French Park
Providence, RI

Lighting System

Pole/Fixture Summary

Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
A1-A2	60'	60'	3	TLC-LED-550	1.62 kW	A
		16'	1	TLC-BT-575	0.57 kW	A
B1-B2	70'	70'	4	TLC-LED-1200	4.68 kW	A
		16'	1	TLC-BT-575	0.57 kW	A
4			**18**		**14.90 kW**	

Circuit Summary

Circuit	Description	Load	Fixture Qty
A	Softball	14.90 kW	18

Fixture Type Summary

Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-BT-575	LED 5700K - 75 CRI	575W	52,000	>120,000	>120,000	>120,000	4
TLC-LED-1200	LED 5700K - 75 CRI	1170W	150,000	>120,000	>120,000	>120,000	8
TLC-LED-550	LED 5700K - 75 CRI	540W	67,000	>120,000	>120,000	>120,000	6

Single Luminaire Amperage Draw Chart

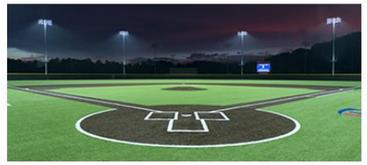
Driver Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
TLC-LED-1200	6.9	6.5	6.0	5.2	4.2	3.8	3.0
TLC-BT-575	3.3	3.2	2.9	2.5	2.0	1.8	1.5
TLC-LED-550	3.2	3.0	2.8	2.4	1.9	1.8	1.4

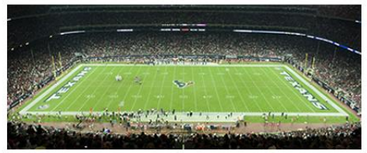
Light Level Summary

Calculation Grid Summary

Grid Name	Calculation Metric	Illumination Ave					Circuits	Fixture Qty
		Ave	Min	Max	Max/Min	Ave/Min		
Softball (Infield)	Horizontal Illuminance	31.96	24	38	1.55	1.31	A	18
Softball (Outfield)	Horizontal Illuminance	23.44	15	30	1.96	1.51	A	18
Spill at 150' (3')	Horizontal Illuminance	0.0595	0.00	0.14	215.683	91.650	A	18
Spill at 150' (5')	Max Candela Metric	11628.8447	218.94	30242.84	138.134	53.115	A	18
Spill at 150' (5')	Max Vertical Illuminance Metric	0.1711	0.00	0.42	204.651	83.593	A	18

From Hometown to Professional





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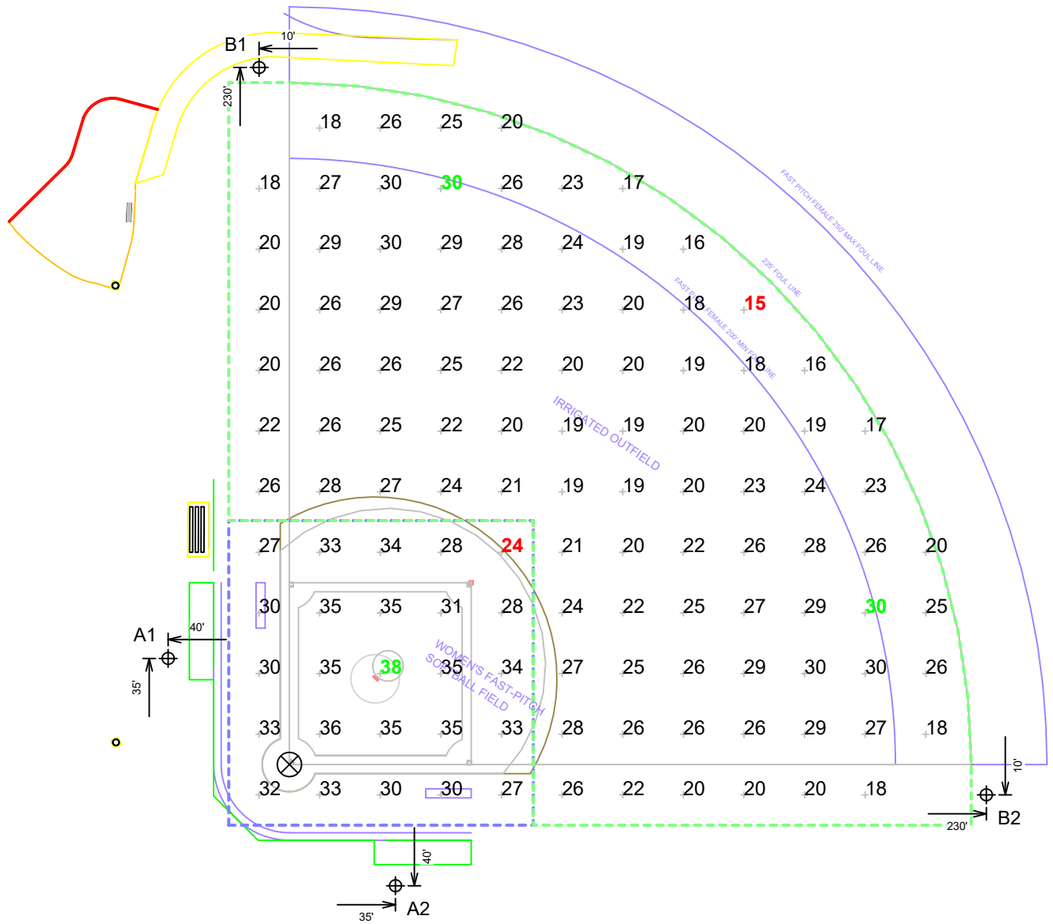
Equipment List For Areas Shown

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	ABOVE GRADE LEVEL	LUMINAIRE TYPE	QTY/POLE	THIS GRID	OTHER GRIDS
2	A1-A2	60'	-	60'	TLC-LED-550	3	3	0
				15.5'	TLC-BT-575	1	1	0
2	B1-B2	70'	-	70'	TLC-LED-1200	4	4	0
				15.5'	TLC-BT-575	1	1	0
4	Totals					18	18	0

*Above Grade level relative to the field



French Park

Providence, RI

Grid Summary

Name:	**Softball**
Size:	225'/225'/225' - basepath 60'
Spacing:	20.0' x 20.0'
Height:	3.0' above grade

Illumination Summary

MAINTAINED HORIZONTAL FOOTCANDLES

	Infield	Outfield
Guaranteed Average:	**30**	**20**
Scan Average:	31.96	23.44
Maximum:	38	30
Minimum:	24	15
Avg/Min:	1.31	1.51
Guaranteed Max/Min:	**2.5**	**3**
Max/Min:	1.55	1.96
UG (adjacent pts):	1.22	1.51
CU:	0.66	
No. of Points:	25	94
LUMINAIRE INFORMATION		
Applied Circuits:	A	
No. of Luminaires:	**18**	
Total Load:	14.90 kW	

Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document and includes a 0.95 dirt depreciation factor.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 50

0' 50' 100'

ENGINEERED DESIGN By: T.Lanphier • File #244443A • 16-Apr-25

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

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French Park

Providence, RI

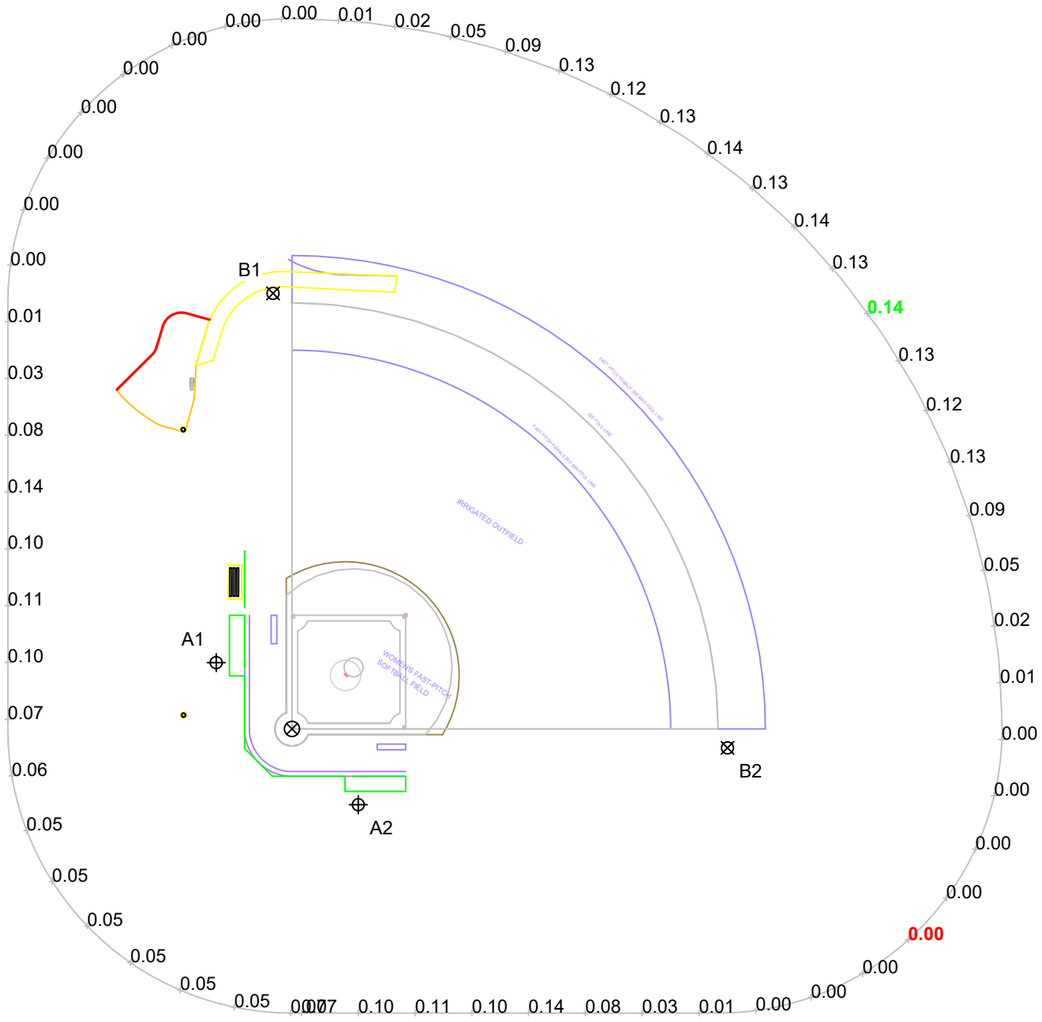
Grid Summary

Name:	**Spill at 150' (3')**
Spacing:	30.0'
Height:	3.0' above grade

Illumination Summary

INITIAL HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**0.0595**
Maximum:	0.14
Minimum:	0.00
CU:	0.00
No. of Points:	59
LUMINAIRE INFORMATION	
Applied Circuits:	A
No. of Luminaires:	**18**
Total Load:	14.90 kW



Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 80

0' 80' 160'

ENGINEERED DESIGN By: T.Lanphier • File #244443A • 16-Apr-25

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

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French Park

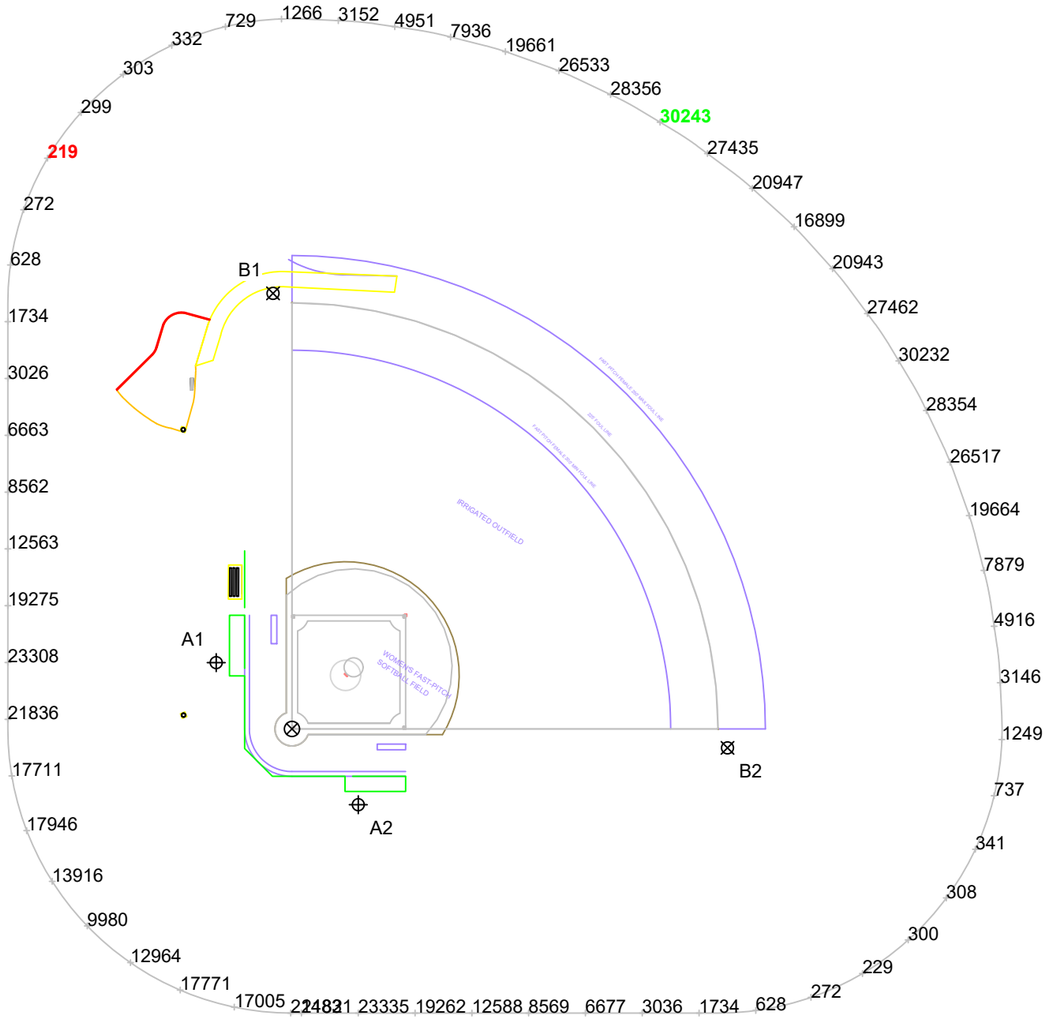
Providence, RI

Grid Summary

Name:	**Spill at 150' (5')**
Spacing:	30.0'
Height:	5.0' above grade

Illumination Summary

INITIAL CANDELA (PER FIXTURE)	
	Entire Grid
Scan Average:	**11628.8447**
Maximum:	30242.84
Minimum:	218.94
CU:	0.00
No. of Points:	59
LUMINAIRE INFORMATION	
Applied Circuits:	A
No. of Luminaires:	**18**
Total Load:	14.90 kW



Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 80

0' 80' 160'

ENGINEERED DESIGN By: T.Lanphier • File #244443A • 16-Apr-25

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

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French Park

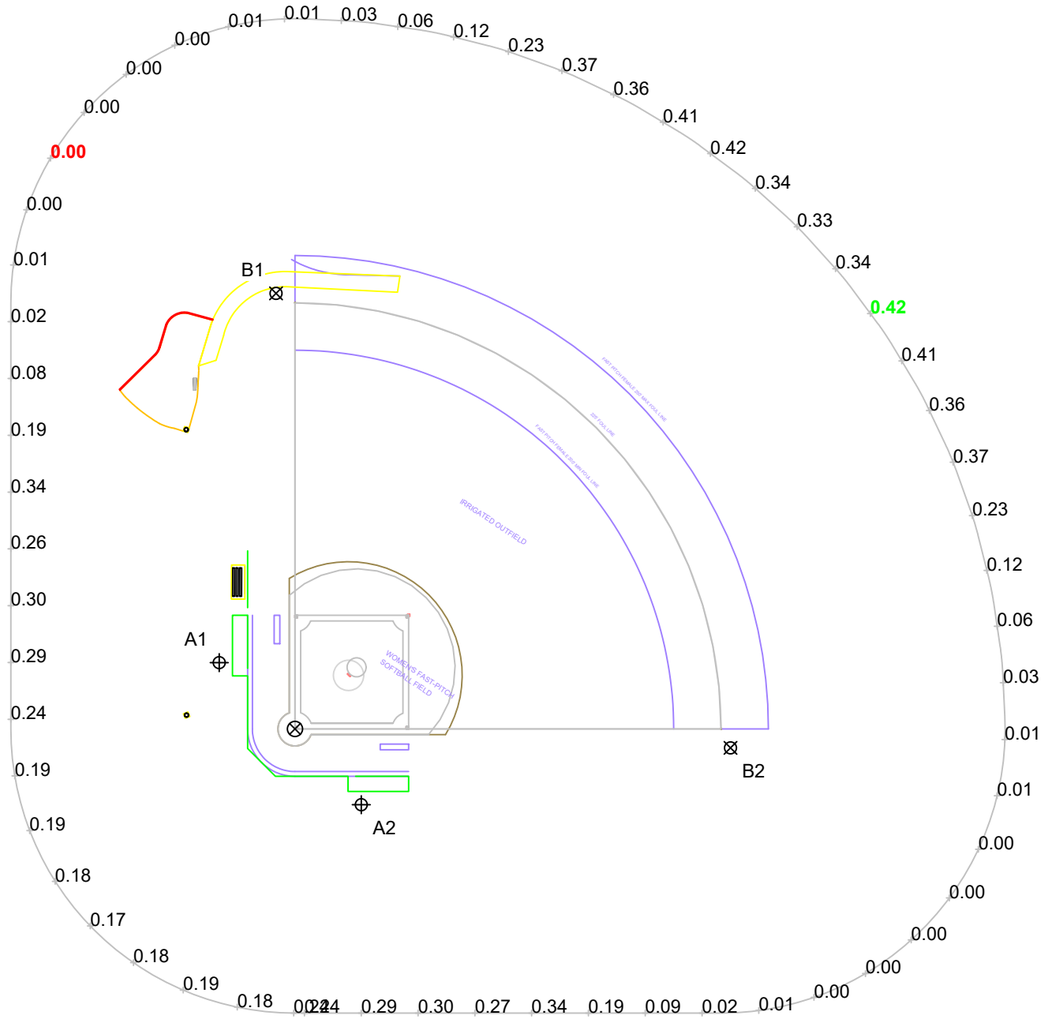
Providence, RI

Grid Summary

Name:	**Spill at 150' (5')**
Spacing:	30.0'
Height:	5.0' above grade

Illumination Summary

	INITIAL MAX VERTICAL FOOTCANDLES
	Entire Grid
Scan Average:	**0.1711**
Maximum:	0.42
Minimum:	0.00
CU:	0.00
No. of Points:	59
LUMINAIRE INFORMATION	
Applied Circuits:	A
No. of Luminaires:	**18**
Total Load:	14.90 kW



Guaranteed Performance: The ILLUMINATION described above is guaranteed per your Musco Warranty document.

Field Measurements: Individual field measurements may vary from computer-calculated predictions and should be taken in accordance with IESNA RP-6-15.

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 driver and structures located within 3 feet (1m) of design locations.

SCALE IN FEET 1 : 80

0' 80' 160'

ENGINEERED DESIGN By: T.Lanphier • File #244443A • 16-Apr-25

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

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French Park

Providence, RI

Equipment Layout

INCLUDES:
· Softball

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

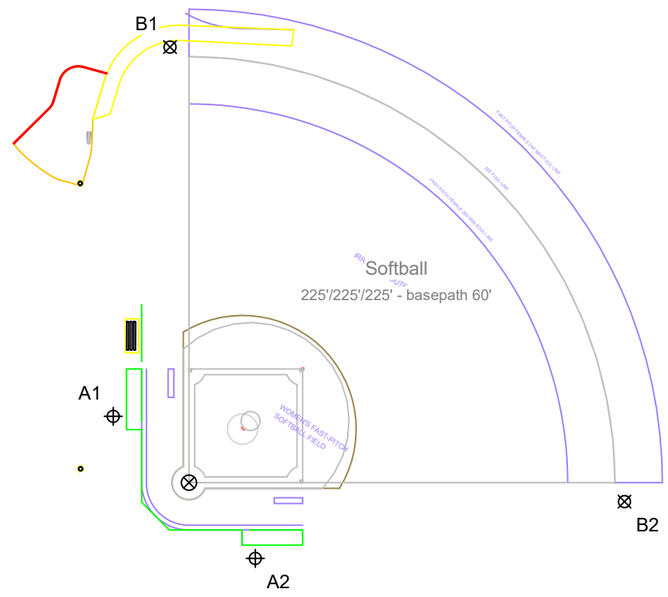
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

Equipment List For Areas Shown

Pole				Luminaires		
QTY	LOCATION	SIZE	GRADE ELEVATION	ABOVE GRADE LEVEL	LUMINAIRE TYPE	QTY/POLE
2	A1-A2	60'	-	60' 15.5'	TLC-LED-550 TLC-BT-575	3 1
2	B1-B2	70'	-	70' 15.5'	TLC-LED-1200 TLC-BT-575	4 1
4	Totals					18

Single Luminaire Amperage Draw Chart

Driver Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
TLC-LED-1200	6.9	6.5	6.0	5.2	4.2	3.8	3.0
TLC-BT-575	3.3	3.2	2.9	2.5	2.0	1.8	1.5
TLC-LED-550	3.2	3.0	2.8	2.4	1.9	1.8	1.4



SCALE IN FEET 1 : 80

0' 80' 160'

ENGINEERED DESIGN By: T.Lanphier • File #244443A • 16-Apr-25

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

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PRELIMINARY FOUNDATION AND POLE ASSEMBLY DRAWING

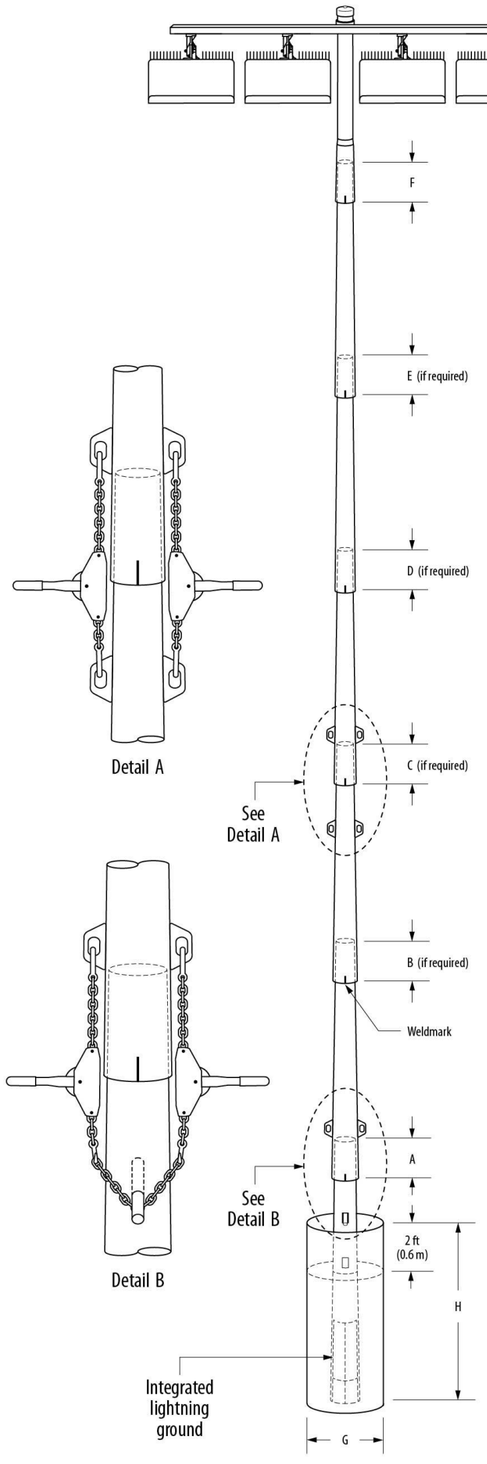


TABLE 1: POLE ASSEMBLY			
POLE ID	POLE HEIGHT ft (m)	# OF LUMINAIRES	ASSEMBLED POLE WEIGHT [3] lb (kg)
A1	60 (18.3)	4	992 (450)
A2	60 (18.3)	4	992 (450)
B1	70 (21.3)	5	1562 (709)
B2	70 (21.3)	5	1562 (709)

Pole Assembly Notes:

1. Steel pole should overlap concrete base and be seated tight with 1 1/2 ton come-alongs (contractor provided).
2. Align weldmarks on steel sections before assembling.
3. Assembled pole weight includes steel sections, crossarms, luminaires, and electrical components enclosures. If pole has stamped structural design then use pole weight (listed as vertical force) on stamped structural design document.
4. Section overlap must be pulled together until tight. Overlap measurement should be +/- 6 in (150 mm).
5. This document is not intended for use as an assembly instruction. See *Installation Instructions: Light-Structure System™ Lighting System* for complete assembly procedure.

TABLE 2: FOUNDATION DETAILS							
POLE ID	CONCRETE BASE WEIGHT lb(kg)	BURIAL INFORMATION [3,4] G in (mm)	H ft (m)	CONCRETE BACKFILL [1,2] yd³ (m³)	CUT BASE	LIGHTNING GROUND [5] TYPE	SUPPLEMENTAL INSTRUCTION
A1	1870 (848)	30 (762)	10 (3.0)	1.2 (0.9)	NO	INTEGRATED [6]	N/A
A2	1870 (848)	30 (762)	10 (3.0)	1.2 (0.9)	NO	INTEGRATED [6]	N/A
B1	2740 (1243)	30 (762)	12 (3.7)	1.5 (1.1)	NO	INTEGRATED [6]	N/A
B2	2740 (1243)	30 (762)	12 (3.7)	1.5 (1.1)	NO	INTEGRATED [6]	N/A

Foundation Notes:

1. Concrete backfill is calculated to 2 ft (0.6m) below grade (no overage included). Top 2 ft (0.6m) to be class 5 soil compacted to 95% density of surrounding undisturbed soil unless otherwise specified in stamped structural design.
2. Concrete backfill required 3000 lb/in² (20 MPa) minimum.
3. Foundation design per 2018 IBC, 130 mph, exposure category C, variation STD (Risk Category II).
4. Assumes IBC class 5 soils.
5. Standard bases include integrated lightning protection. If bases are cut, supplemental lightning protection is required. Contact Musco for materials and instruction.
6. Lightning protection is a manufacturer installed concrete encased electrode and connector. Ground connection is made when concrete base is installed and footing is poured. No additional steps required.

R60-62-00-en04-01_B

French Park - Providence, RI, USA

Date: 05/08/2025 Scale: Not to Scale

Representative: Alan Grady Page: 1 of 1

Project: 244443 PRELIMINARY

System Requirements: Control System Summary

Project Name: French Park | Project #: 244443
Control System ID: 1 of 1
Distribution Panel Location/ID: French Park

Project Information

Control System

Control System ID:	1 of 1
Control System Type:	Control-Link® Control and Monitoring System
Communication Type:	PowerLine-ST

Power Requirements

Control cabinet(s):	
Control voltage (phase to neutral)	120/60
VA loading - Inrush	1553.0
VA loading - Sealed	180.0
Lighting Circuits:	
Voltage/Hertz/Phase	480/60/3

Project Notes:

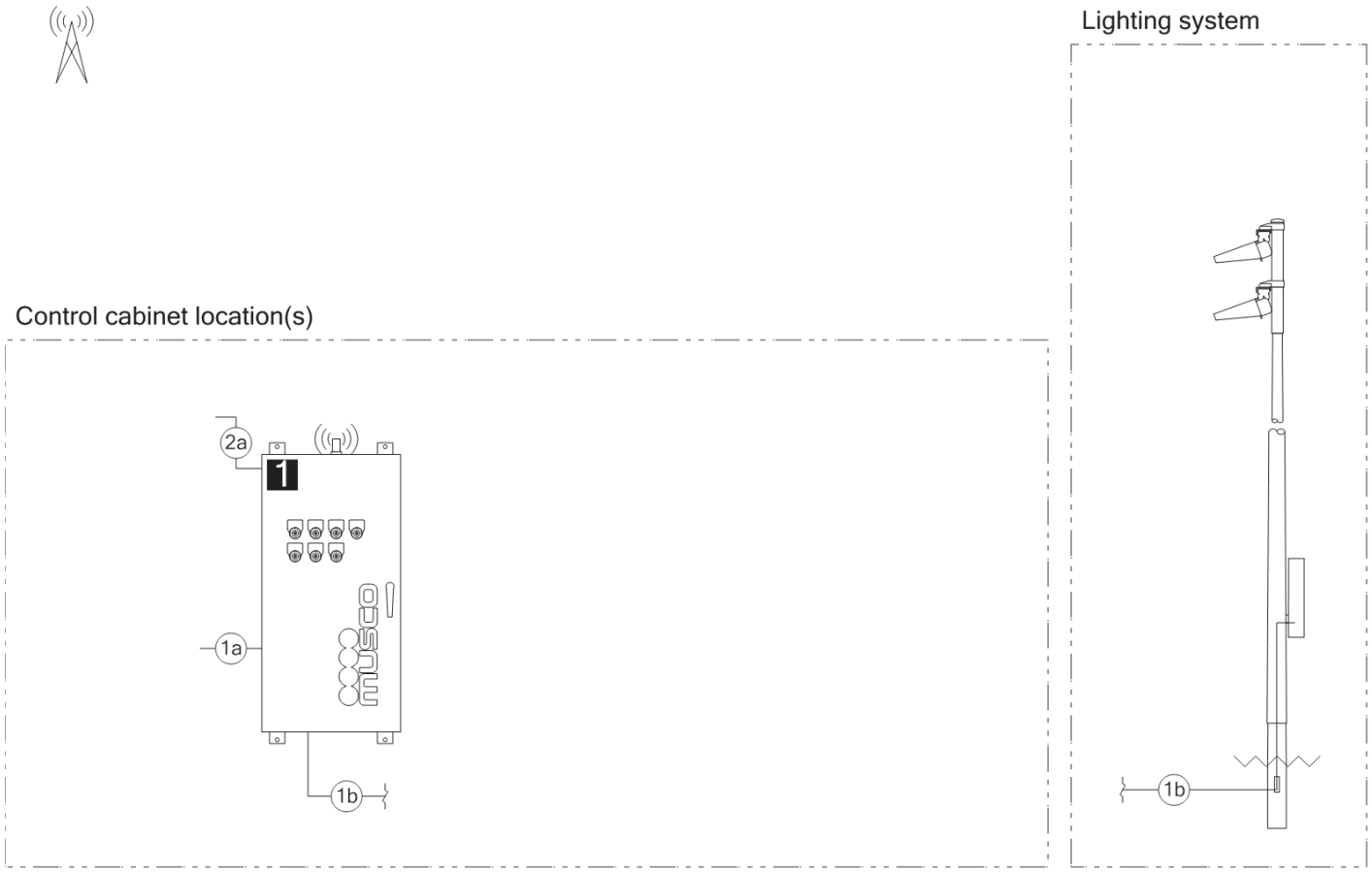
Equipment Listing

Description	Qty	Size (in)
Control and monitoring cabinet - primary	1	24 X 48
Contactors, 30 amperes	4	-
Off/On/Auto switches	1	-

Important Notes:

1. Please confirm that the lighting circuit voltage listed above is accurate for this facility. This is the voltage/phase being connected and utilized at each lighting pole's electrical components enclosure disconnect. Inaccurate 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 location. Musco's single phase luminaires come pre-wired to utilize all 3 phases across the entire facility.
3. One contactor is required for each circuit at each pole location. Contactors are 3 pole and 100% rated for the published continuous load.
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. Size overcurrent devices using the full load amps column of the Circuit Summary by Switch chart (Minimum power factor is 0.9). Size conduit per code unless otherwise specified as larger to allow for harness connectors.
6. Avoid use of in-ground junction/pull boxes when possible. If used, the following best practices must be followed:
   • Underground handholes (pull boxes) must be supported to prevent settling. Boxes buried directly in soil, without support, are not allowed.
   • Use polymer concrete lids marked with ELECTRIC for underground handholes. Steel lids are not allowed.
   • Avoid underground connections when possible. If used, all wire connectors must be UL listed for Wet Locations to prevent leakage current.
7. Control power wiring must be in separate conduit from line or load power wiring. Communication cables must be in separate conduit from any power wiring.
8. Test wire per ANSI/NETA ATS-2021. Wires with insulation resistance less than 100 MOhms, in water-filled conduit, must be replaced.
9. Refer to Installation Instructions for more details on equipment information and the installation requirements.

Equipment Layout and Connection Details



Connection Details	
ID	**Description**
1a	Line power to contactors, and equipment grounding conductor. Requires one circuit per contactor, size wiring per load and voltage drop.
1b	Load power from contactors, and equipment grounding conductor. Requires one circuit per contactor, size wiring per load and voltage drop.
2a	Control power with equipment ground to control cabinet. Requires dedicated 20 A circuit. Provide transformer if control voltage not present.

Equipment	
ID	**Description**
1	Control and monitoring cabinet - primary

Circuit Summary

Switching Schedule	
Field/Switch Description	**Switches**
Softball	1

Control Module ID: 1

Lighting Circuit Voltage: 480/60/3

Circuit Summary by Switch							
Switch	**Zone Description**	**Pole ID**	**Qty of Fixtures**	**Full load amperes**	**Contactor Size (Amps)**	**Cabinet #**	**Contactor ID**
1	Softball	A1	4	3.66	30	1	C1
	Softball	A2	4	3.66	30	1	C2
	Softball	B1	5	9.05	30	1	C3
	Softball	B2	5	9.05	30	1	C4

LIGHTING SPECIFICATION
PREPARED FOR

Iola French Park

Softball Lighting Project
Providence, Rhode Island
April 16, 2025

Project # 244443

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

SECTION 26 56 68 – EXTERIOR ATHLETIC LIGHTING

Lighting System with LED Light Source

PART 1 – GENERAL

1.1 SUMMARY

A. Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.

B. The purpose of these specifications is to define the lighting system performance and design standards for French Park Softball using an LED Lighting source. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.

C. The sports lighting will be for the following venues:

1. Softball

D. The primary goals of this sports lighting project are:

1. Guaranteed Light Levels: Selection of appropriate light levels impacts the safety of players and the enjoyment of spectators. Therefore, light levels are guaranteed to not drop below specified target values for a period of 25 years.
2. Environmental Light Control: It is the primary goal of this project to minimize spill light to adjoining properties and glare to players, spectators, and neighbors.
3. Cost of Ownership: To reduce the operating budget, the preferred lighting system shall be energy efficient and cost effective to operate. All maintenance costs shall be eliminated for the duration of the warranty.
4. Control and Monitoring – To allow for optimized use of labor resources and avoid unneeded operation of the facility, customer requires a remote on/off control system for the lighting system. Fields should be proactively monitored to detect luminaire outages over a 25-year life cycle. All communication and monitoring costs for 25-year period shall be included in the bid.
    a. Control and monitoring system shall provide contactor control of all existing circuits. Key switches shall be provided to provide field-level control of existing circuit groups.

1.2 ONFIELD LIGHTING PERFORMANCE

A. Illumination Levels and Design Factors: Playing surfaces shall be lit to an average target illumination level and uniformity as specified in the chart below. Lighting manufacturers will provide a guarantee that light levels will be sustained over the life of the warranty period. Lighting calculations shall be developed, and field measurements taken on the grid spacing with the minimum number of grid points specified below.

Manufacturers will provide lumen maintenance data of the LED luminaires used per TM-21-11 and will Incorporate the lumen maintenance projections into the lighting designs to ensure target light levels are achieved throughout the guaranteed period of the system. Per IES guidelines, lumen maintenance hours should be reported based on the 6x multiplier of testing hours.

Area of Lighting	Average Target Illumination Levels	Maximum to Minimum Uniformity Ratio	Grid Points	Grid Spacing
Softball Infield	30 footcandles	2.5:1.0	25	20’ x 20’
Softball Outfield	20 footcandles	3.0:1.0	94	20’ x 20’

B. Color Temperature: The lighting system shall have a minimum color temperature of 5700K and a CRI of 75.

C. Playability: Lighting design and luminaire selection should be optimized for playability by reducing

glare onfield and providing sufficient uplight.

1. Aiming Angles: To reduce glare, luminaire aiming should ensure the top of the luminaire field angle (based on sample photometric reports) is a minimum of 10 degrees below horizontal.
2. Glare Control Technology – Luminaires selected should have glare control technology including, but not limited to: external visors, internal shields and louvres. No symmetrical beam patterns are acceptable.
3. Aerial lighting – Adequate illumination must be provided above the field to see the ball in flight. It is recommended that a lighting analysis be performed above the field of play to evaluate the visibility of the ball over its typical trajectory to ensure the participants will adequately see the ball. Calculation planes should be evaluated up to the maximum anticipated height for the level of play.
4. Mounting Heights: To ensure proper aiming angles, minimum mountings heights shall be as described below. Higher mounting heights may be necessary for luminaire with lesser glare control to meet field angle requirements of section 1.2.C.1.

# of Poles	Pole Designation	Pole Height
2	A1 – A2	60’
2	B1 – B2	70’

1.3 ENVIRONMENTAL LIGHT CONTROL

A. Light Control Luminaires: All luminaires shall utilize spill light and glare control devices including, but not limited to, internal shields, louvers, and external shields. No symmetrical beam patterns are accepted.

B. Spill Light and Glare Control: To minimize impact on adjacent properties, spill light and candela values must not exceed the following levels taken at 3 feet above grade.

Specified Spill Line – 150’ From Field Edge	Average	Maximum
Horizontal Footcandles	0.1 fc	0.2 fc
Vertical Footcandles	0.2 fc	0.5 fc
Max Candela (taken at 5 ft above grade)		32,000 cd

C. Spill Scans: Spill scans must be submitted indicating the amount of horizontal and vertical footcandles along the specified lines. Light levels shall be provided in 30-foot intervals along the boundary line at 3 ft above grade.

D. Sample Photometry: The first page of a photometric report for all luminaire types proposed showing horizontal and vertical axial candle power shall be provided to demonstrate the capability of achieving the specified performance. Reports shall be certified by a qualified testing laboratory with a minimum of five years experience or by a manufacturer’s laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products. A summary of the horizontal and vertical aiming angles for each luminaire shall be included with the photometric report.

E. Field Verification: Lighting manufacturer shall supply field verification of environmental light control using a meter calibrated within the last 12 months:
   1. Spill verification: Illumination levels shall be taken in accordance with IESNA RP-6-22. The light sensing surface of the light meter should be held 36 inches above the playing surface with the sensing surface horizontal (for horizontal readings) or vertically pointed at the brightest light bank (for max vertical readings)

PART 2 – PRODUCT

2.1 SPORTS LIGHTING SYSTEM CONSTRUCTION

A. Manufacturing Requirements: All components shall be designed and manufactured as a system. All luminaires, wire harnesses, drivers and other enclosures shall be factory assembled, aimed, wired and tested.

B. Durability: All exposed components shall be constructed of corrosion resistant material and/or coated to help prevent corrosion. All exposed carbon steel shall be hot dip galvanized per ASTM A123. All exposed aluminum shall be powder coated with high performance polyester or anodized. All exterior reflective inserts shall be anodized, coated, and protected from direct environmental exposure to prevent reflective degradation or corrosion. All exposed hardware and fasteners shall be stainless steel, passivated and coated with aluminum-based thermosetting epoxy resin for protection against corrosion and stress corrosion cracking. Structural fasteners may be carbon steel and galvanized meeting ASTM A153 and ISO/EN 1461 (for hot dipped galvanizing), or ASTM B695 (for mechanical galvanizing). All wiring shall be enclosed within the cross-arms, pole, or electrical components enclosure.

C. System Description: Lighting system shall consist of the following:

1. Galvanized steel poles and cross-arm assembly.
2. Non-approved pole technology:
    a. Square static cast concrete poles will not be accepted.
    b. Direct bury steel poles which utilize the extended portion of the steel shaft for their foundation will not be accepted due to potential for internal and external corrosive reaction to the soils and long term performance concerns.
3. Lighting systems shall use concrete foundations. See Section 2.4 for details.
    a. For a foundation using a pre-stressed concrete base embedded in concrete backfill the concrete shall be air-entrained and have a minimum compressive design strength at 28 days of 3,000 PSI. 3,000 PSI concrete specified for early pole erection, actual required minimum allowable concrete strength is 1,000 PSI. All piers and concrete backfill must bear on and against firm undisturbed soil.
    b. For anchor bolt foundations or foundations using a pre-stressed concrete base in a suspended pier or re-enforced pier design pole erection may occur after 7 days. Or after a concrete sample from the same batch achieves a certain strength.
4. Manufacturer will supply all drivers and supporting electrical equipment.
    a. Remote drivers and supporting electrical equipment shall be mounted approximately 10 feet above grade in aluminum enclosures. The enclosures shall be touch-safe and include drivers and fusing with indicator lights on fuses to notify when a fuse is to be replaced for each luminaire. Disconnect per circuit for each pole structure will be located in the enclosure. Integral drivers are not allowed.
    b. Manufacturer shall provide surge protection at the pole equal to or greater than 40 kA for each line to ground (Common Mode) as recommended by IEEE C62.41.2_2002.
5. Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.
6. All luminaires, visors, and cross-arm assemblies shall withstand 150 mi/h winds and maintain luminaire aiming alignment.
7. Control cabinet to provide remote on-off control and monitoring features of the lighting system. See Section 2.3 for further details.
8. Contactor cabinet to provide on-off control.

9. Manufacturer shall provide lightning grounding as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.

    a. Integrated grounding via concrete encased electrode grounding system.

    b. If grounding is not integrated into the structure, the manufacturer shall supply grounding electrodes, copper down conductors, and exothermic weld kits. Electrodes and conductors shall be sized as required by NFPA 780.The grounding electrode shall be minimum size of 5/8 inch diameter and 8 feet long, with a minimum of 10 feet embedment. Grounding electrode shall be connected to the structure by a grounding electrode conductor with a minimum size of 2 AWG for poles with 75 feet mounting height or less, and 2/0 AWG for poles with more than 75 feet mounting height.

10. Enhanced corrosion protection package: Due to the potentially corrosive environment for this project, manufacturers must provide documentation that their products meet the following enhanced requirements in addition to the standard durability protection specified above:

    a) Exposed carbon steel horizontal surfaces on the crossarm assembly shall be galvanized to no less than a five (5) mil average thickness.

    b) Exposed die cast aluminum components shall be Type II anodized per MIL-STD-8625 and coated with high performance polyester.

    c) Exposed extruded aluminum components shall be Type II anodized per MIL-STD-8625 and coated with high performance polyester.

D. Safety: All system components shall be UL listed for the appropriate application.

2.2 ELECTRICAL

A. Electric Power Requirements for the Sports Lighting Equipment:
   1. Electric power: 480 Volt, Three Phase
   2. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.

B. Energy Consumption: The kW consumption for the field lighting system shall be 15kW.

2.3 CONTROL

A. Instant On/Off Capabilities: System shall provide for instant on/off of luminaires.

B. Lighting contactor cabinet(s) constructed of NEMA Type 4 aluminum, designed for easy installation with contactors, labeled to match field diagrams and electrical design. Manual off-on-auto selector switches shall be provided.

C. Contactor control of lights: To minimize wear on drivers and other electrical components and prevent lights from turning on due to communication loss, circuits must be controlled via contactor switching, not dimming driver output to zero.

D. Dimming: System shall provide for 3-stage dimming (high-medium-low). Dimming will be set via scheduling options (Website, app, phone, email)

E. Remote Lighting Control System: System shall allow owner and users with a security code to schedule on/off system operation via a web site, phone, or email up to ten years in advance. Manufacturer shall provide and maintain a two-way TCP/IP communication link. Trained staff shall be available 24/7 to provide scheduling support and assist with reporting needs.

   The owner may assign various security levels to schedulers by function and/or fields. This function must be flexible to allow a range of privileges such as full scheduling capabilities for all fields to only having permission to execute “early off” commands by phone. Scheduling tool shall be capable of setting curfew limits.

   Controller shall accept and store 7-day schedules, be protected against memory loss during power outages, and shall reboot once power is regained and execute any commands that would have occurred during outage.

F. Remote Monitoring System: System shall monitor lighting performance and notify manufacturer if individual luminaire outage is detected so that appropriate maintenance can be scheduled. The controller shall determine switch position (manual or auto) and contactor status (open or closed).

G. Management Tools: Manufacturer shall provide a web-based database and dashboard tool of actual field usage and provide reports by facility and user group. Dashboard shall also show current status of luminaire outages, control operation and service. Mobile application will be provided suitable for IOS and Android devices.

Hours of Usage: Manufacturer shall provide a means of tracking actual hours of usage for the field lighting system that is readily accessible to the owner.

1. Cumulative hours: shall be tracked to show the total hours used by the facility.
2. Report hours saved by using early off and push buttons by users.

H. Communication Costs: Manufacturer shall include communication costs for operating the control and monitoring system for a period of 25 years.

I. Communication with luminaire drivers: Control system shall interface with drivers in electrical components enclosures by means of powerline communication.

2.4 STRUCTURAL PARAMETERS

A. Wind Loads: Wind loads shall be based on the 2018 International Building Code. Wind loads to be calculated using ASCE 7-16, an ultimate design wind speed of 130 and exposure category C.

B. Pole Structural Design: The stress analysis and safety factor of the poles shall conform to 2013 AASHTO Standard Specification for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (LTS-6).

C. Foundation Design: The foundation design shall be based on soil parameters as outlined in the geotechnical report. If no geotechnical report is available, the foundation design shall be based on soils that meet or exceed those of a Class 5 material as defined by 2018 IBC Table 1806.2.

D. Foundation Drawings: Project specific foundation drawings stamped by a registered engineer in the state where the project is located are required. The foundation drawings must list the moment, shear (horizontal) force, and axial (vertical) force at ground level for each pole. These drawings must be submitted at time of bid to allow for accurate pricing.

PART 3 – EXECUTION

3.1 SOIL QUALITY CONTROL

A. It shall be the Contractor's responsibility to notify the Owner if soil conditions exist other than those on which the foundation design is based, or if the soil cannot be readily excavated. Contractor may issue a change order request / estimate for the Owner's approval / payment for additional costs associated with:

1. Providing engineered foundation embedment design by a registered engineer in the State of Rhode Island for soils other than specified soil conditions;
2. Additional materials required to achieve alternate foundation;
3. Excavation and removal of materials other than normal soils, such as rock, caliche, etc.

3.2 DELIVERY TIMING

B. Delivery Timing Equipment On-Site: The equipment must be on-site 8-10 weeks from receipt of approved submittals and receipt of complete order information.

3.3 FIELD QUALITY CONTROL

A. Illumination Measurements: Upon substantial completion of the project and in the presence of the Contractor, Project Engineer, Owner's Representative, and Manufacturer's Representative, illumination measurements shall be taken and verified. The illumination measurements shall be conducted in accordance with IESNA RP-6-22.

B. Field Light Level Accountability

1. Light levels are guaranteed not to fall below the target maintained light levels for the entire warranty period of 25 years. These levels will be specifically stated as “guaranteed” on the illumination summary provided by the manufacturer.

2. The contractor/manufacturer shall be responsible for conducting initial light level testing and an additional inspection of the system, in the presence of the owner, one year from the date of commissioning of the lighting.

3. The contractor/manufacturer will be held responsible for any and all changes needed to bring these fields back to compliance for light levels and uniformities. Contractor/Manufacturer will be held responsible for any damage to the fields during these repairs.

C. Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles, uniformity ratios, uplight for aerial visibility, and offsite candela readings are not in conformance with the requirements of the performance specifications and submitted information, the Manufacturer shall be required to make adjustments to meet specifications and satisfy Owner.

3.4 WARRANTY AND GUARANTEE

A. 25-Year Warranty: Each manufacturer shall supply a signed warranty covering the entire system for 25 years from the date of shipment. Warranty shall guarantee specified light levels. Manufacturer shall maintain specifically funded financial reserves to assure fulfillment of the warranty for the full term. Warranty does not cover weather conditions events such as lightning or hail damage, improper installation, vandalism or abuse, unauthorized repairs or alterations, or product made by other manufacturers.

B. Maintenance: Manufacturer shall monitor the performance of the lighting system, including on/off status, hours of usage and luminaire outage for 25 years from the date of equipment shipment. Parts and labor shall be covered such that individual luminaire outages will be repaired when the usage of any field is materially impacted. Manufacturer is responsible for removal and replacement of failed luminaires, including all parts, labor, shipping, and equipment rental associated with maintenance. Owner agrees to check fuses in the event of a luminaire outage.

PART 4 – DESIGN APPROVAL

4.1 PRE-BID SUBMITTAL REQUIREMENTS (Non-Musco)

A. Design Approval: The owner / engineer will review pre-bid submittals per section 4.1.B from all the manufacturers to ensure compliance to the specification 10 days prior to bid. If the design meets the design requirements of the specifications, a letter and/or addendum will be issued to the manufacturer indicating approval for the specific design submitted.

B. Approved Product: Musco’s Light-Structure System™ with TLC for LED® is the approved product. All substitutions must provide a complete submittal package for approval as outlined in Submittal Information at the end of this section at least 10 days prior to bid. Special manufacturing to meet the standards of this specification may be required. An addendum will be issued prior to bid listing any other approved lighting manufacturers and designs.

C. All listed manufacturers not pre-approved shall submit the information at the end of this section at least 10 days prior to bid. An addendum will be issued prior to bid; listing approved lighting manufacturers and the design method to be used.

D. Bidders are required to bid only products that have been approved by this specification or addendum by the owner or owner’s representative. Bids received that do not utilize an approved system/design, will be rejected.

REQUIRED SUBMITTAL INFORMATION FOR ALL MANUFACTURERS (NOT PRE-APPROVED) 10 DAYS PRIOR TO BID

All items listed below are mandatory, shall comply with the specification and be submitted according to pre-bid submittal requirements. Complete the Yes/No column to indicate compliance (Y) or noncompliance (N) for each item. ***Submit checklist below with submittal.***

Yes / No	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	Equipment Layout	Drawing(s) showing field layouts with pole locations
	C	On Field Lighting Design	Lighting design drawing(s) showing: a. Field Name, date, file number, prepared by b. Outline of field(s) being lighted, as well as pole locations referenced to the center of the field (x & y), Illuminance levels at grid spacing specified c. Pole height, number of fixtures per pole, horizontal and vertical aiming angles, as well as luminaire information including wattage, lumens and optics d. Height of light test meter above field surface. 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 (CV), coefficient of utilization (CU) uniformity gradient; number of luminaries, total kilowatts, average tilt factor; light loss factor.
	D	Off Field Lighting Design	Lighting design drawing showing initial spill light levels along the boundary line (defined on bid drawings) in footcandles. Lighting design showing glare along the boundary line in candela. Light levels shall be taken at 30-foot intervals along the boundary line. Readings shall be taken with the meter orientation at both horizontal and aimed towards the most intense bank of lights.
	E	Photometric Report	Provide first page of photometric report for all luminaire types being proposed showing candela tabulations as defined by IESNA Publication LM-35-02. Photometric data shall be certified by laboratory with current National Voluntary Laboratory Accreditation Program or an independent testing facility with over 5 years experience.
	F	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 to not fall below target levels for warranty period.
	G	Structural Calculations	Pole structural calculations and foundation design showing foundation shape, depth backfill requirements, rebar and anchor bolts (if required). Pole base reaction forces shall be shown on the foundation drawing along with soil bearing pressures. Design must be stamped by a structural engineer in the state of Rhode Island, if required by owner.
	H	Control & Monitoring System	Manufacturer of the control and monitoring system shall provide written definition and schematics for automated control system. They will also provide ten (10) references of customers currently using proposed system in the state of Rhode Island.
	I	Electrical Distribution Plans	Manufacturer bidding an alternate product must include a revised electrical distribution plan including changes to service entrance, panels and wire sizing, signed by a licensed Electrical Engineer in the state of Rhode Island.
	J	Warranty	Provide written warranty information including all terms and conditions. Provide ten (10) references of customers currently under specified warranty in the state of Rhode Island.
	K	Project References	Manufacturer to provide a list of ten (10) projects where the technology and specific fixture proposed for this project has been installed in the state of Rhode Island. Reference list will include project name, project city, installation date, and if requested, contact name and contact phone number.
	L	Product Information	Complete bill of material and current brochures/cut sheets for all products being provided.
	M	Delivery	Manufacturer shall supply an expected delivery timeframe from receipt of approved submittals and complete order information.

	N	Non-Compliance	Manufacturer shall list all items that do not comply with the specifications. If in full compliance, tab may be omitted.

The information supplied herein shall be used for the purpose of complying with the specifications for French Park Softball. 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: _____ **Signature:** _____

Contact Name: _____ **Date:** _____/_____/_____

Contractor: _____ **Signature:** _____