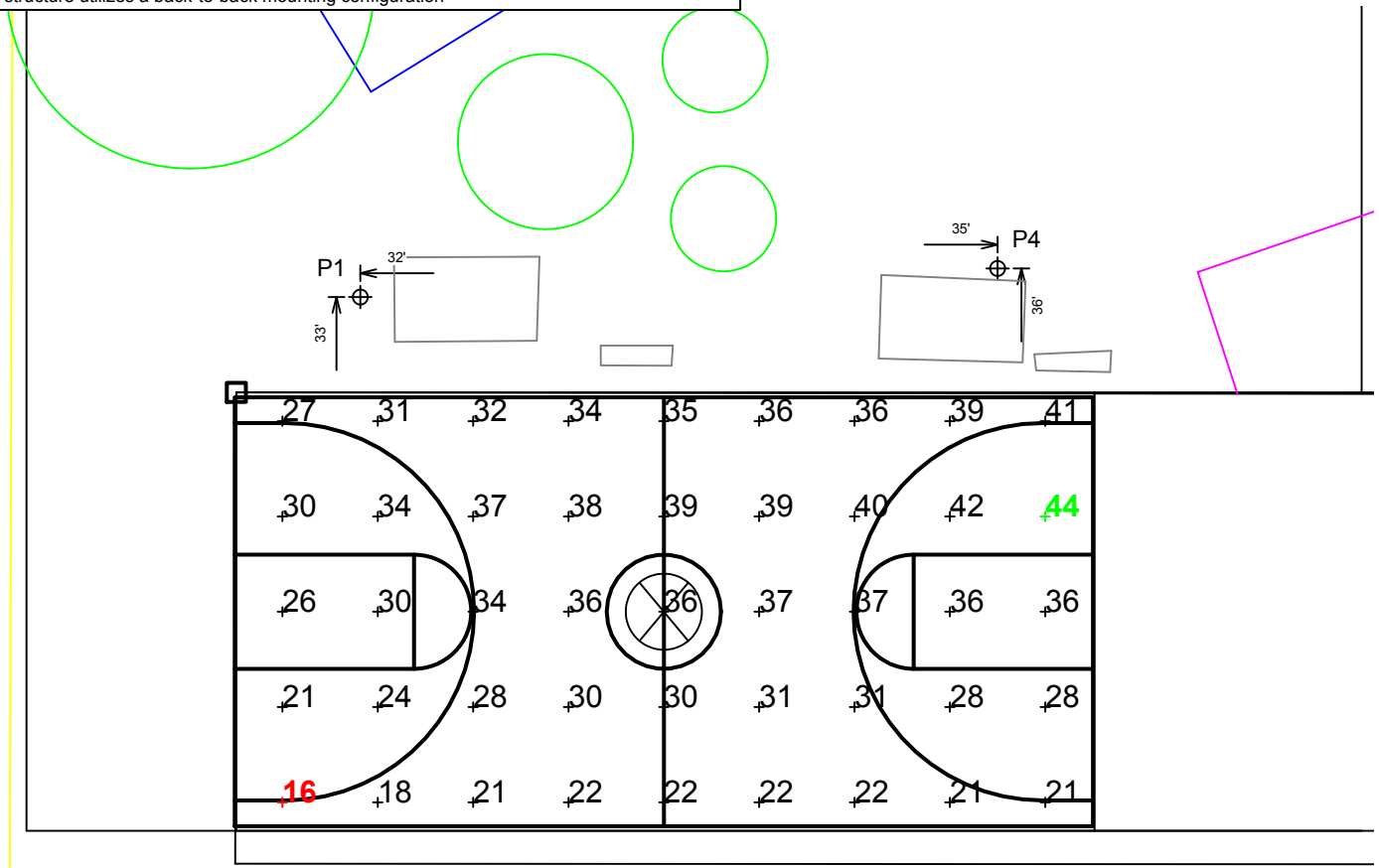


Print Date (04/Jan/2011) & Time (08:16)

## EQUIPMENT LIST FOR AREAS SHOWN

| Pole | | | | Luminaires | | | | |
|---|---|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 1 | P1 | 50' | - | 50' | 1000W MZ | 2/2* | 4 | 0 |
| 1 | P2 | 50' | - | 50' | 1000W MZ | 2/1* | 3 | 0 |
| 1 | P3 | 50' | - | 50' | 1000W MZ | 2 | 2 | 0 |
| 1 | P4 | 50' | - | 50' | 1000W MZ | 3/2* | 5 | 0 |
| 4 | ← TOTALS → | | | | | 14 | 14 | 0 |

* This structure utilizes a back-to-back mounting configuration




SCALE IN FEET 1 : 20

0' 20' 40'

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

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# ILLUMINATION SUMMARY

## Basketball

Nelson English Park EECBG Key West Retro Fit
Key West,FL

**Basketball**

· Size: 90' x 45'
· Grid Spacing = 10.0' x 10.0'
· Values given at 3.0' above grade

· Luminaire Type: Green Generation
· Rated Lamp Life: 12,000 hours
· Avg Lumens/Lamp: 88,000

**CONSTANT ILLUMINATION**
**HORIZONTAL FOOTCANDLES**

| | Entire Grid |
|---|---|
| No. of Target Points: | 45 |
| Average: | 31.1 |
| Maximum: | 44 |
| Minimum: | 16 |
| Avg/Min: | 1.91 |
| Max/Min: | 2.68 |
| UG (Adjacent Pts): | 1.39 |
| CV: | 0.23 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 14 |
| Avg KW over 12,000: | 15.68 |
| Max KW: | 18.2 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

**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.

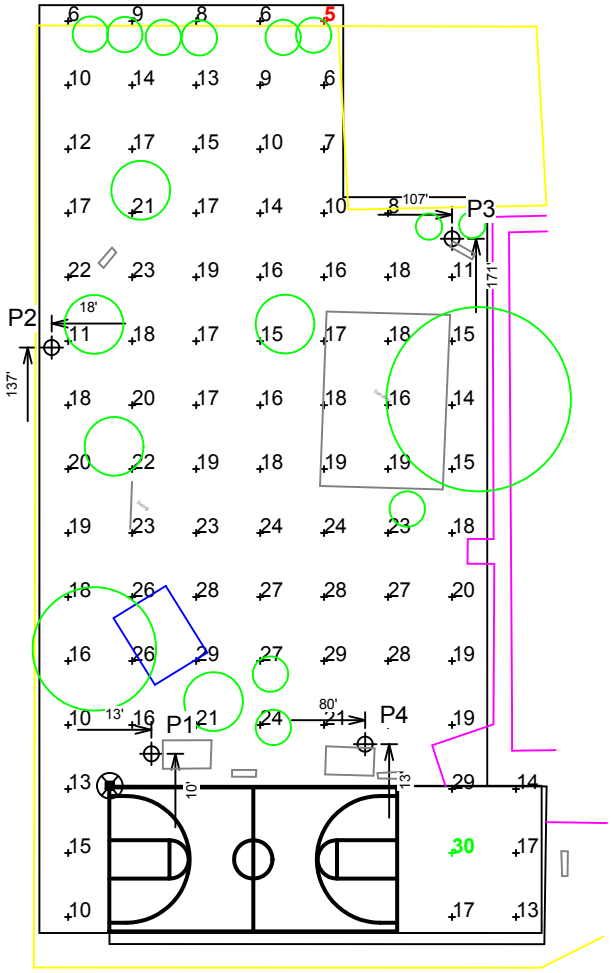
By: Joel Stout

File #: 146480R1 Date: 04-Jan-11

## EQUIPMENT LIST FOR AREAS SHOWN

| Pole | | | | Luminaires | | | | |
|---|---|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 1 | P1 | 50' | - | 50' | 1000W MZ | 2/2* | 4 | 0 |
| 1 | P2 | 50' | - | 50' | 1000W MZ | 2/1* | 3 | 0 |
| 1 | P3 | 50' | - | 50' | 1000W MZ | 2 | 2 | 0 |
| 1 | P4 | 50' | - | 50' | 1000W MZ | 3/2* | 5 | 0 |
| 4 | ← TOTALS → | | | | | 14 | 14 | 0 |

* This structure utilizes a back-to-back mounting configuration




SCALE IN FEET 1 : 60

0' 60' 120'

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

MUSCO GREEN GENERATION LIGHTING™

GUARANTEED PERFORMANCE

# ILLUMINATION SUMMARY

## Playground Area

Nelson English Park EECBG Key West Retro Fit
Key West,FL

**Playground Area**
· Size: 2' x 2'
· Grid Spacing = 20.0' x 20.0'
· Values given at 3.0' above grade

· Luminaire Type: Green Generation
· Rated Lamp Life: 12,000 hours
· Avg Lumens/Lamp: 88,000

**CONSTANT ILLUMINATION**
**HORIZONTAL FOOTCANDLES**

| | Entire Grid |
|---|---|
| No. of Target Points: | 86 |
| Average: | 17.6 |
| Maximum: | 30 |
| Minimum: | 5 |
| Avg/Min: | 3.58 |
| Max/Min: | 6.13 |
| UG (Adjacent Pts): | 2.33 |
| CV: | 0.35 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 14 |
| Avg KW over 12,000: | 15.68 |
| Max KW: | 18.2 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

**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.

By: Joel Stout

File #: 146480R1 Date: 04-Jan-11

GUARANTEED PERFORMANCE

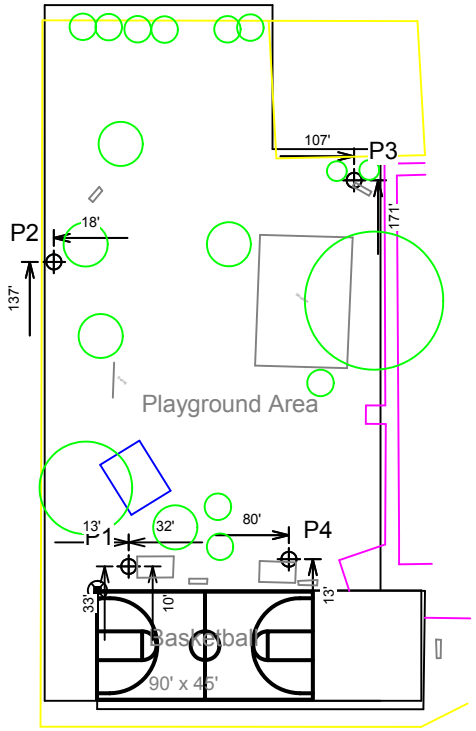
# EQUIPMENT LAYOUT

**Nelson English Park EECBG Key West Retro Fit**
Key West,FL

**INCLUDES:**
· Basketball
· Playground Area

**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.




## EQUIPMENT LIST FOR AREAS SHOWN

| Pole | | | | Luminaires | | |
|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE |
| 1 | P1 | 50' | - | 50' | 1000W MZ | 2/2* |
| 1 | P2 | 50' | - | 50' | 1000W MZ | 2/1* |
| 1 | P3 | 50' | - | 50' | 1000W MZ | 2 |
| 1 | P4 | 50' | - | 50' | 1000W MZ | 3/2* |
| 4 | ← TOTALS → | | | | | 14 |

* This structure utilizes a back-to-back mounting configuration

## SINGLE LUMINAIRE AMPERAGE DRAW CHART

| Ballast Specifications (.90 min power factor) | Line Amperage Per Luminaire (max draw) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Single Phase Voltage | 120 (60) | 208 (60) | 220 (60) | 240 (60) | 277 (60) | 347 (60) | 380 (60) | 415 (60) | 480 (60) |
| 1000 watt MZ | 11.4 | 6.5 | 5.8 | 5.8 | 4.9 | 4.0 | 3.6 | - | 2.9 |

SCALE IN FEET 1 : 80

0' 80' 160'

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

By: Joel Stout

File #: 146480R1 Date: 04-Jan-11

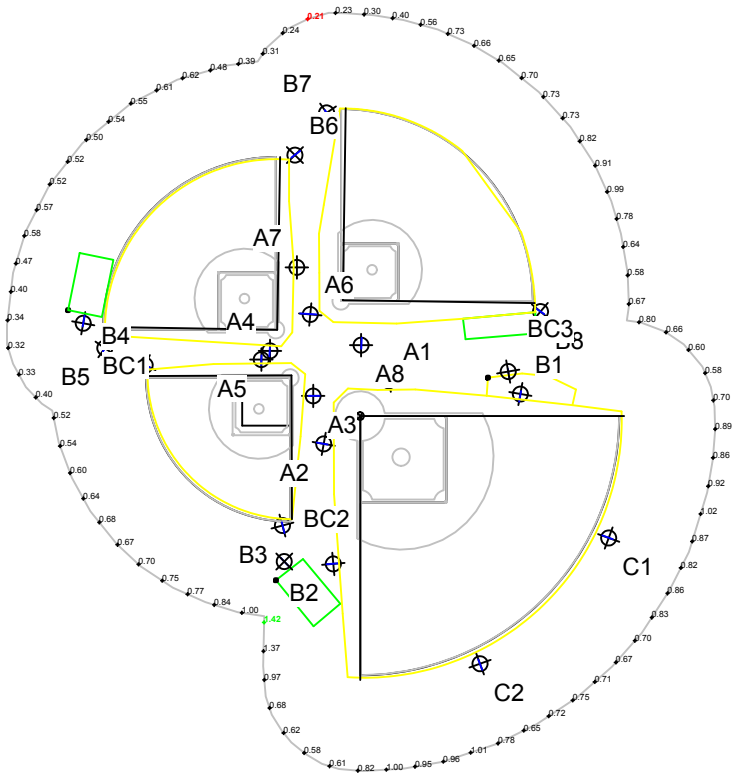


Print Date (04/Jan/2011) & Time (16:27)

# Tab C

## EQUIPMENT LIST FOR AREAS SHOWN

| Pole | | | | Luminaires | | | | |
|---|---|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 2 | A1-A2 | 60' | - | 60' | 1500W MZ | 5 | 5 | 0 |
| 6 | A3-A8 | 60' | - | 60' | 1500W MZ | 3 | 3 | 0 |
| 1 | B1 | 65' | -2' | 63' | 1500W MZ | 7 | 7 | 0 |
| 1 | B2 | 65' | -1' | 64' | 1500W MZ | 7 | 7 | 0 |
| 1 | B3 | 60' | -2.8' | 57.2' | 1500W MZ | 3 | 3 | 0 |
| 1 | B4 | 60' | -2' | 58' | 1500W MZ | 3 | 3 | 0 |
| 1 | B5 | 60' | -1.9' | 58.1' | 1500W MZ | 4 | 4 | 0 |
| 1 | B6 | 60' | -1.6' | 58.4' | 1500W MZ | 4 | 4 | 0 |
| 1 | B7 | 60' | -2.4' | 57.6' | 1500W MZ | 6 | 6 | 0 |
| 1 | B8 | 60' | -2.4' | 57.6' | 1500W MZ | 7 | 7 | 0 |
| 1 | C1 | 63' | -2' | 61' | 1500W MZ | 3 | 3 | 0 |
| 1 | C2 | 63' | -3' | 60' | 1500W MZ | 3 | 3 | 0 |
| 18 | ← TOTALS → | | | | | 75 | 75 | 0 |




SCALE IN FEET 1 : 200

0' 200' 400'

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

GREEN GENERATION LIGHTING™

GUARANTEED PERFORMANCE

## ILLUMINATION SUMMARY

### Spill Grid

Clayton Sterling Complex-Key West Retrofit
Key West,FL

**Spill Grid**

· Grid Spacing = 30.0'
· Values given at 3.0' above grade

· Luminaire Type: Green Generation
· Rated Lamp Life: 5,000 hours
· Avg Lumens/Lamp: 134,000

**CONSTANT ILLUMINATION HORIZONTAL FOOTCANDLES**

| | Entire Grid |
|---|---|
| No. of Target Points: | 80 |
| Average: | 0.676 |
| Maximum: | 1.42 |
| Minimum: | 0.21 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 75 |
| Avg KW over 5,000: | 117.3 |
| Max KW: | 127.5 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

**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.

By: Joel Stout

File #: 141839R1 Date: 05-Jan-11

| EQUIPMENT LIST FOR AREAS SHOWN | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pole | | | | Luminaires | | | | |
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 2 | A1-A2 | 50' | - | 50' | 1500W MZ | 3 | 3 | 0 |
| 2 | B1-B2 | 50' | - | 50' | 1500W MZ | 7 | 7 | 0 |
| 1 | C1 | 50' | - | 50' | 1500W MZ | 4 | 4 | 0 |
| 1 | C2 | 50' | -2' | 48' | 1500W MZ | 4 | 4 | 0 |
| 6 | ← TOTALS → | | | | | 28 | 28 | 0 |

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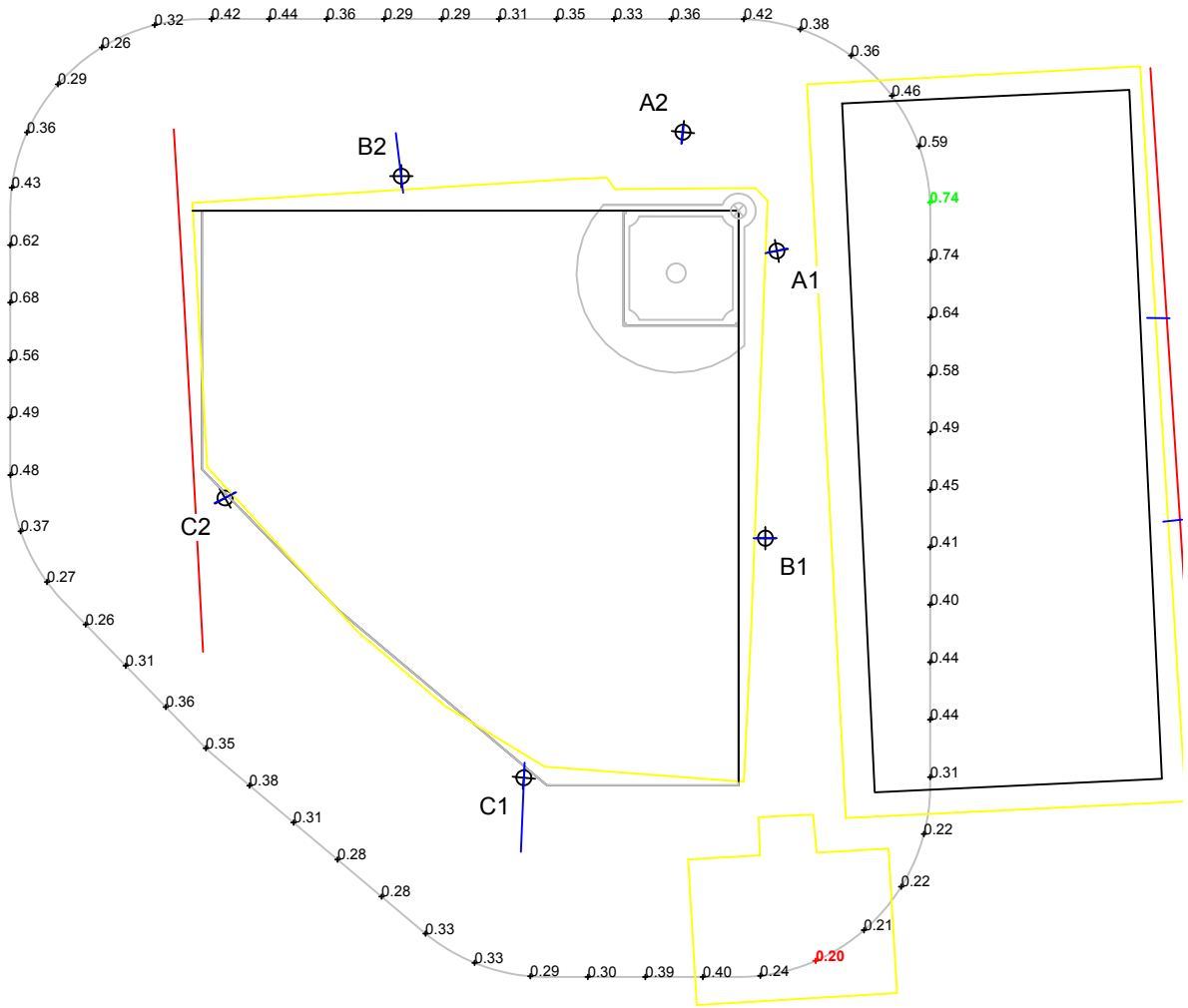



## ILLUMINATION SUMMARY

### Softball

Dewitt Roberts Softball-Key West Retrofit
Key West,FL

**Softball Spill**

· Grid Spacing = 30.0'
· Values given at 3.0' above grade

| | |
|---|---|
| · Luminaire Type: | Green Generation |
| · Rated Lamp Life: | 5,000 hours |
| · Avg Lumens/Lamp: | 134,000 |

**CONSTANT ILLUMINATION HORIZONTAL FOOTCANDLES**

| | Entire Grid |
|---|---|
| No. of Target Points: | 56 |
| Average: | 0.389 |
| Maximum: | 0.74 |
| Minimum: | 0.20 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 28 |
| Avg KW over 5,000: | 43.79 |
| Max KW: | 47.6 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

**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.

SCALE IN FEET 1 : 100

0' 100' 200'

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

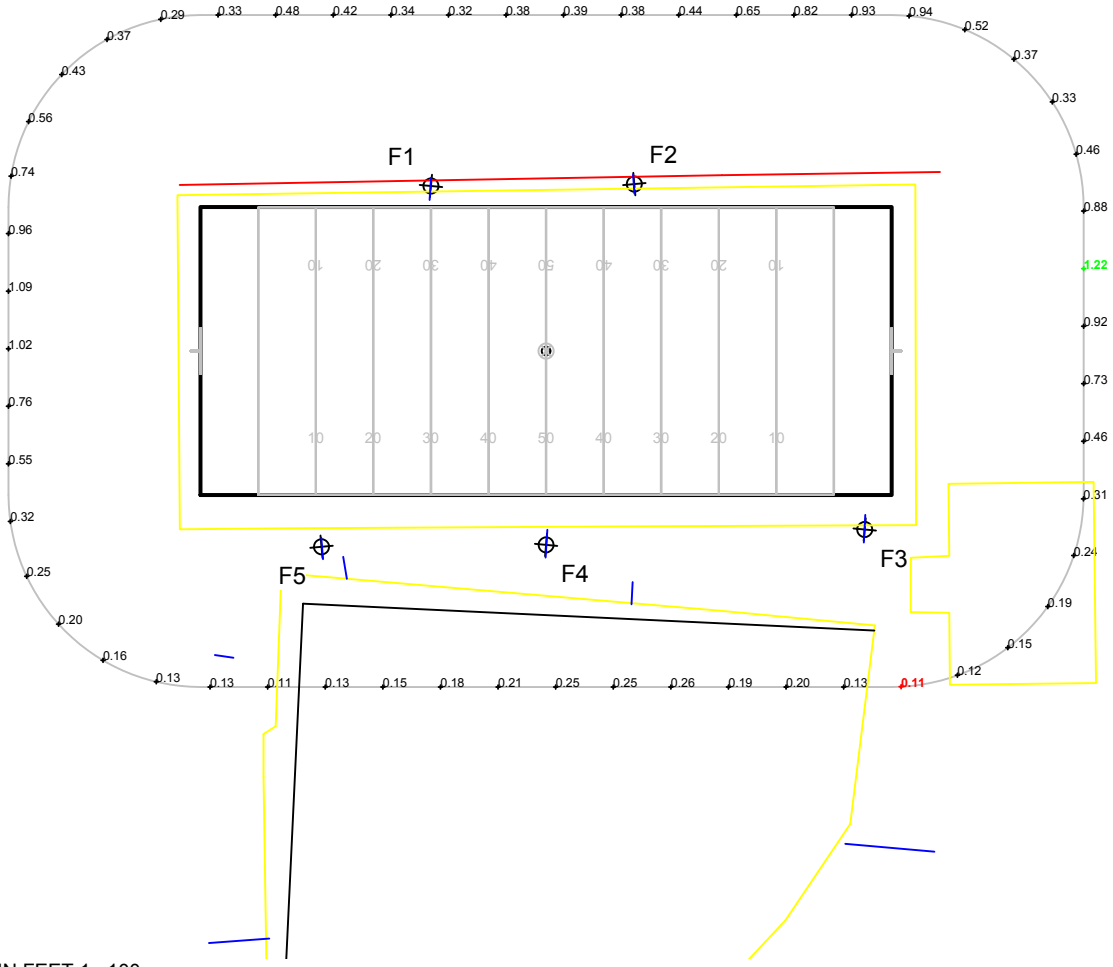
By: Joel Stout

File #: 141846R1 Date: 04-Jan-11

| EQUIPMENT LIST FOR AREAS SHOWN | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pole | | | | Luminaires | | | | |
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 3 | F1-F2, F5 | 50' | - | 50' | 1500W MZ | 5 | 5 | 0 |
| 1 | F3 | 50' | - | 50' | 1500W MZ | 4 | 4 | 0 |
| 1 | F4 | 50' | 1.3' | 51.3' | 1500W MZ | 4 | 4 | 0 |
| 5 | ← TOTALS → | | | | | 23 | 23 | 0 |

GREEN GENERATION LIGHTING™

GUARANTEED PERFORMANCE




SCALE IN FEET 1 : 100

0' 100' 200'

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

# ILLUMINATION SUMMARY

## Football

George Mira Football-Key West Retrofit
Key West,FL

**Football Spill**

· Grid Spacing = 30.0'
· Values given at 3.0' above grade

| | |
|---|---|
| · Luminaire Type: | Green Generation |
| · Rated Lamp Life: | 5,000 hours |
| · Avg Lumens/Lamp: | 134,000 |

**CONSTANT ILLUMINATION HORIZONTAL FOOTCANDLES**

| | Entire Grid |
|---|---|
| No. of Target Points: | 55 |
| Average: | 0.434 |
| Maximum: | 1.22 |
| Minimum: | 0.11 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 23 |
| Avg KW over 5,000: | 35.97 |
| Max KW: | 39.1 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

**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.

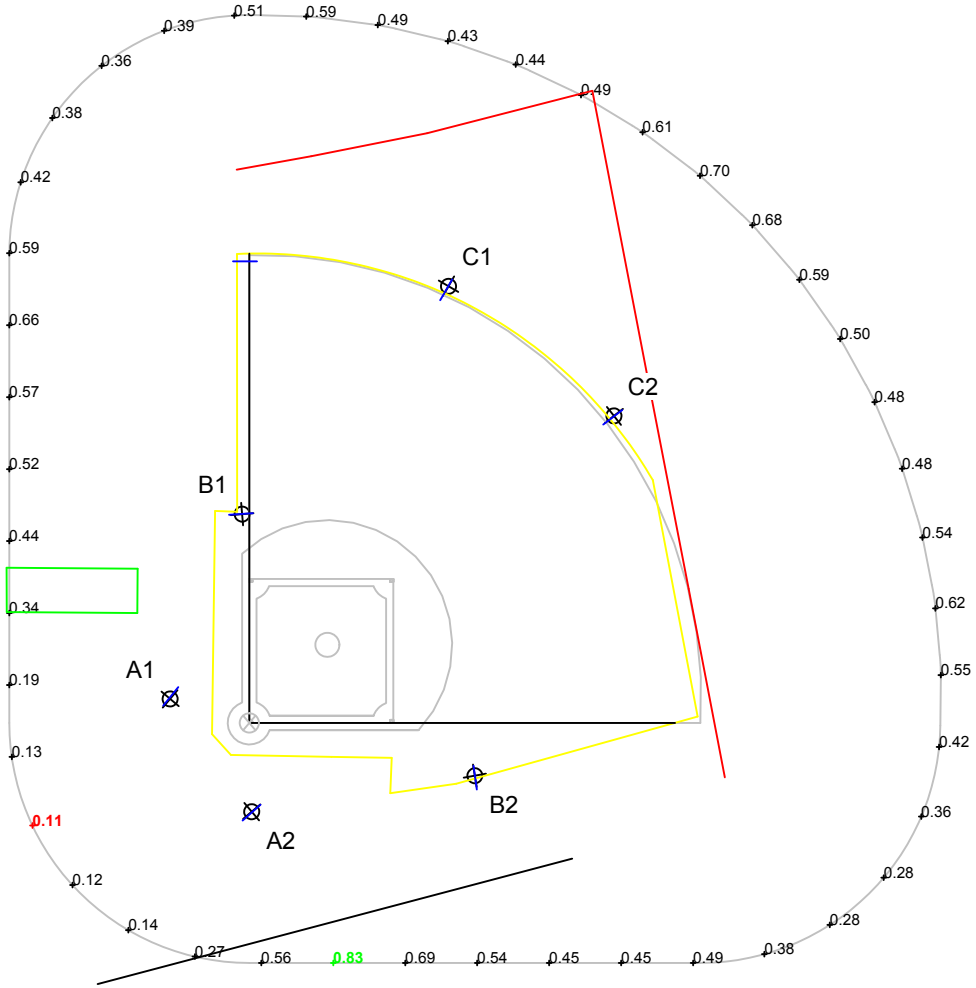
By: Joel Stout

File #: 141847R1 Date: 04-Jan-11

| EQUIPMENT LIST FOR AREAS SHOWN | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pole | | | | Luminaires | | | | |
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 4 | A1-A2<br>B1-B2 | 45' | - | 45' | 1500W MZ | 3 | 3 | 0 |
| 2 | C1-C2 | 45' | - | 45' | 1500W MZ | 2 | 2 | 0 |
| 6 | ← TOTALS → | | | | | 16 | 16 | 0 |

GREEN GENERATION LIGHTING™

GUARANTEED PERFORMANCE




## ILLUMINATION SUMMARY

**Girls Softball**

Rosa Hernandez Softball-Key West Retrofit
Key West,FL

**Girls Softball Spill**

· Grid Spacing = 30.0'
· Values given at 3.0' above grade

| | |
|---|---|
| · Luminaire Type: | Green Generation |
| · Rated Lamp Life: | 5,000 hours |
| · Avg Lumens/Lamp: | 134,000 |

**CONSTANT ILLUMINATION HORIZONTAL FOOTCANDLES**

| | Entire Grid |
|---|---|
| No. of Target Points: | 44 |
| Average: | 0.456 |
| Maximum: | 0.83 |
| Minimum: | 0.11 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 16 |
| Avg KW over 5,000: | 25.02 |
| Max KW: | 27.2 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

**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.

SCALE IN FEET 1 : 80

0' 80' 160'

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

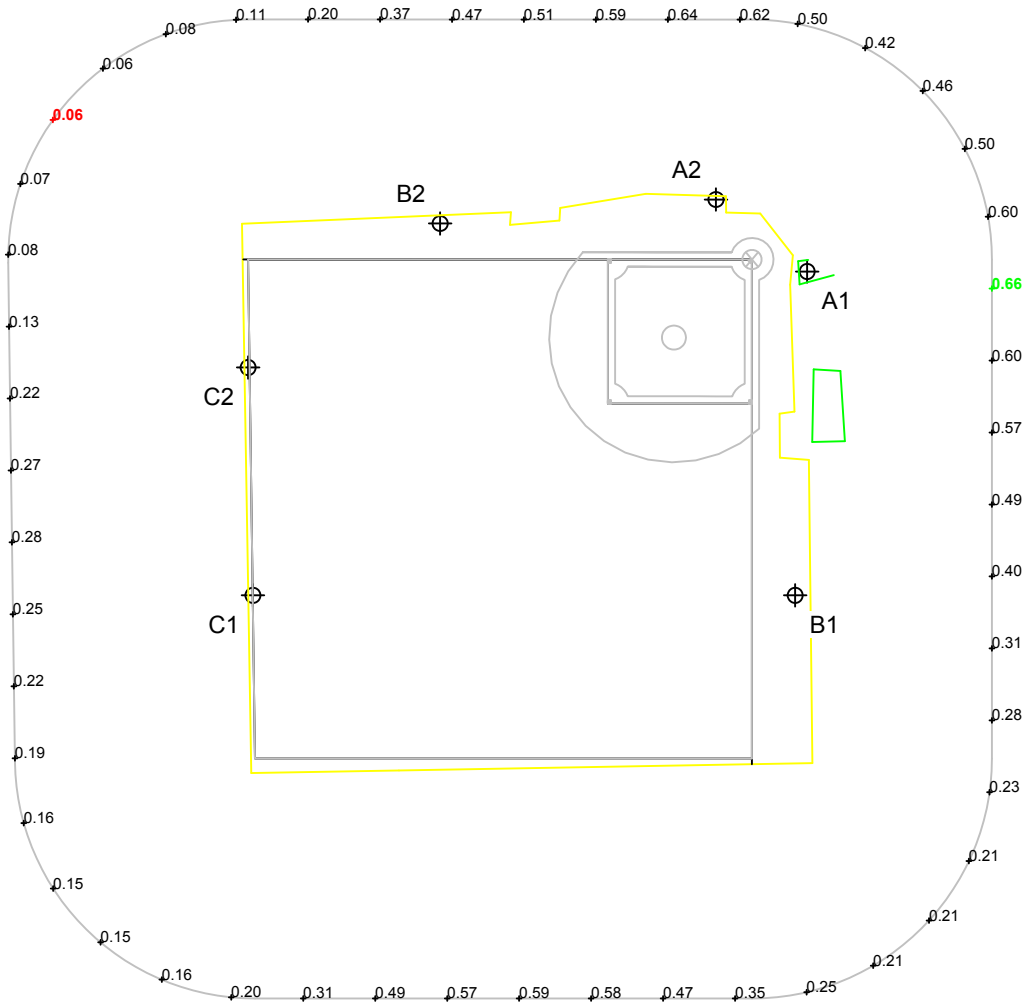
By: Joel Stout

File #: 141845R1 Date: 04-Jan-11

| EQUIPMENT LIST FOR AREAS SHOWN | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Pole | | | | Luminaires | | | | |
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 5 | A1-A2, B2 C1-C2 | 60' | - | 60' | 1500W MZ | 3 | 3 | 0 |
| 1 | B1 | 60' | - | 60' | 1500W MZ | 4 | 4 | 0 |
| 6 | ← TOTALS → | | | | | 19 | 19 | 0 |

GREEN GENERATION LIGHTING™

GUARANTEED PERFORMANCE




# ILLUMINATION SUMMARY

## Multi Purpose

Pepe Hernandez Park EECBG Key West
Key West,FL

**Multi Purpose Spill**

· Grid Spacing = 30.0'
· Values given at 3.0' above grade

| | |
|---|---|
| · Luminaire Type: | Green Generation |
| · Rated Lamp Life: | 5,000 hours |
| · Avg Lumens/Lamp: | 134,000 |

**CONSTANT ILLUMINATION HORIZONTAL FOOTCANDLES**

| | Entire Grid |
|---|---|
| No. of Target Points: | 49 |
| Average: | 0.336 |
| Maximum: | 0.66 |
| Minimum: | 0.06 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 19 |
| Avg KW over 5,000: | 29.72 |
| Max KW: | 32.3 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

**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.

SCALE IN FEET 1 : 80

0' 80' 160'

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

By: Joel Stout

File #: 150167R1 Date: 04-Jan-11

## EQUIPMENT LIST FOR AREAS SHOWN

| Pole | | | | Luminaires | | | | |
|---|---|---|---|---|---|---|---|---|
| QTY | LOCATION | SIZE | GRADE ELEVATION | MOUNTING HEIGHT | LAMP TYPE | QTY / POLE | THIS GRID | OTHER GRIDS |
| 1 | P1 | 50' | - | 50' | 1000W MZ | 2/2* | 4 | 0 |
| 1 | P2 | 50' | - | 50' | 1000W MZ | 2/1* | 3 | 0 |
| 1 | P3 | 50' | - | 50' | 1000W MZ | 2 | 2 | 0 |
| 1 | P4 | 50' | - | 50' | 1000W MZ | 3/2* | 5 | 0 |
| 4 | ← TOTALS → | | | | | 14 | 14 | 0 |

* This structure utilizes a back-to-back mounting configuration

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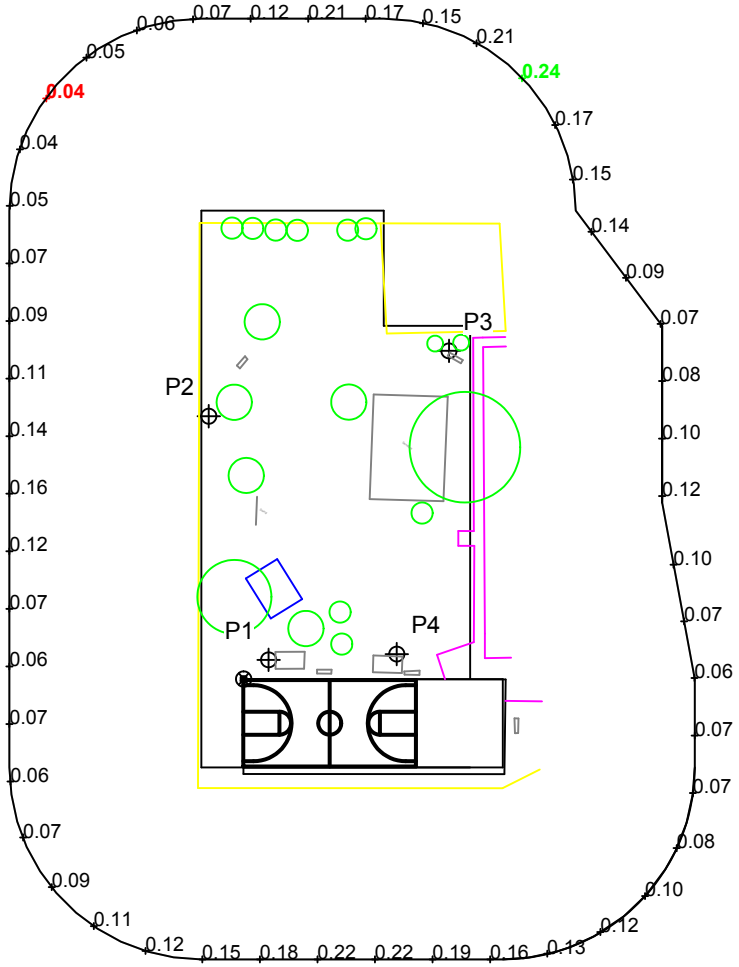


SCALE IN FEET 1 : 100

0' 100' 200'

## ILLUMINATION SUMMARY

### 100' Spill

Nelson English Park EECBG Key West Retro Fit
Key West,FL

**100' Spill**
· Grid Spacing = 30.0'
· Values given at 3.0' above grade

· Luminaire Type: Green Generation
· Rated Lamp Life: 12,000 hours
· Avg Lumens/Lamp: 88,000

**CONSTANT ILLUMINATION**
**HORIZONTAL FOOTCANDLES**

| | Entire Grid |
|---|---|
| No. of Target Points: | 49 |
| Average: | 0.114 |
| Maximum: | 0.24 |
| Minimum: | 0.04 |

| | |
|---|---|
| Average Lamp Tilt Factor: | 1.000 |
| Number of Luminaires: | 14 |
| Avg KW over 12,000: | 15.68 |
| Max KW: | 18.2 |

**Guaranteed Performance:** The CONSTANT ILLUMINATION described above is guaranteed for the rated life of the lamp.

**Field Measurements:** Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4. Individual measurements may vary from computer predictions.

**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.

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

By: Joel Stout

File #: 146480R1 Date: 04-Jan-11

# Tab D

# 10-Year Life Cycle Cost

## Clayton Sterling Complex - Key West Retrofit

Prepared for: City of Key West, FL
5/26/2011

| | Existing | Light·Structure GREEN™ | Your Savings |
|---|---|---|---|
| **Total MWh** | **908.82** | **633.42** | **275.40** |
| **Metric Tons of $CO_2$** | **652.53** | **454.80** | **197.74** |
| **Million Source Btu Saved** | **3101.0** | **2161.3** | **939.70** |
| **Energy** | **$165,240** | **$126,684** | **$38,556** |
| Group Relamp | $23,750 | $0 | $23,750 |
| Lamp Maintenance | $1,500 | $0 | $1,500 |
| Controls - Energy | $16,524 | $0 | $16,524 |
| Controls - Labor | $0 | $0 | $0 |
| **10-Year Life Cycle Cost** | **$207,014** | **$126,684** | **$80,330** |

### Assumptions

**Customer Provided Energy Data:**

| | |
|---|---|
| *Energy Cost per kWh | $0.200 |
| Annual Operating Hours | 500 |
| Green Generation Lighting® Fixture Qty. | 81 |
| Average kW demand per fixture | 1.564 |
| Useful lamp life (Hours) | **5,000** |
| Typical Floodlighting Fixture Qty. | 102 |
| Average kW demand per fixture | 1.62 |
| Rated Life (Hours) | 3,000 |
| Useful lamp life (Hours) | **1,200** |

**Controls Information:**

| | |
|---|---|
| Controls Energy Savings | 10% |
| Labor Rate per Hour | $0.00 |
| # On/Off Cycles per Year | 0 |
| Labor Hours per Cycle | 0 |

**Lamp Maintenance Data:**

| | |
|---|---|
| Lamp replacement cost including parts, equipment & labor | $125 |

| | |
|---|---|
| **Annual Energy Savings =** | **$5,508** |
| Average Annual Savings = | $8,033.00 |

**NOTE:**
*Life cycle costs are based upon the assumptions given above. Any variation in this data will change the life cycle cost proportionately.*

*Carbon dioxide ($CO_2$) is emitted by the power plant when generating the total kWh used by the lighting system. Generating one kWh of electricity in the United States emits an average of 1.583 lbs of $CO_2$. One metric ton equals 2,204.6 lbs.*

*Source for $CO_2$ calculations: http://www.epa.gov/cleanenergy/energy-resources/refs.html (4-15-09)*



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# 10-Year Life Cycle Cost

## DeWitt Roberts Softball - Key West Retrofit

Softball

Prepared for: City of Key West, FL

5/26/2011

| | Existing | Light·Structure GREEN™ | Your Savings |
|---|---|---|---|
| **Total MWh** | **231.66** | **218.96** | **12.70** |
| **Metric Tons of $CO_2$** | **166.33** | **157.21** | **9.12** |
| **Million Source Btu Saved** | **790.5** | **747.1** | **43.33** |
| **Energy** | **$42,120** | **$43,792** | **-$1,672** |
| Group Relamp | $13,542 | $0 | $13,542 |
| Lamp Maintenance | $10,000 | $0 | $10,000 |
| Controls - Energy | $4,212 | $0 | $4,212 |
| Controls - Labor | $0 | $0 | $0 |
| **10-Year Life Cycle Cost** | **$69,874** | **$43,792** | **$26,082** |

### Assumptions

**Customer Provided Energy Data:**

| | |
|---|---|
| *Energy Cost per kWh | $0.200 |
| Annual Operating Hours | 500 |

**Technology Specific Data:**

| | |
|---|---|
| Green Generation Lighting® Fixture Qty. | 28 |
| Average kW demand per fixture | 1.564 |
| Useful lamp life (Hours) | **5,000** |
| Typical Floodlighting Fixture Qty. | 26 |
| Average kW demand per fixture | 1.62 |
| Rated Life (Hours) | 3,000 |
| Useful lamp life (Hours) | **1,200** |

**Controls Information:**

| | |
|---|---|
| Controls Energy Savings | 10% |
| Labor Rate per Hour | $0.00 |
| # On/Off Cycles per Year | 0 |
| Labor Hours per Cycle | 0 |

**Lamp Maintenance Data:**

| | |
|---|---|
| Lamp replacement cost including parts, equipment & labor | $125 |

| | |
|---|---|
| **Annual Energy Savings =** | **$254** |
| Average Annual Savings = | $2,608.20 |

**NOTE:**

*Life cycle costs are based upon the assumptions given above. Any variation in this data will change the life cycle cost proportionately.*

*Carbon dioxide ($CO_2$) is emitted by the power plant when generating the total kWh used by the lighting system. Generating one kWh of electricity in the United States emits an average of 1.583 lbs of $CO_2$. One metric ton equals 2,204.6 lbs.*

*Source for $CO_2$ calculations: http://www.epa.gov/cleanenergy/energy-resources/refs.html (4-15-09)*



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# 10-Year Life Cycle Cost

## George Mira Football - Key West Retrofit

Prepared for: City of Key West, FL
5/26/2011

| | Existing | Light·Structure GREEN™ | Your Savings |
|---|---|---|---|
| **Total MWh** | **267.30** | **179.86** | **87.44** |
| **Metric Tons of $CO_2$** | **191.92** | **129.14** | **62.78** |
| **Million Source Btu Saved** | **912.1** | **613.7** | **298.36** |
| **Energy** | **$48,600** | **$35,972** | **$12,628** |
| Group Relamp | $23,750 | $0 | $23,750 |
| Lamp Maintenance | $1,500 | $0 | $1,500 |
| Controls - Energy | $4,860 | $0 | $4,860 |
| Controls - Labor | $0 | $0 | $0 |
| **10-Year Life Cycle Cost** | **$78,710** | **$35,972** | **$42,738** |

### Assumptions

**Customer Provided Energy Data:**

| | |
|---|---|
| *Energy Cost per kWh | $0.200 |
| Annual Operating Hours | 500 |

**Technology Specific Data:**

| | |
|---|---|
| Green Generation Lighting® Fixture Qty. | 23 |
| Average kW demand per fixture | 1.564 |
| Useful lamp life (Hours) | **5,000** |
| Typical Floodlighting Fixture Qty. | 30 |
| Average kW demand per fixture | 1.62 |
| Rated Life (Hours) | 3,000 |
| Useful lamp life (Hours) | **1,200** |

**Controls Information:**

| | |
|---|---|
| Controls Energy Savings | 10% |
| Labor Rate per Hour | $0.00 |
| # On/Off Cycles per Year | 0 |
| Labor Hours per Cycle | 0 |

**Lamp Maintenance Data:**

| | |
|---|---|
| Lamp replacement cost including parts, equipment & labor | $125 |

| | |
|---|---|
| **Annual Energy Savings =** | **$1,749** |
| Average Annual Savings = | $4,273.80 |

**NOTE:**
*Life cycle costs are based upon the assumptions given above. Any variation in this data will change the life cycle cost proportionately.*

*Carbon dioxide ($CO_2$) is emitted by the power plant when generating the total kWh used by the lighting system. Generating one kWh of electricity in the United States emits an average of 1.583 lbs of $CO_2$. One metric ton equals 2,204.6 lbs.*

*Source for $CO_2$ calculations: http://www.epa.gov/cleanenergy/energy-resources/refs.html (4-15-09)*

# 10-Year Life Cycle Cost

## Rosa Hernandez Softball - Key West Retrofit

Softball

Prepared for: City of Key West, FL

5/26/2011

| | Existing | Light·Structure GREEN™ | Your Savings |
|---|---|---|---|
| **Total MWh** | **178.20** | **125.12** | **53.08** |
| **Metric Tons of $CO_2$** | **127.95** | **89.84** | **38.11** |
| **Million Source Btu Saved** | **608.0** | **426.9** | **181.12** |
| **Energy** | **$32,400** | **$25,024** | **$7,376** |
| Group Relamp | $5,417 | $0 | $5,417 |
| Lamp Maintenance | $1,500 | $0 | $1,500 |
| Controls - Energy | $3,240 | $0 | $3,240 |
| Controls - Labor | $0 | $0 | $0 |
| **10-Year Life Cycle Cost** | **$42,557** | **$25,024** | **$17,533** |

### Assumptions

**Customer Provided Energy Data:**

| | |
|---|---|
| *Energy Cost per kWh | $0.200 |
| Annual Operating Hours | 500 |

**Technology Specific Data:**

| | |
|---|---|
| Green Generation Lighting® Fixture Qty. | 16 |
| Average kW demand per fixture | 1.564 |
| Useful lamp life (Hours) | **5,000** |
| Typical Floodlighting Fixture Qty. | 20 |
| Average kW demand per fixture | 1.62 |
| Rated Life (Hours) | 3,000 |
| Useful lamp life (Hours) | **1,200** |

**Controls Information:**

| | |
|---|---|
| Controls Energy Savings | 10% |
| Labor Rate per Hour | $0.00 |
| # On/Off Cycles per Year | 0 |
| Labor Hours per Cycle | 0 |

**Lamp Maintenance Data:**

| | |
|---|---|
| Lamp replacement cost including parts, equipment & labor | $125 |

| | |
|---|---|
| **Annual Energy Savings =** | **$1,062** |
| Average Annual Savings = | $1,753.30 |

**NOTE:**

*Life cycle costs are based upon the assumptions given above. Any variation in this data will change the life cycle cost proportionately.*

*Carbon dioxide ($CO_2$) is emitted by the power plant when generating the total kWh used by the lighting system. Generating one kWh of electricity in the United States emits an average of 1.583 lbs of $CO_2$. One metric ton equals 2,204.6 lbs.*

*Source for $CO_2$ calculations: http://www.epa.gov/cleanenergy/energy-resources/refs.html (4-15-09)*



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# 10-Year Life Cycle Cost

## Pepe Hernandez Park - Key West Retrofit

Prepared for: City of Key West, FL
5/26/2011

| | Existing | Light·Structure GREEN™ | Your Savings |
|---|---|---|---|
| **Total MWh** | **160.38** | **148.58** | **11.80** |
| **Metric Tons of $CO_2$** | **115.15** | **106.68** | **8.47** |
| **Million Source Btu Saved** | **547.2** | **507.0** | **40.26** |
| **Energy** | **$29,160** | **$29,716** | **-$556** |
| Group Relamp | $5,417 | $0 | $5,417 |
| Lamp Maintenance | $1,500 | $0 | $1,500 |
| Controls - Energy | $2,916 | $0 | $2,916 |
| Controls - Labor | $0 | $0 | $0 |
| **10-Year Life Cycle Cost** | **$38,993** | **$29,716** | **$9,277** |

### Assumptions

**Customer Provided Energy Data:**

| | |
|---|---|
| *Energy Cost per kWh | $0.200 |
| Annual Operating Hours | 500 |

**Technology Specific Data:**

| | |
|---|---|
| Green Generation Lighting® Fixture Qty. | 19 |
| Average kW demand per fixture | 1.564 |
| Useful lamp life (Hours) | **5,000** |
| Typical Floodlighting Fixture Qty. | 18 |
| Average kW demand per fixture | 1.62 |
| Rated Life (Hours) | 3,000 |
| Useful lamp life (Hours) | **1,200** |

**Controls Information:**

| | |
|---|---|
| Controls Energy Savings | 10% |
| Labor Rate per Hour | $0.00 |
| # On/Off Cycles per Year | 0 |
| Labor Hours per Cycle | 0 |

**Lamp Maintenance Data:**

| | |
|---|---|
| Lamp replacement cost including parts, equipment & labor | $125 |

| | |
|---|---|
| **Annual Energy Savings =** | **$236** |
| Average Annual Savings = | $927.70 |

**NOTE:**
*Life cycle costs are based upon the assumptions given above. Any variation in this data will change the life cycle cost proportionately.*

*Carbon dioxide ($CO_2$) is emitted by the power plant when generating the total kWh used by the lighting system. Generating one kWh of electricity in the United States emits an average of 1.583 lbs of $CO_2$. One metric ton equals 2,204.6 lbs.*

*Source for $CO_2$ calculations: http://www.epa.gov/cleanenergy/energy-resources/refs.html (4-15-09)*

# 10-Year Life Cycle Cost

## Nelson English Park - Key West Retrofit

Prepared for: City of Key West, FL
5/26/2011

| | Existing | Light·Structure GREEN™ | Your Savings |
|---|---|---|---|
| **Total MWh** | **105.93** | **78.40** | **27.53** |
| **Metric Tons of $CO_2$** | **76.06** | **56.29** | **19.77** |
| **Million Source Btu Saved** | **361.4** | **267.5** | **93.94** |
| **Energy** | **$19,260** | **$15,680** | **$3,580** |
| Group Relamp | $5,417 | $0 | $5,417 |
| Lamp Maintenance | $1,500 | $0 | $1,500 |
| Controls - Energy | $1,926 | $0 | $1,926 |
| Controls - Labor | $0 | $0 | $0 |
| **10-Year Life Cycle Cost** | **$28,103** | **$15,680** | **$12,423** |

### Assumptions

**Customer Provided Energy Data:**

| | |
|---|---|
| *Energy Cost per kWh | $0.200 |
| Annual Operating Hours | 500 |

**Technology Specific Data:**

| | |
|---|---|
| Green Generation Lighting® Fixture Qty. | 14 |
| Average kW demand per fixture | 1.12 |
| Useful lamp life (Hours) | **12,000** |
| Typical Floodlighting Fixture Qty. | 18 |
| Average kW demand per fixture | 1.07 |
| Rated Life (Hours) | 10,000 |
| Useful lamp life (Hours) | **1,200** |

**Controls Information:**

| | |
|---|---|
| Controls Energy Savings | 10% |
| Labor Rate per Hour | $0.00 |
| # On/Off Cycles per Year | 0 |
| Labor Hours per Cycle | 0 |

**Lamp Maintenance Data:**

| | |
|---|---|
| Lamp replacement cost including parts, equipment & labor | $125 |

| | |
|---|---|
| **Annual Energy Savings =** | **$551** |
| Average Annual Savings = | $1,242.30 |

**NOTE:**
*Life cycle costs are based upon the assumptions given above. Any variation in this data will change the life cycle cost proportionately.*

*Carbon dioxide ($CO_2$) is emitted by the power plant when generating the total kWh used by the lighting system. Generating one kWh of electricity in the United States emits an average of 1.583 lbs of $CO_2$. One metric ton equals 2,204.6 lbs.*

*Source for $CO_2$ calculations: http://www.epa.gov/cleanenergy/energy-resources/refs.html (4-15-09)*



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# Tab E

| Pole ID | Dimensioned From | Pole Location | | Light Bank Mounting Height | Reflector NEMA Type | Aiming Point | | | Aiming Angle | | Group |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | X | Y | | | X | Y | Z | HOR | VER | |
| A1 | Field A | -37.00 | 30.00 | 60.00 | 5 | 7.13 | -22.38 | 0.00 | R 58.3 | 42.50 | A |
| | | | | | 5 | 8.90 | 140.46 | 0.00 | L 56.4 | 27.04 | A |
| | | | | | 5 | 81.75 | -22.86 | 0.00 | R 33.3 | 24.69 | A |
| | | | | | 4 | 80.32 | 118.08 | 0.00 | L 26.2 | 22.11 | A |
| | | | | | 4 | 104.13 | 56.66 | 0.00 | L 0.7 | 22.40 | A |
| A2 | Field A | 29.00 | -38.00 | 60.00 | 5 | 124.60 | 1.43 | 0.00 | R 56.4 | 30.70 | A |
| | | | | | 5 | -25.86 | 12.38 | 0.00 | L 55.8 | 39.94 | A |
| | | | | | 4 | 109.36 | 81.42 | 0.00 | R 23.2 | 22.48 | A |
| | | | | | 5 | -15.39 | 94.28 | 0.00 | L 27.8 | 23.14 | A |
| | | | | | 4 | 35.56 | 113.32 | 0.00 | L 7.5 | 21.35 | A |
| A3 | Field B | -24.00 | 19.00 | 60.00 | 6 | 6.81 | -24.82 | 0.00 | R 53.9 | 48.91 | B |
| | | | | | 5 | 12.80 | 87.95 | 0.00 | L 61.4 | 37.85 | B |
| | | | | | 5 | 69.12 | 59.58 | 0.00 | L 23.7 | 30.26 | B |
| A4 | Field B | 21.00 | -28.00 | 60.00 | 5 | 88.14 | 18.34 | 0.00 | R 54.8 | 36.60 | B |
| | | | | | 6 | -24.13 | 6.86 | 0.00 | L 51.3 | 47.04 | B |
| | | | | | 5 | 53.81 | 72.17 | 0.00 | R 18.2 | 29.35 | B |
| A5 | Field C | -31.00 | 15.00 | 60.00 | 6 | 19.34 | -16.47 | 0.00 | R 30.4 | 45.60 | C |
| | | | | | 5 | 14.92 | 85.08 | 0.00 | L 56.2 | 35.86 | C |
| | | | | | 5 | 76.44 | 52.70 | 0.00 | L 19.4 | 27.49 | C |
| A6 | Field C | 16.00 | -36.00 | 60.00 | 5 | 87.92 | 17.38 | 0.00 | R 47.7 | 33.97 | C |
| | | | | | 5 | -12.45 | 28.86 | 0.00 | L 27.3 | 40.40 | C |
| | | | | | 5 | 53.77 | 68.89 | 0.00 | R 14.9 | 27.99 | C |
| A7 | Field D | -46.00 | 35.00 | 60.00 | 5 | 11.39 | -16.77 | 0.00 | R 41.0 | 38.03 | D |
| | | | | | 5 | 47.42 | 71.98 | 0.00 | L 20.5 | 30.74 | D |
| | | | | | 5 | 56.80 | 37.86 | 0.00 | L 1.6 | 29.96 | D |
| A8 | Field D | 21.00 | -46.00 | 60.00 | 5 | 78.55 | 40.84 | 0.00 | R 32.6 | 29.92 | D |
| | | | | | 5 | -12.74 | 15.41 | 0.00 | L 27.3 | 40.71 | D |
| | | | | | 5 | 46.14 | 56.20 | 0.00 | R 13.9 | 29.39 | D |
| B1 | Field A | -23.00 | 167.00 | 65.00 | 4 | 73.98 | 76.15 | 0.00 | R 32.0 | 25.39 | A |
| | | | | | 4 | 50.32 | 266.64 | 0.00 | L 63.2 | 27.23 | A |
| | | | | | 4 | 103.17 | 116.65 | 0.00 | R 11.3 | 24.65 | A |
| | | | | | 4 | 93.51 | 241.08 | 0.00 | L 42.2 | 24.36 | A |
| | | | | | 5 | 20.32 | 69.04 | 0.00 | R 55.7 | 29.56 | A |
| | | | | | 5 | -2.09 | 258.98 | 0.00 | L 87.4 | 32.89 | A |
| | | | | | 4 | 114.60 | 176.65 | 0.00 | L 14.1 | 23.42 | A |
| B2 | Field A | 154.00 | -28.00 | 65.00 | 4 | 262.68 | 53.80 | 0.00 | R 57.4 | 25.36 | A |
| | | | | | 4 | 67.90 | 82.22 | 0.00 | L 31.9 | 24.60 | A |
| | | | | | 4 | 225.89 | 101.32 | 0.00 | R 33.8 | 23.21 | A |
| | | | | | 4 | 106.03 | 118.56 | 0.00 | L 12.8 | 22.32 | A |
| | | | | | 5 | 266.25 | 5.40 | 0.00 | R 78.4 | 27.80 | A |
| | | | | | 5 | 50.80 | 29.04 | 0.00 | L 55.7 | 27.61 | A |
| | | | | | 4 | 161.26 | 130.94 | 0.00 | R 7.6 | 20.89 | A |
| B3 | Field B | 8.00 | 154.00 | 60.00 | 5 | -6.01 | 47.53 | 0.00 | R 21.5 | 27.91 | B |
| | | | | | 5 | 106.85 | 90.94 | 0.00 | L 41.8 | 25.97 | B |

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# AIMING SUMMARY

Pole-Mounted Luminaires

**Clayton Sterling Complex-Key West Retrofit**
Key West,FL

| Zone Description | Groups |
|---|---|
| Zone1 | A |
| Zone2 | D |
| Zone3 | B |
| Zone4 | C |
| Zone5 | ABCD |
| Zone6 | E |
| Zone7 | F |
| Zone8 | G |

By: Joel Stout

File #: 141839R1 Date: 25-May-11

| Pole ID | Dimensioned From | Pole Location | | Light Bank Mounting Height | Reflector NEMA Type | Aiming Point | | | Aiming Angle | | Group |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | X | Y | | | X | Y | Z | HOR | VER | |
| | | | | | 5 | 58.95 | 60.00 | 0.00 | L 13.5 | 27.84 | B |
| B4 | Field B | 151.00 | -13.00 | 60.00 | 5 | 109.10 | 90.94 | 0.00 | R 42.4 | 27.35 | B |
| | | | | | 5 | 42.98 | 0.13 | 0.00 | L 17.0 | 27.90 | B |
| | | | | | 5 | 60.45 | 57.26 | 0.00 | R 12.9 | 26.54 | B |
| B5 | Field C | -19.00 | 178.00 | 60.00 | 4 | 11.68 | 62.71 | 0.00 | R 39.0 | 26.06 | C |
| | | | | | 4 | 114.53 | 132.62 | 0.00 | L 15.0 | 22.24 | C |
| | | | | | 4 | 55.83 | 71.54 | 0.00 | R 19.5 | 23.83 | C |
| | | | | | 4 | 89.68 | 99.21 | 0.00 | R 1.4 | 23.12 | C |
| B6 | Field C | 182.00 | -20.00 | 60.00 | 4 | 130.59 | 115.69 | 0.00 | R 23.1 | 21.83 | C |
| | | | | | 4 | 58.19 | 2.96 | 0.00 | L 33.3 | 24.91 | C |
| | | | | | 4 | 95.86 | 94.20 | 0.00 | R 7.6 | 21.95 | C |
| | | | | | 4 | 74.08 | 46.81 | 0.00 | L 12.8 | 24.46 | C |
| B7 | Field D | -15.00 | 196.00 | 60.00 | 4 | -8.88 | 63.02 | 0.00 | R 30.4 | 23.57 | D |
| | | | | | 3 | 128.46 | 155.15 | 0.00 | L 37.5 | 21.28 | D |
| | | | | | 4 | 21.40 | 66.86 | 0.00 | R 18.0 | 23.11 | D |
| | | | | | 4 | 114.38 | 138.52 | 0.00 | L 30.0 | 22.09 | D |
| | | | | | 4 | 64.48 | 77.52 | 0.00 | R 0.7 | 21.71 | D |
| | | | | | 4 | 100.73 | 98.85 | 0.00 | L 14.6 | 20.63 | D |
| B8 | Field D | 208.00 | -11.00 | 60.00 | 3 | 155.75 | 121.46 | 0.00 | R 27.4 | 21.96 | D |
| | | | | | 4 | 73.01 | -12.47 | 0.00 | L 39.7 | 23.14 | D |
| | | | | | 4 | 121.63 | 80.94 | 0.00 | R 6.3 | 24.27 | D |
| | | | | | 4 | 82.39 | 14.83 | 0.00 | L 28.0 | 23.98 | D |
| | | | | | 4 | 141.68 | 106.95 | 0.00 | R 19.8 | 21.99 | D |
| | | | | | 5 | 152.34 | -49.15 | 0.00 | L 74.3 | 39.72 | D |
| | | | | | 4 | 94.76 | 51.93 | 0.00 | L 11.0 | 22.76 | D |
| BC1 | Batting Cage 1 | 15.83 | -13.65 | 25.00 | 6 | 41.99 | 48.44 | 2.76 | R 12.0 | 19.80 | E |
| | | | | | 6 | 16.13 | 55.38 | 2.76 | L 8.9 | 19.34 | E |
| BC2 | Batting Cage 2 | 8.69 | 19.46 | 25.00 | 5 | 38.71 | -40.77 | 2.03 | R 17.7 | 19.85 | F |
| | | | | | 6 | 61.12 | -22.61 | 2.03 | L 5.3 | 19.81 | F |
| BC3 | Batting Cage 3 | 21.07 | 6.32 | 25.00 | 6 | 14.27 | -45.88 | 1.77 | R 16.4 | 24.84 | G |
| | | | | | 6 | 89.52 | -23.66 | 1.77 | L 56.2 | 18.08 | G |
| C1 | Field A | 127.00 | 259.00 | 63.00 | 4 | -6.32 | 227.19 | 0.00 | R 56.2 | 23.98 | A |
| | | | | | 4 | 192.47 | 146.46 | 0.00 | L 49.7 | 25.09 | A |
| | | | | | 4 | 82.22 | 130.46 | 0.00 | L 0.8 | 23.87 | A |
| C2 | Field A | 258.00 | 125.00 | 63.00 | 4 | 150.36 | 198.54 | 0.00 | R 53.9 | 24.70 | A |
| | | | | | 5 | 246.29 | 10.61 | 0.00 | L 63.9 | 27.62 | A |
| | | | | | 4 | 131.27 | 98.72 | 0.00 | R 8.3 | 24.59 | A |

GREEN GENERATION LIGHTING™

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# AIMING SUMMARY

Pole-Mounted Luminaires

**Clayton Sterling Complex-Key West Retrofit**
Key West,FL

| Zone Description | Groups |
|---|---|
| Zone1 | A |
| Zone2 | D |
| Zone3 | B |
| Zone4 | C |
| Zone5 | ABCD |
| Zone6 | E |
| Zone7 | F |
| Zone8 | G |

By: Joel Stout

File #: 141839R1 Date: 25-May-11

| Pole ID | Dimensioned From | Pole Location | | Light Bank Mounting Height | Reflector NEMA Type | Aiming Point | | | Aiming Angle | | Group |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | X | Y | | | X | Y | Z | HOR | VER | |
| A1 | Softball | -20.00 | 21.00 | 50.00 | 5 | 24.12 | 81.81 | 0.00 | L 42.5 | 33.53 | A |
| | | | | | 6 | 5.74 | -12.95 | 0.00 | R 60.8 | 50.18 | A |
| | | | | | 4 | 71.09 | 58.67 | 0.00 | L 12.4 | 26.32 | A |
| A2 | Softball | 29.00 | -41.00 | 50.00 | 6 | -17.87 | -1.05 | 0.00 | L 52.9 | 39.20 | A |
| | | | | | 5 | 90.15 | 31.04 | 0.00 | R 34.0 | 27.62 | A |
| | | | | | 4 | 51.99 | 70.66 | 0.00 | R 6.6 | 23.17 | A |
| B1 | Softball | -14.00 | 171.00 | 50.00 | 4 | 58.93 | 82.78 | 0.00 | R 49.5 | 23.71 | A |
| | | | | | 4 | 58.08 | 267.22 | 0.00 | L 52.4 | 22.68 | A |
| | | | | | 3 | 94.22 | 114.21 | 0.00 | R 27.3 | 22.00 | A |
| | | | | | 4 | 101.47 | 222.03 | 0.00 | L 23.5 | 21.35 | A |
| | | | | | 4 | 0.68 | 65.04 | 0.00 | R 82.2 | 23.97 | A |
| | | | | | 4 | 7.68 | 276.66 | 0.00 | L 78.4 | 23.79 | A |
| | | | | | 3 | 111.16 | 158.66 | 0.00 | R 5.7 | 20.38 | A |
| B2 | Softball | 176.00 | -18.00 | 50.00 | 4 | 269.58 | 60.92 | 0.00 | R 49.0 | 22.29 | A |
| | | | | | 4 | 72.46 | 49.90 | 0.00 | L 56.1 | 22.09 | A |
| | | | | | 4 | 229.50 | 100.24 | 0.00 | R 24.0 | 20.82 | A |
| | | | | | 3 | 111.54 | 89.76 | 0.00 | L 30.6 | 21.47 | A |
| | | | | | 5 | 268.83 | 8.86 | 0.00 | R 73.8 | 26.26 | A |
| | | | | | 4 | 66.58 | 7.68 | 0.00 | L 76.8 | 22.92 | A |
| | | | | | 3 | 164.34 | 111.10 | 0.00 | L 5.2 | 19.82 | A |
| C1 | Softball | 112.00 | 296.00 | 50.00 | 4 | 195.75 | 183.83 | 0.00 | L 40.6 | 19.53 | A |
| | | | | | 5 | 20.73 | 280.53 | 0.00 | R 74.5 | 28.72 | A |
| | | | | | 3 | 126.62 | 171.26 | 0.00 | L 11.1 | 21.27 | A |
| | | | | | 5 | 36.69 | 206.07 | 0.00 | R 34.4 | 22.71 | A |
| C2 | Softball | 268.00 | 150.00 | 50.00 | 5 | 268.83 | 35.83 | 0.00 | L 59.3 | 22.85 | A |
| | | | | | 4 | 167.34 | 211.47 | 0.00 | R 60.4 | 22.19 | A |
| | | | | | 5 | 191.68 | 81.89 | 0.00 | L 11.1 | 24.62 | A |
| | | | | | 3 | 148.61 | 147.06 | 0.00 | R 28.0 | 21.50 | A |


GUARANTEED PERFORMANCE

# AIMING SUMMARY

Pole-Mounted Luminaires

**Dewitt Roberts Softball-Key West Retrofit**
Key West,FL

| Zone Description | Groups |
|---|---|
| Zone1 | A |

By: Joel Stout

File #: 141846R1 Date: 25-May-11

| Pole ID | Dimensioned From | Pole Location | | Light Bank Mounting Height | Reflector NEMA Type | Aiming Point | | | Aiming Angle | | Group |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | X | Y | | | X | Y | Z | HOR | VER | |
| F1 | Football | -60.00 | 86.00 | 50.00 | 5 | -170.59 | 74.75 | 0.00 | R 79.0 | 24.68 | A |
| | | | | | 5 | 35.88 | 33.09 | 0.00 | L 65.4 | 24.97 | A |
| | | | | | 4 | -162.08 | 47.74 | 0.00 | R 64.2 | 24.65 | A |
| | | | | | 4 | -31.38 | -17.66 | 0.00 | L 19.4 | 24.75 | A |
| | | | | | 4 | -136.07 | -4.28 | 0.00 | R 35.3 | 22.61 | A |
| F2 | Football | 46.00 | 87.00 | 50.00 | 5 | -60.20 | 29.90 | 0.00 | R 66.1 | 22.85 | A |
| | | | | | 3 | 173.64 | 67.22 | 0.00 | L 75.9 | 21.45 | A |
| | | | | | 4 | 33.49 | -13.95 | 0.00 | R 10.9 | 25.93 | A |
| | | | | | 4 | 151.00 | 37.75 | 0.00 | L 59.5 | 23.30 | A |
| | | | | | 4 | 126.78 | 1.20 | 0.00 | L 38.4 | 22.64 | A |
| F3 | Football | 166.00 | -93.00 | 50.00 | 3 | 176.03 | 46.60 | 0.00 | L 2.3 | 19.35 | A |
| | | | | | 4 | 52.23 | -59.40 | 0.00 | L 78.5 | 23.04 | A |
| | | | | | 4 | 139.57 | 31.06 | 0.00 | L 17.6 | 21.14 | A |
| | | | | | 4 | 82.79 | -0.32 | 0.00 | L 46.7 | 21.66 | A |
| F4 | Football | 0.00 | -101.00 | 50.00 | 4 | 121.20 | -43.85 | 0.00 | R 59.2 | 21.03 | A |
| | | | | | 5 | -89.70 | -28.31 | 0.00 | L 55.2 | 24.11 | A |
| | | | | | 4 | 71.76 | 2.79 | 0.00 | R 29.3 | 21.89 | A |
| | | | | | 4 | -11.56 | 12.36 | 0.00 | L 10.3 | 23.95 | A |
| F5 | Football | -117.00 | -102.00 | 50.00 | 5 | -8.07 | -49.04 | 0.00 | R 68.5 | 22.77 | A |
| | | | | | 5 | -182.61 | -46.94 | 0.00 | L 43.0 | 30.81 | A |
| | | | | | 4 | -55.29 | 10.44 | 0.00 | R 33.0 | 21.16 | A |
| | | | | | 4 | -168.09 | 5.22 | 0.00 | L 19.5 | 22.63 | A |
| | | | | | 4 | -123.57 | 17.23 | 0.00 | R 1.9 | 22.39 | A |


GUARANTEED PERFORMANCE

# AIMING SUMMARY

Pole-Mounted Luminaires

**George Mira Football-Key West Retrofit**
Key West,FL

| Zone Description | Groups |
|---|---|
| Zone1 | A |

By: Joel Stout

File #: 141847R1 Date: 25-May-11

| Pole ID | Dimensioned From | Pole Location | | Light Bank Mounting Height | Reflector NEMA Type | Aiming Point | | | Aiming Angle | | Group |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | X | Y | | | X | Y | Z | HOR | VER | |
| A1 | Girls Softball | -33.00 | 10.00 | 45.00 | 6 | 24.60 | -27.42 | 0.00 | R 83.2 | 33.53 | A |
| | | | | | 5 | 2.03 | 84.03 | 0.00 | L 13.2 | 28.55 | A |
| | | | | | 5 | 53.10 | 66.26 | 0.00 | R 16.9 | 23.26 | A |
| A2 | Girls Softball | 1.00 | -37.00 | 45.00 | 5 | 83.85 | 7.57 | 0.00 | R 10.4 | 25.28 | A |
| | | | | | 5 | -4.18 | 62.59 | 0.00 | L 52.4 | 24.26 | A |
| | | | | | 5 | 67.20 | 45.10 | 0.00 | L 11.2 | 22.74 | A |
| B1 | Girls Softball | -3.00 | 87.00 | 45.00 | 5 | 80.75 | 58.08 | 0.00 | R 22.8 | 26.76 | A |
| | | | | | 5 | 7.10 | 177.99 | 0.00 | L 78.7 | 26.24 | A |
| | | | | | 5 | 78.64 | 149.44 | 0.00 | L 32.6 | 23.26 | A |
| B2 | Girls Softball | 94.00 | -22.00 | 45.00 | 5 | 176.96 | 10.67 | 0.00 | R 78.5 | 26.86 | A |
| | | | | | 5 | 47.45 | 56.95 | 0.00 | L 19.3 | 25.95 | A |
| | | | | | 5 | 134.92 | 64.28 | 0.00 | R 35.5 | 24.83 | A |
| C1 | Girls Softball | 83.00 | 182.00 | 45.00 | 5 | 7.10 | 178.51 | 0.00 | R 57.2 | 30.48 | A |
| | | | | | 5 | 102.91 | 100.26 | 0.00 | L 43.4 | 27.93 | A |
| C2 | Girls Softball | 152.00 | 128.00 | 45.00 | 5 | 79.92 | 76.62 | 0.00 | R 1.8 | 26.57 | A |
| | | | | | 4 | 170.76 | 27.04 | 0.00 | L 62.5 | 23.44 | A |


GUARANTEED PERFORMANCE

# AIMING SUMMARY

Pole-Mounted Luminaires

**Rosa Hernandez Softball-Key West Retrofit**
Key West,FL

| Zone Description | Groups |
|---|---|
| Zone1 | A |

By: Joel Stout

File #: 141845R1 Date: 25-May-11

| Pole ID | Dimensioned From | Pole Location | | Light Bank Mounting Height | Reflector NEMA Type | Aiming Point | | | Aiming Angle | | Group |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | X | Y | | | X | Y | Z | HOR | VER | |
| A1 | Multi Purpose | -23.00 | 5.00 | 60.00 | 6 | 18.03 | -23.53 | 0.00 | R 33.0 | 50.69 | A |
| | | | | | 5 | 6.98 | 78.76 | 0.00 | L 67.6 | 37.34 | A |
| | | | | | 5 | 62.24 | 62.29 | 0.00 | L 34.1 | 29.97 | A |
| A2 | Multi Purpose | 15.00 | -25.00 | 60.00 | 5 | 80.34 | 4.87 | 0.00 | R 65.0 | 40.29 | A |
| | | | | | 6 | -26.15 | 5.13 | 0.00 | L 52.7 | 50.35 | A |
| | | | | | 5 | 54.65 | 65.88 | 0.00 | R 23.7 | 30.87 | A |
| B1 | Multi Purpose | -18.00 | 140.00 | 60.00 | 5 | 20.92 | 52.99 | 0.00 | R 65.3 | 32.66 | A |
| | | | | | 5 | 35.91 | 193.93 | 0.00 | L 43.4 | 38.74 | A |
| | | | | | 4 | 84.29 | 85.07 | 0.00 | R 27.9 | 27.13 | A |
| | | | | | 4 | 102.43 | 183.41 | 0.00 | L 19.4 | 24.89 | A |
| B2 | Multi Purpose | 130.00 | -15.00 | 60.00 | 5 | 194.46 | 62.72 | 0.00 | R 38.9 | 30.75 | A |
| | | | | | 5 | 48.00 | 42.21 | 0.00 | L 54.6 | 31.09 | A |
| | | | | | 4 | 84.81 | 97.69 | 0.00 | L 21.9 | 26.00 | A |
| C1 | Multi Purpose | 208.00 | 140.00 | 60.00 | 5 | 157.91 | 203.13 | 0.00 | R 50.8 | 36.92 | A |
| | | | | | 5 | 98.22 | 114.26 | 0.00 | L 12.1 | 27.83 | A |
| | | | | | 4 | 86.39 | 184.99 | 0.00 | R 20.4 | 24.54 | A |
| C2 | Multi Purpose | 210.00 | 45.00 | 60.00 | 5 | 153.44 | 135.55 | 0.00 | R 57.6 | 29.43 | A |
| | | | | | 5 | 147.13 | -7.49 | 0.00 | L 38.9 | 36.38 | A |
| | | | | | 4 | 89.02 | 87.17 | 0.00 | R 19.3 | 24.81 | A |


GUARANTEED PERFORMANCE

# AIMING SUMMARY

Pole-Mounted Luminaires

**Pepe Hernandez Park EECBG Key West**

Key West,FL

| Zone Description | Groups |
|---|---|
| Zone1 | A |

By: Joel Stout

File #: 150167R1 Date: 25-May-11

| Pole ID | Dimensioned From | Pole Location | | Light Bank Mounting Height | Reflector NEMA Type | Aiming Point | | | Aiming Angle | | Group |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | X | Y | | | X | Y | Z | HOR | VER | |
| P1 | Basketball | -31.83 | 33.01 | 50.00 | 5 | 20.89 | 122.18 | 0.00 | R 30.2 | 25.53 | A |
| | | | | | 5 | -61.31 | 120.45 | 0.00 | L 18.1 | 28.18 | A |
| | | | | | 6 | -45.60 | -20.38 | 0.00 | R 13.5 | 42.02 | A |
| | | | | | 5 | 32.95 | -20.17 | 0.00 | L 50.4 | 30.67 | A |
| P2 | Playground Area | -18.17 | 136.99 | 50.00 | 5 | 21.47 | 50.02 | 0.00 | L 24.6 | 27.25 | A |
| | | | | | 4 | 62.41 | 230.71 | 0.00 | R 40.4 | 21.80 | A |
| | | | | | 4 | 10.17 | 236.39 | 0.00 | R 16.6 | 25.40 | A |
| P3 | Playground Area | 107.00 | 171.00 | 50.00 | 4 | 9.11 | 133.33 | 0.00 | R 69.0 | 25.30 | A |
| | | | | | 4 | 81.96 | 76.12 | 0.00 | R 15.5 | 26.58 | A |
| P4 | Basketball | 35.00 | 36.01 | 50.00 | 5 | -31.92 | -20.02 | 0.00 | R 49.3 | 29.89 | A |
| | | | | | 5 | 81.91 | -15.30 | 0.00 | L 41.3 | 35.92 | A |
| | | | | | 6 | 45.43 | -18.98 | 0.00 | L 10.8 | 41.45 | A |
| | | | | | 5 | 73.11 | 102.45 | 0.00 | R 29.3 | 32.95 | A |
| | | | | | 5 | -8.21 | 121.59 | 0.00 | L 26.3 | 27.30 | A |

GREEN GENERATION LIGHTING™

GUARANTEED PERFORMANCE

# AIMING SUMMARY

Pole-Mounted Luminaires

**Nelson English Park EECBG Key West Retro Fit**
Key West,FL

| Zone Description | Groups |
|---|---|
| Zone1 | A |

By: Joel Stout

File #: 146480R1 Date: 25-May-11

# Tab F

# Jobs Created or Retained

**Key West Retrofit**
Clayton Sterling Complex
City of Key West
5/26/2011

## Lighting Design, Manufacturing, and Installation Jobs

| Temporary Full-time Equivalent Jobs | 1.7 |
|---|---|

**Select job period:** For one year

## Owner Facility Operation/Management Jobs

| Annual Full-time Equivalent Jobs | 0.0 |
|---|---|

### Project Specifics

| | | | |
|---|---|---|---|
| **Number of fixtures:** | 81 | **Number of fields:** | 4 |
| **Number of poles:** | 21 | **Type of installation:** | Retrofit |

### Calculation Assumptions

**Lighting specifier design hours** — **80**
- First field: 20
- Additional fields (per field): 20

**Lighting contractor installation hours** — **840**
Includes truck unloading, electrical design and installation, lighting system assembly and installation

**Lighting manufacturer hours** — **2673**
Includes system aiming design, component fabrication, manufacturing, transportation, administration, warranty, and Control-Link Central.

**Owner facility operation/mgmt hours** — **0**
Owner annual hours to operate facility and/or manage programs

*Default design and installation hours were provided by specifiers and contractors for prior Musco lighting projects. Defaults may be overridden with project-specific hours in the assumptions section. Owner facility operation/management hours are optional and include all non-Musco hours used to operate and manage the facility on an annual basis.*



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# Jobs Created or Retained

**Key West Retrofit**
Dewitt Roberts Softball
City of Key West
5/26/2011

## Lighting Design, Manufacturing, and Installation Jobs

| Temporary Full-time Equivalent Jobs | 0.6 |
|---|---|

**Select job period:** For one year

## Owner Facility Operation/Management Jobs

| Annual Full-time Equivalent Jobs | 0.0 |
|---|---|

### Project Specifics

| | | | |
|---|---|---|---|
| **Number of fixtures:** | 28 | **Number of fields:** | 1 |
| **Number of poles:** | 6 | **Type of installation:** | Retrofit |

### Calculation Assumptions

**Lighting specifier design hours** — **20**
- First field: 20
- Additional fields (per field): 20

**Lighting contractor installation hours** — **240**
Includes truck unloading, electrical design and installation, lighting system assembly and installation

**Lighting manufacturer hours** — **924**
Includes system aiming design, component fabrication, manufacturing, transportation, administration, warranty, and Control-Link Central.

**Owner facility operation/mgmt hours** — **0**
Owner annual hours to operate facility and/or manage programs

*Default design and installation hours were provided by specifiers and contractors for prior Musco lighting projects. Defaults may be overridden with project-specific hours in the assumptions section. Owner facility operation/management hours are optional and include all non-Musco hours used to operate and manage the facility on an annual basis.*



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# Jobs Created or Retained

**Key West Retrofit**
George Mira Football
City of Key West
5/26/2011

## Lighting Design, Manufacturing, and Installation Jobs

| Temporary Full-time Equivalent Jobs | 0.5 |
|---|---|

**Select job period:** For one year

## Owner Facility Operation/Management Jobs

| Annual Full-time Equivalent Jobs | 0.0 |
|---|---|

### Project Specifics

| | | | |
|---|---|---|---|
| **Number of fixtures:** | 23 | **Number of fields:** | 1 |
| **Number of poles:** | 5 | **Type of installation:** | Retrofit |

### Calculation Assumptions

**Lighting specifier design hours** — **20**
- First field: 20
- Additional fields (per field): 20

**Lighting contractor installation hours** — **200**
Includes truck unloading, electrical design and installation, lighting system assembly and installation

**Lighting manufacturer hours** — **759**
Includes system aiming design, component fabrication, manufacturing, transportation, administration, warranty, and Control-Link Central.

**Owner facility operation/mgmt hours** — **0**
Owner annual hours to operate facility and/or manage programs

*Default design and installation hours were provided by specifiers and contractors for prior Musco lighting projects. Defaults may be overridden with project-specific hours in the assumptions section. Owner facility operation/management hours are optional and include all non-Musco hours used to operate and manage the facility on an annual basis.*



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# Jobs Created or Retained

**Key West Retrofit**
Rosa Hernandez Softball
City of Key West
5/26/2011

## Lighting Design, Manufacturing, and Installation Jobs

| Temporary Full-time Equivalent Jobs | 0.4 |
|---|---|

**Select job period:** For one year

## Owner Facility Operation/Management Jobs

| Annual Full-time Equivalent Jobs | 0.0 |
|---|---|

### Project Specifics

| | | | |
|---|---|---|---|
| **Number of fixtures:** | 16 | **Number of fields:** | 1 |
| **Number of poles:** | 6 | **Type of installation:** | Retrofit |

### Calculation Assumptions

**Lighting specifier design hours** — **20**
- First field: 20
- Additional fields (per field): 20

**Lighting contractor installation hours** — **240**
Includes truck unloading, electrical design and installation, lighting system assembly and installation

**Lighting manufacturer hours** — **528**
Includes system aiming design, component fabrication, manufacturing, transportation, administration, warranty, and Control-Link Central.

**Owner facility operation/mgmt hours** — **0**
Owner annual hours to operate facility and/or manage programs

*Default design and installation hours were provided by specifiers and contractors for prior Musco lighting projects. Defaults may be overridden with project-specific hours in the assumptions section. Owner facility operation/management hours are optional and include all non-Musco hours used to operate and manage the facility on an annual basis.*



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# Jobs Created or Retained

**Key West Retrofit**
Pepe Hernandez Park
City of Key West
5/26/2011

## Lighting Design, Manufacturing, and Installation Jobs

| Temporary Full-time Equivalent Jobs | 0.6 |
|---|---|

**Select job period:** For one year

## Owner Facility Operation/Management Jobs

| Annual Full-time Equivalent Jobs | 0.0 |
|---|---|

## Project Specifics

| | | | |
|---|---|---|---|
| **Number of fixtures:** | 19 | **Number of fields:** | 1 |
| **Number of poles:** | 6 | **Type of installation:** | New |

## Calculation Assumptions

**Lighting specifier design hours** — **48**
- First field: 48
- Additional fields (per field): 24

**Lighting contractor installation hours** — **480**
Includes truck unloading, electrical design and installation, lighting system assembly and installation

**Lighting manufacturer hours** — **627**
Includes system aiming design, component fabrication, manufacturing, transportation, administration, warranty, and Control-Link Central.

**Owner facility operation/mgmt hours** — **0**
Owner annual hours to operate facility and/or manage programs

*Default design and installation hours were provided by specifiers and contractors for prior Musco lighting projects. Defaults may be overridden with project-specific hours in the assumptions section. Owner facility operation/management hours are optional and include all non-Musco hours used to operate and manage the facility on an annual basis.*



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# Jobs Created or Retained

**Key West Retrofit**
Nelson English Park
City of Key West
5/26/2011

## Lighting Design, Manufacturing, and Installation Jobs

| Temporary Full-time Equivalent Jobs | 0.4 |
|---|---|

**Select job period:** For one year

## Owner Facility Operation/Management Jobs

| Annual Full-time Equivalent Jobs | 0.0 |
|---|---|

## Project Specifics

| | | | |
|---|---|---|---|
| **Number of fixtures:** | 14 | **Number of fields:** | 2 |
| **Number of poles:** | 4 | **Type of installation:** | New |

## Calculation Assumptions

**Lighting specifier design hours** — **72**
- First field: 48
- Additional fields (per field): 24

**Lighting contractor installation hours** — **320**
Includes truck unloading, electrical design and installation, lighting system assembly and installation

**Lighting manufacturer hours** — **462**
Includes system aiming design, component fabrication, manufacturing, transportation, administration, warranty, and Control-Link Central.

**Owner facility operation/mgmt hours** — **0**
Owner annual hours to operate facility and/or manage programs

*Default design and installation hours were provided by specifiers and contractors for prior Musco lighting projects. Defaults may be overridden with project-specific hours in the assumptions section. Owner facility operation/management hours are optional and include all non-Musco hours used to operate and manage the facility on an annual basis.*



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# 10-Year Life Cycle Cost

## Clayton Sterling Complex - Key West Retrofit

Prepared for: City of Key West, FL
5/26/2011

| | Existing | Light·Structure GREEN™ | Your Savings |
|---|---|---|---|
| **Total MWh** | **908.82** | **633.42** | **275.40** |
| **Metric Tons of $CO_2$** | **652.53** | **454.80** | **197.74** |
| **Million Source Btu Saved** | **3101.0** | **2161.3** | **939.70** |
| **Energy** | **$165,240** | **$126,684** | **$38,556** |
| Group Relamp | $23,750 | $0 | $23,750 |
| Lamp Maintenance | $1,500 | $0 | $1,500 |
| Controls - Energy | $16,524 | $0 | $16,524 |
| Controls - Labor | $0 | $0 | $0 |
| **10-Year Life Cycle Cost** | **$207,014** | **$126,684** | **$80,330** |

### Assumptions

**Customer Provided Energy Data:**

| | |
|---|---|
| *Energy Cost per kWh | $0.200 |
| Annual Operating Hours | 500 |
| Green Generation Lighting® Fixture Qty. | 81 |
| Average kW demand per fixture | 1.564 |
| Useful lamp life (Hours) | **5,000** |
| Typical Floodlighting Fixture Qty. | 102 |
| Average kW demand per fixture | 1.62 |
| Rated Life (Hours) | 3,000 |
| Useful lamp life (Hours) | **1,200** |

**Controls Information:**

| | |
|---|---|
| Controls Energy Savings | 10% |
| Labor Rate per Hour | $0.00 |
| # On/Off Cycles per Year | 0 |
| Labor Hours per Cycle | 0 |

**Lamp Maintenance Data:**

| | |
|---|---|
| Lamp replacement cost including parts, equipment & labor | $125 |

| | |
|---|---|
| **Annual Energy Savings =** | **$5,508** |
| Average Annual Savings = | $8,033.00 |

**NOTE:**
*Life cycle costs are based upon the assumptions given above. Any variation in this data will change the life cycle cost proportionately.*

*Carbon dioxide ($CO_2$) is emitted by the power plant when generating the total kWh used by the lighting system. Generating one kWh of electricity in the United States emits an average of 1.583 lbs of $CO_2$. One metric ton equals 2,204.6 lbs.*

*Source for $CO_2$ calculations: http://www.epa.gov/cleanenergy/energy-resources/refs.html (4-15-09)*



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# 10-Year Life Cycle Cost

## DeWitt Roberts Softball - Key West Retrofit

Softball

Prepared for: City of Key West, FL

5/26/2011

| | Existing | Light·Structure GREEN™ | Your Savings |
|---|---|---|---|
| **Total MWh** | **231.66** | **218.96** | **12.70** |
| **Metric Tons of $CO_2$** | **166.33** | **157.21** | **9.12** |
| **Million Source Btu Saved** | **790.5** | **747.1** | **43.33** |
| **Energy** | **$42,120** | **$43,792** | **-$1,672** |
| Group Relamp | $13,542 | $0 | $13,542 |
| Lamp Maintenance | $10,000 | $0 | $10,000 |
| Controls - Energy | $4,212 | $0 | $4,212 |
| Controls - Labor | $0 | $0 | $0 |
| **10-Year Life Cycle Cost** | **$69,874** | **$43,792** | **$26,082** |

### Assumptions

**Customer Provided Energy Data:**

| | |
|---|---|
| *Energy Cost per kWh | $0.200 |
| Annual Operating Hours | 500 |

**Technology Specific Data:**

| | |
|---|---|
| Green Generation Lighting® Fixture Qty. | 28 |
| Average kW demand per fixture | 1.564 |
| Useful lamp life (Hours) | **5,000** |
| Typical Floodlighting Fixture Qty. | 26 |
| Average kW demand per fixture | 1.62 |
| Rated Life (Hours) | 3,000 |
| Useful lamp life (Hours) | **1,200** |

**Controls Information:**

| | |
|---|---|
| Controls Energy Savings | 10% |
| Labor Rate per Hour | $0.00 |
| # On/Off Cycles per Year | 0 |
| Labor Hours per Cycle | 0 |

**Lamp Maintenance Data:**

| | |
|---|---|
| Lamp replacement cost including parts, equipment & labor | $125 |

| | |
|---|---|
| **Annual Energy Savings =** | **$254** |
| Average Annual Savings = | $2,608.20 |

**NOTE:**

*Life cycle costs are based upon the assumptions given above. Any variation in this data will change the life cycle cost proportionately.*

*Carbon dioxide ($CO_2$) is emitted by the power plant when generating the total kWh used by the lighting system. Generating one kWh of electricity in the United States emits an average of 1.583 lbs of $CO_2$. One metric ton equals 2,204.6 lbs.*

*Source for $CO_2$ calculations: http://www.epa.gov/cleanenergy/energy-resources/refs.html (4-15-09)*



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# 10-Year Life Cycle Cost

## George Mira Football - Key West Retrofit

Prepared for: City of Key West, FL
5/26/2011

| | Existing | Light·Structure GREEN™ | Your Savings |
|---|---|---|---|
| **Total MWh** | **267.30** | **179.86** | **87.44** |
| **Metric Tons of $CO_2$** | **191.92** | **129.14** | **62.78** |
| **Million Source Btu Saved** | **912.1** | **613.7** | **298.36** |
| **Energy** | **$48,600** | **$35,972** | **$12,628** |
| Group Relamp | $23,750 | $0 | $23,750 |
| Lamp Maintenance | $1,500 | $0 | $1,500 |
| Controls - Energy | $4,860 | $0 | $4,860 |
| Controls - Labor | $0 | $0 | $0 |
| **10-Year Life Cycle Cost** | **$78,710** | **$35,972** | **$42,738** |

### Assumptions

**Customer Provided Energy Data:**

| | |
|---|---|
| *Energy Cost per kWh | $0.200 |
| Annual Operating Hours | 500 |

**Technology Specific Data:**

| | |
|---|---|
| Green Generation Lighting® Fixture Qty. | 23 |
| Average kW demand per fixture | 1.564 |
| Useful lamp life (Hours) | **5,000** |
| Typical Floodlighting Fixture Qty. | 30 |
| Average kW demand per fixture | 1.62 |
| Rated Life (Hours) | 3,000 |
| Useful lamp life (Hours) | **1,200** |

**Controls Information:**

| | |
|---|---|
| Controls Energy Savings | 10% |
| Labor Rate per Hour | $0.00 |
| # On/Off Cycles per Year | 0 |
| Labor Hours per Cycle | 0 |

**Lamp Maintenance Data:**

| | |
|---|---|
| Lamp replacement cost including parts, equipment & labor | $125 |

| | |
|---|---|
| **Annual Energy Savings =** | **$1,749** |
| Average Annual Savings = | $4,273.80 |

**NOTE:**
*Life cycle costs are based upon the assumptions given above. Any variation in this data will change the life cycle cost proportionately.*

*Carbon dioxide ($CO_2$) is emitted by the power plant when generating the total kWh used by the lighting system. Generating one kWh of electricity in the United States emits an average of 1.583 lbs of $CO_2$. One metric ton equals 2,204.6 lbs.*

*Source for $CO_2$ calculations: http://www.epa.gov/cleanenergy/energy-resources/refs.html (4-15-09)*

# 10-Year Life Cycle Cost

## Rosa Hernandez Softball - Key West Retrofit

Softball

Prepared for: City of Key West, FL

5/26/2011

| | Existing | Light·Structure GREEN™ | Your Savings |
|---|---|---|---|
| **Total MWh** | **178.20** | **125.12** | **53.08** |
| **Metric Tons of $CO_2$** | **127.95** | **89.84** | **38.11** |
| **Million Source Btu Saved** | **608.0** | **426.9** | **181.12** |
| **Energy** | **$32,400** | **$25,024** | **$7,376** |
| Group Relamp | $5,417 | $0 | $5,417 |
| Lamp Maintenance | $1,500 | $0 | $1,500 |
| Controls - Energy | $3,240 | $0 | $3,240 |
| Controls - Labor | $0 | $0 | $0 |
| **10-Year Life Cycle Cost** | **$42,557** | **$25,024** | **$17,533** |

### Assumptions

**Customer Provided Energy Data:**

| | |
|---|---|
| *Energy Cost per kWh | $0.200 |
| Annual Operating Hours | 500 |

**Technology Specific Data:**

| | |
|---|---|
| Green Generation Lighting® Fixture Qty. | 16 |
| Average kW demand per fixture | 1.564 |
| Useful lamp life (Hours) | **5,000** |
| Typical Floodlighting Fixture Qty. | 20 |
| Average kW demand per fixture | 1.62 |
| Rated Life (Hours) | 3,000 |
| Useful lamp life (Hours) | **1,200** |

**Controls Information:**

| | |
|---|---|
| Controls Energy Savings | 10% |
| Labor Rate per Hour | $0.00 |
| # On/Off Cycles per Year | 0 |
| Labor Hours per Cycle | 0 |

**Lamp Maintenance Data:**

| | |
|---|---|
| Lamp replacement cost including parts, equipment & labor | $125 |

| | |
|---|---|
| **Annual Energy Savings =** | **$1,062** |
| Average Annual Savings = | $1,753.30 |

**NOTE:**

*Life cycle costs are based upon the assumptions given above. Any variation in this data will change the life cycle cost proportionately.*

*Carbon dioxide ($CO_2$) is emitted by the power plant when generating the total kWh used by the lighting system. Generating one kWh of electricity in the United States emits an average of 1.583 lbs of $CO_2$. One metric ton equals 2,204.6 lbs.*

*Source for $CO_2$ calculations: http://www.epa.gov/cleanenergy/energy-resources/refs.html (4-15-09)*



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# 10-Year Life Cycle Cost

## Pepe Hernandez Park - Key West Retrofit

Prepared for: City of Key West, FL
5/26/2011

| | Existing | Light·Structure GREEN™ | Your Savings |
|---|---|---|---|
| **Total MWh** | **160.38** | **148.58** | **11.80** |
| **Metric Tons of $CO_2$** | **115.15** | **106.68** | **8.47** |
| **Million Source Btu Saved** | **547.2** | **507.0** | **40.26** |
| **Energy** | **$29,160** | **$29,716** | **-$556** |
| Group Relamp | $5,417 | $0 | $5,417 |
| Lamp Maintenance | $1,500 | $0 | $1,500 |
| Controls - Energy | $2,916 | $0 | $2,916 |
| Controls - Labor | $0 | $0 | $0 |
| **10-Year Life Cycle Cost** | **$38,993** | **$29,716** | **$9,277** |

### Assumptions

**Customer Provided Energy Data:**

| | |
|---|---|
| *Energy Cost per kWh | $0.200 |
| Annual Operating Hours | 500 |

**Technology Specific Data:**

| | |
|---|---|
| Green Generation Lighting® Fixture Qty. | 19 |
| Average kW demand per fixture | 1.564 |
| Useful lamp life (Hours) | **5,000** |
| Typical Floodlighting Fixture Qty. | 18 |
| Average kW demand per fixture | 1.62 |
| Rated Life (Hours) | 3,000 |
| Useful lamp life (Hours) | **1,200** |

**Controls Information:**

| | |
|---|---|
| Controls Energy Savings | 10% |
| Labor Rate per Hour | $0.00 |
| # On/Off Cycles per Year | 0 |
| Labor Hours per Cycle | 0 |

**Lamp Maintenance Data:**

| | |
|---|---|
| Lamp replacement cost including parts, equipment & labor | $125 |

| | |
|---|---|
| **Annual Energy Savings =** | **$236** |
| Average Annual Savings = | $927.70 |

**NOTE:**
*Life cycle costs are based upon the assumptions given above. Any variation in this data will change the life cycle cost proportionately.*

*Carbon dioxide ($CO_2$) is emitted by the power plant when generating the total kWh used by the lighting system. Generating one kWh of electricity in the United States emits an average of 1.583 lbs of $CO_2$. One metric ton equals 2,204.6 lbs.*

*Source for $CO_2$ calculations: http://www.epa.gov/cleanenergy/energy-resources/refs.html (4-15-09)*

# 10-Year Life Cycle Cost

## Nelson English Park - Key West Retrofit

Prepared for: City of Key West, FL
5/26/2011

| | Existing | Light·Structure GREEN™ | Your Savings |
|---|---|---|---|
| **Total MWh** | **105.93** | **78.40** | **27.53** |
| **Metric Tons of $CO_2$** | **76.06** | **56.29** | **19.77** |
| **Million Source Btu Saved** | **361.4** | **267.5** | **93.94** |
| **Energy** | **$19,260** | **$15,680** | **$3,580** |
| Group Relamp | $5,417 | $0 | $5,417 |
| Lamp Maintenance | $1,500 | $0 | $1,500 |
| Controls - Energy | $1,926 | $0 | $1,926 |
| Controls - Labor | $0 | $0 | $0 |
| **10-Year Life Cycle Cost** | **$28,103** | **$15,680** | **$12,423** |

### Assumptions

**Customer Provided Energy Data:**

| | |
|---|---|
| *Energy Cost per kWh | $0.200 |
| Annual Operating Hours | 500 |

**Technology Specific Data:**

| | |
|---|---|
| Green Generation Lighting® Fixture Qty. | 14 |
| Average kW demand per fixture | 1.12 |
| Useful lamp life (Hours) | **12,000** |
| Typical Floodlighting Fixture Qty. | 18 |
| Average kW demand per fixture | 1.07 |
| Rated Life (Hours) | 10,000 |
| Useful lamp life (Hours) | **1,200** |

**Controls Information:**

| | |
|---|---|
| Controls Energy Savings | 10% |
| Labor Rate per Hour | $0.00 |
| # On/Off Cycles per Year | 0 |
| Labor Hours per Cycle | 0 |

**Lamp Maintenance Data:**

| | |
|---|---|
| Lamp replacement cost including parts, equipment & labor | $125 |

| | |
|---|---|
| **Annual Energy Savings =** | **$551** |
| Average Annual Savings = | $1,242.30 |

**NOTE:**
*Life cycle costs are based upon the assumptions given above. Any variation in this data will change the life cycle cost proportionately.*

*Carbon dioxide ($CO_2$) is emitted by the power plant when generating the total kWh used by the lighting system. Generating one kWh of electricity in the United States emits an average of 1.583 lbs of $CO_2$. One metric ton equals 2,204.6 lbs.*

*Source for $CO_2$ calculations: http://www.epa.gov/cleanenergy/energy-resources/refs.html (4-15-09)*



musco Lighting
We Make It Happen.

100 1st Ave West · PO Box 808 · Oskaloosa, IA 52577 · 641/673-0411 · 800/825-6020 · Fax: 641/673-4740 · Web: www.musco.com · Email: lighting@musco.com

June 4, 2009

To whom it may concern:

Musco Sports Lighting's products sold in the United States are manufactured in the United States and meet the requirements of the "Buy American" provisions of the ARRA.

Sincerely,

Doug Yates
Vice President, Operations

# Tab G

# Control-Link Central™

City of Key West Retrofit
Ball Field Lighting Project
Key West, FL

Control-Link Central™ has trained staff available 24/7

## Contact Information:

**Internet** - www.control-link.com

**Fax -** 800-853-8847

**Phone** - 877-347-3319

**Email** - schedule@musco.com

# Control System Summary

## Project Specific Notes:

## Project Information

| | |
|---|---|
| Project #: | 141839 |
| Project Name: | Clayton Sterling Complex-Key West Retrof |
| Date: | 01/14/11 |
| Project Engineer: | Joel Stout |
| Sales Representative: | Lewis Gilbert Jr. |
| Control System Type: | Control and Monitoring |
| Communication Type: | Digital Cellular |
| Scan: | 141839R1 |
| Distribution Panel Location or ID: | Clayton Sterling |
| Total # of Distribution Panel Locations for Project: | 1 |
| Design Voltage/Hertz/Phase: | 480/60/3 |
| Control Voltage: | 120 |

## Equipment Listing

| DESCRIPTION | APPROXIMATE SIZE |
|---|---|
| 1.Control and Monitoring Cabinet | 24 X 72 |

| | QTY | SIZE |
|---|---|---|
| Total Contactors | 9 | 30 AMP |
| Total Contactors | 2 | 60 AMP |
| Total Off/On/Auto Switches: | 7 | |



## Materials Checklist

### Contractor/Customer Supplied:

- ❑ A single control circuit must be supplied per distribution panel location.
  - — If the control voltage is NOT available, a control transformer is required.
- ❑ Electrical distribution panel to provide overcurrent protection for lighting circuits
  - — Thermal/Magnetic circuit breaker sized per full load amps on Circuit Summary by Zone chart
- ❑ Wiring:
  - — Dedicated control power circuit
  - — Power circuit to and from lighting contactors
  - — Monitoring circuit from surge protection device to Control and Monitoring cabinet 1
  - — Harnesses for cabinets at remote locations
  - — Means of grounding, including lightning ground protection
- ❑ Electrical conduit wireway system
  - — Entrance hubs rated NEMA 4: must be die-cast zinc, PVC, or copper-free die-cast aluminum
- ❑ Mounting hardware for cabinets
- ❑ Control circuit lock-on device to prevent unauthorized power interruption to control power
- ❑ Anti-corrosion compound to apply to ends of wire, if necessary

*Call* Control-Link Central ™ *operations center at 877/347-3319 to schedule activation of the control system upon completion of the installation. Note: Activation may take up to 1 1/2 hours*

### IMPORTANT NOTES

1. Please confirm that the design voltage listed above is accurate for this facility. Design voltage/phase is defined as the voltage/phase being connected and utilized at each lighting pole's ballast enclosure disconnect. Inaccurate design voltage/phase can result in additional costs and delays. Contact your Musco sales representative to confirm this item.
2. In a 3 phase design, all 3 phases are to be run to each pole. When a 3 phase design is used Musco's single phase luminaries come pre-wired to utilize all 3 phases across the entire facility.
3. One contactor is required for each pole. When a pole has multiple circuits, one contactor is required for each circuit. All contactors are UL 100% rated for the published continuous load. All contactors are 3 pole.
4. If the lighting system will be fed from more than one distribution location, additional equipment may be required. Contact your Musco sales representative.
5. A single control circuit must be supplied per control system.
6. Size overcurrent devices using the full load amps column of the Circuit Summary By Zone chart- Minimum power factor of 0.9.

***NOTE:*** *Refer to Installation Instructions for more details on equipment information and the installation requirements*

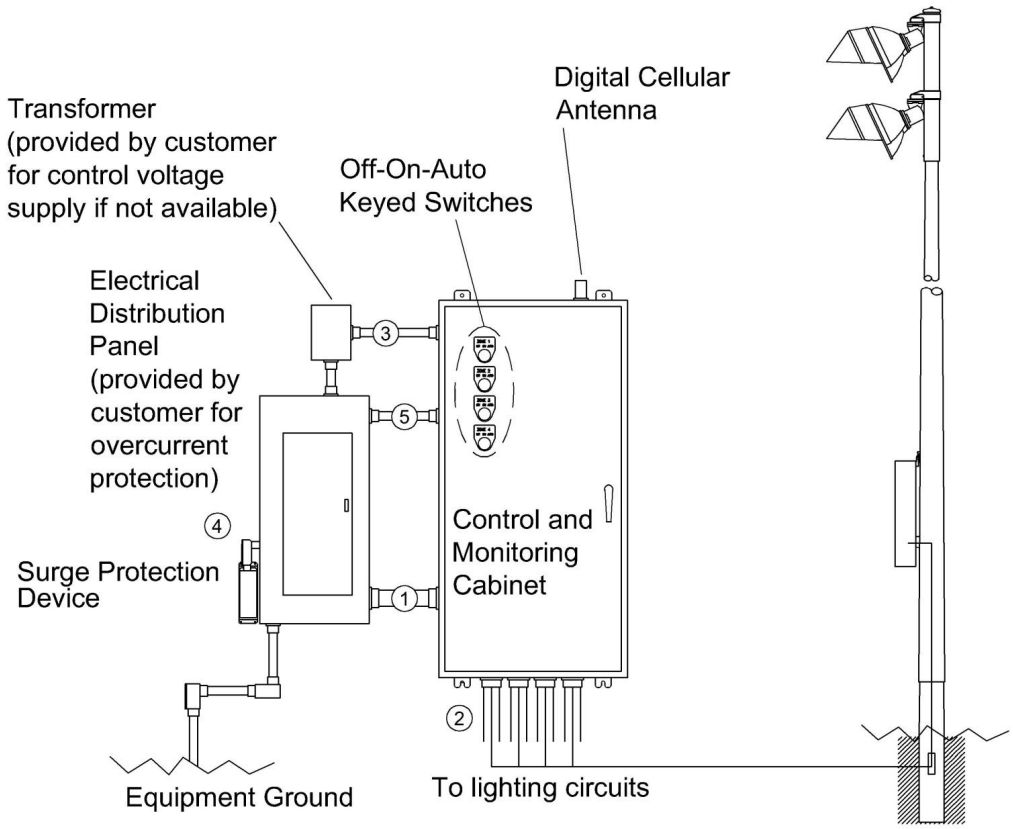
Form: T-5030-1

# Control System Summary



## Control•Link.
## Control and Monitoring System - Digital Cellular

(Quantity of equipment may differ from what is shown below)




| WIRE | DESCRIPTION | # OF WIRES | TYP. WIRE SIZE (AWG) | MAX. WIRE LENGTH (FT) | WIRE FROM MUSCO | NOTES |
|---|---|---|---|---|---|---|
| 1 | LINE POWER & GROUND TO CONTACTORS (AS REQUIRED) | NOTE A | NOTE B | N/A | NO | A–D |
| 2 | LOAD POWER TO LIGHTING CIRCUITS (AS REQUIRED) | NOTE A | NOTE B | N/A | NO | A–D |
| 3 | CONTROL POWER (DEDICATED, 20A) | 3 | 12 | N/A | NO | C, D |
| 4 | SURGE PROTECTION DEVICE TO DISTRIBUTION PANEL | -- | -- | N/A | YES | D |
| 5 | SURGE PROTECTION DEVICE MONITORING | 2 | 14 | N/A | NO | D |

R60–25–00

Notes:
A. Voltage and phasing per the notes on cover page
B. Calculate per load and voltage drop
C. All conduit diameters per code.
D. Refer to Control and Monitoring System Installation Instructions for more details on equipment information and the installation requirements.

**IMPORTANT:** Control (wire # 3) and monitoring (wire #5) wiring must each be in separate conduits from any AC power wiring.

# Control System Summary




Form: T-5030-1

## SWITCHING SCHEDULE

| Field Type | Zones | Zone Description |
|---|---|---|
| Baseball-Softball | 1 | Field A |
| Baseball-Softball | 2 | Field B |
| Baseball-Softball | 3 | Field C |
| Baseball-Softball | 4 | Field D |
| Other | 5 | Batting Cage 1-2 |
| Other | 6 | Batting Cage 3 |
| Other | 7 | Parking Lot |

| CONTROL POWER CONSUMPTION | |
|---|---|
| 120V Single Phase | |
| VA loading of Musco Supplied Equipment | INRUSH: 5230.0 |
| | SEALED: 631.0 |

| BALLAST SPECIFICATIONS<br>.90 Minimum Power Factor | VOLTAGE: 480v | | THREE PHASE | | | | |
|---|---|---|---|---|---|---|---|
| Single Phase Voltage<br>(Also applicable to each single phase of a 3 phase system) | 208 | 240 | 277 | 347 | 380 | 415 | 480 |
| 1500 Watt Metal Halide Lamp<br>Operating line amperage per fixture, max draw | 8.6 | 7.5 | 6.5 | 5.1 | 4.7 | 4.2 | 3.7 |
| 1000 Watt Metal Halide Lamp<br>Operating line amperage per fixture, max draw | 6.5 | 5.8 | 4.9 | 4.0 | 3.6 | 3.2 | 2.9 |

## CIRCUIT SUMMARY BY ZONE

| POLE | CIRCUIT DESCRIPTION | # OF FIXTURES | FULL LOAD AMPS | CONTACTOR SIZE (AMPS) | CONTACTOR ID | ZONE |
|---|---|---|---|---|---|---|
| A1,B1,C1 | Field A | 15 | 37 | 60 | C1 | 1 |
| A2,B2,C2 | Field A | 15 | 37 | 60 | C2 | 1 |
| A3,B3 | Field B | 6 | 14.8 | 30 | C3 | 2 |
| A4,B4 | Field B | 6 | 14.8 | 30 | C4 | 2 |
| A5,B5 | Field C | 7 | 18.5 | 30 | C5 | 3 |
| A6,B6 | Field C | 7 | 18.5 | 30 | C6 | 3 |
| A7,B7 | Field D | 9 | 22.2 | 30 | C7 | 4 |
| A8,B8 | Field D | 10 | 25.9 | 30 | C8 | 4 |
| NA | Batting Cage 1-2 | 4 | 8.7 | 30 | C9 | 5 |
| NA | Batting Cage 3 | 2 | 7.4 | 30 | C10 | 6 |
| P1 | Parking Lot | 0 | 0 | 30 | C11 | 7 |

Form: T-5030-1

# Control System Summary



## PANEL SUMMARY

| CABINET # | CONTROL MODULE LOCATION | CONTACTOR ID | CIRCUIT DESCRIPTION | FULL LOAD AMPS | DISTRIBUTION PANEL ID (BY OTHERS) | CIRCUIT BREAKER POSITION (BY OTHERS) |
|---|---|---|---|---|---|---|
| 1 | 1 | C1 | Pole A1,B1,C1 | 37.0 | | |
| 1 | 1 | C2 | Pole A2,B2,C2 | 37.0 | | |
| 1 | 1 | C3 | Pole A3,B3 | 14.8 | | |
| 1 | 1 | C4 | Pole A4,B4 | 14.8 | | |
| 1 | 1 | C5 | Pole A5,B5 | 18.5 | | |
| 1 | 1 | C6 | Pole A6,B6 | 18.5 | | |
| 1 | 1 | C7 | Pole A7,B7 | 22.2 | | |
| 1 | 1 | C8 | Pole A8,B8 | 25.9 | | |
| 1 | 1 | C9 | Pole NA | 8.7 | | |
| 1 | 1 | C10 | Pole NA | 7.4 | | |
| 1 | 1 | C11 | Pole P1 | 0.0 | | |

## ZONE SCHEDULE

| | | | CIRCUIT DESCRIPTION | |
|---|---|---|---|---|
| ZONE | SELECTOR SWITCH | ZONE DESCRIPTION | POLE ID | CONTACTOR ID |
| Zone 1 | 1 | Field A | A1 | C1 |
| | | | B1 | C1 |
| | | | C1 | C1 |
| | | | A2 | C2 |
| | | | B2 | C2 |
| | | | C2 | C2 |
| Zone 2 | 2 | Field B | A3 | C3 |
| | | | B3 | C3 |
| | | | A4 | C4 |
| | | | B4 | C4 |
| Zone 3 | 3 | Field C | A5 | C5 |
| | | | B5 | C5 |
| | | | A6 | C6 |
| | | | B6 | C6 |
| Zone 4 | 4 | Field D | A7 | C7 |
| | | | B7 | C7 |
| | | | A8 | C8 |
| | | | B8 | C8 |
| Zone 5 | 5 | Batting Cage 1-2 | NA | C9 |
| Zone 6 | 6 | Batting Cage 3 | NA | C10 |
| Zone 7 | 7 | Parking Lot | P1 | C11 |

# Control System Summary

## Project Specific Notes:

## Project Information

| | |
|---|---|
| Project #: | 141846 |
| Project Name: | Dewitt Roberts Softball-Key West Retrofi |
| Date: | 01/14/11 |
| Project Engineer: | Joel Stout |
| Sales Representative: | Lewis Gilbert Jr. |
| Control System Type: | Control and Monitoring |
| Communication Type: | Digital Cellular |
| Scan: | 141846R1 |
| Distribution Panel Location or ID: | Dewitt Roberts Softball |
| Total # of Distribution Panel Locations for Project: | 1 |
| Design Voltage/Hertz/Phase: | 480/60/3 |
| Control Voltage: | 120 |

## Equipment Listing

| DESCRIPTION | APPROXIMATE SIZE |
|---|---|
| 1.Control and Monitoring Cabinet | 24 X 48 |

| | QTY | SIZE |
|---|---|---|
| Total Contactors | 3 | 30 AMP |
| Total Off/On/Auto Switches: | 1 | |



## Materials Checklist

### Contractor/Customer Supplied:

- ❑ A single control circuit must be supplied per distribution panel location.
  - — If the control voltage is NOT available, a control transformer is required.
- ❑ Electrical distribution panel to provide overcurrent protection for lighting circuits
  - — Thermal/Magnetic circuit breaker sized per full load amps on Circuit Summary by Zone chart
- ❑ Wiring:
  - — Dedicated control power circuit
  - — Power circuit to and from lighting contactors
  - — Monitoring circuit from surge protection device to Control and Monitoring cabinet 1
  - — Harnesses for cabinets at remote locations
  - — Means of grounding, including lightning ground protection
- ❑ Electrical conduit wireway system
  - — Entrance hubs rated NEMA 4: must be die-cast zinc, PVC, or copper-free die-cast aluminum
- ❑ Mounting hardware for cabinets
- ❑ Control circuit lock-on device to prevent unauthorized power interruption to control power
- ❑ Anti-corrosion compound to apply to ends of wire, if necessary

*Call* Control-Link Central ™ *operations center at 877/347-3319 to schedule activation of the control system upon completion of the installation. Note: Activation may take up to 1 1/2 hours*

### IMPORTANT NOTES

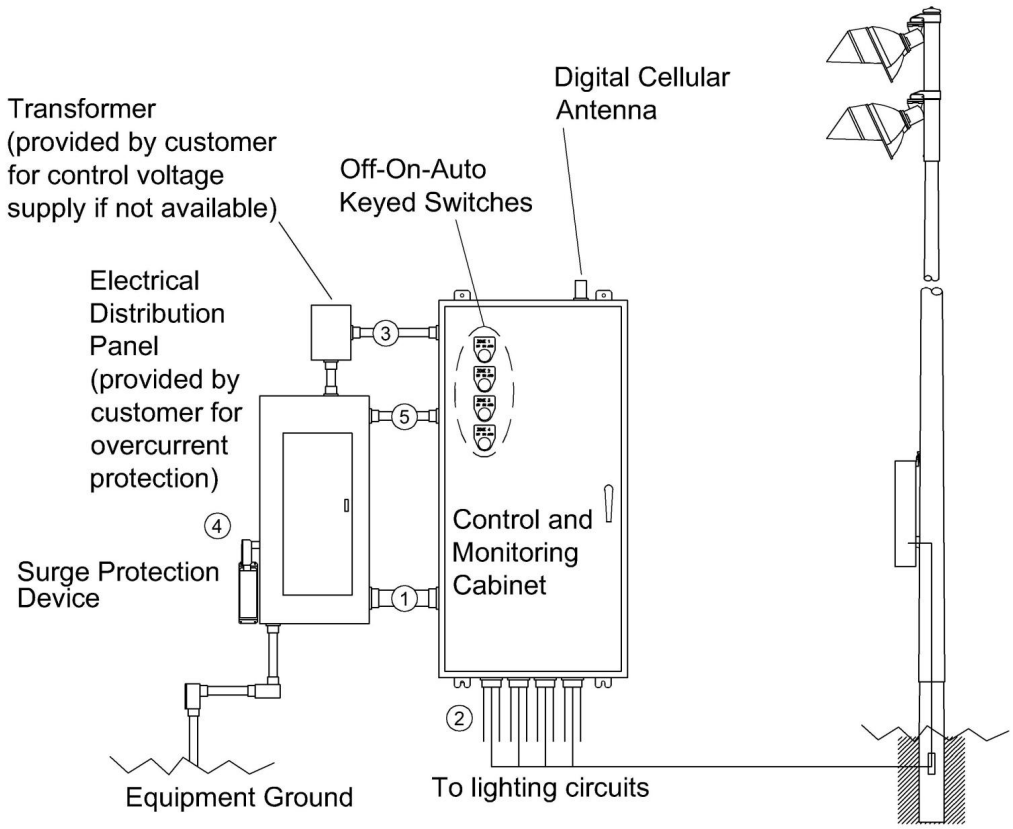
1. Please confirm that the design voltage listed above is accurate for this facility. Design voltage/phase is defined as the voltage/phase being connected and utilized at each lighting pole's ballast enclosure disconnect. Inaccurate design voltage/phase can result in additional costs and delays. Contact your Musco sales representative to confirm this item.
2. In a 3 phase design, all 3 phases are to be run to each pole. When a 3 phase design is used Musco's single phase luminaries come pre-wired to utilize all 3 phases across the entire facility.
3. One contactor is required for each pole. When a pole has multiple circuits, one contactor is required for each circuit. All contactors are UL 100% rated for the published continuous load. All contactors are 3 pole.
4. If the lighting system will be fed from more than one distribution location, additional equipment may be required. Contact your Musco sales representative.
5. A single control circuit must be supplied per control system.
6. Size overcurrent devices using the full load amps column of the Circuit Summary By Zone chart- Minimum power factor of 0.9.

***NOTE:*** *Refer to Installation Instructions for more details on equipment information and the installation requirements*

Form: T-5030-1

## Control•Link.
## Control and Monitoring System - Digital Cellular

(Quantity of equipment may differ from what is shown below)




| WIRE | DESCRIPTION | # OF WIRES | TYP. WIRE SIZE (AWG) | MAX. WIRE LENGTH (FT) | WIRE FROM MUSCO | NOTES |
|---|---|---|---|---|---|---|
| 1 | LINE POWER & GROUND TO CONTACTORS (AS REQUIRED) | NOTE A | NOTE B | N/A | NO | A–D |
| 2 | LOAD POWER TO LIGHTING CIRCUITS (AS REQUIRED) | NOTE A | NOTE B | N/A | NO | A–D |
| 3 | CONTROL POWER (DEDICATED, 20A) | 3 | 12 | N/A | NO | C, D |
| 4 | SURGE PROTECTION DEVICE TO DISTRIBUTION PANEL | -- | -- | N/A | YES | D |
| 5 | SURGE PROTECTION DEVICE MONITORING | 2 | 14 | N/A | NO | D |

R60–25–00

Notes:
A. Voltage and phasing per the notes on cover page
B. Calculate per load and voltage drop
C. All conduit diameters per code.
D. Refer to Control and Monitoring System Installation Instructions for more details on equipment information and the installation requirements.

**IMPORTANT:** Control (wire # 3) and monitoring (wire #5) wiring must each be in separate conduits from any AC power wiring.

Form: T-5030-1

# Control System Summary



## SWITCHING SCHEDULE

| Field Type | Zones | Zone Description |
|---|---|---|
| Baseball-Softball | 1 | Softball |

| CONTROL POWER CONSUMPTION | |
|---|---|
| 120V Single Phase | |
| VA loading of Musco Supplied Equipment | INRUSH: 1555.0 |
| | SEALED: 241.0 |

| BALLAST SPECIFICATIONS<br>.90 Minimum Power Factor | VOLTAGE: 480v | | THREE PHASE | | | | |
|---|---|---|---|---|---|---|---|
| Single Phase Voltage<br>(Also applicable to each single phase of a 3 phase system) | 208 | 240 | 277 | 347 | 380 | 415 | 480 |
| 1500 Watt Metal Halide Lamp<br>Operating line amperage per fixture, max draw | 8.6 | 7.5 | 6.5 | 5.1 | 4.7 | 4.2 | 3.7 |
| 1000 Watt Metal Halide Lamp<br>Operating line amperage per fixture, max draw | 6.5 | 5.8 | 4.9 | 4.0 | 3.6 | 3.2 | 2.9 |

## CIRCUIT SUMMARY BY ZONE

| POLE | CIRCUIT DESCRIPTION | # OF FIXTURES | FULL LOAD AMPS | CONTACTOR SIZE (AMPS) | CONTACTOR ID | ZONE |
|---|---|---|---|---|---|---|
| A1,B1 | Softball | 10 | 25.9 | 30 | C1 | 1 |
| A2,B2 | Softball | 10 | 25.9 | 30 | C2 | 1 |
| C1,C2 | Softball | 8 | 22.2 | 30 | C3 | 1 |

# Control System Summary




Form: T-5030-1

## PANEL SUMMARY

| CABINET # | CONTROL MODULE LOCATION | CONTACTOR ID | CIRCUIT DESCRIPTION | FULL LOAD AMPS | DISTRIBUTION PANEL ID (BY OTHERS) | CIRCUIT BREAKER POSITION (BY OTHERS) |
|---|---|---|---|---|---|---|
| 1 | 1 | C1 | Pole A1,B1 | 25.9 | | |
| 1 | 1 | C2 | Pole A2,B2 | 25.9 | | |
| 1 | 1 | C3 | Pole C1,C2 | 22.2 | | |

## ZONE SCHEDULE

| | | | CIRCUIT DESCRIPTION | |
|---|---|---|---|---|
| ZONE | SELECTOR SWITCH | ZONE DESCRIPTION | POLE ID | CONTACTOR ID |
| Zone 1 | 1 | Softball | A1<br>B1<br>A2<br>B2<br>C1<br>C2 | C1<br>C1<br>C2<br>C2<br>C3<br>C3 |

# Control System Summary

## Project Specific Notes:

## Project Information

| | |
|---|---|
| Project #: | 141847 |
| Project Name: | George Mira Football-Key West Retrofit |
| Date: | 01/14/11 |
| Project Engineer: | Joel Stout |
| Sales Representative: | Lewis Gilbert Jr. |
| Control System Type: | Control and Monitoring |
| Communication Type: | Digital Cellular |
| Scan: | 141847R1 |
| Distribution Panel Location or ID: | George Mira Football |
| Total # of Distribution Panel Locations for Project: | 1 |
| Design Voltage/Hertz/Phase: | 480/60/3 |
| Control Voltage: | 120 |

## Equipment Listing

| DESCRIPTION | APPROXIMATE SIZE |
|---|---|
| 1.Control and Monitoring Cabinet | 24 X 48 |

| | QTY | SIZE |
|---|---|---|
| Total Contactors | 3 | 30 AMP |
| Total Off/On/Auto Switches: | 1 | |



## Materials Checklist

### Contractor/Customer Supplied:

- ❑ A single control circuit must be supplied per distribution panel location.
  - — If the control voltage is NOT available, a control transformer is required.
- ❑ Electrical distribution panel to provide overcurrent protection for lighting circuits
  - — Thermal/Magnetic circuit breaker sized per full load amps on Circuit Summary by Zone chart
- ❑ Wiring:
  - — Dedicated control power circuit
  - — Power circuit to and from lighting contactors
  - — Monitoring circuit from surge protection device to Control and Monitoring cabinet 1
  - — Harnesses for cabinets at remote locations
  - — Means of grounding, including lightning ground protection
- ❑ Electrical conduit wireway system
  - — Entrance hubs rated NEMA 4: must be die-cast zinc, PVC, or copper-free die-cast aluminum
- ❑ Mounting hardware for cabinets
- ❑ Control circuit lock-on device to prevent unauthorized power interruption to control power
- ❑ Anti-corrosion compound to apply to ends of wire, if necessary

*Call* Control-Link Central ™ *operations center at 877/347-3319 to schedule activation of the control system upon completion of the installation. Note: Activation may take up to 1 1/2 hours*

### IMPORTANT NOTES

1. Please confirm that the design voltage listed above is accurate for this facility. Design voltage/phase is defined as the voltage/phase being connected and utilized at each lighting pole's ballast enclosure disconnect. Inaccurate design voltage/phase can result in additional costs and delays. Contact your Musco sales representative to confirm this item.
2. In a 3 phase design, all 3 phases are to be run to each pole. When a 3 phase design is used Musco's single phase luminaries come pre-wired to utilize all 3 phases across the entire facility.
3. One contactor is required for each pole. When a pole has multiple circuits, one contactor is required for each circuit. All contactors are UL 100% rated for the published continuous load. All contactors are 3 pole.
4. If the lighting system will be fed from more than one distribution location, additional equipment may be required. Contact your Musco sales representative.
5. A single control circuit must be supplied per control system.
6. Size overcurrent devices using the full load amps column of the Circuit Summary By Zone chart- Minimum power factor of 0.9.

***NOTE:*** *Refer to Installation Instructions for more details on equipment information and the installation requirements*

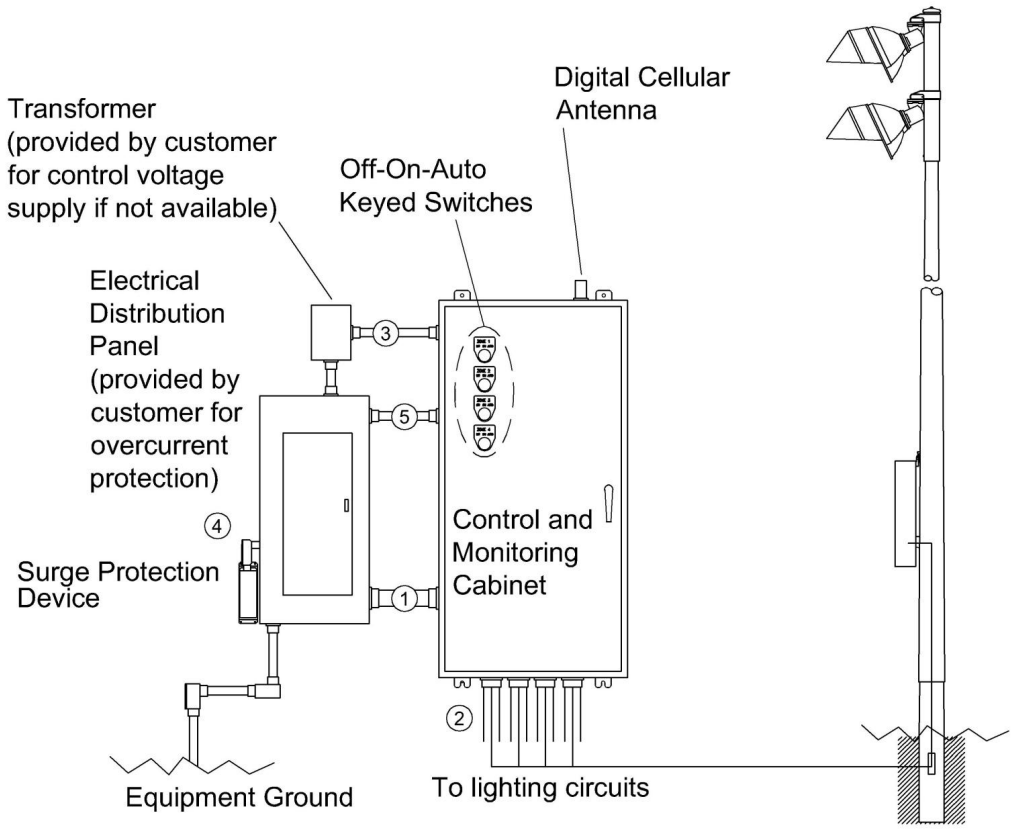
Form: T-5030-1

# Control System Summary



## Control•Link.
## Control and Monitoring System - Digital Cellular

(Quantity of equipment may differ from what is shown below)




| WIRE | DESCRIPTION | # OF WIRES | TYP. WIRE SIZE (AWG) | MAX. WIRE LENGTH (FT) | WIRE FROM MUSCO | NOTES |
|---|---|---|---|---|---|---|
| 1 | LINE POWER & GROUND TO CONTACTORS (AS REQUIRED) | NOTE A | NOTE B | N/A | NO | A–D |
| 2 | LOAD POWER TO LIGHTING CIRCUITS (AS REQUIRED) | NOTE A | NOTE B | N/A | NO | A–D |
| 3 | CONTROL POWER (DEDICATED, 20A) | 3 | 12 | N/A | NO | C, D |
| 4 | SURGE PROTECTION DEVICE TO DISTRIBUTION PANEL | -- | -- | N/A | YES | D |
| 5 | SURGE PROTECTION DEVICE MONITORING | 2 | 14 | N/A | NO | D |

R60–25–00

Notes:
A. Voltage and phasing per the notes on cover page
B. Calculate per load and voltage drop
C. All conduit diameters per code.
D. Refer to Control and Monitoring System Installation Instructions for more details on equipment information and the installation requirements.

**IMPORTANT:** Control (wire # 3) and monitoring (wire #5) wiring must each be in separate conduits from any AC power wiring.

Form: T-5030-1

# Control System Summary



## SWITCHING SCHEDULE

| Field Type | Zones | Zone Description |
|---|---|---|
| Football | 1 | Football |

| CONTROL POWER CONSUMPTION | |
|---|---|
| 120V Single Phase | |
| VA loading of Musco Supplied Equipment | INRUSH: 1310.0 |
| | SEALED: 215.0 |

| BALLAST SPECIFICATIONS<br>.90 Minimum Power Factor | VOLTAGE: 480v | | THREE PHASE | | | | |
|---|---|---|---|---|---|---|---|
| Single Phase Voltage<br>(Also applicable to each single phase of a 3 phase system) | 208 | 240 | 277 | 347 | 380 | 415 | 480 |
| 1500 Watt Metal Halide Lamp<br>Operating line amperage per fixture, max draw | 8.6 | 7.5 | 6.5 | 5.1 | 4.7 | 4.2 | 3.7 |
| 1000 Watt Metal Halide Lamp<br>Operating line amperage per fixture, max draw | 6.5 | 5.8 | 4.9 | 4.0 | 3.6 | 3.2 | 2.9 |

## CIRCUIT SUMMARY BY ZONE

| POLE | CIRCUIT DESCRIPTION | # OF FIXTURES | FULL LOAD AMPS | CONTACTOR SIZE (AMPS) | CONTACTOR ID | ZONE |
|---|---|---|---|---|---|---|
| F1 | Football | 5 | 14.8 | 30 | C1 | 1 |
| F2,F3 | Football | 9 | 22.2 | 30 | C2 | 1 |
| F4,F5 | Football | 9 | 22.2 | 30 | C3 | 1 |

# Control System Summary




Form: T-5030-1

## PANEL SUMMARY

| CABINET # | CONTROL MODULE LOCATION | CONTACTOR ID | CIRCUIT DESCRIPTION | FULL LOAD AMPS | DISTRIBUTION PANEL ID (BY OTHERS) | CIRCUIT BREAKER POSITION (BY OTHERS) |
|---|---|---|---|---|---|---|
| 1 | 1 | C1 | Pole F1 | 14.8 | | |
| 1 | 1 | C2 | Pole F2,F3 | 22.2 | | |
| 1 | 1 | C3 | Pole F4,F5 | 22.2 | | |

## ZONE SCHEDULE

| | | | CIRCUIT DESCRIPTION | |
|---|---|---|---|---|
| ZONE | SELECTOR SWITCH | ZONE DESCRIPTION | POLE ID | CONTACTOR ID |
| Zone 1 | 1 | Football | F1<br>F2<br>F3<br>F4<br>F5 | C1<br>C2<br>C2<br>C3<br>C3 |

# Control System Summary

## Project Specific Notes:

## Project Information

| | |
|---|---|
| Project #: | 141845 |
| Project Name: | Rosa Hernandez Softball-Key West Retrofi |
| Date: | 01/14/11 |
| Project Engineer: | Joel Stout |
| Sales Representative: | Lewis Gilbert Jr. |
| Control System Type: | Control and Monitoring |
| Communication Type: | Digital Cellular |
| Scan: | 141845R1 |
| Distribution Panel Location or ID: | Rosa Hernandez |
| Total # of Distribution Panel Locations for Project: | 1 |
| Design Voltage/Hertz/Phase: | 480/60/3 |
| Control Voltage: | 120 |

## Equipment Listing

| DESCRIPTION | APPROXIMATE SIZE |
|---|---|
| 1.Control and Monitoring Cabinet | 24 X 48 |

| | QTY | SIZE |
|---|---|---|
| Total Contactors | 3 | 30 AMP |
| Total Off/On/Auto Switches: | 1 | |



## Materials Checklist

### Contractor/Customer Supplied:

- ❑ A single control circuit must be supplied per distribution panel location.
  - — If the control voltage is NOT available, a control transformer is required.
- ❑ Electrical distribution panel to provide overcurrent protection for lighting circuits
  - — Thermal/Magnetic circuit breaker sized per full load amps on Circuit Summary by Zone chart
- ❑ Wiring:
  - — Dedicated control power circuit
  - — Power circuit to and from lighting contactors
  - — Monitoring circuit from surge protection device to Control and Monitoring cabinet 1
  - — Harnesses for cabinets at remote locations
  - — Means of grounding, including lightning ground protection
- ❑ Electrical conduit wireway system
  - — Entrance hubs rated NEMA 4: must be die-cast zinc, PVC, or copper-free die-cast aluminum
- ❑ Mounting hardware for cabinets
- ❑ Control circuit lock-on device to prevent unauthorized power interruption to control power
- ❑ Anti-corrosion compound to apply to ends of wire, if necessary

*Call* Control-Link Central ™ *operations center at 877/347-3319 to schedule activation of the control system upon completion of the installation. Note: Activation may take up to 1 1/2 hours*

### IMPORTANT NOTES

1. Please confirm that the design voltage listed above is accurate for this facility. Design voltage/phase is defined as the voltage/phase being connected and utilized at each lighting pole's ballast enclosure disconnect. Inaccurate design voltage/phase can result in additional costs and delays. Contact your Musco sales representative to confirm this item.
2. In a 3 phase design, all 3 phases are to be run to each pole. When a 3 phase design is used Musco's single phase luminaries come pre-wired to utilize all 3 phases across the entire facility.
3. One contactor is required for each pole. When a pole has multiple circuits, one contactor is required for each circuit. All contactors are UL 100% rated for the published continuous load. All contactors are 3 pole.
4. If the lighting system will be fed from more than one distribution location, additional equipment may be required. Contact your Musco sales representative.
5. A single control circuit must be supplied per control system.
6. Size overcurrent devices using the full load amps column of the Circuit Summary By Zone chart- Minimum power factor of 0.9.

***NOTE:*** *Refer to Installation Instructions for more details on equipment information and the installation requirements*

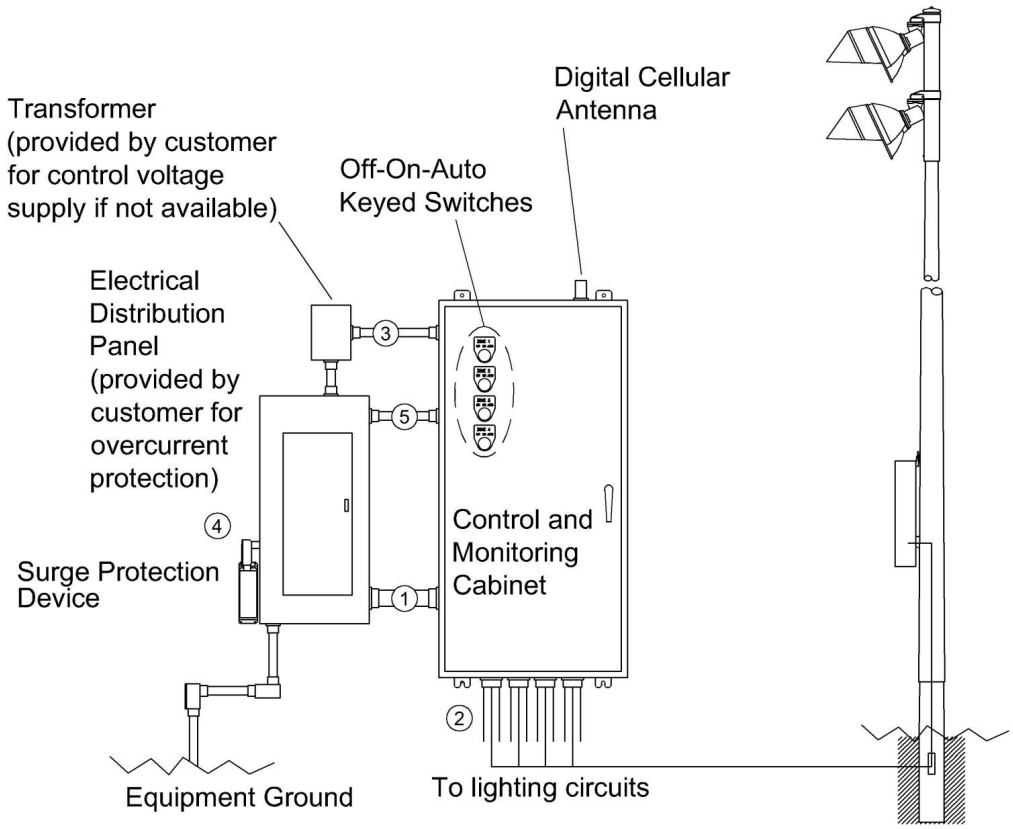
Form: T-5030-1

# Control System Summary



## Control•Link.
## Control and Monitoring System - Digital Cellular

(Quantity of equipment may differ from what is shown below)




| WIRE | DESCRIPTION | # OF WIRES | TYP. WIRE SIZE (AWG) | MAX. WIRE LENGTH (FT) | WIRE FROM MUSCO | NOTES |
|---|---|---|---|---|---|---|
| 1 | LINE POWER & GROUND TO CONTACTORS (AS REQUIRED) | NOTE A | NOTE B | N/A | NO | A–D |
| 2 | LOAD POWER TO LIGHTING CIRCUITS (AS REQUIRED) | NOTE A | NOTE B | N/A | NO | A–D |
| 3 | CONTROL POWER (DEDICATED, 20A) | 3 | 12 | N/A | NO | C, D |
| 4 | SURGE PROTECTION DEVICE TO DISTRIBUTION PANEL | -- | -- | N/A | YES | D |
| 5 | SURGE PROTECTION DEVICE MONITORING | 2 | 14 | N/A | NO | D |

R60–25–00

Notes:
A. Voltage and phasing per the notes on cover page
B. Calculate per load and voltage drop
C. All conduit diameters per code.
D. Refer to Control and Monitoring System Installation Instructions for more details on equipment information and the installation requirements.

**IMPORTANT:** Control (wire # 3) and monitoring (wire #5) wiring must each be in separate conduits from any AC power wiring.

Form: T-5030-1

# Control System Summary



## SWITCHING SCHEDULE

| Field Type | Zones | Zone Description |
|---|---|---|
| Baseball-Softball | 1 | Softball |

| CONTROL POWER CONSUMPTION | |
|---|---|
| 120V Single Phase | |
| VA loading of Musco Supplied Equipment | INRUSH: 1555.0 |
| | SEALED: 241.0 |

| BALLAST SPECIFICATIONS<br>.90 Minimum Power Factor | VOLTAGE: 480v | | THREE PHASE | | | | |
|---|---|---|---|---|---|---|---|
| Single Phase Voltage<br>(Also applicable to each single phase of a 3 phase system) | 208 | 240 | 277 | 347 | 380 | 415 | 480 |
| 1500 Watt Metal Halide Lamp<br>Operating line amperage per fixture, max draw | 8.6 | 7.5 | 6.5 | 5.1 | 4.7 | 4.2 | 3.7 |
| 1000 Watt Metal Halide Lamp<br>Operating line amperage per fixture, max draw | 6.5 | 5.8 | 4.9 | 4.0 | 3.6 | 3.2 | 2.9 |

## CIRCUIT SUMMARY BY ZONE

| POLE | CIRCUIT DESCRIPTION | # OF FIXTURES | FULL LOAD AMPS | CONTACTOR SIZE (AMPS) | CONTACTOR ID | ZONE |
|---|---|---|---|---|---|---|
| A1,B1 | Softball | 6 | 14.8 | 30 | C1 | 1 |
| A2,B2 | Softball | 6 | 14.8 | 30 | C2 | 1 |
| C1,C2 | Softball | 4 | 11.1 | 30 | C3 | 1 |

Form: T-5030-1

# Control System Summary



## PANEL SUMMARY

| CABINET # | CONTROL MODULE LOCATION | CONTACTOR ID | CIRCUIT DESCRIPTION | FULL LOAD AMPS | DISTRIBUTION PANEL ID (BY OTHERS) | CIRCUIT BREAKER POSITION (BY OTHERS) |
|---|---|---|---|---|---|---|
| 1 | 1 | C1 | Pole A1,B1 | 14.8 | | |
| 1 | 1 | C2 | Pole A2,B2 | 14.8 | | |
| 1 | 1 | C3 | Pole C1,C2 | 11.1 | | |

## ZONE SCHEDULE

| | | | CIRCUIT DESCRIPTION | |
|---|---|---|---|---|
| ZONE | SELECTOR SWITCH | ZONE DESCRIPTION | POLE ID | CONTACTOR ID |
| Zone 1 | 1 | Softball | A1 | C1 |
| | | | B1 | C1 |
| | | | A2 | C2 |
| | | | B2 | C2 |
| | | | C1 | C3 |
| | | | C2 | C3 |

# Control System Summary

## Project Specific Notes:

## Project Information

| | |
|---|---|
| Project #: | 150167 |
| Project Name: | Pepe Hernandez Park EECBG Key West Retro |
| Date: | 01/14/11 |
| Project Engineer: | Joel Stout |
| Sales Representative: | Lewis Gilbert Jr. |
| Control System Type: | Control and Monitoring |
| Communication Type: | Digital Cellular |
| Scan: | 150167R1 |
| Distribution Panel Location or ID: | Pepe Hernandez |
| Total # of Distribution Panel Locations for Project: | 1 |
| Design Voltage/Hertz/Phase: | 480/60/3 |
| Control Voltage: | 120 |

## Equipment Listing

| DESCRIPTION | APPROXIMATE SIZE |
|---|---|
| 1.Control and Monitoring Cabinet | 24 X 48 |

| | QTY | SIZE |
|---|---|---|
| Total Contactors | 6 | 30 AMP |
| Total Off/On/Auto Switches: | 1 | |



## Materials Checklist

### Contractor/Customer Supplied:

- ❑ A single control circuit must be supplied per distribution panel location.
  - — If the control voltage is NOT available, a control transformer is required.
- ❑ Electrical distribution panel to provide overcurrent protection for lighting circuits
  - — Thermal/Magnetic circuit breaker sized per full load amps on Circuit Summary by Zone chart
- ❑ Wiring:
  - — Dedicated control power circuit
  - — Power circuit to and from lighting contactors
  - — Monitoring circuit from surge protection device to Control and Monitoring cabinet 1
  - — Harnesses for cabinets at remote locations
  - — Means of grounding, including lightning ground protection
- ❑ Electrical conduit wireway system
  - — Entrance hubs rated NEMA 4: must be die-cast zinc, PVC, or copper-free die-cast aluminum
- ❑ Mounting hardware for cabinets
- ❑ Control circuit lock-on device to prevent unauthorized power interruption to control power
- ❑ Anti-corrosion compound to apply to ends of wire, if necessary

*Call* Control-Link Central ™ *operations center at 877/347-3319 to schedule activation of the control system upon completion of the installation. Note: Activation may take up to 1 1/2 hours*

### IMPORTANT NOTES

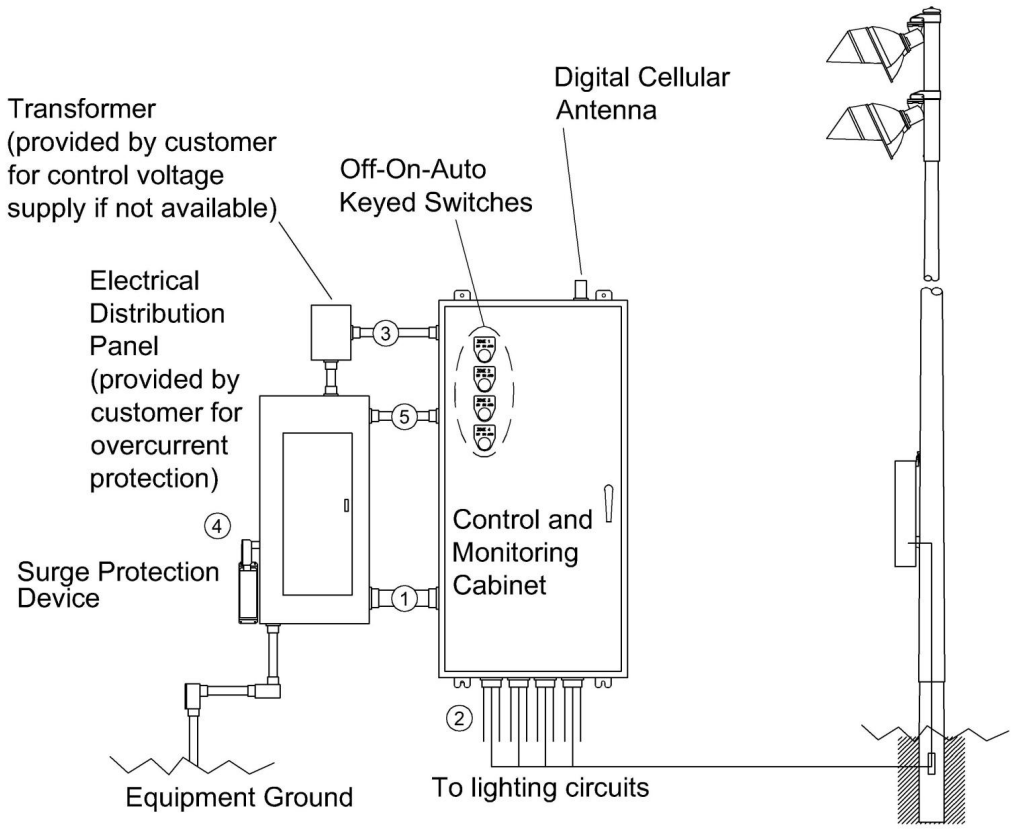
1. Please confirm that the design voltage listed above is accurate for this facility. Design voltage/phase is defined as the voltage/phase being connected and utilized at each lighting pole's ballast enclosure disconnect. Inaccurate design voltage/phase can result in additional costs and delays. Contact your Musco sales representative to confirm this item.
2. In a 3 phase design, all 3 phases are to be run to each pole. When a 3 phase design is used Musco's single phase luminaries come pre-wired to utilize all 3 phases across the entire facility.
3. One contactor is required for each pole. When a pole has multiple circuits, one contactor is required for each circuit. All contactors are UL 100% rated for the published continuous load. All contactors are 3 pole.
4. If the lighting system will be fed from more than one distribution location, additional equipment may be required. Contact your Musco sales representative.
5. A single control circuit must be supplied per control system.
6. Size overcurrent devices using the full load amps column of the Circuit Summary By Zone chart- Minimum power factor of 0.9.

***NOTE:*** *Refer to Installation Instructions for more details on equipment information and the installation requirements*

Form: T-5030-1

## Control•Link.
## Control and Monitoring System - Digital Cellular

(Quantity of equipment may differ from what is shown below)




| WIRE | DESCRIPTION | # OF WIRES | TYP. WIRE SIZE (AWG) | MAX. WIRE LENGTH (FT) | WIRE FROM MUSCO | NOTES |
|---|---|---|---|---|---|---|
| 1 | LINE POWER & GROUND TO CONTACTORS (AS REQUIRED) | NOTE A | NOTE B | N/A | NO | A–D |
| 2 | LOAD POWER TO LIGHTING CIRCUITS (AS REQUIRED) | NOTE A | NOTE B | N/A | NO | A–D |
| 3 | CONTROL POWER (DEDICATED, 20A) | 3 | 12 | N/A | NO | C, D |
| 4 | SURGE PROTECTION DEVICE TO DISTRIBUTION PANEL | -- | -- | N/A | YES | D |
| 5 | SURGE PROTECTION DEVICE MONITORING | 2 | 14 | N/A | NO | D |

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Notes:
A. Voltage and phasing per the notes on cover page
B. Calculate per load and voltage drop
C. All conduit diameters per code.
D. Refer to Control and Monitoring System Installation Instructions for more details on equipment information and the installation requirements.

**IMPORTANT:** Control (wire # 3) and monitoring (wire #5) wiring must each be in separate conduits from any AC power wiring.

Form: T-5030-1

# Control System Summary



## SWITCHING SCHEDULE

| Field Type | Zones | Zone Description |
|---|---|---|
| Baseball-Softball | 1 | Baseball |

| CONTROL POWER CONSUMPTION | |
|---|---|
| 120V Single Phase | |
| VA loading of Musco Supplied Equipment | INRUSH: 1555.0 |
| | SEALED: 241.0 |

| BALLAST SPECIFICATIONS<br>.90 Minimum Power Factor | VOLTAGE: 480v | | THREE PHASE | | | | |
|---|---|---|---|---|---|---|---|
| Single Phase Voltage<br>(Also applicable to each single phase of a 3 phase system) | 208 | 240 | 277 | 347 | 380 | 415 | 480 |
| 1500 Watt Metal Halide Lamp<br>Operating line amperage per fixture, max draw | 8.6 | 7.5 | 6.5 | 5.1 | 4.7 | 4.2 | 3.7 |
| 1000 Watt Metal Halide Lamp<br>Operating line amperage per fixture, max draw | 6.5 | 5.8 | 4.9 | 4.0 | 3.6 | 3.2 | 2.9 |

## CIRCUIT SUMMARY BY ZONE

| POLE | CIRCUIT DESCRIPTION | # OF FIXTURES | FULL LOAD AMPS | CONTACTOR SIZE (AMPS) | CONTACTOR ID | ZONE |
|---|---|---|---|---|---|---|
| A1 | Baseball | 3 | 7.4 | 30 | C1 | 1 |
| A2 | Baseball | 3 | 7.4 | 30 | C2 | 1 |
| B1 | Baseball | 4 | 11.1 | 30 | C3 | 1 |
| B2 | Baseball | 3 | 7.4 | 30 | C4 | 1 |
| C1 | Baseball | 3 | 7.4 | 30 | C5 | 1 |
| C2 | Baseball | 3 | 7.4 | 30 | C6 | 1 |

# Control System Summary

**Pepe Hernandez Park EECBG Key West Retro / 150167 - 150167R1**



Form: T-5030-1

## PANEL SUMMARY

| CABINET # | CONTROL MODULE LOCATION | CONTACTOR ID | CIRCUIT DESCRIPTION | FULL LOAD AMPS | DISTRIBUTION PANEL ID (BY OTHERS) | CIRCUIT BREAKER POSITION (BY OTHERS) |
|---|---|---|---|---|---|---|
| 1 | 1 | C1 | Pole A1 | 7.4 | | |
| 1 | 1 | C2 | Pole A2 | 7.4 | | |
| 1 | 1 | C3 | Pole B1 | 11.1 | | |
| 1 | 1 | C4 | Pole B2 | 7.4 | | |
| 1 | 1 | C5 | Pole C1 | 7.4 | | |
| 1 | 1 | C6 | Pole C2 | 7.4 | | |

## ZONE SCHEDULE

| | | | CIRCUIT DESCRIPTION | |
|---|---|---|---|---|
| ZONE | SELECTOR SWITCH | ZONE DESCRIPTION | POLE ID | CONTACTOR ID |
| Zone 1 | 1 | Baseball | A1 | C1 |
| | | | A2 | C2 |
| | | | B1 | C3 |
| | | | B2 | C4 |
| | | | C1 | C5 |
| | | | C2 | C6 |

# Control System Summary

## Project Specific Notes:

## Project Information

| | |
|---|---|
| Project #: | 146480 |
| Project Name: | Nelson English Park EECBG Key West Retro |
| Date: | 01/14/11 |
| Project Engineer: | Joel Stout |
| Sales Representative: | Lewis Gilbert Jr. |
| Control System Type: | Control and Monitoring |
| Communication Type: | Digital Cellular |
| Scan: | 146480R1 |
| Distribution Panel Location or ID: | Nelson English Park |
| Total # of Distribution Panel Locations for Project: | 1 |
| Design Voltage/Hertz/Phase: | 480/60/3 |
| Control Voltage: | 120 |

## Equipment Listing

| DESCRIPTION | APPROXIMATE SIZE |
|---|---|
| 1.Control and Monitoring Cabinet | 24 X 48 |

| | QTY | SIZE |
|---|---|---|
| Total Contactors | 6 | 30 AMP |
| Total Off/On/Auto Switches: | 2 | |



## Materials Checklist

### Contractor/Customer Supplied:

- ❑ A single control circuit must be supplied per distribution panel location.
  - — If the control voltage is NOT available, a control transformer is required.
- ❑ Electrical distribution panel to provide overcurrent protection for lighting circuits
  - — Thermal/Magnetic circuit breaker sized per full load amps on Circuit Summary by Zone chart
- ❑ Wiring:
  - — Dedicated control power circuit
  - — Power circuit to and from lighting contactors
  - — Monitoring circuit from surge protection device to Control and Monitoring cabinet 1
  - — Harnesses for cabinets at remote locations
  - — Means of grounding, including lightning ground protection
- ❑ Electrical conduit wireway system
  - — Entrance hubs rated NEMA 4: must be die-cast zinc, PVC, or copper-free die-cast aluminum
- ❑ Mounting hardware for cabinets
- ❑ Control circuit lock-on device to prevent unauthorized power interruption to control power
- ❑ Anti-corrosion compound to apply to ends of wire, if necessary

*Call* Control-Link Central ™ *operations center at 877/347-3319 to schedule activation of the control system upon completion of the installation. Note: Activation may take up to 1 1/2 hours*

### IMPORTANT NOTES

1. Please confirm that the design voltage listed above is accurate for this facility. Design voltage/phase is defined as the voltage/phase being connected and utilized at each lighting pole's ballast enclosure disconnect. Inaccurate design voltage/phase can result in additional costs and delays. Contact your Musco sales representative to confirm this item.
2. In a 3 phase design, all 3 phases are to be run to each pole. When a 3 phase design is used Musco's single phase luminaries come pre-wired to utilize all 3 phases across the entire facility.
3. One contactor is required for each pole. When a pole has multiple circuits, one contactor is required for each circuit. All contactors are UL 100% rated for the published continuous load. All contactors are 3 pole.
4. If the lighting system will be fed from more than one distribution location, additional equipment may be required. Contact your Musco sales representative.
5. A single control circuit must be supplied per control system.
6. Size overcurrent devices using the full load amps column of the Circuit Summary By Zone chart- Minimum power factor of 0.9.

***NOTE:*** *Refer to Installation Instructions for more details on equipment information and the installation requirements*

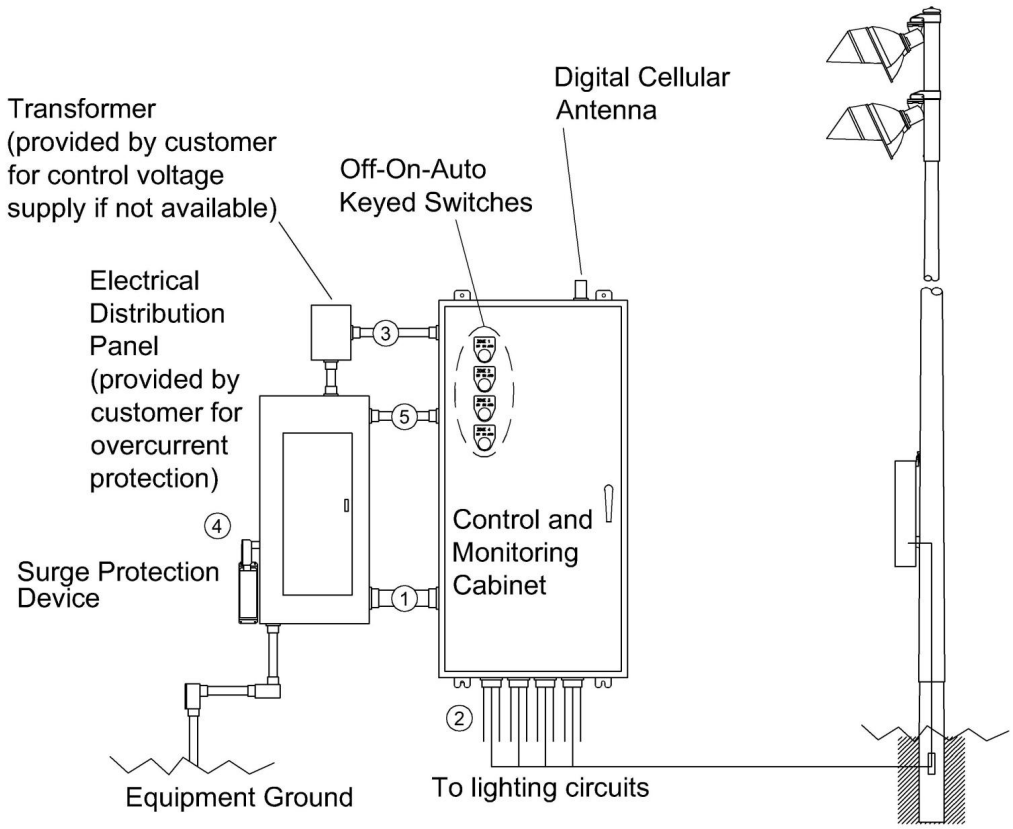
Form: T-5030-1

# Control System Summary



## Control•Link.
## Control and Monitoring System - Digital Cellular

(Quantity of equipment may differ from what is shown below)




| WIRE | DESCRIPTION | # OF WIRES | TYP. WIRE SIZE (AWG) | MAX. WIRE LENGTH (FT) | WIRE FROM MUSCO | NOTES |
|---|---|---|---|---|---|---|
| 1 | LINE POWER & GROUND TO CONTACTORS (AS REQUIRED) | NOTE A | NOTE B | N/A | NO | A–D |
| 2 | LOAD POWER TO LIGHTING CIRCUITS (AS REQUIRED) | NOTE A | NOTE B | N/A | NO | A–D |
| 3 | CONTROL POWER (DEDICATED, 20A) | 3 | 12 | N/A | NO | C, D |
| 4 | SURGE PROTECTION DEVICE TO DISTRIBUTION PANEL | -- | -- | N/A | YES | D |
| 5 | SURGE PROTECTION DEVICE MONITORING | 2 | 14 | N/A | NO | D |

R60–25–00

Notes:
A. Voltage and phasing per the notes on cover page
B. Calculate per load and voltage drop
C. All conduit diameters per code.
D. Refer to Control and Monitoring System Installation Instructions for more details on equipment information and the installation requirements.

**IMPORTANT:** Control (wire # 3) and monitoring (wire #5) wiring must each be in separate conduits from any AC power wiring.

Form: T-5030-1

# Control System Summary



## SWITCHING SCHEDULE

| Field Type | Zones | Zone Description |
|---|---|---|
| Other | 1 | Playground Area |
| Basketball | 2 | Basketball |

| CONTROL POWER CONSUMPTION | |
|---|---|
| 120V Single Phase | |
| VA loading of Musco Supplied Equipment | INRUSH: 1555.0 |
| | SEALED: 241.0 |

| BALLAST SPECIFICATIONS<br>.90 Minimum Power Factor | VOLTAGE: 480v | | THREE PHASE | | | | |
|---|---|---|---|---|---|---|---|
| Single Phase Voltage<br>(Also applicable to each single phase of a 3 phase system) | 208 | 240 | 277 | 347 | 380 | 415 | 480 |
| 1500 Watt Metal Halide Lamp<br>Operating line amperage per fixture, max draw | 8.6 | 7.5 | 6.5 | 5.1 | 4.7 | 4.2 | 3.7 |
| 1000 Watt Metal Halide Lamp<br>Operating line amperage per fixture, max draw | 6.5 | 5.8 | 4.9 | 4.0 | 3.6 | 3.2 | 2.9 |

## CIRCUIT SUMMARY BY ZONE

| POLE | CIRCUIT DESCRIPTION | # OF FIXTURES | FULL LOAD AMPS | CONTACTOR SIZE (AMPS) | CONTACTOR ID | ZONE |
|---|---|---|---|---|---|---|
| P1 | Playground Area | 2 | 5.8 | 30 | C1 | 1 |
| P2 | Playground Area | 3 | 5.8 | 30 | C2 | 1 |
| P3 | Playground Area | 2 | 5.8 | 30 | C3 | 1 |
| P4 | Playground Area | 2 | 5.8 | 30 | C4 | 1 |
| P1 | Basketball | 2 | 5.8 | 30 | C5 | 2 |
| P4 | Basketball | 3 | 5.8 | 30 | C6 | 2 |

# Control System Summary




Form: T-5030-1

## PANEL SUMMARY

| CABINET # | CONTROL MODULE LOCATION | CONTACTOR ID | CIRCUIT DESCRIPTION | FULL LOAD AMPS | DISTRIBUTION PANEL ID (BY OTHERS) | CIRCUIT BREAKER POSITION (BY OTHERS) |
|---|---|---|---|---|---|---|
| 1 | 1 | C1 | Pole P1 | 5.8 | | |
| 1 | 1 | C2 | Pole P2 | 5.8 | | |
| 1 | 1 | C3 | Pole P3 | 5.8 | | |
| 1 | 1 | C4 | Pole P4 | 5.8 | | |
| 1 | 1 | C5 | Pole P1 | 5.8 | | |
| 1 | 1 | C6 | Pole P4 | 5.8 | | |

## ZONE SCHEDULE

| | | | CIRCUIT DESCRIPTION | |
|---|---|---|---|---|
| ZONE | SELECTOR SWITCH | ZONE DESCRIPTION | POLE ID | CONTACTOR ID |
| Zone 1 | 1 | Playground Area | P1<br>P2<br>P3<br>P4 | C1<br>C2<br>C3<br>C4 |
| Zone 2 | 2 | Basketball | P1<br>P4 | C5<br>C6 |

# Tab H

# Performance Guarantee

City of Key West Retrofit
Ball Field Lighting Project
Key West, FL

Musco hereby guarantees compliance with the following specifications for your project. Furthermore, Musco guarantees the constant light levels for 10 years +/-10% of the predicted mean in accordance with IESNA RP-6-01.

**Clayton Sterling Complex**

| Field | Constant Average Illumination | | Uniformity | | Lamp Tilt Factor |
|---|---|---|---|---|---|
| | Infield | Outfield | Infield | Outfield | |
| Field A | 50 FC | 30 FC | 2.0:1.0 | 2.5:1.0 | 1.0 |
| Field B | 50 FC | 30 FC | 2.0:1.0 | 2.5:1.0 | 1.0 |
| Field C | 50 FC | 30 FC | 2.0:1.0 | 2.5:1.0 | 1.0 |
| Field D | 50 FC | 30 FC | 2.0:1.0 | 2.5:1.0 | 1.0 |

Energy Consumption: The average kWh consumption for the field lighting system shall be less than or equal 125kWh.

This guarantee is dependent upon the following:

- All test stations matched exactly to the number and location of points supplied with the Musco computer generated light scan for constant light levels.
- Pole placement must be within 3 feet of Musco recommendation.
- Voltage supply to the ballast of all fixtures must be no less than 97% of the designed secondary voltage.

In the unlikely event that these performance specifications are not met, Musco shall provide necessary corrective action at no expense to the owner.

We trust this meets with your approval.

Musco Sports Lighting, LLC

Luann Ferreira

Luann Ferreira
Vice-President Sales

# Performance Guarantee

City of Key West Retrofit
Ball Field Lighting Project
Key West, FL

Musco hereby guarantees compliance with the following specifications for your project. Furthermore, Musco guarantees the constant light levels for 10 years +/-10% of the predicted mean in accordance with IESNA RP-6-01.

**Dewitt Roberts Softball**

| Field | Constant Average Illumination | | Uniformity | | Lamp Tilt Factor |
|---|---|---|---|---|---|
| | Infield | Outfield | Infield | Outfield | |
| Softball | 50 FC | 30 FC | 2.0:1.0 | 2.5:1.0 | 1.0 |

Energy Consumption: The average kWh consumption for the field lighting system shall be less than or equal 44kWh.

This guarantee is dependent upon the following:

* All test stations matched exactly to the number and location of points supplied with the Musco computer generated light scan for constant light levels.
* Pole placement must be within 3 feet of Musco recommendation.
* Voltage supply to the ballast of all fixtures must be no less than 97% of the designed secondary voltage.

In the unlikely event that these performance specifications are not met, Musco shall provide necessary corrective action at no expense to the owner.

We trust this meets with your approval.

Musco Sports Lighting, LLC

Luann Ferreira

Luann Ferreira
Vice-President Sales

# Performance Guarantee

City of Key West Retrofit
Ball Field Lighting Project
Key West, FL

Musco hereby guarantees compliance with the following specifications for your project. Furthermore, Musco guarantees the constant light levels for 10 years +/-10% of the predicted mean in accordance with IESNA RP-6-01.

**George Mira Football**

| Field | Constant Average Illumination | Uniformity | Lamp Tilt Factor |
|---|---|---|---|
| Football | 30 FC | 2.5:1.0 | 1.0 |

Energy Consumption: The average kWh consumption for the field lighting system shall be less than or equal 36kWh.

This guarantee is dependent upon the following:

* All test stations matched exactly to the number and location of points supplied with the Musco computer generated light scan for constant light levels.
* Pole placement must be within 3 feet of Musco recommendation.
* Voltage supply to the ballast of all fixtures must be no less than 97% of the designed secondary voltage.

In the unlikely event that these performance specifications are not met, Musco shall provide necessary corrective action at no expense to the owner.

We trust this meets with your approval.

Musco Sports Lighting, LLC

Luann Ferreira

Luann Ferreira
Vice-President Sales

# Performance Guarantee

City of Key West Retrofit
Ball Field Lighting Project
Key West, FL

Musco hereby guarantees compliance with the following specifications for your project. Furthermore, Musco guarantees the constant light levels for 10 years +/-10% of the predicted mean in accordance with IESNA RP-6-01.

**Rosa Hernandez Softball**

| Field | Constant Average Illumination | | Uniformity | | Lamp Tilt Factor |
|---|---|---|---|---|---|
| | Infield | Outfield | Infield | Outfield | |
| Girls Softball | 50 FC | 30 FC | 2.0:1.0 | 2.5:1.0 | 1.0 |

Energy Consumption: The average kWh consumption for the field lighting system shall be less than or equal 26kWh.

This guarantee is dependent upon the following:

* All test stations matched exactly to the number and location of points supplied with the Musco computer generated light scan for constant light levels.
* Pole placement must be within 3 feet of Musco recommendation.
* Voltage supply to the ballast of all fixtures must be no less than 97% of the designed secondary voltage.

In the unlikely event that these performance specifications are not met, Musco shall provide necessary corrective action at no expense to the owner.

We trust this meets with your approval.

Musco Sports Lighting, LLC

Luann Ferreira

Luann Ferreira
Vice-President Sales

# Performance Guarantee

City of Key West Retrofit
Ball Field Lighting Project
Key West, FL

Musco hereby guarantees compliance with the following specifications for your project. Furthermore, Musco guarantees the constant light levels for 10 years +/-10% of the predicted mean in accordance with IESNA RP-6-01.

**Pepe Hernandez Park**

| Field | Constant Average Illumination | | Uniformity | | Lamp Tilt Factor |
|---|---|---|---|---|---|
| | Infield | Outfield | Infield | Outfield | |
| Multipurpose | 50 FC | 30 FC | 2.0:1.0 | 2.5:1.0 | 1.0 |

Energy Consumption: The average kWh consumption for the field lighting system shall be less than or equal 30kWh.

This guarantee is dependent upon the following:

* All test stations matched exactly to the number and location of points supplied with the Musco computer generated light scan for constant light levels.
* Pole placement must be within 3 feet of Musco recommendation.
* Voltage supply to the ballast of all fixtures must be no less than 97% of the designed secondary voltage.

In the unlikely event that these performance specifications are not met, Musco shall provide necessary corrective action at no expense to the owner.

We trust this meets with your approval.

Musco Sports Lighting, LLC

Luann Ferreira

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Vice-President Sales

# Performance Guarantee

City of Key West Retrofit
Ball Field Lighting Project
Key West, FL

Musco hereby guarantees compliance with the following specifications for your project. Furthermore, Musco guarantees the constant light levels for 10 years +/-10% of the predicted mean in accordance with IESNA RP-6-01.

**Nelson English Park**

| Field | Constant Average Illumination | Uniformity | Lamp Tilt Factor |
|---|---|---|---|
| Basketball | 30 FC | 3.0:1.0 | 1.0 |
| Playground Area | 15 FC | 10.0:1.0 | 1.0 |

Energy Consumption: The average kWh consumption for the field lighting system shall be less than or equal 16kWh.

This guarantee is dependent upon the following:

* All test stations matched exactly to the number and location of points supplied with the Musco computer generated light scan for constant light levels.
* Pole placement must be within 3 feet of Musco recommendation.
* Voltage supply to the ballast of all fixtures must be no less than 97% of the designed secondary voltage.

In the unlikely event that these performance specifications are not met, Musco shall provide necessary corrective action at no expense to the owner.

We trust this meets with your approval.

Musco Sports Lighting, LLC

Luann Ferreira

Luann Ferreira
Vice-President Sales

# Tab I

# Musco Constant 10™

**10-Year Product Assurance & Warranty Program**

**Musco Sports Lighting, LLC will provide all materials and labor to maintain operation of your lighting system to original design criteria for 10 years, or until maximum hours of coverage have accumulated, whichever comes first. Musco products and services are guaranteed to perform on your project as detailed in this document.**

## Light

Average Constant Light™ levels are guaranteed through Musco's Smart Lamp® and service technology, within the Illumination Engineering Society of North America RP-6-01 standards of +/- 10% of the design criteria.

Musco will electronically monitor lamp operation and operating hours, and will group re-lamp as needed based on usage hours.

Individual lamp outages that occur during the lamp warranty and maintenance period are repaired when the usage of any field is materially impacted. If actual usage exceeds the maximum hours of coverage, the customer will be required to purchase lamp replacements in order to maintain the warranty to the end of ten years.

## Energy Consumption

Average and maximum energy consumptions for your lighting system are guaranteed. Exhibit A provides a 10-year energy cost model based upon the customer provided utility rate and anticipated hours of usage. Changes in rates or usage will proportionately change the costs.

## Monitoring, Maintenance, and Control Services

Musco shall monitor the performance of your lighting system, including on/off status, hours of usage, and lamp outages. If fixture outages that affect playability are detected, Musco will contact you and proactively dispatch technicians.

On-off control of your lighting system is provided via an easy-to-use web site scheduling system, phone, fax, or email. Our trained Control-Link Central™ staff is available toll-free 24/7. Regular usage reports are always available on Control-Link Central's web site.

## Spill Light Control

Spill light readings at identified locations are guaranteed to be controlled to the values provided in Musco's design documents for your project, shown in Exhibit B. Readings shall be within the Illumination Engineering Society of North America RP-6-01 standards of +/- 10% of the design criteria.

## Structural Integrity

Your project has been designed to _____ .
Structural integrity of equipment manufactured by Musco is guaranteed.

**Musco has a team of people to ensure fulfillment of our product and services warranty (Exhibit C) and maintains financial reserves dedicated to support our fulfillment of this warranty. Please keep this document as your signed contract guaranteeing comprehensive service for the 10-year period.**

# Musco Constant 10™

10-Year Product Assurance & Warranty Program

## Project Details

Project Name: _____ Project Number: _____

Owner: _____ City: _____ State: _____

Covered Product(s): _____

Date Issued: _____

Expiration: _____ or maximum hours of coverage noted below, whichever occurs first

Total Average kW per hour: _____ Total Maximum kW per hour: _____

Musco products and services are guaranteed to perform on your project as follows:

| Field/Zone | Fixture Quantity | Lamp Type/ Lamp Hours | Target Constant Light Level | Uniformity Max/Min | Total Relamps Included | Estimated Annual/10-Year Estimated Usage Hours | Maximum Hours of Coverage |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
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# Musco Constant 10™

## 10-Year Product Assurance & Warranty Program

## Terms and Conditions

Service under this Contract is provided by Musco Sports Lighting, LLC ("Musco") or an authorized servicer approved by Musco. Services performed under this Contract shall consist of furnishing labor and parts necessary to restore the operation of the Covered Product(s) to original design criteria provided such service is necessitated by failure of the Covered Product(s) during normal usage. This Contract covers Product(s) consisting of Musco's Green Generation Lighting® with Control-Link® and any additional Musco manufactured product as listed on page 2.

"We", "us," and "our" mean Musco. "You" and "your" mean the purchaser of the Covered Product(s). No one has the authority to change this Contract without the prior written approval of Musco. Musco shall not assume responsibility for their agents or assignees other than as described below. If there is a conflict between the terms of this Contract and information communicated either orally or in writing by one or more of our employees or agents, this Contract shall control.

### Additional Provisions

1. **Availability of Service:** Control-Link Central™ operators shall be available 24/7 via web site, phone, fax, or email. Maintenance service specialists shall be available 8AM to 5PM Central Time, and services shall be rendered during these same hours in your local time zone, Monday through Friday (with the exception of national holidays). Hours of operation are subject to change without notice to you. Musco will exercise all reasonable efforts to perform service under this Contract, but will not be responsible for delays or failure in performing such services caused by adverse weather conditions, acts of any government, failure of transportation, accidents, riots, war, labor actions or strikes or other causes beyond its control.

2. **Determination of Repairs:** Musco will utilize the field monitoring system and any information provided by the customer to determine when the usage of the field is materially impacted. From this information, Musco will determine needed repair and/or replacement of Covered Product(s) and parts. Repair will be with Product(s) of like kind and quality.

3. **Your Requirements Under this Contract:** You must meet all electrical and installation requirements as specified by the manufacturer. In addition, you promise and assure: full cooperation with Musco, Musco's technicians and authorized servicers during telephone diagnosis and repair of the Covered Product(s); reasonable accessibility of the Covered Product(s); a non-threatening and safe environment for service.

   You agree to check fuses and to replace fuses as needed. Musco provides spare fuses and a fuse puller in the lowest alpha-numeric numbered enclosure. Musco will replenish spare fuses used.

   You agree to keep your Green Generation Lighting system online. This means keeping the required control voltage to the control system at all times. Any deviation from this practice must be discussed with Musco's Warranty Department.

4. **Service Limitations — This Contract does not cover:** Maintenance, repair, or replacement necessitated by loss or damage resulting from any external causes such as, but not limited to, theft, environmental conditions, negligence, misuse, abuse, improper electrical/power supply, unauthorized repairs by third parties, attachments, damage to cabinetry, equipment modifications, vandalism, animal or insect infestation, physical damage to Covered Product(s) parts or components, failure of existing structures, supporting electrical systems or any non-Musco equipment, or acts of God/nature (including, but not limited to: earthquake, flood, tornadoes, typhoons, hurricanes, or lightning).

5. **Contract Limitations:**

   a. EXCLUSIONS FROM COVERAGE: IN NO EVENT WILL MUSCO BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES WHICH INCLUDE, BUT ARE NOT LIMITED TO, ANY DELAY IN RENDERING SERVICE OR LOSS OF USE DURING THE REPAIR PERIOD OF THE COVERED PRODUCT(S) OR WHILE OTHERWISE AWAITING PARTS.

   b. LIMITATION OF LIABILITY: To the extent permitted by applicable law, the liability of Musco, if any, for any allegedly defective Covered Product(s) or components shall be limited to repair or replacement of the Covered Product(s) or components at Musco's option. THIS CONTRACT IS YOUR SOLE EXPRESS WARRANTY WITH RESPECT TO THE COVERED PRODUCT(S). ALL IMPLIED WARRANTIES WITH RESPECT TO THE COVERED PRODUCT(S) INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY EXPRESSLY EXCLUDED.

   c. For the purposes of and by your acceptance of this Contract you acknowledge and agree that if a surety bond ("Bond") is provided the warranty and/or maintenance guarantee provided for in this Contract and any corresponding liability on behalf of the issuing surety under the Bond is limited to the first **twelve (12) months** of said warranty and/or maintenance guarantee coverage period. Any warranty and/or guarantee coverage period in excess of said initial 12 month period does not fall within the scope of the Bond and shall be the sole responsibility of Musco.

   d. Musco requires reasonable access for a crane or man lift equipment to service the lighting system. Musco will not be responsible for damage from operating the vehicle on the property when the equipment is operated in the prescribed manner over the designated access route.

6. **Transfer and Assignment:** Except to owners, you shall not have the right to assign or otherwise transfer your rights and obligations under this Contract except with the prior written consent of Musco; however, a successor in interest by merger, operation of law, assignment or purchase or otherwise of your entire business shall acquire all of your interests under this Contract.

7. **Governing Law:** Unless otherwise governed by applicable state law, the Contract shall be interpreted and enforced according to the laws of the State of Iowa.

8. **Subrogation:** In the event Musco repairs or replaces any Covered Product(s), parts or components due to any defect for which the manufacturer or its agents or suppliers may be legally responsible, you agree to assign your rights of recovery to Musco. You will be reimbursed for any reasonable costs and expenses you may incur in connection with the assignment of your rights. You will be made whole before Musco retains any amounts it may recover.

**Signature:** _____

**Vice President of Sales**

# Tab J

# Project References*

## Florida Projects

## Baseball

**Alfred A. McKethan Stadium**
Gainesville, FL

**Davis Park**
Ponte Vedra Beach, FL

**Deerfield Beach High School**
Deerfield Beach, FL

**Disney's Wide World of Sports™ Complex**
Spring training home of the MLB Atlanta Braves
Osceola County, FL

**Forest High School**
Ocala, FL

**Hammond Stadium**
Spring training home of the MLB Minnesota Twins
Fort Myers, FL

**L.A. Dodgers Spring Training Facility**
Dodgertown, FL

**Marchant Stadium**
Spring training home of the MLB Detroit Tigers
Lakeland, FL

**McKechnie Field**
Spring training home of the MLB Pittsburgh Pirates
Bradenton, FL

**Osceola County Stadium Complex**
Spring training home of the MLB Houston Astros
Kissimmee, FL

**Pat Thomas Baseball Field**
Leesburg, FL

**Roger Dean Stadium**
Spring training home of the MLB St. Louis Cardinals & Florida Marlins
Jupiter, FL

**University of Central Florida**
Orlando, FL

**University of South Florida**
Tampa, FL

## Basketball

**Amway Arena**
Home of the NBA Orlando Magic
Orlando, FL

**University of Florida**
O'Connell Center
Gainesville, FL

## Football

**Florida State University**
Doak Campbell Stadium and Practice football field
Tallahassee, FL

**Raymond James Stadium**
Home of the NFL Tampa Bay Buccaneers
Tampa Bay, FL

**University of Florida**
Ben Hill Griffin Stadium
Gainesville, FL

## Multi-Field

**Brian Piccolo Park**
Broward County, FL

**Cape Coral Multi-Field Complex**
Cape Coral, FL

**Carter Road Park**
14-Field Sports Complex
Polk County, FL

**Jupiter Community Park**
Jupiter, FL

**North Naples Regional Park**
Naples, FL

**Pasco Parks**
Regional Parks/Sports Complex
Pasco County, FL

**Patch Reef Park**
Boca Raton, FL

## Soccer

**Austin/Tindell Park**
Soccer Complex
Osceola County, FL

**Florida State University**
Women's Soccer Complex
Tallahassee, FL

**Kelly Road Community Park**
Soccer Complex
Lee County, FL

**University of Florida**
Percy Beard Stadium
Gainesville, FL

## Other

**Brevard County**
Brevard County, FL

**Broward County Public Schools**
Broward County, FL

**City of Pembroke Pines**
Pembroke Pines, FL

**City of Wellington**
Wellington, FL

**Daytona International Speedway**
2.5-mile Superspeedway
Daytona Beach, FL

**Florida State University**
Intramural fields
Tallahassee, FL

**Gadsden Park**
Tampa, FL

**Homestead Miami Speedway**
Miami, FL

**University of Florida**
Recreation Complex
Gainesville, FL

**University of Central Florida**
Student Recreational Facility
Orlando, FL

## Softball

**City of Maitland Softball Complex**
Maitland, FL

**Florida State University**
Women's Softball Complex
Tallahassee, FL

**Forest High School**
Ocala, FL

**Fort Meade Sports Complex**
Fort Meade, FL

**Seminole County**
5-Field Softball Complex
Altamonte Springs, FL

**University of Central Florida**
Orlando, FL

**University of Florida**
Softball Complex
Gainesville, FL

**Youngtown Sports Complex**
Panama City, FL

## Little League

**Whispering Pines Park**
Port St. Lucie, FL

*Partial listing

# Tab K

# UL Listing

UL Listed Under

Musco Sports-Lighting LLC
100 1st Ave W
PO Box 808
Oskaloosa, IA 52577

Underwriters Laboratories Inc.®
LISTED

| UL Category | Covers | UL Number |
|---|---|---|
| High-Intensity Discharge Surface-Mounted Luminaires | • SportsCluster Green™ and Light-Structure Green™ luminaires and remote ballast assemblies<br>• Sports Cluster® and SportsCluster-2® luminaires and remote ballast assemblies<br>• Light-Structure 2™ and Light-Structure System™ luminaires and remote ballast assemblies<br>• 1000 W Light-Pak™ and Light-Pak with Multi-Watt™ indoor luminaires<br>• 1000 W ShowLight™ and ShowLight Green™ with hooded light actuator system and remote ballast assemblies<br>• 2000 W Mirtran™ luminaire<br>• Stadium 2K Fixture™ 2000 W luminaire and Hot Restrike Green™ 2000 W hot restrike luminaire | E33316 |
| Management Equipment, Energy | Lighting control systems for<br>• Control-Link® Control and Monitoring System<br>• Control-Link Retrofit Control System | E139944 |

# UL Listing

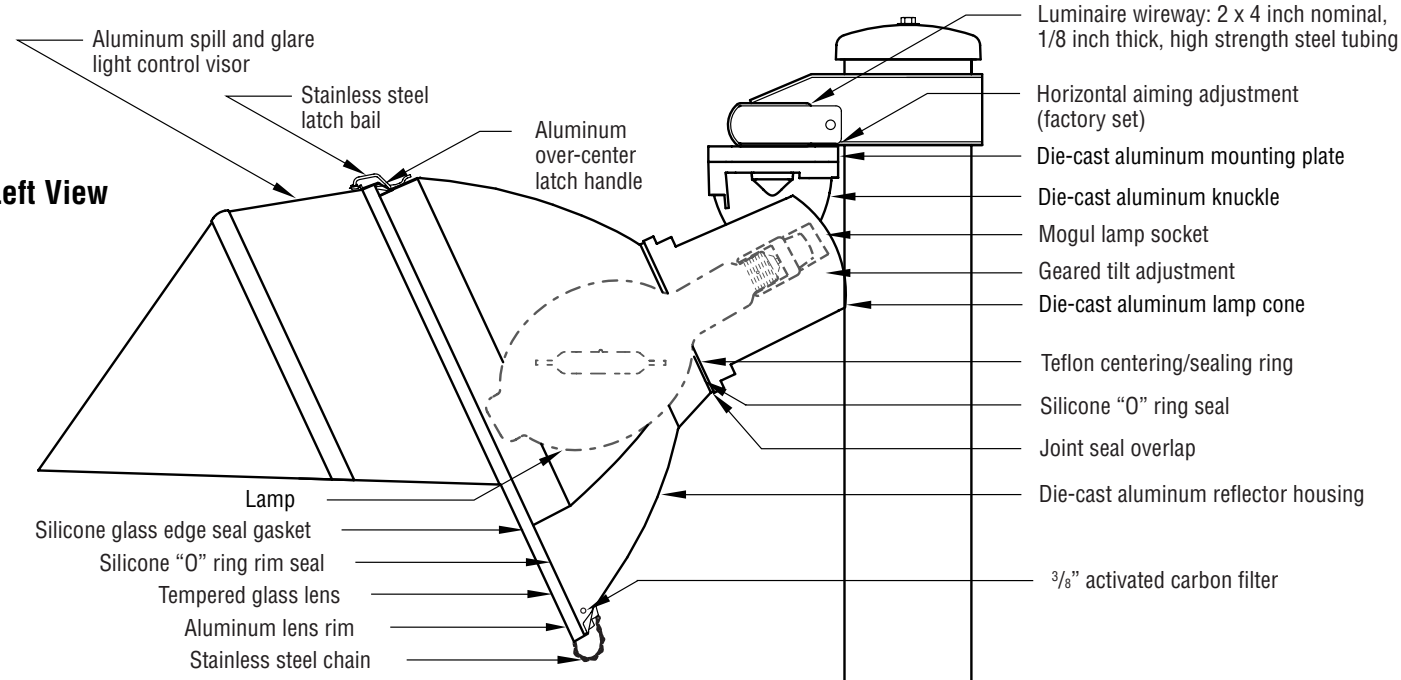
| UL Category | Covers | UL Number |
|---|---|---|
| Industrial Control Panels | Control panels and enclosures for<br>• Control-Link Control and Monitoring System<br>• Control-Link Retrofit Control System<br>• Lighting Contactor Cabinets<br>• Multi-Watt systems | E204954 |
| Emergency Lighting and Power Equipment | • Control-Link Automatic Transfer Switch (ATS CL) | R311491 |
| Luminaire Fittings | Galvanized steel poles 12 feet or less for<br>• Mirtran poles<br>• Rooftop poles<br>• Special applications | E132445 |
| Luminaire Pole in excess of 12 feet | Galvanized steel poles greater than 12 feet for<br>• Light-Structure Green System<br>• Light-Structure System<br>• Sportspole™ and special applications | E325078 |
| Devices, Scaffolding | Service platforms for<br>• Light-Structure Green System<br>• Light-Structure System<br>• SportsCluster Green System<br>• Sports Cluster System | SA7004 |

A copy of the UL Certificate of Compliance is available upon your request.

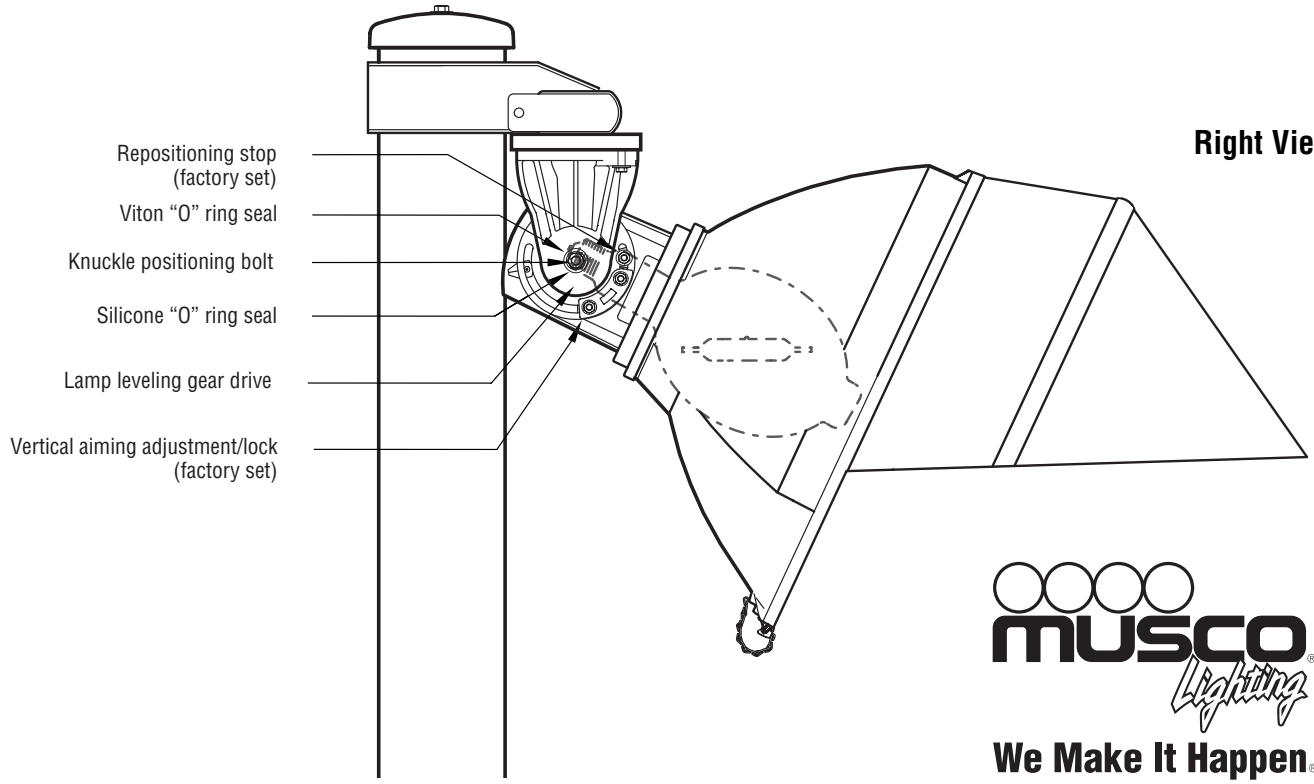
Light·Structure GREEN™

# Luminaire Assembly

## Left View




## Right View



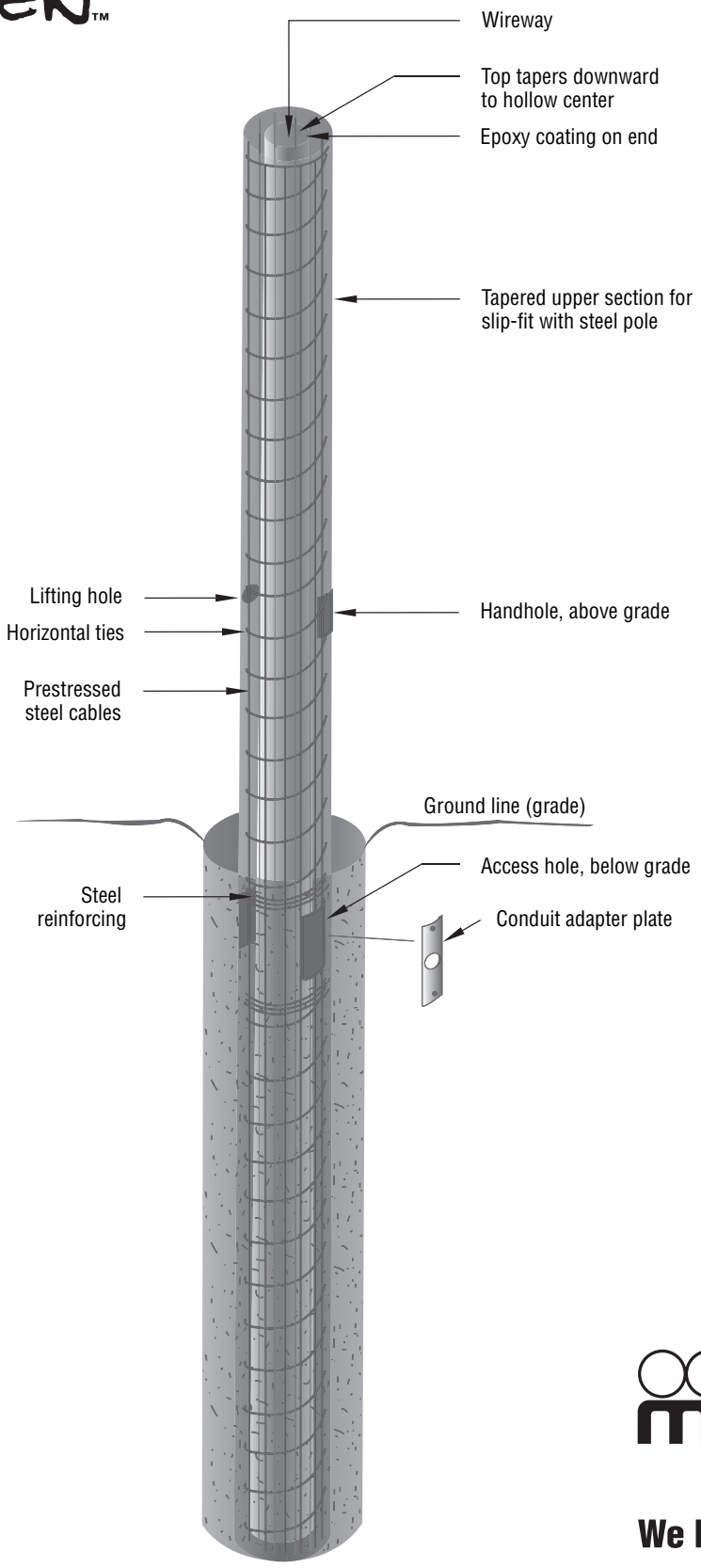

MUSCO Lighting®

**We Make It Happen®**

800/825-6030
www.musco.com
lighting@musco.com

Light·Structure GREEN™

# Pre-cast Concrete Base



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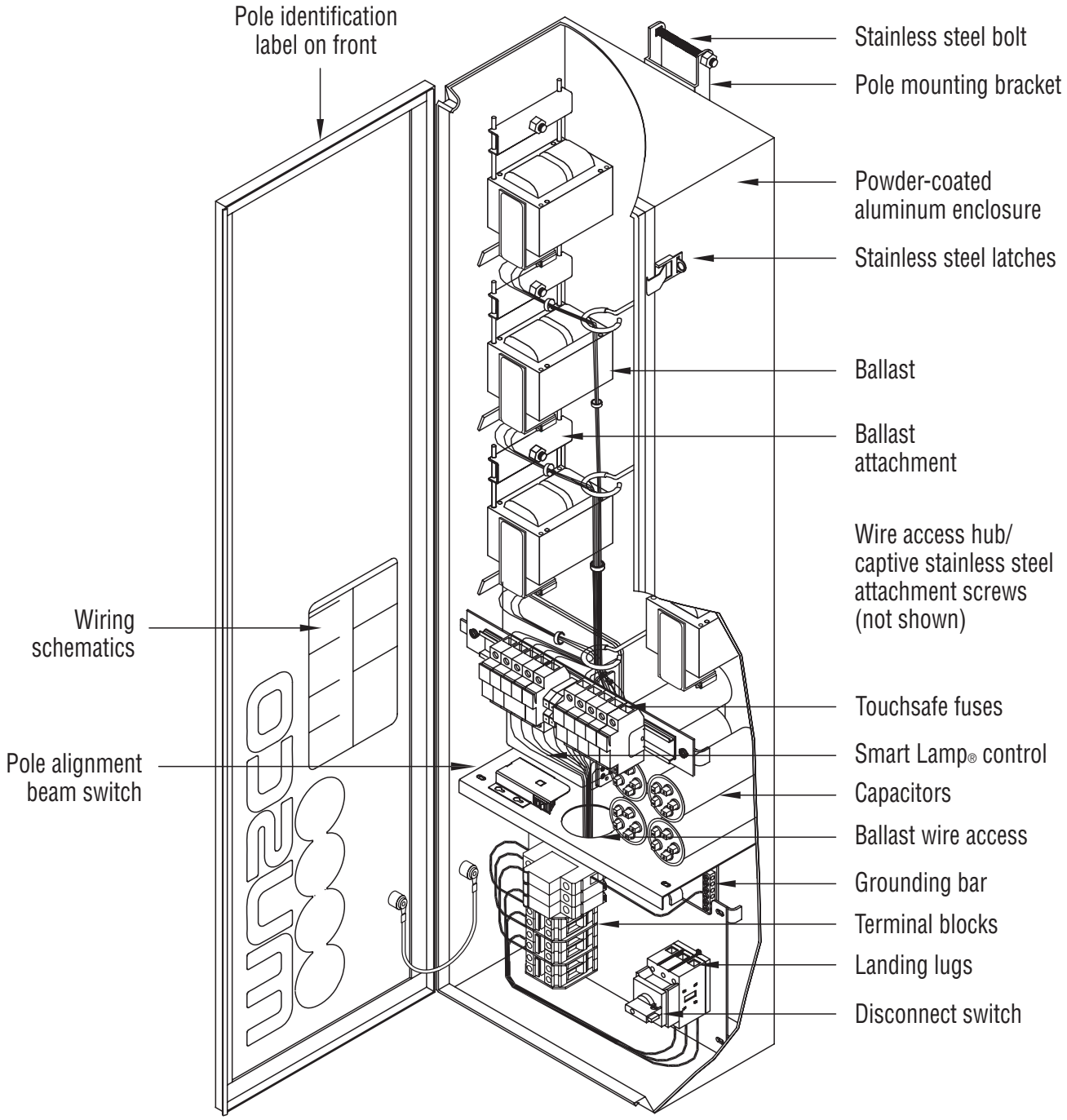
Light·Structure GREEN™

# Electrical Components Enclosure

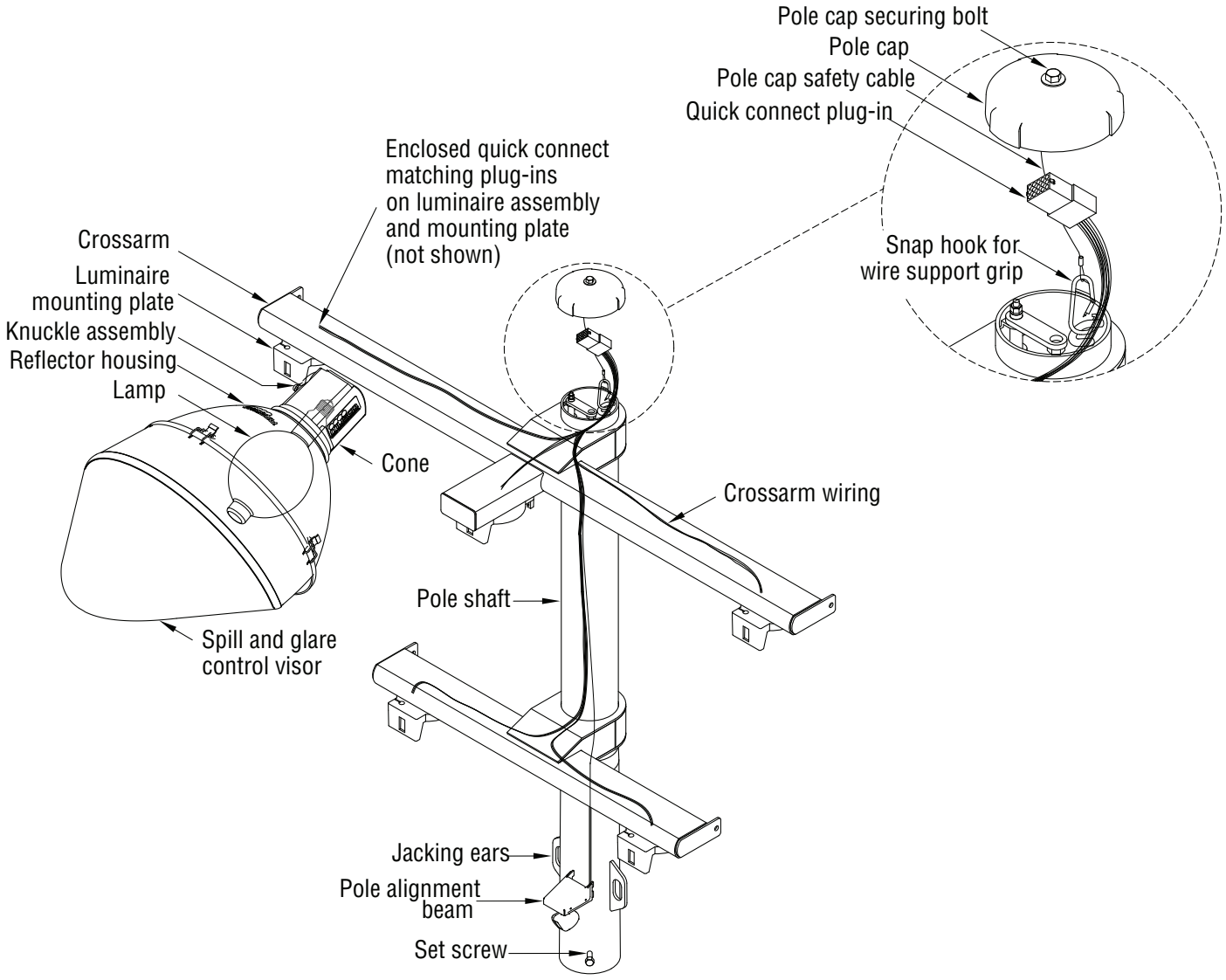



musco Lighting

www.musco.com
lighting@musco.com

Light·Structure GREEN™

# Poletop Luminaire Assembly



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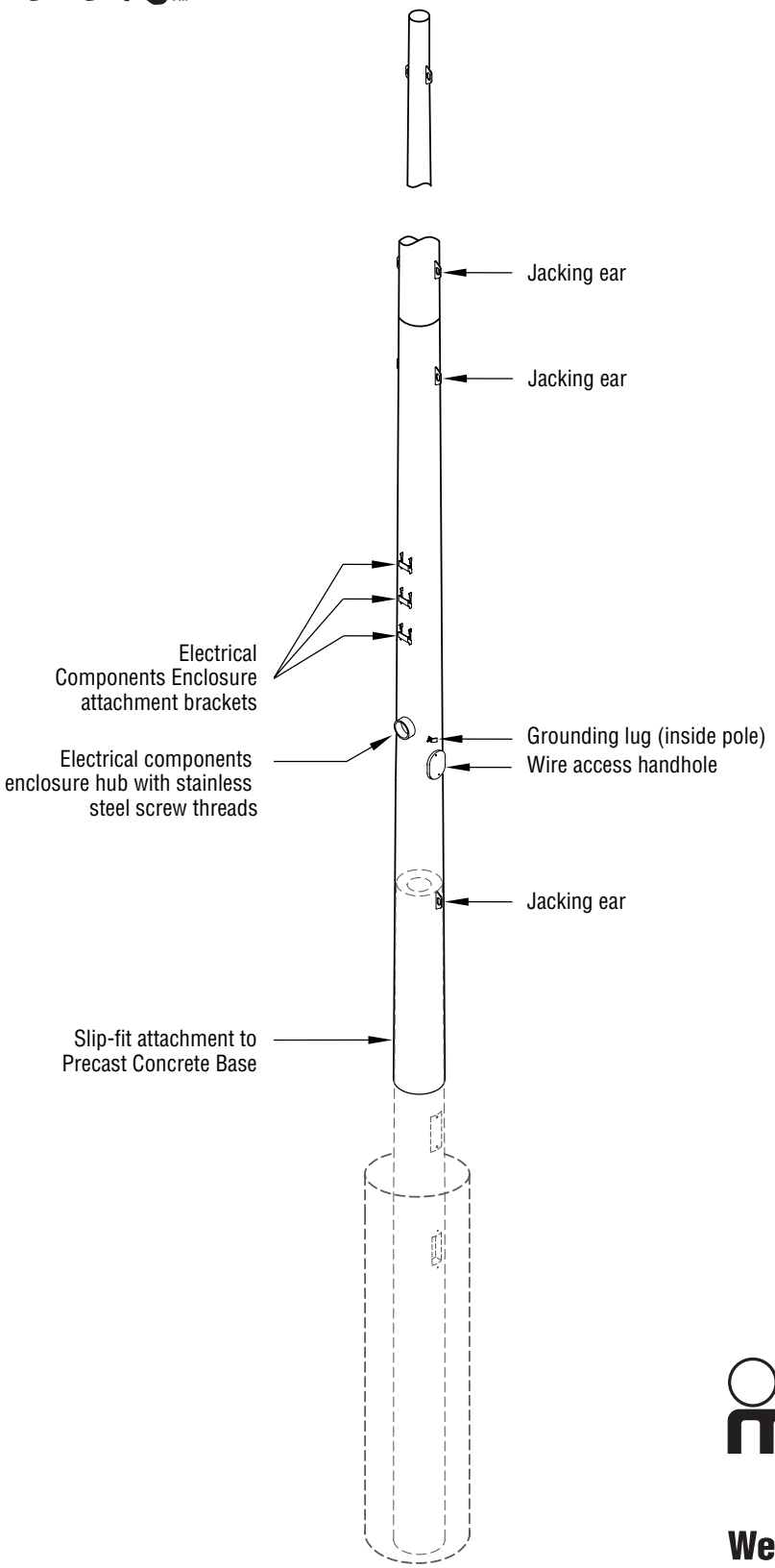
Light·Structure GREEN™

# Galvanized Steel Pole



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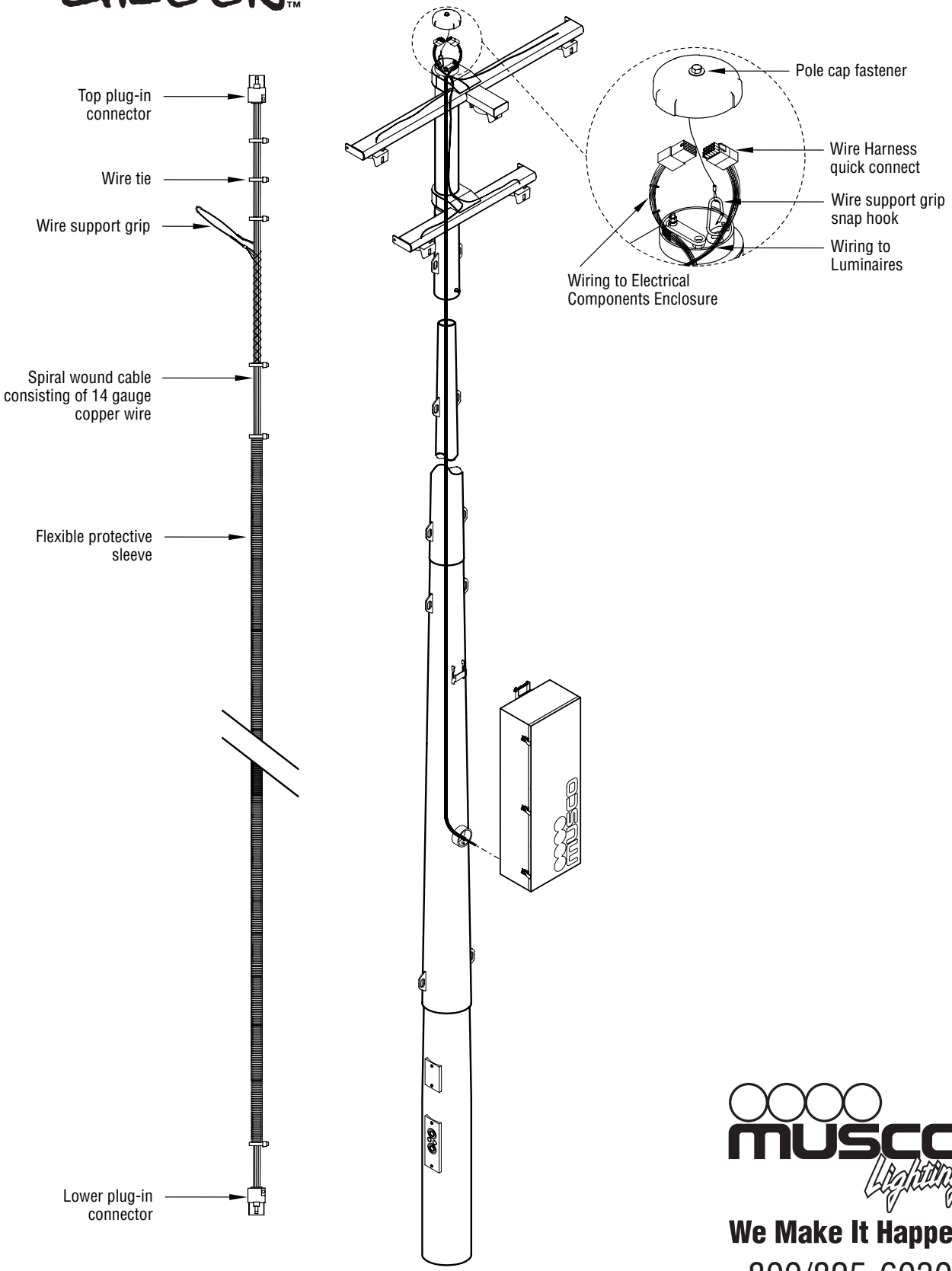
www.musco.com
lighting@musco.com

Light·Structure GREEN™

# Wire Harness



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800/825-6030
www.musco.com
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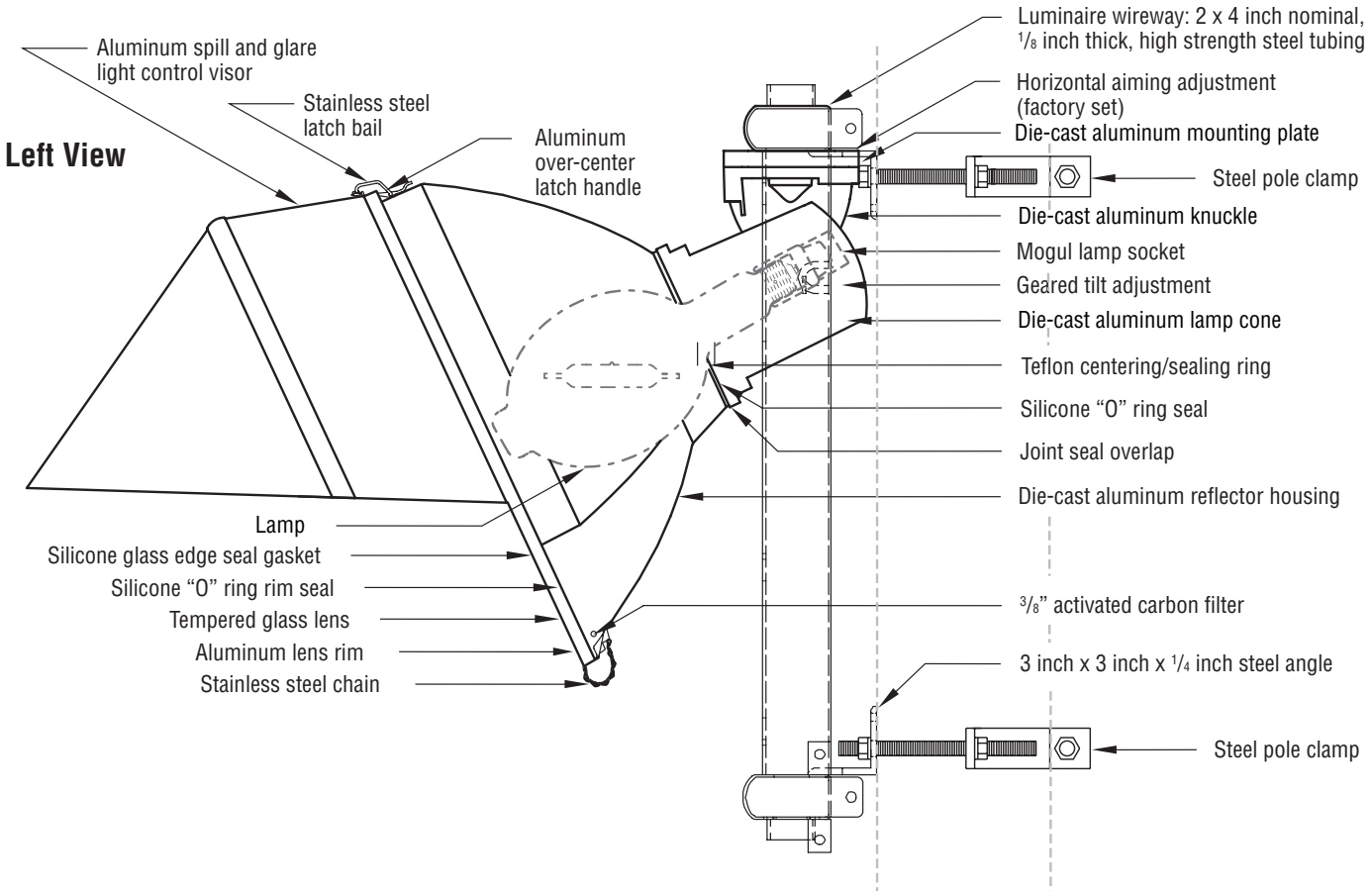
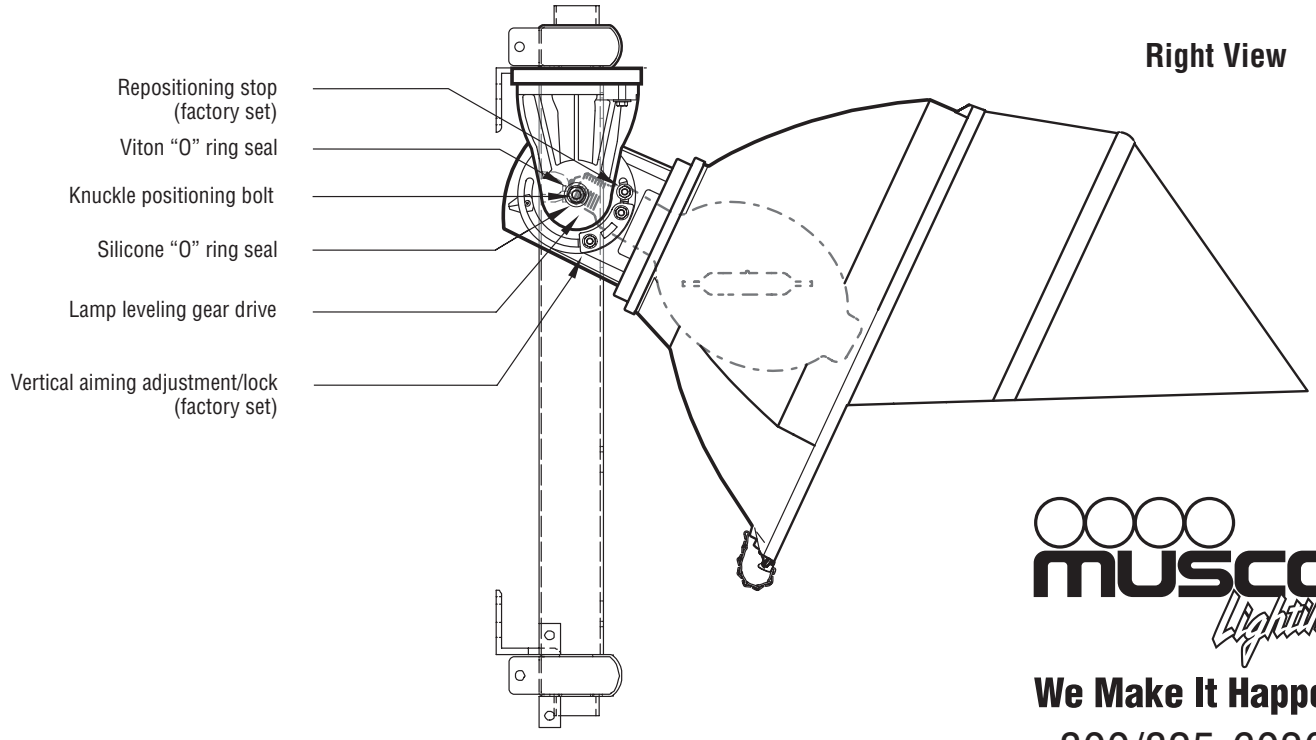
SportsCluster GREEN™

# Luminaire Assembly



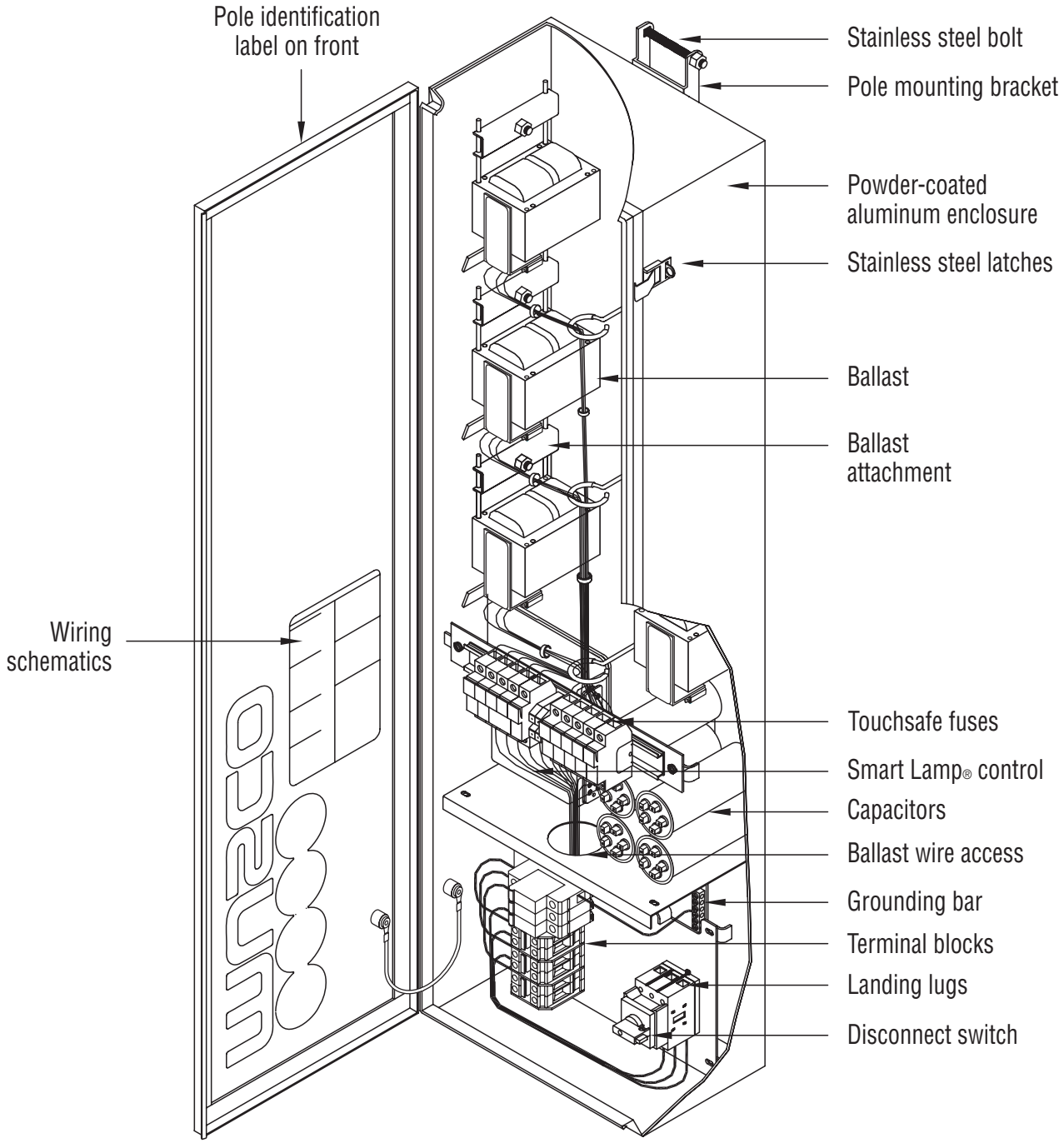




**We Make It Happen.**

800/825-6030
www.musco.com
lighting@musco.com

SportsCluster GREEN™

# Electrical Components Enclosure



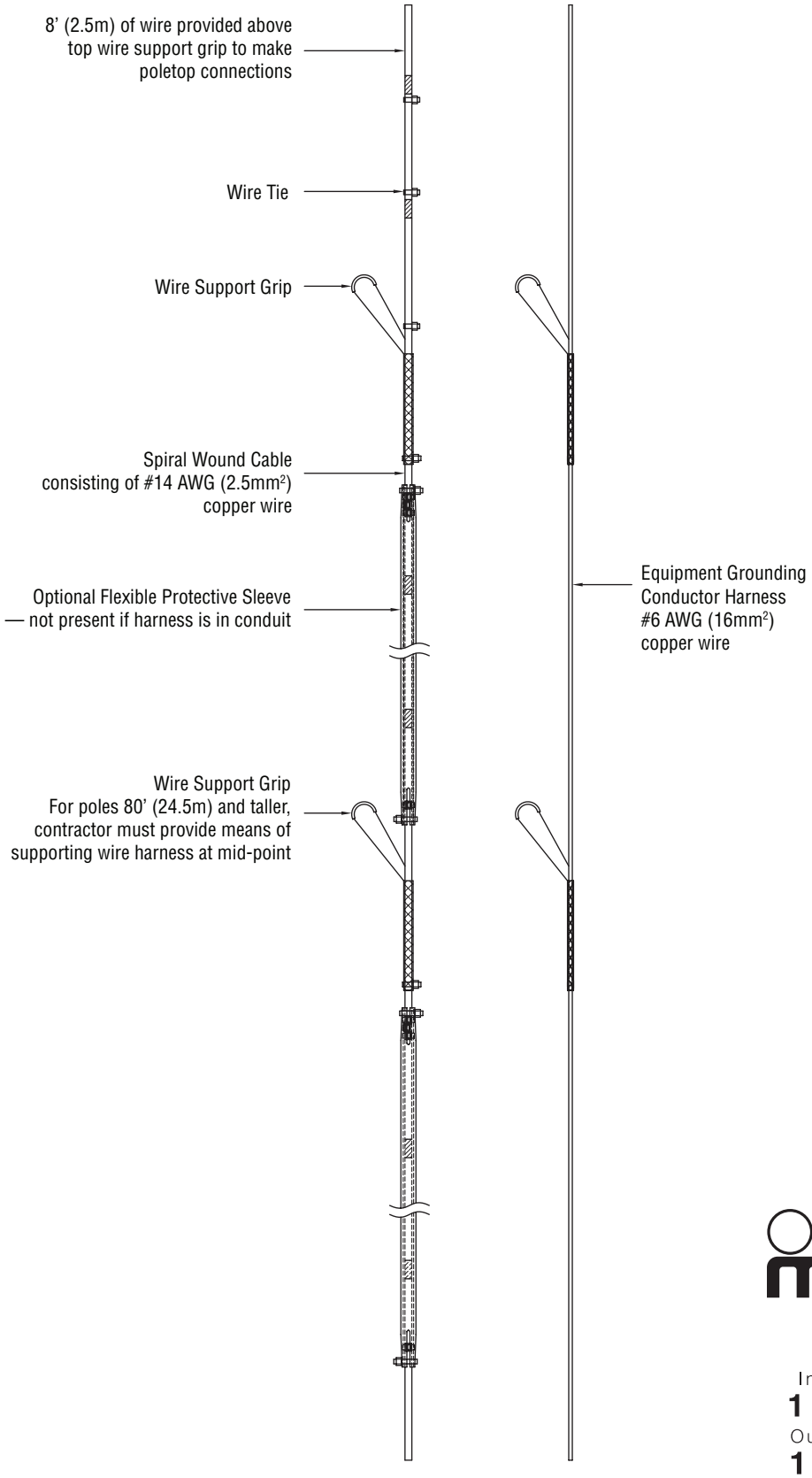

Patents issued and pending



www.musco.com
lighting@musco.com

SportsCluster GREEN™

# Wire Harness





Musco Lighting

Inside United States
**1 800 825 6030**
Outside United States
**1 641 673 0411**
**www.musco.com**
e-mail: lighting@musco.com

# Manufacturer's Certification of Corrosion Protection for Light-Structure Green™ and SportsCluster Green™

All exposed components are constructed of corrosion-resistant material and/or coated to protect against corrosion.

All exposed carbon steel is hot-dip galvanized, meeting ASTM A123 and ISO/EN 1461.

All exposed aluminum is powder coated with high-performance polyester or anodized. All exterior reflective inserts are anodized, coated with a clear, high-gloss, durable fluorocarbon, and protected from direct environmental exposure to prevent reflective degradation or corrosion.

All exposed hardware and fasteners are stainless steel of 18-8 grade or better, passivated, and coated with an aluminum based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Alternately, for hardware in non-stressed applications, an electroless nickel coating meeting ASTM B733 may be used. Pole strapping used to mount certain equipment to light poles is annealed stainless steel (grade 304) and passivated.

Certain structural fasteners are carbon steel, galvanized meeting ASTM A153 and ISO/EN 1461 (for hot-dip galvanizing), or ASTM B695 (for mechanical galvanizing).

Exposed custom designed or auxiliary equipment and hardware may not fully comply with the above statements.

Musco Sports Lighting, LLC

Greg Kubbe
Product Development Manager

# Enhanced Corrosion Protection for Light-Structure Green™ and SportsCluster Green™

Certain environmental conditions, such as those common in coastal regions, may accelerate the corrosion rate of equipment. Through careful selection of materials and specialized coatings, protection in these corrosive environments can be achieved.

Musco conducted over 150,000 hours of corrosion testing to study the effects of highly corrosive environments on the lighting system. Salt spray testing of aluminum components was conducted per ASTM B117 at an independent laboratory and Musco's in-house test chamber to evaluate various selections of alloys and coatings. All salt spray testing was conducted to minimum 3000 hours duration.

Evaluation of various installation sites was conducted to study actual field conditions.

The results of Musco's research and development provided for selection of materials and coating solutions that significantly outperform the control sample, which is representative of typical materials used in the lighting industry.

The following additional corrosion protection is provided on your equipment to protect against harsh environmental conditions in your area. The corrosion package includes Musco's standard protection as outlined in (SD-1045-2) Manufacturer's Certification of Corrosion Protection for Light-Structure Green and SportsCluster Green, plus the protection outlined below.

**Poletop Luminaire Crossarm Assembly**
Musco's poletop luminaire crossarm assembly is constructed of carbon steel and hot dip galvanized per ASTM A123. A proprietary galvanization process ensures minimum 5 mil average thickness.

**Exposed Die Cast Aluminum**
Exposed die cast aluminum components are constructed using low copper aluminum alloy that is Type II anodized per MIL-STD-8625 and sealed with proprietary coating prior to application of protective high performance polyester powder coating.

**Exposed Extruded Aluminum**
Exposed extruded aluminum components are constructed using low copper aluminum alloy that is Type II anodized per MIL-STD-8625 and coated with high performance polyester powder coating.

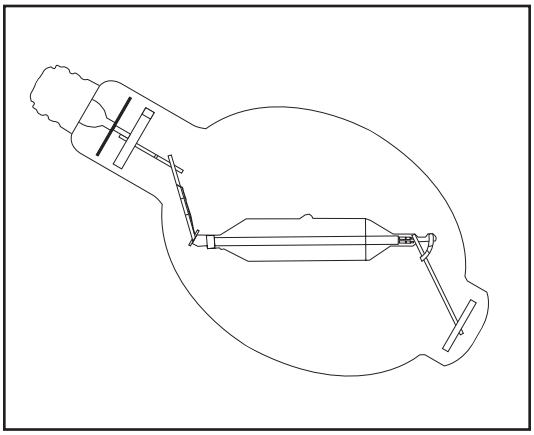
Musco Sports Lighting, LLC

Tim Boyle
Research and Development Manager

# Smart Lamp® Operating System

## 1500 Watt Metal Halide Lamp (Clear)
## Technical Data Sheet

Proprietary to Musco Lighting



## Ordering Information

| | |
|---|---|
| Ordering Code | LA-30Z-1 |
| ANSI Designation | M48 |
| Description | MH1500 MZ |
| Lamp Type | HID: Metal Halide |

## Physical Characteristics

| | |
|---|---|
| Bulb Size | BT-56 |
| Bulb Finish | Clear |
| Base | Mogul Screw Position Oriented |
| Maximum Overall Length (MOL) | 15⅜" (391mm) |
| Light Center Length (LCL) | 9⅛" (232mm) |
| Arc Tube Lighted Length | 3 5/16" (84mm) |
| Arc Tube Material | Fused Silica |
| Maximum Permissible Bulb Temperature | 400˚C (752˚F) |
| Maximum Permissible Base Temperature | 210˚C (410˚F) |

## Photometric Operating Characteristics[1]

| | |
|---|---|
| System Rated Constant Lumens Over Life [2] | 134,000 |
| Operating Position | Arc Tube Horizontal |
| Lamp Replacement Interval, Hours [3] | 5000 |
| Correlated Color Temperature (Approximate) | 4200K |
| CIE Chromaticity Coordinates (Approximate) | x-.370, y-.390 |
| Color Rendering Index ($R_a$) | 65-70 |

## Electrical Data

| | |
|---|---|
| Average Lamp Wattage Over Operating Life [2] | 1450 |
| Warm-up Time to 80% of Output | 3-5 Minutes |
| Re-strike Time for Hot Lamp | 10-15 Minutes |
| Lamp Operating Current (Max. rms Amps) | 6.0 |
| Ballast Type | ANSI M48 |
| Minimum Starting Temperature | -30˚C |

Footnotes:

(1) Operating Characteristics are per the Musco Smart Lamp(TM) Operating System on a commercial ballast with arc tube horizontal. Lamp lumen measurements in accordance with IESNA LM-51-00. Lamp color data in accordance with IESNA LM-58-94. Lamp operating cycle of five hours per start to reflect expected field use in the sports lighting industry.

(2) Lamp starts out at a reduced wattage and increases over life to offset lumen loss as lamp ages. Average wattage over life is 1450 watts.

(3) Beyond 5,000 hours is the time when constant lumens are no longer maintained by the Smart Lamp™ Operating System. Average lamp life before failure is substantially greater than 5,000 hours as tested and defined per IESNA LM-47-01 with five hours per start.

www.musco.com

## Recommended Warnings, Cautions and Operating Instructions

⚠ **WARNING:** These lamps can cause serious skin burn and eye inflammation from short wave ultraviolet radiation if outer envelope of the lamp is broken or punctured. Do not use where people will remain for more than a few minutes unless adequate shielding or other safety precautions are used. Certain lamps that will automatically extinguish when the outer envelope is broken or punctured are commercially available. This lamp complies with FDA radiation performance standard USA:21CFR 1040.30 Canada:SOR/DORS/80-381

**If the outer bulb is broken or punctured, turn off at once and replace the lamp to avoid possible injury from hazardous short wave ultraviolet radiation. Do not scratch the outer bulb or subject it to pressure as this could cause the outer bulb to crack or shatter. A partial vacuum in the outer bulb could cause glass to fly if the envelope is struck.**

⚠ **WARNING:** The arc tube of metal halide lamps are designed to operate under high pressure and at temperatures up to 1000˚C and can unexpectedly rupture due to internal or external factors such as a ballast failure or misapplication. If the arc tube ruptures for any reason, the outer bulb may break and pieces of extremely hot glass might be discharged into the surrounding environment. If such a rupture were to happen, **THERE IS A RISK OF PERSONAL INJURY, PROPERTY DAMAGE, BURNS AND FIRE.**

**RELAMP FIXTURES AT OR BEFORE THE END OF RATED LIFE. Allowing lamps to operate until they fail is not advised and may increase the possibility of inner arc tube rupture.**

**CAUTION:** TO REDUCE THE RISK OF PERSONAL INJURY, PROPERTY DAMAGE, BURNS AND FIRE RESULTING FROM AN ARC TUBE RUPTURE, THE FOLLOWING LAMP OPERATING INSTRUCTIONS MUST BE FOLLOWED.

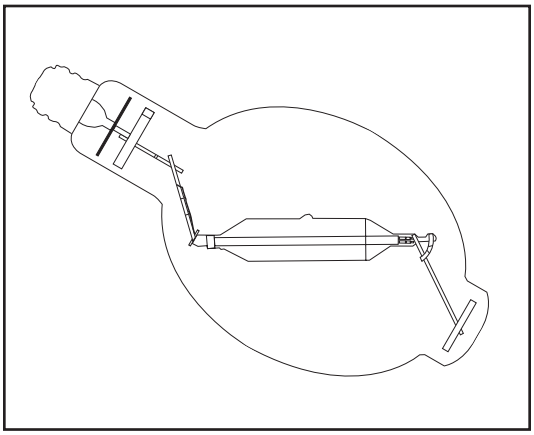
Hg - LAMP CONTAINS MERCURY
Manage in Accord with Disposal Laws
See www.lamprecycle.org or call 1-800-825-6020

## Lamp Operating Instructions:

1. Turn off lamps at least once a week for at least 15 minutes in systems which are operating on a continuous basis (24 hours/day-7days/week). FAILURE TO TURN OFF LAMPS FOR THE MINIMUM RECOMMENDED TIME MAY INCREASE THE POSSIBILITY OF AN INNER ARC-TUBE RUPTURE.
2. RELAMP FIXTURES AT OR BEFORE THE END OF RATED LIFE. Allowing lamps to operate until they fail is not advised and may increase the possibility of inner arc tube rupture.
3. Before lamp installation/replacement, shut power off and allow lamp and fixture to cool to avoid electrical shock and potential burn hazards.
4. To meet lamp performance, use only with Musco supplied equipment.
   A. Operate lamp with proper circuits and auxiliary equipment.
   B. Operate lamp only within specified limits of operation.
   C. For total supply load, refer to manufacturers electrical data.
5. Time should be allowed for lamps to stabilize in color when turned on for the first time. This may require several hours of operation, with more than one start. Lamp color is also subject to change under conditions of excess vibration or shock, and color appearance may vary between individual lamps.
6. Lamps may require 10 to 20 minutes to re-light if there is a power interruption.
7. Take care in handling and disposing of lamps. If an arc tube is broken, avoid skin contact with any of the contents or fragments.
8. Lamp is designed to operate per the Musco Smart Lamp® operating system. Performance when operated by a different lighting system is not guaranteed. Also note the following:
   - Do not use this lamp in a fixture that contains a pulse start metal halide ballast and is specifically designed for use with pulse start metal halide lamps.
   - Use only in an enclosed fixture capable of withstanding particles of glass having temperatures up to 1000° C.
   - If a lamp bulb support is used, be sure to insulate the support electrically to avoid possible decomposition of the bulb glass.
   - Protect lamp base, socket, and wiring against moisture, corrosive atmospheres, and excessive heat.

# Smart Lamp® Operating System

## 1000 Watt Metal Halide Lamp (Clear)
## Technical Data Sheet



## Ordering Information

| | |
|---|---|
| Ordering Code | LA-10Z |
| ANSI Designation | M47 |
| Description | MH1000 MZ |
| Lamp Type | HID: Metal Halide |

## Physical Characteristics

| | |
|---|---|
| Bulb Size | BT-56 |
| Bulb Finish | Clear |
| Base | Mogul Screw Position Oriented |
| Maximum Overall Length (MOL) | 15⅜" (391mm) |
| Light Center Length (LCL) | 9⅛" (232mm) |
| Arc Tube Lighted Length | 3 5/16" (84mm) |
| Arc Tube Material | Fused Silica |
| Maximum Permissible Bulb Temperature | 400˚C (752˚F) |
| Maximum Permissible Base Temperature | 210˚C (410˚F) |

## Photometric Operating Characteristics[1]

| | |
|---|---|
| System Rated Constant Lumens Over Life [2] | 88,000 |
| Operating Position | Arc Tube Horizontal |
| Lamp Replacement Interval, Hours [3] | 12,000 |
| Correlated Color Temperature (Approximate) | 4200K |
| CIE Chromaticity Coordinates (Approximate) | x-.370, y-.390 |
| Color Rendering Index ($R_a$) | 65-70 |

## Electrical Data

| | |
|---|---|
| Average Lamp Wattage Over Operating Life [2] | 1040 |
| Warm-up Time to 80% of Output | 3–5 Minutes |
| Re-strike Time for Hot Lamp | 10–15 Minutes |
| Lamp Operating Current (Max. rms Amps) | 4.0 |
| Ballast Type | ANSI M47 |
| Minimum Starting Temperature | -30˚C |

Footnotes:

(1) Operating characteristics are per the Musco Smart Lamp® Operating System on a commercial ballast with arc tube horizontal. Lamp lumen measurements in accordance with IESNA LM-51-00. Lamp color data in accordance with IESNA LM-58-94. Lamp operating cycle of five to ten hours per start.

(2) Lamp starts out at a reduced wattage and increases over life to offset lumen loss as lamp ages. Average wattage over life is 1040 watts.

(3) Beyond 12,000 hours is the time when constant lumens are no longer maintained by the Smart Lamp® Operating System. Average lamp life before failure is greater than 12,000 hours as tested and defined per IESNA LM-47-01 with five to ten hours per start.

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# Tab L

# Non-Compliance

City of Key West Retrofit
Ball Field Lighting Project
Key West, FL

Musco Lighting complies with specifications

# Tab M

City of Key West Retrofit
Ball Field Lighting Project
Key West, FL

# Musco Lighting complies with specifications

# Tab N

# Delivery

City of Key West Retrofit
Ball Field Lighting Project
Key West, FL

Musco Lighting shall deliver equipment to the job site
4-6 weeks after submittal approval
or release of order