

Vreeland Engineers Incorporated

February 16, 2021

Mr. B. J. Best
Allen H. Edmondson Electrical Contractors
(via email)

RE: Soccer Field No. 3 Lighting, Sansom Sports Complex

Dear B.J.:

As you are aware, owner is planning on illuminating Field No. 3 at subject sports complex with 70' poles. We understand this is contrary to current City lighting ordinance, limiting height of athletic field lighting to 65'.

We recommend that we apply for a special usage permit, requesting permission to utilize 70' height.

We cite the following as rationale for proposing special permission:

1. There are two existing illuminated fields immediately to the southwest of this field. Both of these fields are illuminated utilizing 70' poles.
2. The field elevation of the field to be illuminated is already a few feet lower than the other two fields to the southwest.
3. The field to be illuminated is closer to Western Avenue and further away from residential development.
4. The new field is being illuminated with LED, which has more precise control of illumination with less spill.

If you have any questions, please give me a call.

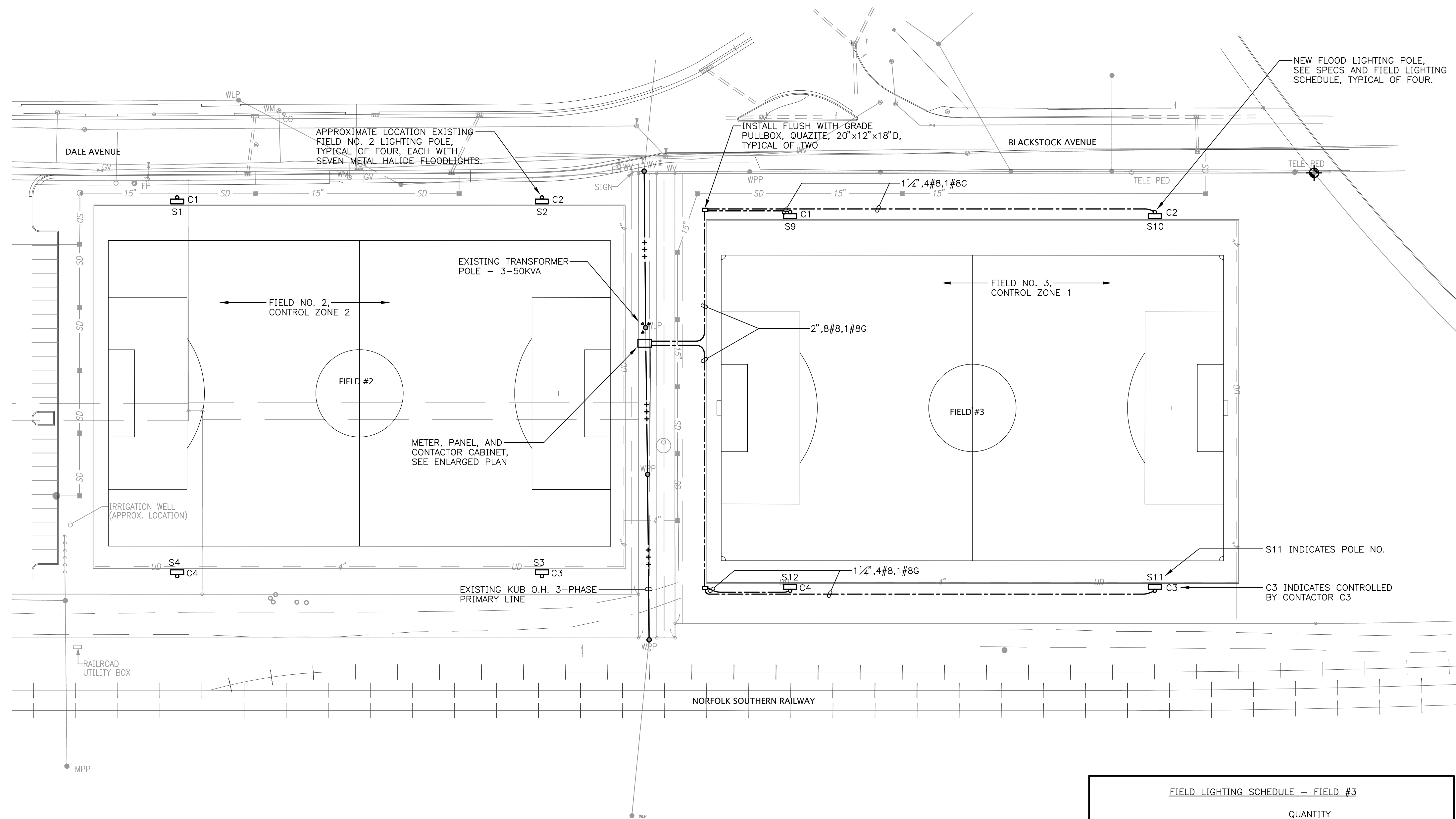
Very truly yours,

VREELAND ENGINEERS, INC.

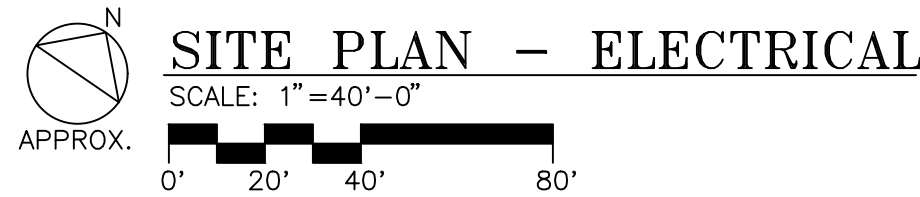
Charles N. Luttrell, Jr.

mc

SE1 - Sansom Soccer Field 3 - Site Plan - Electrical.dwg
A.L.S. 12/31/20 11:07 AM CL20348(CL)

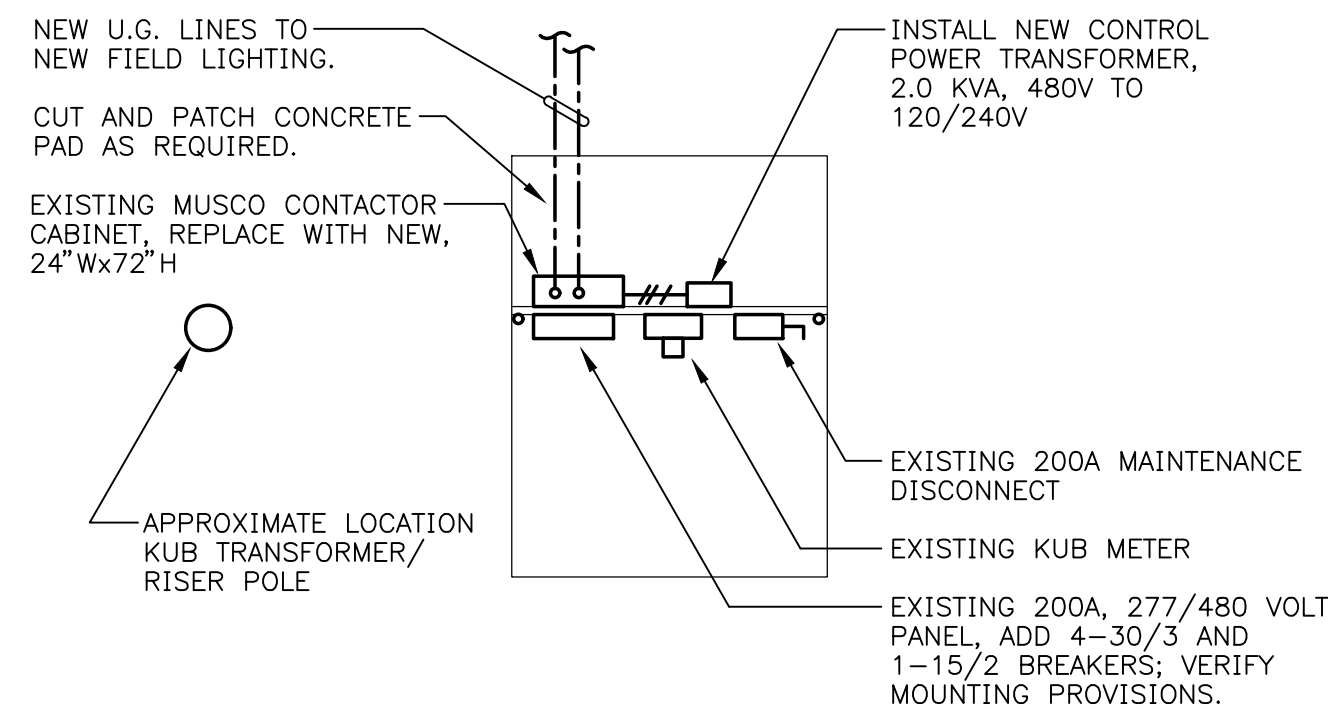


FIELD ILLUMINATION DATA	
DESIGN LEVEL	30 FT.
MAXIMUM	40.1 FC
MINIMUM	23.0 FC
AVG./MIN.	1.31

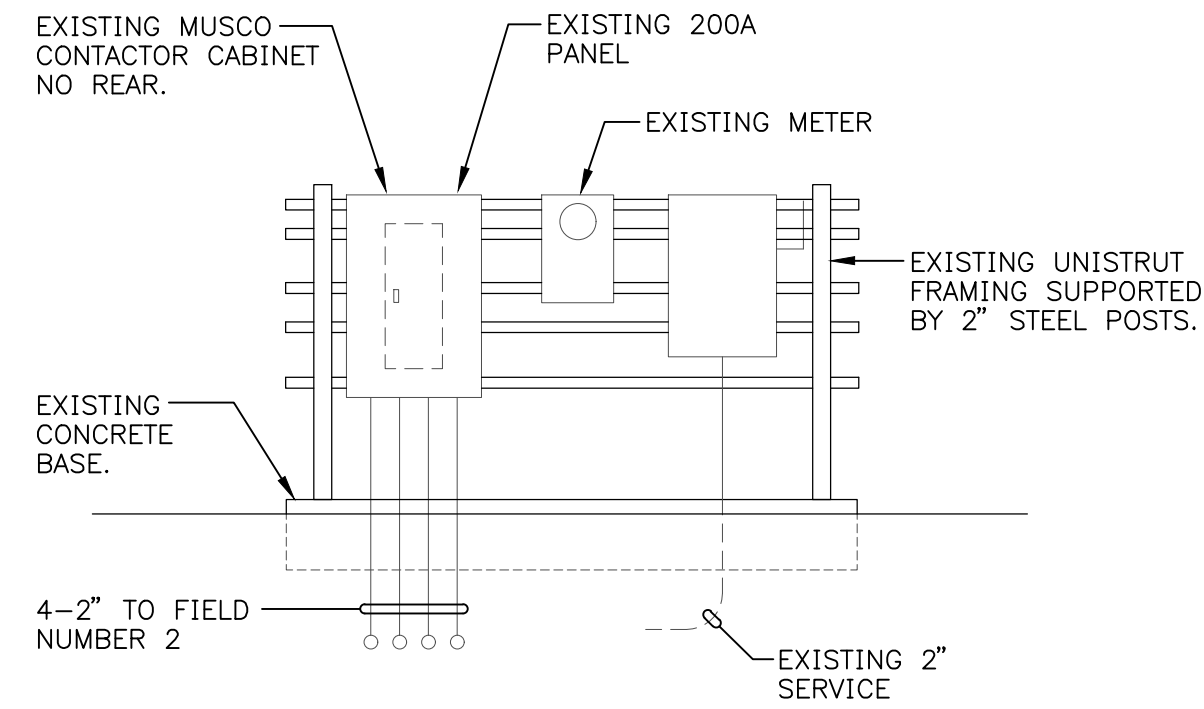


CONNECTED LOAD	
FIELD NO. 2: 28 x 1.63 =	45.6 KVA
FIELD NO. 3: 16 x 1.43 =	22.9 KVA
CONTROLS	0.3 KVA
	68.8 KVA

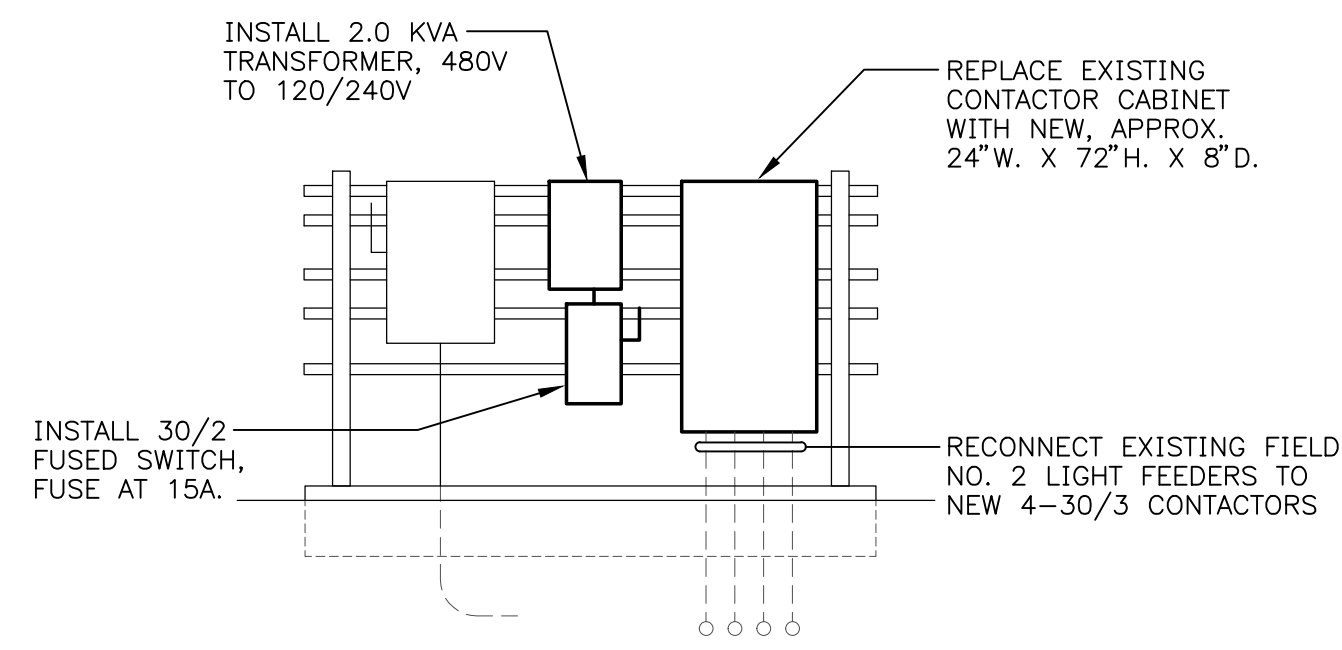
FIELD LIGHTING SCHEDULE - FIELD #3			
POLE NO.	HEIGHT	QUANTITY OF LUMINAIRES	LOAD-KW
S9	70'	4	5.72
S10	70'	4	5.72
S11	70'	4	5.72
S12	70'	4	5.72
		16	84.2 KVA



ENLARGED EQUIPMENT PAD
N.T.S.



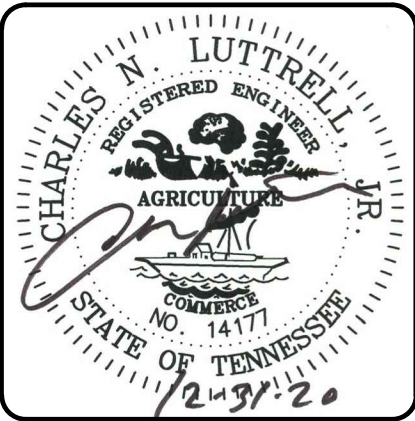
EXISTING METER CENTER WEST ELEVATION
N.T.S.



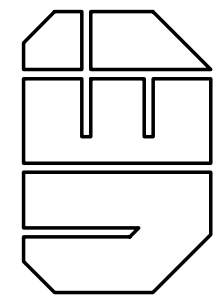
EXISTING METER CENTER EAST ELEVATION
N.T.S.

4-A-21-SU 3/23/2021

FILE #4-A-21-SU



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SOCCER FIELD #3 LIGHTING
SANSOM SPORTS COMPLEX
KNOXVILLE, TENNESSEE

DRAWING DESCRIPTION:
SITE PLAN -
ELECTRICAL

DATE:
12-31-20

REVISIONS:

SHEET NUMBER

SE1

OF

SE2 - Sansom Soccer Field 3 - Specifications.dwg
A.L.S. 12/31/20 11:31 AM CL20346(CL)

<p>SANSOM SPORTS LTG.</p> <p><u>ELECTRICAL SPECIFICATIONS:</u></p> <p>1. SCOPE: Furnish plant, labor, material, services, and equipment necessary for and reasonably incidental to the installation of electrical facilities shown on the drawings and called for hereinafter.</p> <p>2. CODES AND PERMITS: Secure necessary permits, pay necessary fees, conform to the Knoxville Electrical Code.</p> <p>3. SERVICE: Service for field lighting is existing from KUB pole-mounted transformers. Voltage is 277/480-volts, 3-phase, 4-wire, wye.</p> <p>4. WIRING: All conduit exposed above grade shall be IMC conduit. Conduit run underground shall be Schedule 40 PVC. All conductors shall be "THWN" insulated copper. All wiring shall be color coded as to voltage and phase.</p> <p>5. PANELBOARD: Panelboard is existing at site and is that as manufactured by Eaton Company. Contractor shall furnish and install additional circuit breakers in panelboard as scheduled on plans. Verify mounting provision of existing panelboard to accept new circuit breakers. AIC rating of circuit breakers shall match those existing in panelboard.</p> <p>6. CONTROL POWER TRANSFORMER: Provide new 480-volt to 120/240-volt, single-phase transformer to provide control voltage for new contactor cabinet. Transformer shall be similar and equal to Square D Company Class 7400, 2-KVA, catalog No. 2S1F. Transformer shall be enclosed in 4X enclosure. Transformer voltage shall be 480-volt primary, 120/240-volt secondary.</p> <p>7. GROUNDING: Furnish and install grounding in accordance with code. Bond lighting fixtures and equipment. Provide in all conduit lines separate insulated grounding conductor.</p> <p>8. FIELD LIGHTING SYSTEMS: General: Work covered by this section of the specifications shall conform to the contract documents, engineering plans as well as state and local codes.</p> <p>The purpose of these specifications is to define the lighting system performance and design standards for Field No. 3 at Sansom Sports Complex using an LED Lighting source. The manufacturer / contractor shall supply lighting equipment to meet or exceed the standards set forth in these specifications.</p> <p>The primary goals of this sports lighting project are:</p>	<p>A. Guaranteed Light Levels: Selection of appropriate light levels impact the safety of the players and the enjoyment of spectators. Therefore light levels are guaranteed to not drop below specified target values for a period of 25 years.</p> <p>B. Environmental Light Control: It is the primary goal of this project to minimize spill light to adjoining properties and glare to the players, spectators and neighbors.</p> <p>C. Cost of Ownership: In order 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.</p> <p>Lighting Performance</p> <p>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 calculations shall be developed and field measurements taken on the grid spacing with the minimum number of grid points specified below. Appropriate light loss factors shall be applied and submitted for the basis of design. Average illumination level shall be measured in accordance with the IESNA LM-5-04 (IESNA Guide for Photometric Measurements of Area and Sports Lighting Installations). Illumination levels shall not to drop below desired target values in accordance to IES RP-6-15, Page 2, Maintained Average Illuminance and shall be guaranteed for the full warranty period.</p> <table><tr><th>Area Lighting</th><th>of</th><th>Average Target Illumination Levels</th><th>Maximum to Minimum Uniformity Ratio</th></tr><tr><td>Soccer Field</td><td></td><td>30 Footcandles</td><td>2.5:1.0</td></tr></table> <p>Color: The lighting system shall have a minimum color temperature of 5700K and a CRI of 75.</p> <p>Mounting Heights: To ensure proper aiming angles for reduced glare and to provide better playability, minimum mounting heights shall be as described below. Higher mounting heights may be required based on photometric report and ability to ensure the top of the field angle is a minimum of 10 degrees below horizontal.</p> <table><tr><th># of Poles</th><th>Pole Designation</th><th>Pole Height</th></tr><tr><td>4</td><td>S9-S12</td><td>70'</td></tr><tr><td></td><td></td><td></td></tr></table>	Area Lighting	of	Average Target Illumination Levels	Maximum to Minimum Uniformity Ratio	Soccer Field		30 Footcandles	2.5:1.0	# of Poles	Pole Designation	Pole Height	4	S9-S12	70'				<p>Environmental Light Control:</p> <p>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.</p> <p>Spill Scans: Spill scans must be submitted indicating the amount of horizontal and vertical footcandles along the specified lines. 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. Illumination level shall be measured in accordance with the IESNA LM-5-04 after 1 hour warm up.</p> <p>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.</p> <p>Cost of Ownership:</p> <p>Manufacturer shall submit a 25 year Cost of Ownership summary that includes energy consumption, anticipated maintenance costs, and control costs. All costs associated with faulty luminaire replacement - equipment rentals, removal and installation labor, and shipping - are to be included in the maintenance costs.</p> <p>Products:</p> <p>Sports Lighting System Construction:</p> <p>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.</p> <p>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 of 18-8 grade or better, 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</p>	<p>B695 (for mechanical galvanizing). All wiring shall be enclosed within the cross-arms, pole, or electrical components enclosure.</p> <p>System Description: Lighting system shall consist of the following: Galvanized steel poles and cross-arm assembly.</p> <p>Non-approved pole technology: Square static cast concrete poles will not be accepted.</p> <p>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.</p> <p>Lighting systems shall use concrete foundations. See Section 2.4 for details.</p> <p>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.</p> <p>For anchor bolt foundations or foundations using a pre-stressed concrete base in a suspended pier or re-inforced pier design pole erection may occur after 7 days. Or after a concrete sample from the same batch achieves a certain strength.</p> <p>Manufacturer will supply all drivers and supporting electrical equipment</p> <p>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.</p> <p>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.</p> <p>Wire harness complete with an abrasion protection sleeve, strain relief and plug-in connections for fast, trouble-free installation.</p> <p>All luminaires, visors, and cross-arm assemblies shall withstand 150 mph winds and maintain luminaire aiming alignment.</p> <p>Control cabinet to provide remote on-off control and monitoring of the lighting system. See Section 2.3 for further details.</p> <p>Manufacturer shall provide lightning grounding as defined by NFPA 780 and be UL Listed per UL 96 and UL 96A.</p>
Area Lighting	of	Average Target Illumination Levels	Maximum to Minimum Uniformity Ratio																	
Soccer Field		30 Footcandles	2.5:1.0																	
# of Poles	Pole Designation	Pole Height																		
4	S9-S12	70'																		
<p>Integrated grounding via concrete encased electrode grounding system.</p> <p>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.</p> <p>Safety: All system components shall be UL listed for the appropriate application.</p> <p>Electrical: Electric Power Requirements for the Sports Lighting Equipment:</p> <p>Electric power: 480-volts, 3-phase. Maximum total voltage drop: Voltage drop to the disconnect switch located on the poles shall not exceed three (3) percent of the rated voltage.</p> <p>Control:</p> <p>Instant On/Off Capabilities: System shall provide for instant on/off of luminaires.</p> <p>Lighting contactor cabinet 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.</p> <p>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, fax 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.</p> <p>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.</p> <p>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.</p> <p>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).</p>	<p>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, Android and Blackberry devices.</p> <p>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.</p> <p>Cumulative hours: shall be tracked to show the total hours used by the facility Report hours saved by using early off and push buttons by users.</p> <p>Communication Costs: Manufacturer shall include communication costs for operating the control and monitoring system for a period of 25 years.</p> <p>Communication with luminaire drivers: Control system shall interface with drivers in electrical components enclosures by means of powerline communication.</p> <p>Structural Parameters:</p> <p>Wind Loads: Wind loads shall be based on the 2015 International Building Code. Wind loads to be calculated using ASCE 7-10, an ultimate design wind speed of 115 and exposure category C.</p> <p>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).</p> <p>Foundation Design: The foundation design shall be based on soil parameters as outlined in the geotechnical report: Foundation Systems Engineering, P.C. dated September 20, 2019</p> <p>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.</p> <p>Execution:</p> <p>Soil Quality Control:</p> <p>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:</p>	<p>Providing engineered foundation embedment design by a registered engineer in the State of Tennessee for soils other than specified soil conditions;</p> <p>Additional materials required to achieve alternate foundation;</p> <p>Excavation and removal of materials other than normal soils, such as rock, caliche, etc.</p> <p>Field Quality Control:</p> <p>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 LM-5-04.</p> <p>Field Light Level Accountability:</p> <p>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.</p> <p>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.</p> <p>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.</p> <p>Correcting Non-Conformance: If, in the opinion of the Owner or his appointed Representative, the actual performance levels including footcandles and uniformity ratios 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.</p> <p>Warranty and Guarantee:</p> <p>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.</p> <p>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</p>	<p>9. GUARANTY: Guarantee all work to be free from defects in material and workmanship for one year after date of final acceptance.</p>																	

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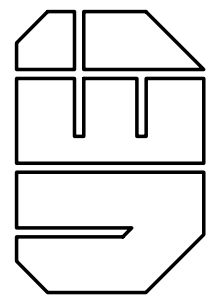
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SOCCER FIELD #3 LIGHTING
SANSOM SPORTS COMPLEX
KNOXVILLE, TENNESSEE

DRAWING DESCRIPTION:
ELECTRICAL
SPECIFICATIONS

DATE:
12-31-20

REVISIONS:

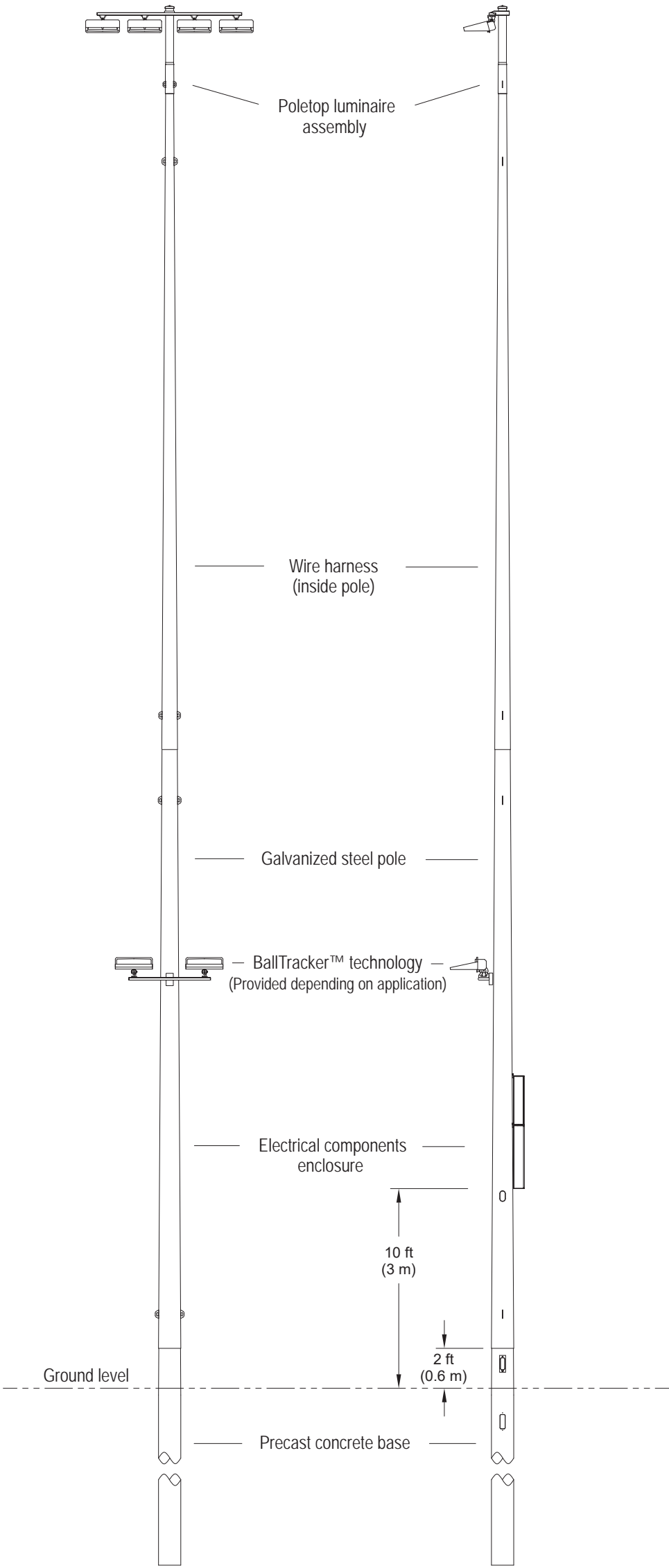
SHEET NUMBER

SE2

OF

4-A-21-SU 3/23/2021

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written permission of Musco Sports Lighting, L.L.C.
U.S. and foreign patents issued and pending.



PRELIMINARY

CONFIGURATION:	04
DRAWN BY:	RWS
APPROVED BY:	TDM
SCALE:	Not to scale
DATE:	06/18/19
DRAWING NUMBER:	M-2151-en04-3_04

Light-Structure System™ typical configuration
TLC for LED® Luminaires



CORPORATE OFFICE:
P.O. Box 808
100 1st Avenue West
Oskaloosa, Iowa 52577
+1-800-825-6020
+1-641-673-0411

Luminaire Data

Weight (luminaire)	67 lb (30 kg)
UL listing number	E338094 (pending)
UL listed for USA / Canada	UL1598 CSA-C22.2 No.250.0 (pending)
CE Declaration	LVD, EMC, RoHS
Ingress protection, luminaire	IP65
Material and finish	Aluminum, powder-coat painted
Wind speed rating (aiming only)	150 mi/h (67 m/s)
UL, IEC ambient temperature rating, luminaire	50°C (122°F)

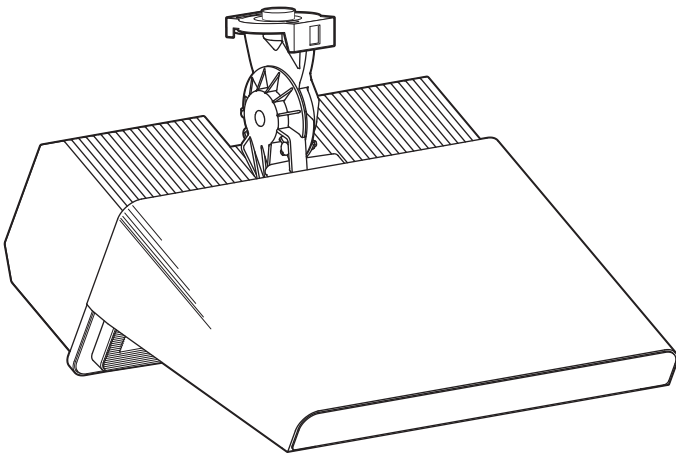
Photometric Characteristics

Projected lumen maintenance per IES TM-21-11

L90 (13.5k)	>81,000 h
L80 (13.5k)	>81,000 h
L70 (13.5k)	>81,000 h
CIE correlated color temperature	5700 K
Color rendering index (CRI)	75 typ, 70 min
Lumens ¹	156,100

Footnotes:

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



Driver Data

Electrical Data

Rated wattage ¹	
Per driver	1500 W
Per luminaire	1500 W
Number of luminaires per driver	1
Starting (inrush) current	<40 A, 256 µs
Fuse rating	15 A
UL, IEC ambient temperature rating, electrical components enclosure	45°C (113°F) - pending
Ingress protection, electrical components enclosure	IP54
Efficiency	95%
Dimming mode	optional
Range, energy consumption	11 – 100%
Range, light output	16 – 100%

	200 Vac 50/60 Hz	208 Vac 60 Hz	220 Vac 50/60 Hz	230 Vac 50 Hz	240 Vac 50/60 Hz	277 Vac 60 Hz	347 Vac 60 Hz	380 Vac 50/60 Hz	400 Vac 50 Hz	415 Vac 50 Hz	480 Vac 60 Hz
Max operating current per luminaire²	9.30 A	8.95 A	8.46 A	8.09 A	7.75 A	6.72 A	5.36 A	4.90 A	4.65 A	4.49 A	3.88 A

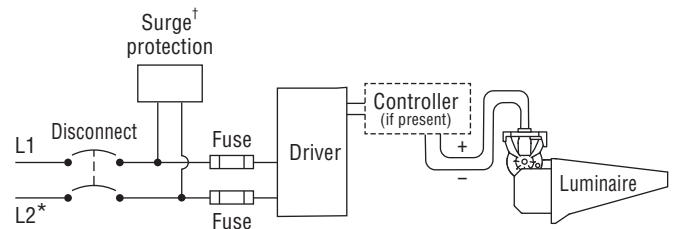
Footnotes:

- 1) Rated wattage is the power consumption, including driver efficiency losses, at stabilized operation in 25°C ambient temperature environment.
- 2) Operating current includes allowance for 0.90 minimum power factor, operating temperature, and LED light source manufacturing tolerances.

Notes

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

Typical Wiring

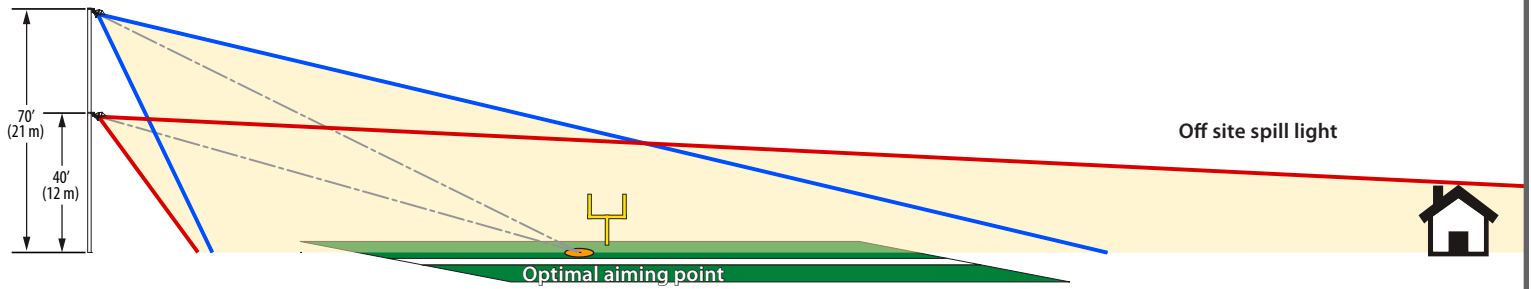


* If L2 (com) is neutral then not switched or fused.

† Not present if indoor installation.



Pole height impacts aiming angles and the amount of spill light



Distance from the aiming point determines optimal pole height

