MUSCO LIGHTING PROPOSAL
PREPARED FOR

Tobique First Nation Softball 2

LED Lighting Project
Perth Andover, NB, Canada
May 24, 2021

Project # 212654

SUBMITTED BY

Musco Sports Lighting Canada Co.

100 1st Ave W
Oskaloosa, Iowa 52577
Phone: 800-754-6025
Fax: 641-673-4740

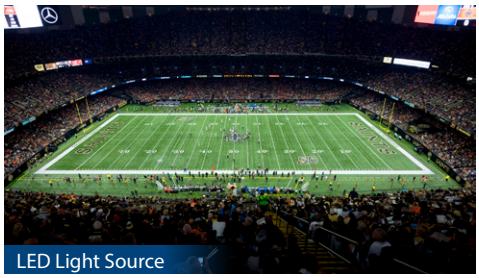
Project Submittal: **Table of Contents**

ITEM A

Company Profile

Statue of Liberty National Monument
New York, New York, USA

Yas Marina Circuit
Grand Prix Racing
Abu Dhabi, UAE



Mercedes-Benz Superdome
New Orleans Saints
New Orleans, Louisiana, USA

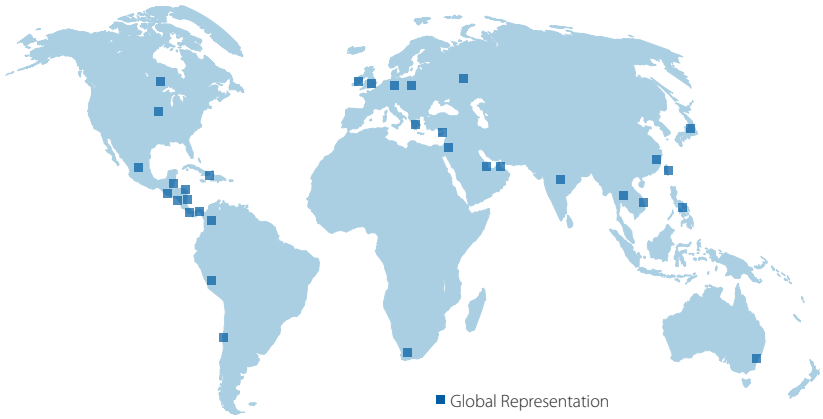
Chongqing Olympic Sports Center
Chongqing Lifan F.C.
Chongqing, China

Vancouver International Airport
Vancouver, BC, Canada

Introduction

Since 1976, Musco Lighting has specialized in the design and manufacture of sports and large-area lighting with innovations in glare reduction and light control responsible to the needs of facility owners, users, neighbors, and the night sky. Musco's Total Light Control – TLC for LED™ technology delivers a level of light control and uniformity that can't be matched, and is the solution of choice for neighborhood Little League® fields, collegiate and professional stadiums and arenas, international airports, rail yards, the Olympic Games, iconic landmarks, and some of the largest ports around the world. Musco has a global team of experts that partner with customers to plan, complete, and maintain a cost-effective, trouble-free lighting solution for their facility.

Headquarters: Oskaloosa, Iowa, USA
Manufacturing: Muscatine, Iowa USA; Shanghai, China; Gumi, South Korea
Global Representation: Australia, Belize, Canada, Caribbean Islands, Chile, China, Colombia, Costa Rica, Cyprus, El Salvador, Germany, Greece, Guatemala, Honduras, India, Ireland, Japan, Jordan, Mexico, Nicaragua, Panama, Peru, Philippines, Poland, Qatar, Russia, South Africa, South Korea, Taiwan, Thailand, United Arab Emirates, United Kingdom, United States, Vietnam



Special Projects

- Olympic Games — Rio, 2016; Sochi, 2014; London, 2012; Vancouver, 2010; Athens, 2004; Sydney, 2000; Atlanta, 1996; Los Angeles, 1984
- "Battle": Tiger Woods Golf, 2000 – 2004
- ESPN Wide World of Sports Complex
- Daytona International Speedway
- Losail International Circuit
- Yas Marina Circuit
- Bahrain International Circuit
- Churchill Downs
- Wimbledon Centre Court
- Madison Square Garden
- Mercedes-Benz Arena, Shanghai
- Mercedes-Benz Arena, Berlin
- Purcell Pavilion, University of Notre Dame
- Munn Ice Arena, Michigan State University
- AT&T Center, San Antonio Spurs
- Emirates Stadium, Arsenal F.C.
- Twickenham Stadium, England National Rugby
- Tianjin TEDA Football Stadium, Tianjin TEDA F.C.
- Citi Field, New York Mets
- NRG Stadium, Houston Texans
- Nationals Park, Washington Nationals
- Dodger Stadium, Los Angeles Dodgers
- Comerica Park, Detroit Tigers
- Lamade Stadium, Home of the Little League® World Series
- Super Bowls XVII, XIX, XXI, XXVII, XXX, XXXV, XXXVIII, XL, XLII, XLIII, XLIV, LI
- ESPN X Games
- San Francisco-Oakland Bay Bridge East Span
- Statue of Liberty
- The White House
- Mount Rushmore National Memorial
- McCarran International Airport
- DP World Jebel Ali Port Terminal 2

continued on back

Company Profile

Major Innovations

1982 "The night the lights went on at Notre Dame Stadium," said Keith Jackson, broadcaster, made television history by taking sports lighting on the road with Musco mobile lighting systems for broadcast of the Notre Dame vs. Michigan prime time college football game.

1987 Made significant technical advancements in providing affordable light control with Level-8™ and Total Light Control™ systems.

1991 Introduced the industry's first sports-lighting system complete from foundation to poletop: Light-Structure System™.

1992 Revolutionized NASCAR broadcasts by making night racing at the Winston Cup level possible. Mirtran™ systems were first used at Charlotte Motor Speedway and as of 2017, are in place at 20 speedways and racetracks, including the Daytona International Speedway and the Bahrain International Circuit.

1996 Introduced cost-effective, quality lighting for special effects and dramatic player introductions in large indoor arenas. ShowLight™ systems were first used at Charlotte Coliseum and are installed throughout the U.S., England, and Ireland.

1999 Introduced technology to dramatically advance on/off capability and facility management. Control-Link® system allows facility managers to control their lighting systems remotely as well as provide critical management reports.

2005 Revolutionized the sports lighting industry with the introduction of Green Generation™ technology. This system reduces energy consumption by half, spill light by 50% and includes maintenance & relamping for 25 years. Musco's Constant 25™ product assurance and warranty program guarantees the system will perform at the designed light levels for the duration of the warranty.

2008 Installed a cutting-edge lighting system using LED technology in Washington D.C. at the White House. This system dramatically reduced energy consumption by 87%, while providing a clean, color accurate light.

2013 Matched its proven system design and application expertise with the evolving LED technology to provide custom lighting solutions for several major arenas and the East Span of the San Francisco-Oakland Bay Bridge.

2016 Introduced TLC for LED™ technology, delivering to customers light control and uniformity never before possible, while virtually eliminating glare and significantly improving efficiency. The system is backed by a 25-year parts and labor warranty.

Television Credits

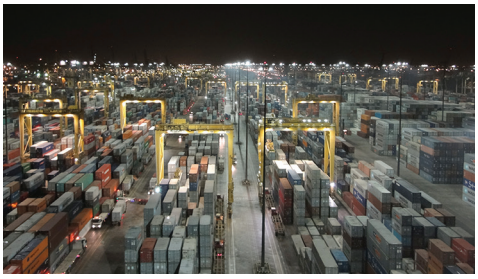
ABC, CBS, NBC, TBS, TNN, ESPN, ESPN2, FOX, FoxSports, SkyTV, CBC, BTN, ESPNU, Longhorn Network, and Channel 9 (Australia) have relied on Musco to provide quality lighting to meet broadcast requirements.

Xcel Energy Center
St. Paul, Minnesota, USA

San Francisco-Oakland Bay Bridge
Oakland, California, USA

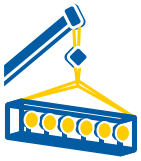
Twickenham Stadium
England National Rugby
Twickenham, United Kingdom

02 Ski and Resort
Taebaek-si, Gangwon-do, South Korea



DP World Jebel Ali Terminal 1
Dubai, UAE

Key Values Worksheet

	Musco Lighting	Other Manufacturer
 **Experience** • 40+ years specializing in sports lighting • Team of 1200 people • Unmatched expertise in research, application, and control of lighting	☑	☐
 **Precise Light Control** • Patented light control technology redirects otherwise wasted spill light onto the field • Virtual elimination of glare for players, spectators, & broadcast cameras	☑	☐
 **Broadcast Quality Lighting** • Multi-zone aiming reduces harsh shadows & improves uniformity • Superior broadcast results	☑	☐
 **Theatrical Effects** • Dimming and instant on/off • Light show programming through DMX interface • Color changing capability	☑	☐
 **Complete System – Lighting, Structural, & Electrical** • Custom designed for retrofit or new application • Factory wired, aimed, & tested • Simple and fast to install - reduces cost & hassle • Single source accountability	☑	☐
 **Service & Reliability Focused Design** • Remote drivers provide easy access & protect sensitive electronics from heat • Patented convection cooling for luminaires • Fully enclosed wiring & electrical components • Tempered glass lens protects optics from environment	☑	☐
 **Full System Warranty - No Hassle for 25 Years** • **ALL** parts & **ALL** labor, including lift equipment, provided by Musco • Light levels and uniformity guaranteed • 24/7 full system monitoring & diagnostics • Proactively scheduled maintenance & service • 170+ Team members dedicated to monitoring, operation, maintenance, & service	☑	☐

Project Installations: **Atlantic Canada***

Baseball

BJ Higgins Baseball (L)
Cole Harbour, Nova Scotia

Goodyear Avenue Baseball
Grand Falls Windsor, Newfoundland & Labrador

Guysborough High School
Guysborough, Nova Scotia

Henry Park Baseball
Fredericton, New Brunswick

John MacNeil Park
Dartmouth, Nova Scotia

Kiwanis Baseball Park
Moncton, New Brunswick

Mainland Commons Park
Halifax, Nova Scotia

Main Street Ballfield
Grand Falls Windsor, Newfoundland & Labrador

Memorial Field
Saint John, New Brunswick

Royal Senior Baseball Field
Fredericton, New Brunswick

Smallwood Rec Plex
Mount Pearl, Newfoundland

Stoney Hill Baseball
Conception Bay South, Newfoundland & Labrador

Three Rivers Baseball (L)
Cardigan, Prince Edward Isle

Football

Acadia University
Wolfville, Nova Scotia

Allison Grounds
Saint John, New Brunswick

Bedford High School Football
Bedford, Nova Scotia

Cape Breton University
Sydney, Nova Scotia

Harbour East Regional Fields
Dartmouth, Nova Scotia

Huskies Stadium
St. Mary's University
Halifax, Nova Scotia

Moncton High School (L)
Moncton, New Brunswick

St. Francis Xavier University
Antigonish, Nova Scotia

UNB Chapman Field
Fredericton, New Brunswick

Large Area Lighting

Fredericton Airport Apron Lighting
Fredericton, New Brunswick

Port of Halifax – Fairview Container Terminal
Halifax, Nova Scotia

Port of Halifax – Halterm Container Terminal
Halifax, Nova Scotia

Softball

14 Wing Greenwood
CFB Greenwood, Nova Scotia

Allison Grounds
Saint John, New Brunswick

Bennets Field
Musquodoboit Harbour, Nova Scotia

Canada Games Softball
Charlottetown, Prince Edward Island

Canada Games Softball
Halifax, Nova Scotia

Dennis Naugle Softball (L)
Dartmouth, Nova Scotia

Don Bayer Softball (L)
Dartmouth, Nova Scotia

Gander Town Field
Gander, Newfoundland

Guysborough High School
Guysborough, Nova Scotia

Hal Betts Sports Fields
Moncton, New Brunswick

John MacNeil Park
Dartmouth, Nova Scotia

Kensington Softball
Kensington, Prince Edward Island

Ned Nugent Park
Conception Bay South, Newfoundland

Oromocto Park
Oromocto, New Brunswick

Parsons Softball
Seal Cove, Newfoundland & Labrador

Placentia Softball
Argentia, Newfoundland

Prospect Park
Fredericton, New Brunswick

Squires Softball
St. John's, Newfoundland

Speedways

Riverside Speedway
Antigonish, Nova Scotia

Soccer

Bridgetown P-12 School (L)
Bridgetown, Nova Scotia

Cornwall Sports Field
Cornwall, Prince Edward Island

CN Moncton Commons
Moncton, New Brunswick

Dalhousie University
Halifax, Nova Scotia

Harbour East Region Fields
Dartmouth, Nova Scotia

Kennebecasis Soccer
Quispamsis, New Brunswick

King George V Soccer Pitch
St Johns, Newfoundland

Millidgeville Soccer
Saint John, New Brunswick

Rainbow Gully Park
Portugal Cove, Newfoundland

Scotiabank Park North Athletic Field
Fredericton, New Brunswick

Sydney Soccer / Football
Sydney, Nova Scotia

Team Gushue Soccer
Mt. Pearl, Newfoundland

UPEI Soccer
Charlottetown, Prince Edward Island

Waasis Road Turf Field
Oromocto, New Brunswick

Wellington Street Sports Complex
Cornerbrook, Newfoundland

Tennis

Centennial Park Tennis
Moncton, New Brunswick

Labrador City Tennis Club
Labrador City, Newfoundland

Queens Square Park Tennis
Fredericton, New Brunswick

Shamrock Park Tennis
Saint John, New Brunswick

Track & Field

UNBSJ Canada Games Stadium
Saint John, New Brunswick

University of Moncton Outdoor Stadium
Moncton, New Brunswick

Rugby

Kings Edgehill Rugby
Windsor, Nova Scotia

(L) LED *Partial Listing

ITEM B

Tobique First Nation Softball 2

Perth Andover,NB

Lighting System

Pole / Fixture Summary

Pole ID	Pole Height	Mtg Height	Fixture Qty	Luminaire Type	Load	Circuit
A1-A2	18.3	18.3	2	TLC-LED-1200	2.34 kW	A
		4.7	1	TLC-BT-575	0.58 kW	A
B1-B2	21.3	21.3	6	TLC-LED-1500	8.58 kW	A
		4.7	1	TLC-BT-575	0.58 kW	A
C1-C2	18.3	18.3	4	TLC-LED-1200	4.68 kW	A
		4.7	2	TLC-BT-575	1.15 kW	A
6			***32***		***35.80 kW***	

Circuit Summary

Circuit	Description	Load	Fixture Qty
A	Softball	35.8 kW	32

Fixture Type Summary

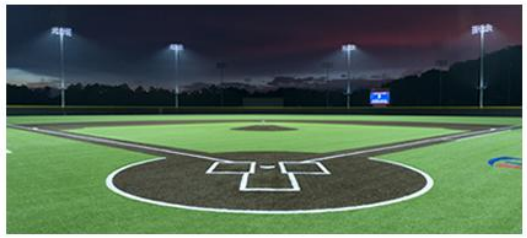
Type	Source	Wattage	Lumens	L90	L80	L70	Quantity
TLC-LED-1500	LED 5700K - 75 CRI	1430W	160,000	>120,000	>120,000	>120,000	12
TLC-LED-1200	LED 5700K - 75 CRI	1170W	136,000	>120,000	>120,000	>120,000	12
TLC-BT-575	LED 5700K - 75 CRI	575W	52,000	>120,000	>120,000	>120,000	8

Light Level Summary

Calculation Grid Summary

Grid Name	Calculation Metric	Illumination					Circuits	Fixture Qty
		Ave	Min	Max	Max/Min	Ave/Min		
Blanket Grid	Horizontal	5.58	0	62	0.00		A	32
Softball (Infield)	Horizontal Illuminance	51.2	40	66	1.66	1.28	A	32
Softball (Outfield)	Horizontal Illuminance	31	20	44	2.27	1.55	A	32

From Hometown to Professional

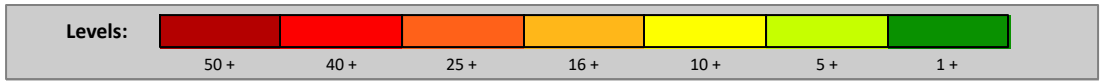


We Make It Happen®

ENGINEERED DESIGN By: Will Hartl · File #212654A · 20-May-21

Tobique First Nation Softball 2

Perth Andover,NB



Plot based on maintained horizontal footcandles at the ground level.

Shaded Plots

Plots are provided to demonstrate the lighting coverage of a particular layout or system.

This may be provided to illustrate the control of light and how effective a system is at minimizing spill-related issues while maintaining quality of light.

This is only an illustration and should be used with complete point-by-point calculation results.

We Make It Happen®

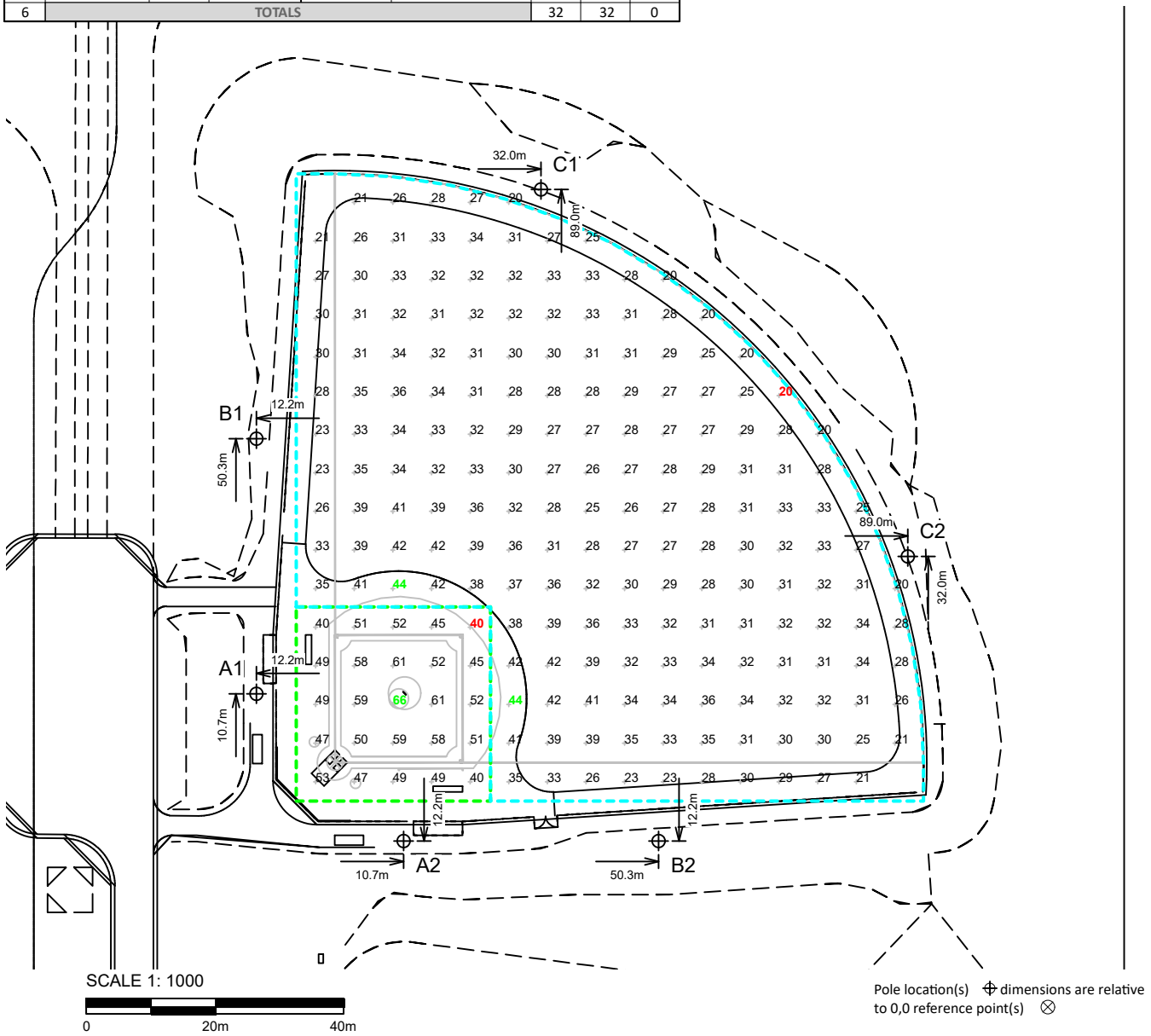
ENGINEERED DESIGN By: Will Hartl · File #212654A · 20-May-21

Tobique First Nation Softball 2

Perth Andover,NB

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	A1-A2	18.29m	-	4.72m	TLC-BT-575	1	1	0
				18.29m	TLC-LED-1200	2	2	0
2	B1-B2	21.34m	-	4.72m	TLC-BT-575	1	1	0
				21.34m	TLC-LED-1500	6	6	0
2	C1-C2	18.29m	-	4.72m	TLC-BT-575	2	2	0
				18.29m	TLC-LED-1200	4	4	0
6	TOTALS					32	32	0



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

GRID SUMMARY

Name:	**Softball**
Size:	91.4m/91.4m/91.4m - basepath 19.8m
Spacing:	6.0m x 6.0m
Height:	1.0m above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Infield	Outfield
Guaranteed Average:	**50**	**30**
Scan Average:	51.24	30.98
Maximum:	66	44
Minimum:	40	20
Avg / Min:	1.29	1.58
Guaranteed Max / Min:	**2**	**2.5**
Max / Min:	1.66	2.27
UG (adjacent pts):	1.27	1.54
CU:	0.71	
CV:	0.13	0.17
No. of Points:	25	187

LUMINAIRE INFORMATION

Applied Circuits:	A
No. of Luminaires:	**32**
Total Load:	35.8 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.

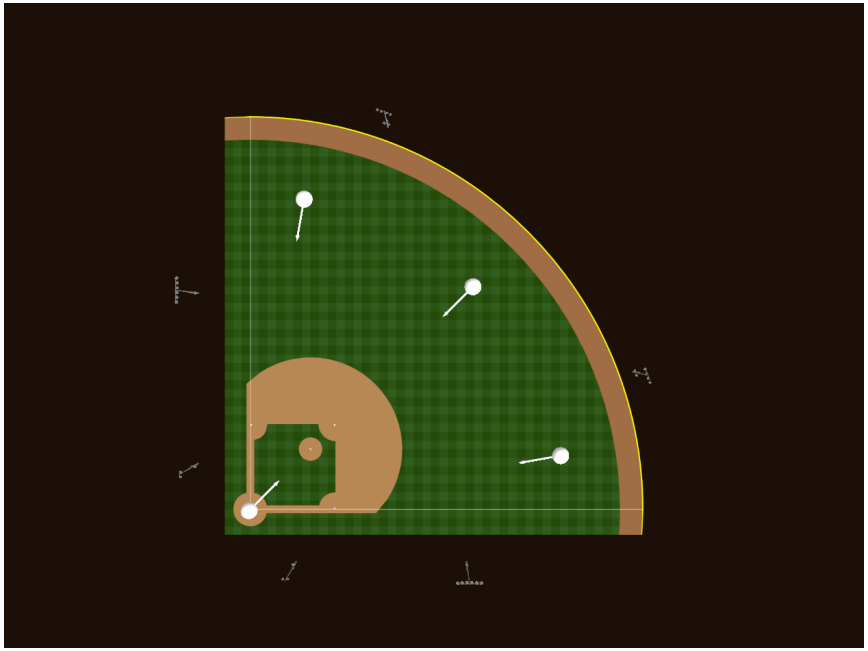
Installation Requirements: Results assume ± 3% nominal voltage at line side of the driver and structures located within 3 feet (1m) of design locations.

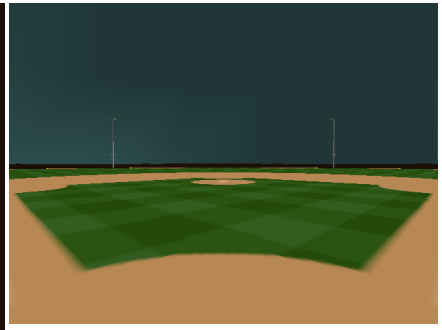
ENGINEERED DESIGN By: Will Hartl · File #212654A · 20-May-21

We Make It Happen®

Tobique First Nation Softball 2

Perth Andover,NB



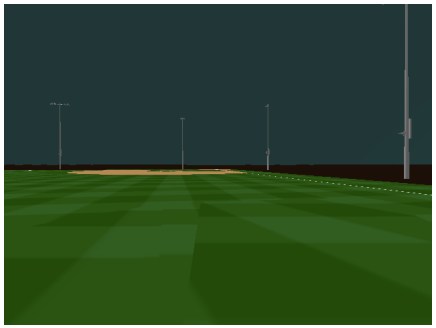


Batter

High | Marginal | Low | None

Max Source Candela

43

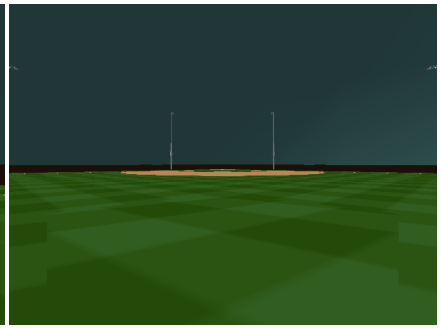


Left Outfielder

High | Marginal | Low | None

Max Source Candela

0

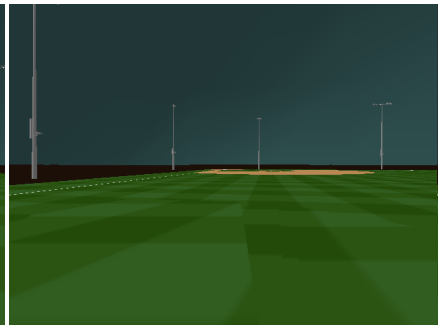


Center Outfielder

High | Marginal | Low | None

Max Source Candela

23



Right Outfielder

High | Marginal | Low | None

Max Source Candela

0

Baseball / Softball Analysis

Summary

For playability, four primary positions are analyzed: the batter and the three outfield positions.

For the batter, the view back to the pitcher is analyzed for excessive direct light and glare from sources in the outfield. The maximum candela from any source present in their view is shown.

For the outfield, the view from the left, center, and right field are analyzed. In each case, the outfielder is looking back at home plate. The maximum candela is again used to evaluate the lighting for the outfielder at that position.

Maximum Source Candela

50000 | 10000 | 4500

High | Marginal | Low | None

Impact on Playability

For the viewpoints shown, the maximum candela from any source within the field-of-view is reported. Higher values can adversely impact a player's ability to properly see a pitch or a ball-in-flight.

ENGINEERED DESIGN by Will Hartl • File # • 20-May-21

Tobique First Nation Softball 2

Perth Andover,NB

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	A1-A2	18.29m	-	4.72m	TLC-BT-575	1	1	0
				18.29m	TLC-LED-1200	2	2	0
2	B1-B2	21.34m	-	4.72m	TLC-BT-575	1	1	0
				21.34m	TLC-LED-1500	6	6	0
2	C1-C2	18.29m	-	4.72m	TLC-BT-575	2	2	0
				18.29m	TLC-LED-1200	4	4	0
6	TOTALS					32	32	0

SCALE 1 : 1000

0 20m 40m

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

GRID SUMMARY

Name:	**Blanket Grid**
Spacing:	10.0m x 10.0m
Height:	1.0m above grade

ILLUMINATION SUMMARY

MAINTAINED HORIZONTAL FOOTCANDLES

	Entire Grid
Scan Average:	**5.58**
Maximum:	62
Minimum:	0
Avg / Min:	-
Max / Min:	**-**
UG (adjacent pts):	90.77
CU:	0.89
No. of Points:	572

LUMINAIRE INFORMATION

Applied Circuits:	A
No. of Luminaires:	**32**
Total Load:	35.8 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.

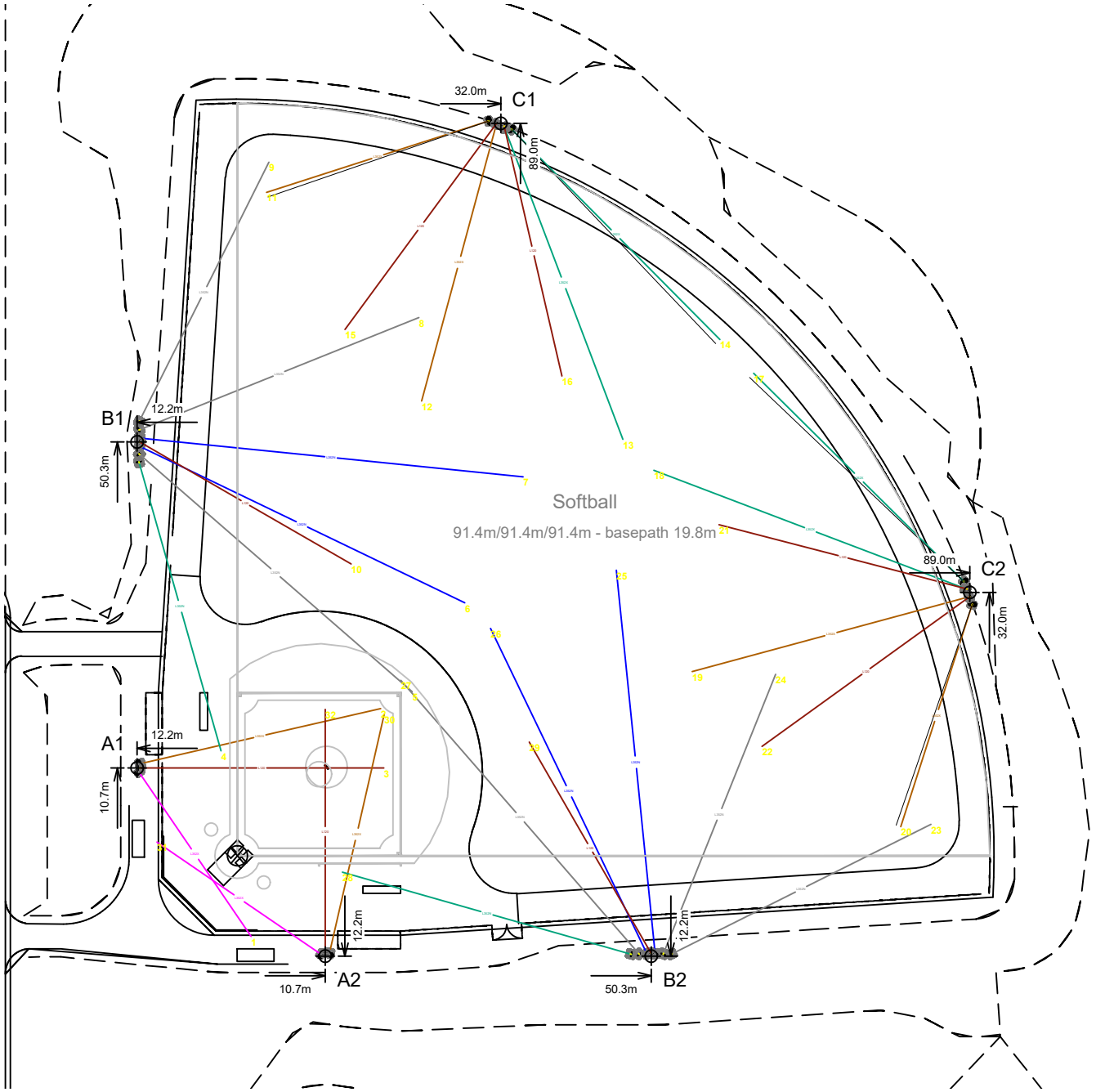
Electrical System Requirements: Refer to Amperage Draw Chart and/or the **"Musco Control System Summary"** for electrical sizing.

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

ENGINEERED DESIGN By: Will Hartl · File #212654A · 20-May-21

Tobique First Nation Softball 2

Perth Andover,NB



SCALE 1: 750

0 20m 40m

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

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	MOUNTING HEIGHT	LUMINAIRE TYPE	QTY / POLE
2	A1-A2	18.29m	-	4.72m	TLC-BT-575	1
				18.29m	TLC-LED-1200	2
2	B1-B2	21.34m	-	4.72m	TLC-BT-575	1
				21.34m	TLC-LED-1500	6
2	C1-C2	18.29m	-	4.72m	TLC-BT-575	2
				18.29m	TLC-LED-1200	4
6	TOTALS					32

SINGLE LUMINAIRE AMPERAGE DRAW CHART

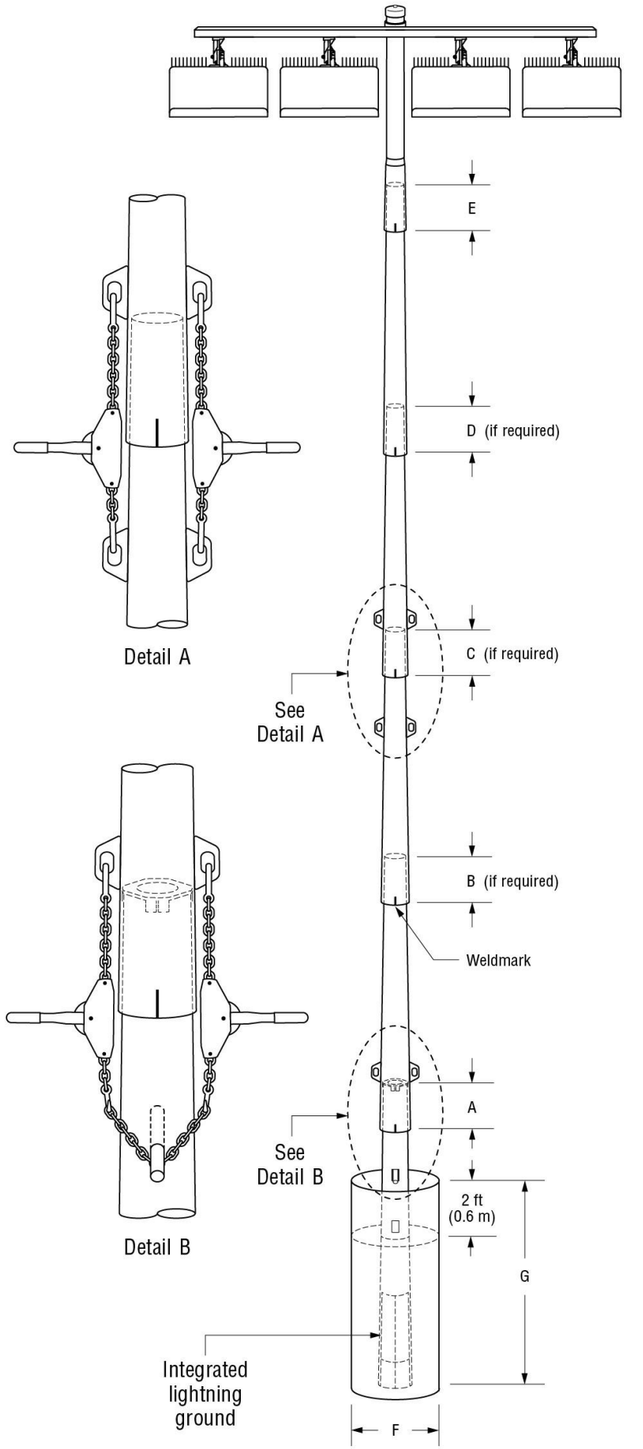
Ballast Specifications (.90 min power factor)	Line Amperage Per Luminaire (max draw)						
Single Phase Voltage	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	480 (60)
TLC-LED-1500	8.5	8.1	7.4	6.4	5.1	4.7	3.7
TLC-LED-1200	7.0	6.6	6.1	5.2	4.2	4.0	3.0
TLC-BT-575	3.4	3.2	2.9	2.5	2.0	1.8	1.5

ENGINEERED DESIGN By: Will Hartl · File #212654A · 20-May-21

We Make It Happen®

ITEM C

PRELIMINARY FOUNDATION AND POLE ASSEMBLY DRAWING



R60-62-00_A

TABLE 1: POLE ASSEMBLY			
POLE ID	POLE HEIGHT ft (m)	# OF LUMINAIRES	ASSEMBLED POLE WEIGHT [3] lb (kg)
A1	60 (18.3)	3	963 (437)
A2	60 (18.3)	3	963 (437)
B1	70 (21.3)	7	2032 (922)
B2	70 (21.3)	7	2032 (922)
C1	60 (18.3)	6	1231 (558)
C2	60 (18.3)	6	1231 (558)

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.
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] F in (mm)	G ft (m)	CONCRETE BACKFILL [1,2] yd^3 (m^3)	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	2770 (1256)	30 (762)	12 (3.7)	1.5 (1.1)	NO	INTEGRATED [6]	N/A
B2	2770 (1256)	30 (762)	12 (3.7)	1.5 (1.1)	NO	INTEGRATED [6]	N/A
C1	1870 (848)	30 (762)	10 (3.0)	1.2 (0.9)	NO	INTEGRATED [6]	N/A
C2	1870 (848)	30 (762)	10 (3.0)	1.2 (0.9)	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/in^2 (20 MPa) minimum.
3. Foundation design per 2015 NBC, 0.40 kPa mph, exposure category None, variation STD.
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.

Tobique First Nation Softball 2 - Perth Andover, NB, Canada

Date:	05/21/2021	Scale:	N/A
Rep:	Lloyd Corkum	Page:	1 of 1
Project:	212654		Preliminary

ITEM D

Control System Summary

Project Specific Notes:

Project Information

Project #:	212654
Project Name:	Tobique First Nation Softball 2
Date:	05/20/21
Project Engineer:	Will Hartl
Sales Representative:	Lloyd Corkum
Control System Type:	Control-Link™ Control and Monitoring System
Communication Type:	PowerLine-ST
Scan:	212654A
Document ID:	212654P1V1-0520131625
Distribution Panel Location or ID:	Controls
Total # of Distribution Panel Locations for Project:	1
Design Voltage/Hertz/Phase:	347/60/3
Control Voltage:	120

Equipment Listing

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

	QTY	SIZE (AMPS)
Total Contactors	6	30 AMP
Total Off/On/Auto Switches:	1	

Materials Checklist

Contractor/Customer Supplied:

- ❑ A dedicated 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 circuits
  - — HID rated or D-curve circuit breaker sized per full load amps on Circuit Summary by Zone Chart
- ❑ Wiring
  - — See chart on page 2 for wiring requirements
  - — Equipment grounding conductor and splices must be insulated (per circuit)
  - — Lightning ground protection (per pole), if not Musco supplied
- ❑ 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
- ❑ Breaker lock-on device to prevent unauthorized power interruption to control power and powerline connection (if present)
- ❑ 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.

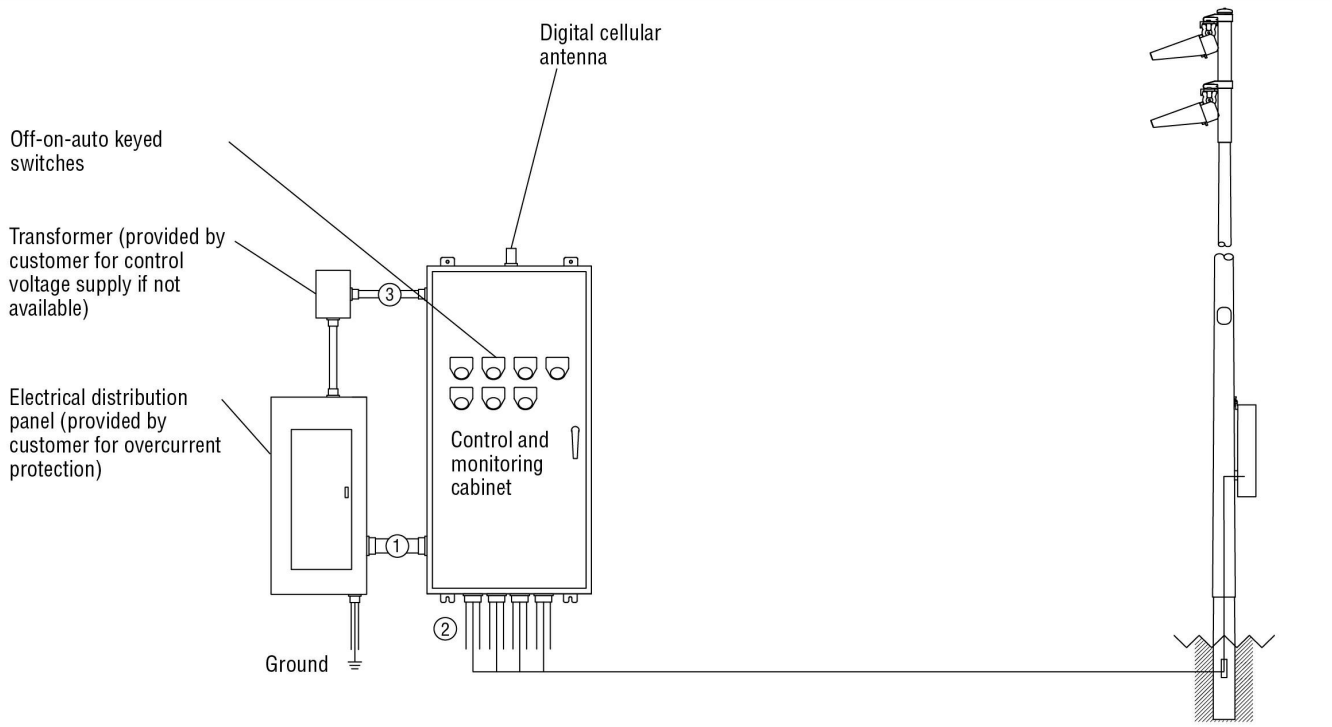
IMPORTANT NOTES

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 electrical components 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 luminaires 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 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 is 0.9.

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

Control System Summary

Control•Link® Control and Monitoring System



Conduit ID	Description	# of Wires	Wire (AWG)	Conduit (in)	Max. Wire Length (ft)	MUSCO Supplied	Notes
1	Line power to contactors, and equipment grounding conductor	*A	*B	*C	N/A	No	A-E
2	Load power to lighting circuits, and equipment grounding conductor	*A	*B	*C	N/A	No	A-E
3	Control power (dedicated, 20A)	3	12	*C	N/A	No	C,E

R60-100-00_B

* Notes:
A. See voltage and phasing per the notes on cover page.
B. Calculate per load and voltage drop.
C. All conduit diameters should be per code unless otherwise specified to allow for connector size.
D. Equipment grounding conductor and any splices must be insulated.
E. Refer to control and monitoring system installation instructions for more details on equipment information and the installation requirements.

IMPORTANT: Control wires (3) must be in separate conduit from line and load power wires (1, 2).

Control System Summary

SWITCHING SCHEDULE

Field/Zone Description	Zones
Softball	**1**

CONTROL POWER CONSUMPTION	
120V Single Phase	
VA loading of Musco Supplied Equipment	INRUSH: 2043.0
	SEALED: 231.8

CIRCUIT SUMMARY BY ZONE

POLE	CIRCUIT DESCRIPTION	# OF FIXTURES	# OF DRIVERS	*FULL LOAD AMPS	CONTACTOR SIZE (AMPS)	CONTACTOR ID	ZONE
A1	Softball	3	3	**4.2**	30	C1	1
A2	Softball	3	3	**4.2**	30	C2	1
B1	Softball	7	7	**12.2**	30	C3	1
B2	Softball	7	7	**12.2**	30	C4	1
C1	Softball	6	6	**8.4**	30	C5	1
C2	Softball	6	6	**8.4**	30	C6	1

*Full Load Amps based on amps per driver.

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	4.18		
1	1	C2	Pole A2	4.18		
1	1	C3	Pole B1	12.23		
1	1	C4	Pole B2	12.23		
1	1	C5	Pole C1	8.36		
1	1	C6	Pole C2	8.36		

ZONE SCHEDULE

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

ITEM E

Musco Constant 25™

25-Year Product Assurance & Warranty Program

Project name:_____ **Project number:**_____

Owner:_____ **City:**_____ **State:**_____

Covered product(s):_____

Date issued:_____ **Expiration:**_____

Musco Sports Lighting, LLC will provide all materials and labor to maintain operation of your lighting system to original design criteria for 25 years. Musco products and services are guaranteed to perform on your project as detailed in this document.

Light Performance

Specified illumination levels will be maintained and are marked as guaranteed in the Musco Illumination Summary.

Individual luminaire outages that occur during the warranty and maintenance period are repaired when the usage of any field is materially impacted.

Spill Light Control

If specified, spill light levels at identified locations are guaranteed to be controlled to the maximum values provided in the Musco Illumination Summary.

Energy Consumption

Total average kW consumption for your lighting system is guaranteed to be not more than the total load shown in the Musco Illumination Summary.

Monitoring, Maintenance, and Control Services

Musco shall monitor the performance of your lighting system, including on/off status, hours of usage, and luminaire outages. If 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, smartphone app, phone, email, or fax. Our trained Control-Link Central™ service center staff is available toll-free 24/7. Regular usage reports are always available on Control-Link Central's web site.

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 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 25 year period.

M-1291-enUS-11

Musco Constant 25™

25-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 Total Light Control – TLC for LED® with Control-Link® and any additional Musco manufactured product as listed on page 1.

"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 nonthreatening and safe environment for service.

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

   You agree to keep your control 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.

   e. Obsolescence or Environmental Restrictions: If during any maintenance or other work performed under this Warranty, any of the parts of the Covered Product(s) are found to be either obsolete, no longer available, or prohibited by any state of federal agency, Musco shall replace said parts with comparable parts and materials with equal operating characteristics solely at Musco's discretion. The cost of replacement of any obsolete cellular related technology shall be borne by you. Prior to completing any such work, Musco shall notify you of the cost (if any) you will incur in the replacement of such parts under this section.

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.

ITEM F

TLC for LED®

5 Easy Pieces™

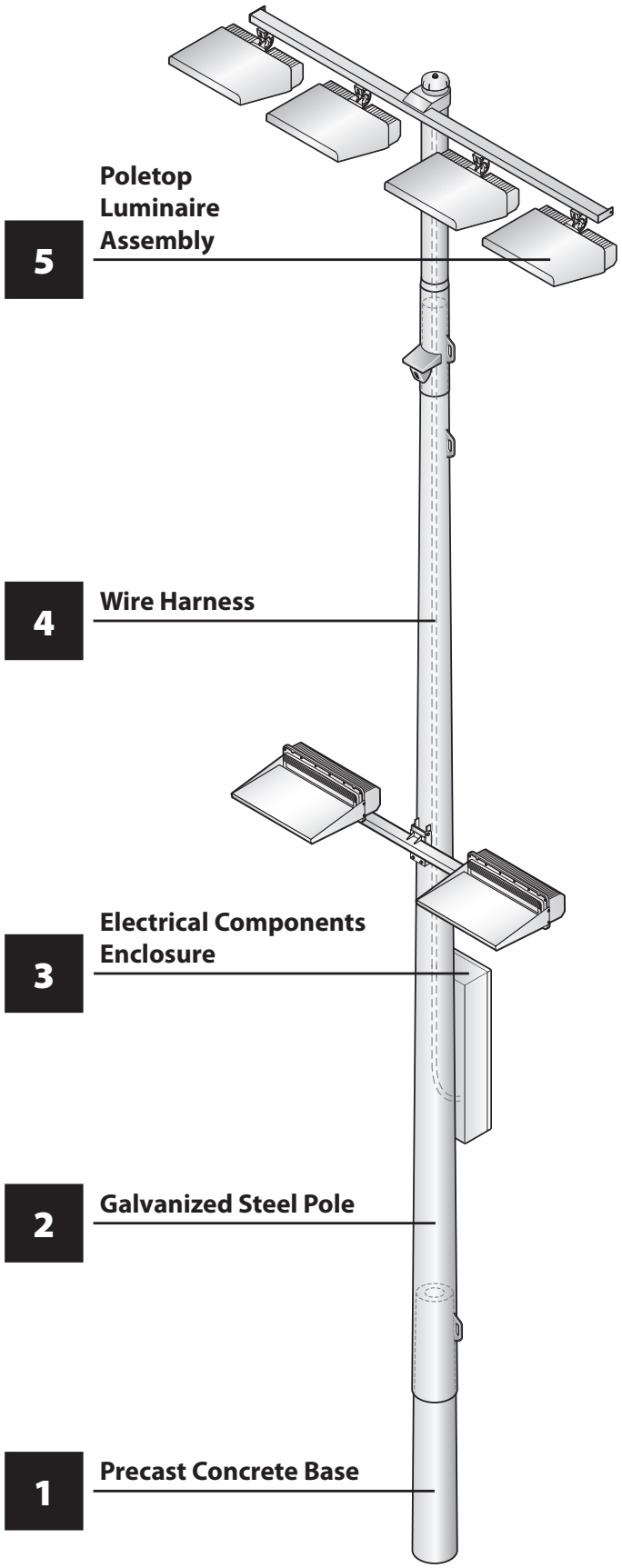
Complete System from Foundation to Poletop

Factory wired, aimed, and tested

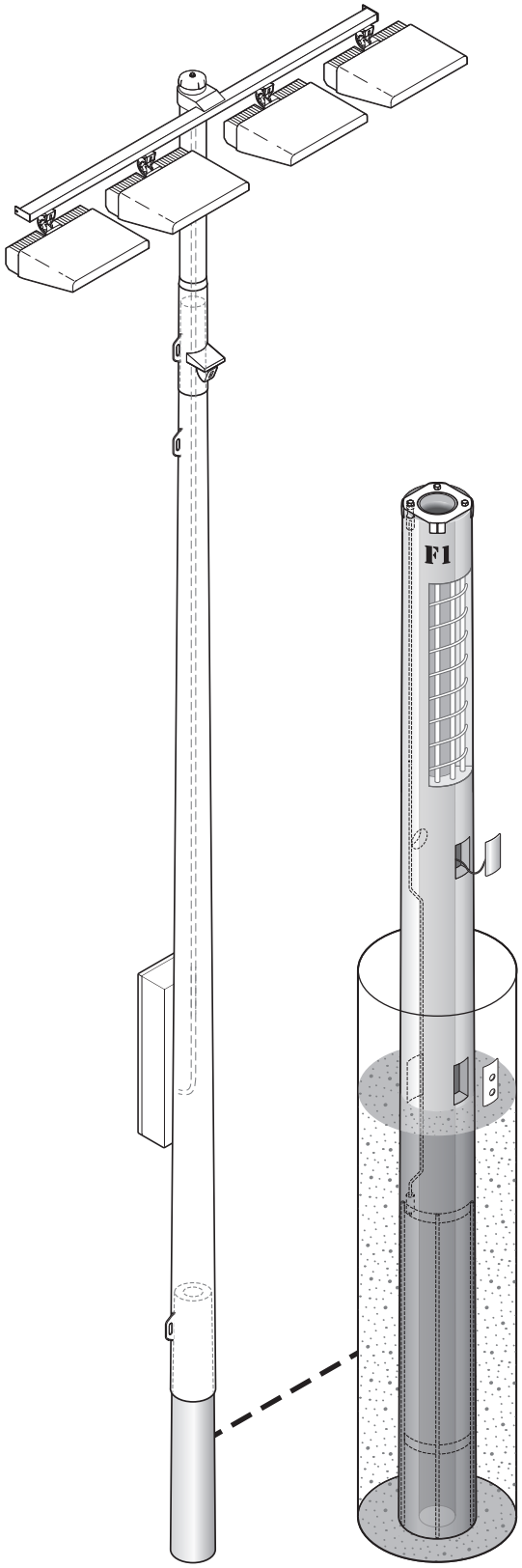
Fast, trouble-free installation

Comprehensive corrosion package

Integrated lightning ground



TLC for LED® – Precast Concrete Base



Overview

The precast concrete base is set directly into the ground and backfilled with concrete. The base includes an integrated lightning ground system.

Features

Base

- Set pole on base in 24 hours
- Tapered upper section for slip-fit steel pole
- Access holes for wire entry
- Epoxy-coated ends prevent water intrusion
- Lifting hole accepts load-rated steel rod provided by Musco

Integrated Lightning Ground System

- Complies with NFPA 780, UL 96A, and EN 62305 standards when installed per Musco installation instructions
- UL Listed, Class II Lightning Protection, file number E337467
- Tested up to 100 kA by independent laboratory
- Steel pole interfaces with integrated grounding system by means of the pole grounding connector
- 2/0 AWG (crossectional area of 67.4 mm^2) grounding electrode conductor
- Concrete-encased grounding electrode, 20 feet (6.1 m) total length, ½ inch (12.7 mm) diameter

Technical Specifications

Base dimensions vary. For measurements refer to project-specific *Foundation and Pole Assembly* drawing.

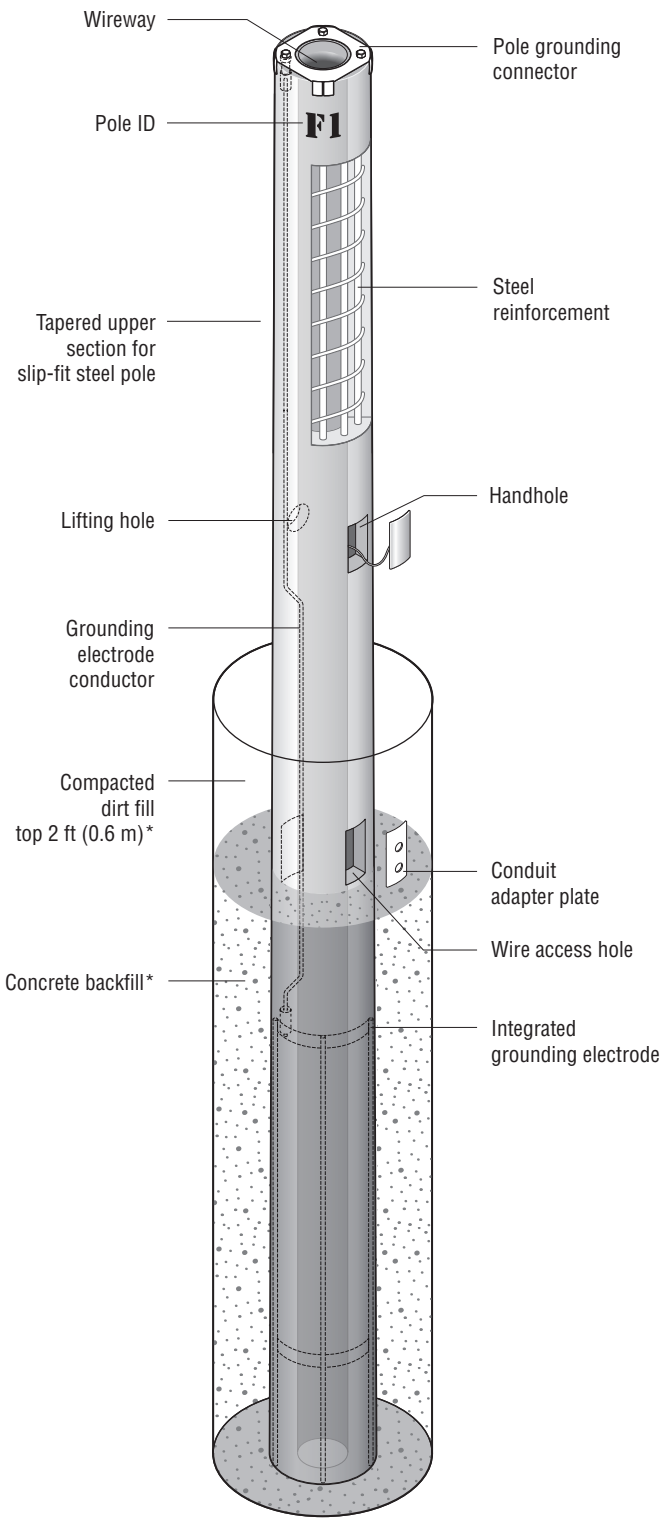
Construction

- Spun concrete construction
- Prestressed steel vertical strands and coil spiral for strength throughout base
- Minimum design strength is 9500 lb/in^2 (65.5 MPa) at 28 days
- Meets ASTM C1804 design requirements

Quality Assurance Tests

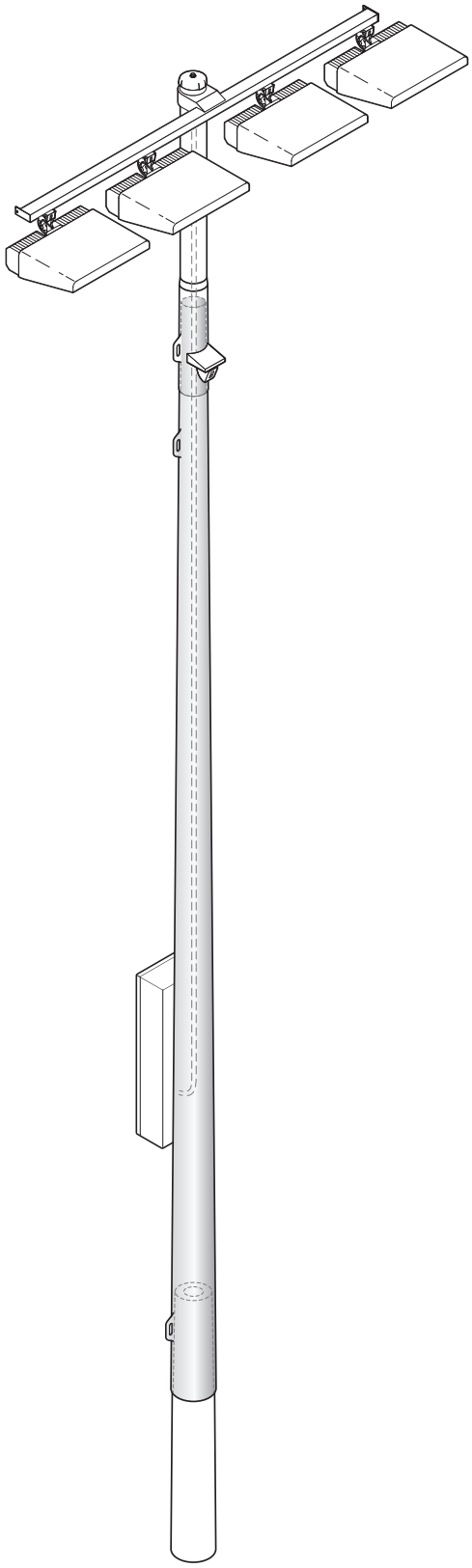
- 28-day compressive strength
- Bending moment capacity
- Grounding system continuity

TLC for LED® – Precast Concrete Base



*Standard pier foundation shown. Foundation and/or backfill may vary per alternate foundation design.

TLC for LED® – Galvanized Steel Pole



Overview

The galvanized steel pole is designed to slip-fit together with the precast concrete base and the poletop luminaire assembly.

Features

- Slip-fit connection allows pole assembly with come-alongs
- Built-in hardware for attaching electrical components enclosure
- Wire access from inside the pole (no exposed wiring or conduit)
- Shipped in sections for easier handling
- Labeled with pole identification for location on field

Technical Specifications

Pole dimensions vary. For measurements refer to project specific pole configuration drawing.

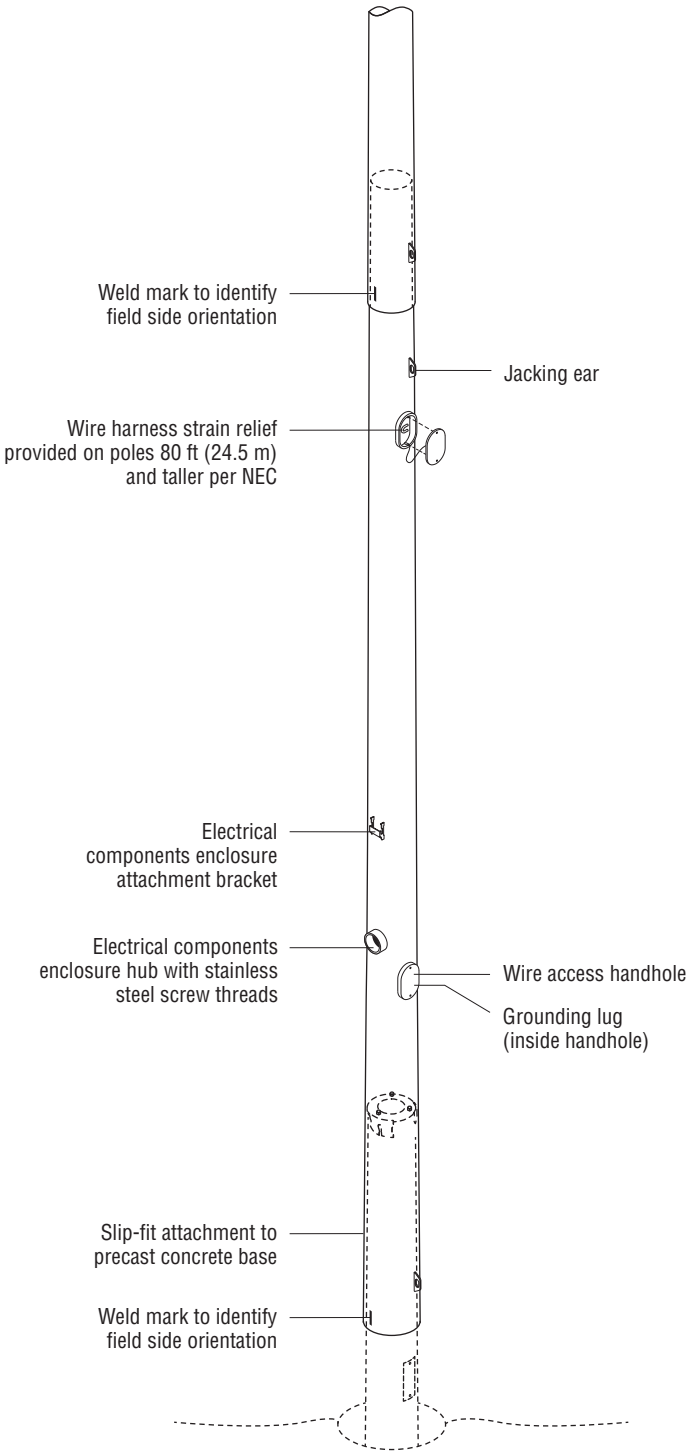
Construction

- Pole designs comply with all major building codes
- High strength, low alloy, tapered, round steel pole
- Hot-dip galvanizing inside and outside after fabrication meets ASTM-A123 and EN 1461 standards
- Conforms to AASHTO stress standards and BS EN 40-3-1
- Grounding lug—rated for aluminum (AL) or copper (CU) wiring
- Pole shipped in sections
- Stainless steel fasteners passivated and coated
- Material certifications are available

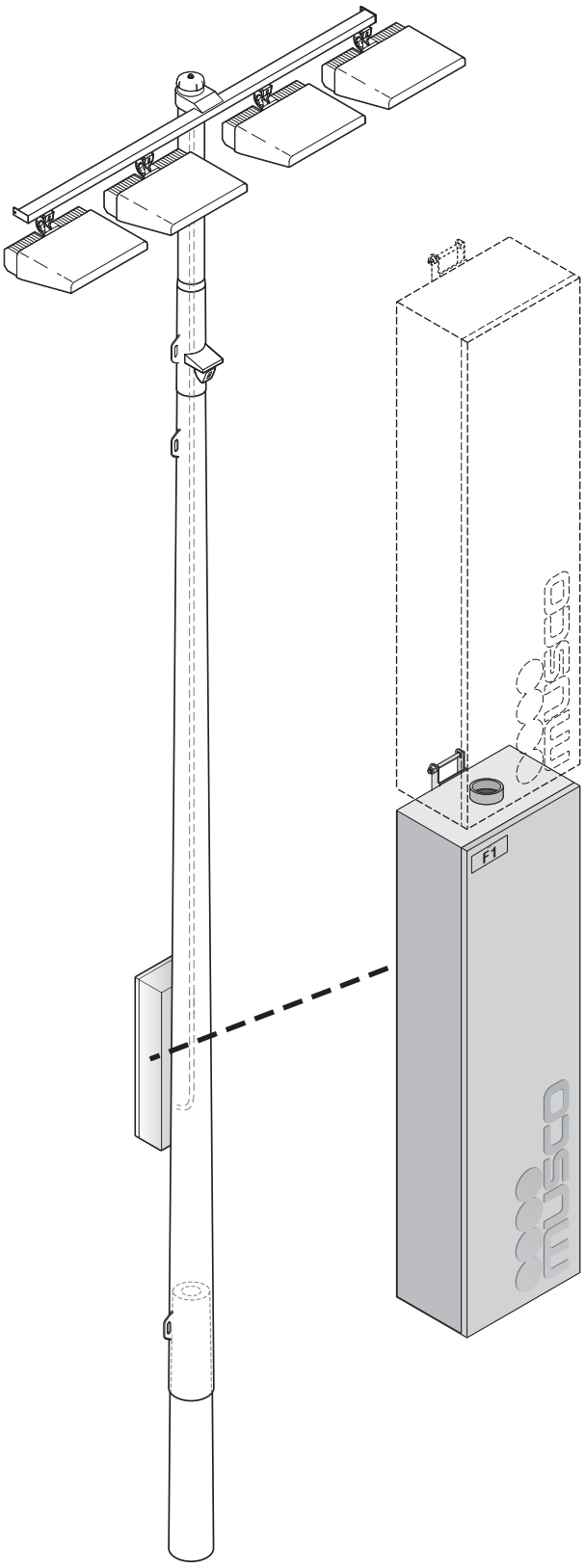
Quality Assurance Tests

- Bending stress
- Minimum galvanizing thickness
- Straightness measurement

TLC for LED® – Galvanized Steel Pole



TLC for LED® – Electrical Components Enclosure



Overview

The electrical components enclosure contains all necessary equipment to operate luminaires. Built-in mounting hardware allows for easy attachment to the galvanized steel pole. Quick connect plugs fasten to the wire harness.

Features

- Factory-built and tested as a unit
- Quick connect plug for easy field wiring
- Mounted 10 ft (3 m) above grade for servicing with ladder
- Labeled with pole identification and electrical information
- Drivers individually fused and spare fuses supplied
- Wire access from inside the pole (no exposed wiring or conduit)
- Disconnect per circuit

Technical Specifications

For amperage draws and circuitry refer to project specific document.

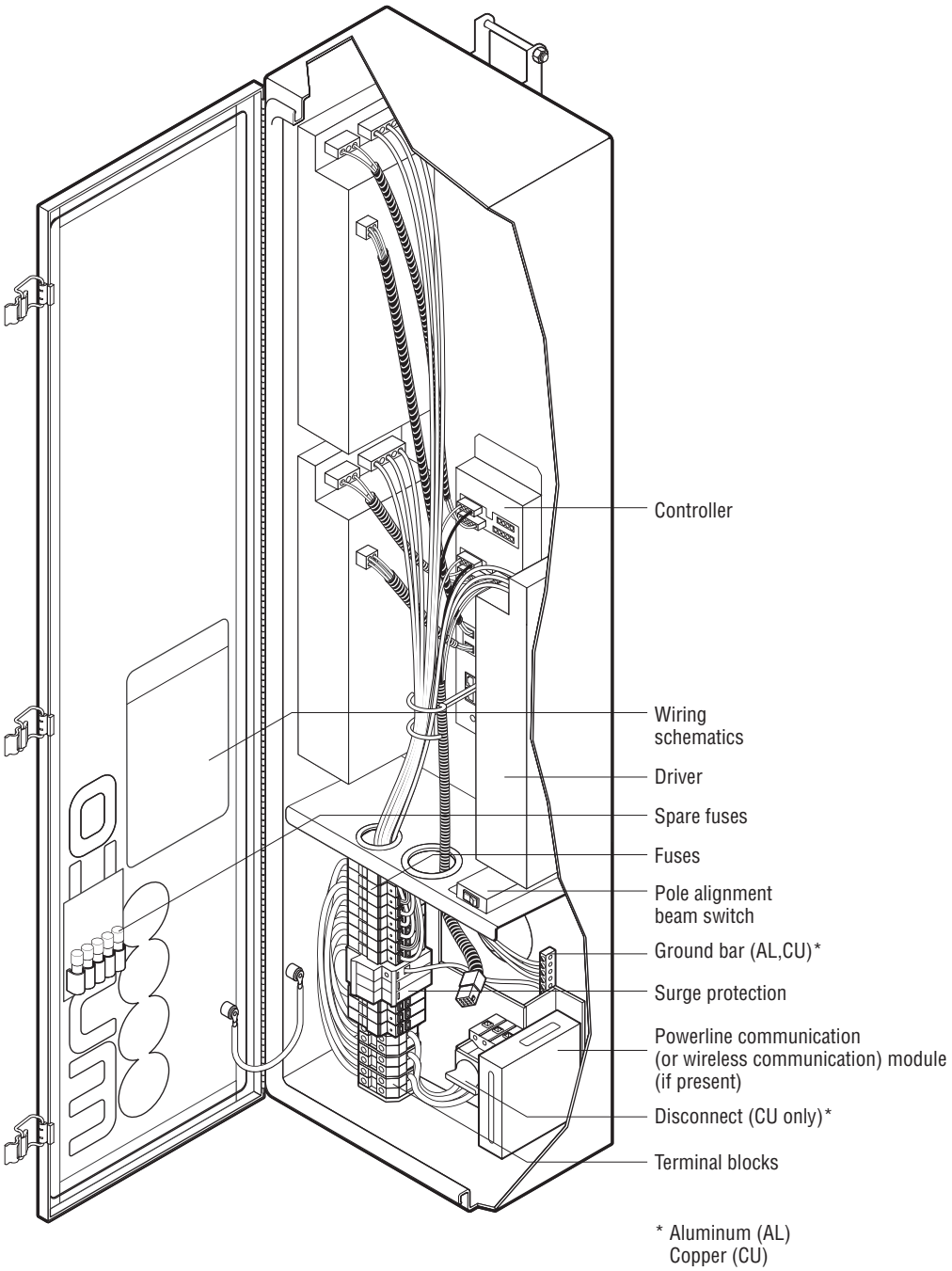
Construction

- 0.08 inch (2 mm) thick, powder-coated aluminum
- Enclosure ratings: NEMA 3R, IP54
- Designed to operate in up to 50˚ C (122˚ F) ambient temperature
- Full length stainless steel hinge
- All stainless steel fasteners passivated and coated
- Meets touchsafe standards
- Up to four drivers per enclosure
- Approximate weight 65 lb (29 kg)
- Lower enclosure size 14.25 in (362 mm) wide x 8 in (203 mm) deep x 52.5 in (1334 mm) high
- Upper enclosure size 14.25 in (362 mm) wide x 8 in (203 mm) deep x 40.5 in (1029 mm) high

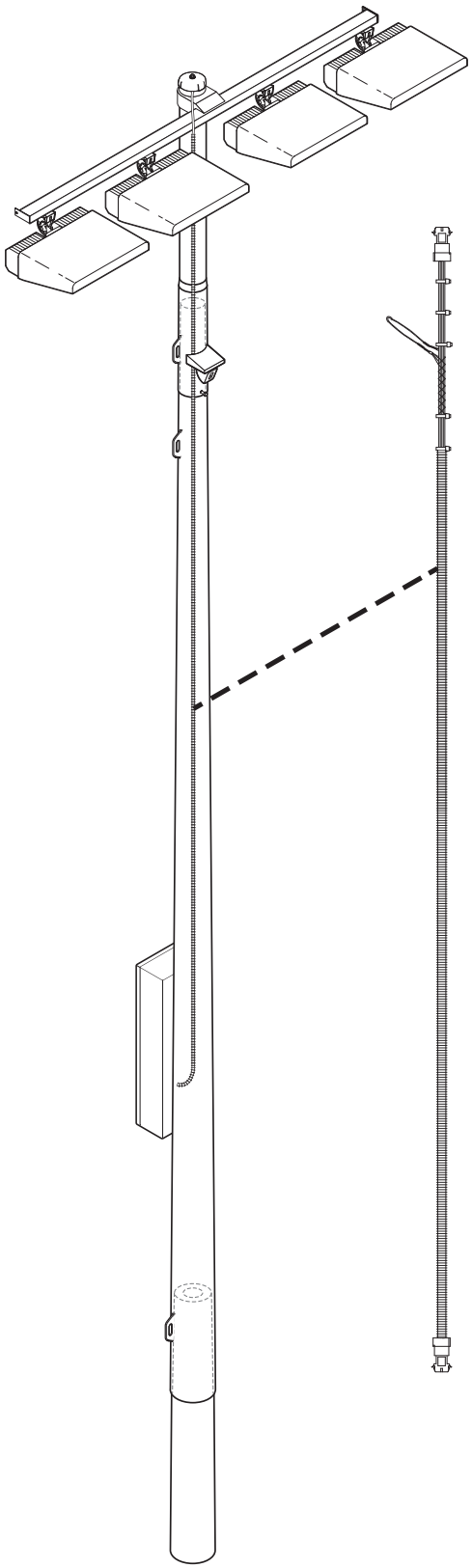
Quality Assurance Tests

- Grounding continuity
- High potential dielectric withstand
- Full functionality test

TLC for LED® – Electrical Components Enclosure



TLC for LED® – Wire Harness



Overview

The factory-built wire harness connects the electrical components enclosure to the poletop luminaire assembly.

Features

- Quick connect plugs for easy field wiring
- Factory-assembled support grip alleviates strain on connections
- Spiral wound cable eliminates slippage
- Protective sleeve prevents wire damage
- All internal wiring, no exposed wires
- Labels identify pole and luminaires

Technical Specifications

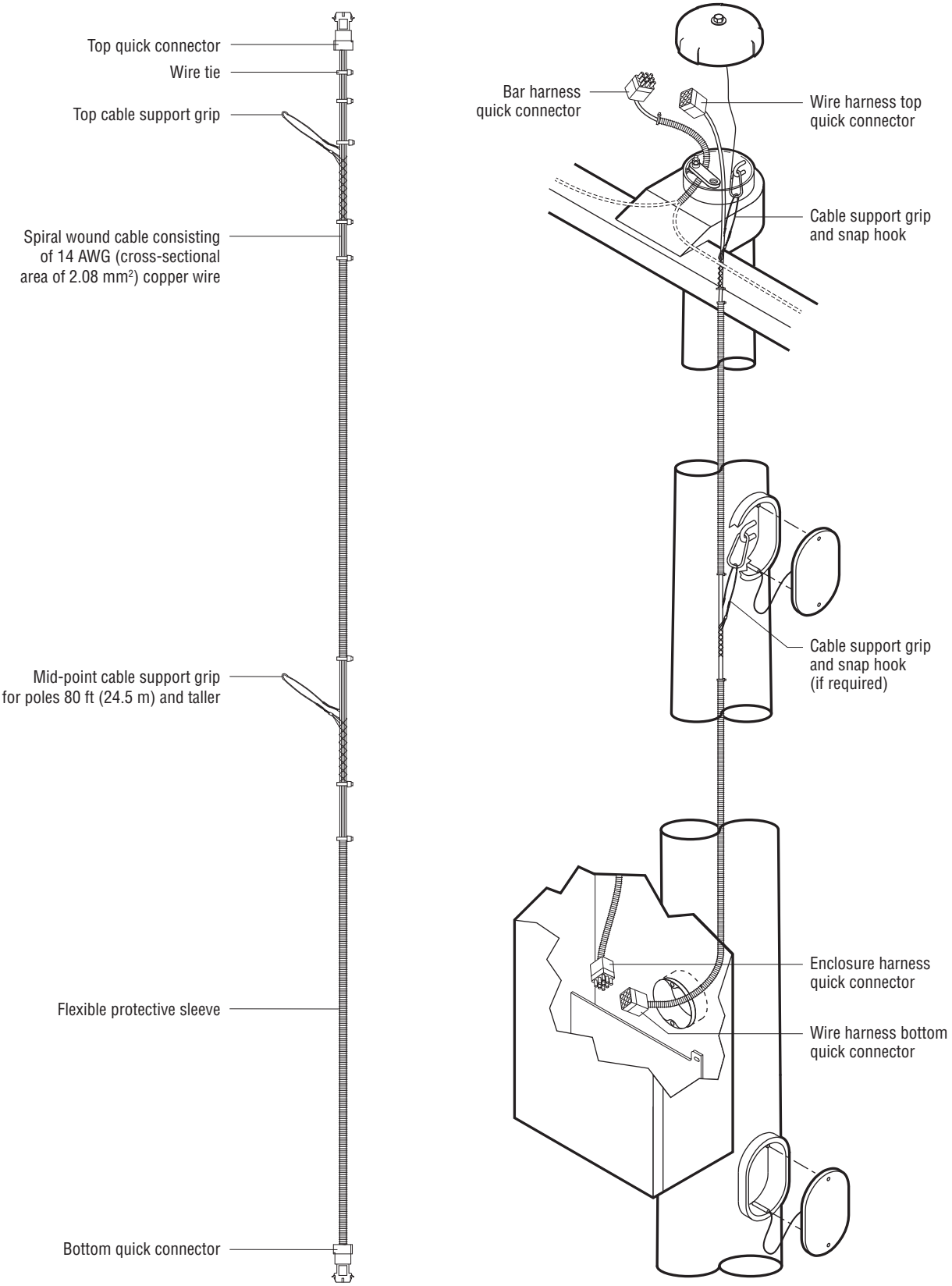
Construction

- Spiral wound, wrapped cable, 14 AWG (cross-sectional area of 2.08 mm^2) copper wire
- Integral cable support grip
- Two wires per driver
- Each harness supports up to four drivers
- Multiple top connectors may be present if required for number of luminaires

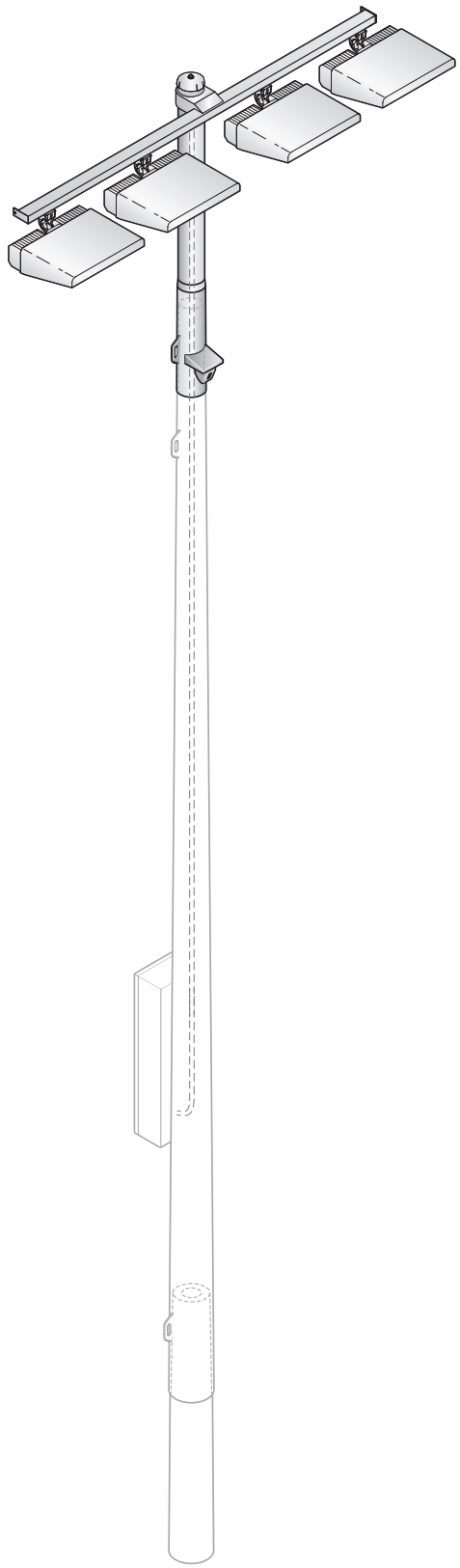
Quality Assurance Tests

- Connector/load resistance
- High potential dielectric withstand
- Grounding continuity
- Termination crimp

TLC for LED® – Wire Harness



TLC for LED® – Poletop Luminaire Assembly, Weld On



Overview

The factory-aimed poletop luminaire assembly is the upper section of the pole and slip-fits together with the galvanized steel pole.

Features

- Each luminaire is factory-built, tested, and ships as a unit
- Luminaires are factory-aimed to two-tenths degree of accuracy
- Luminaire mounts and connects in a single step
- Slip-fit connection allows assembly with come-alongs
- All luminaires are factory-wired to a quick connect harness for easy installation
- Labels identify pole and luminaire location
- No exposed wiring or conduit
- Factory-set pole alignment beam allows easy field alignment

Technical Specifications

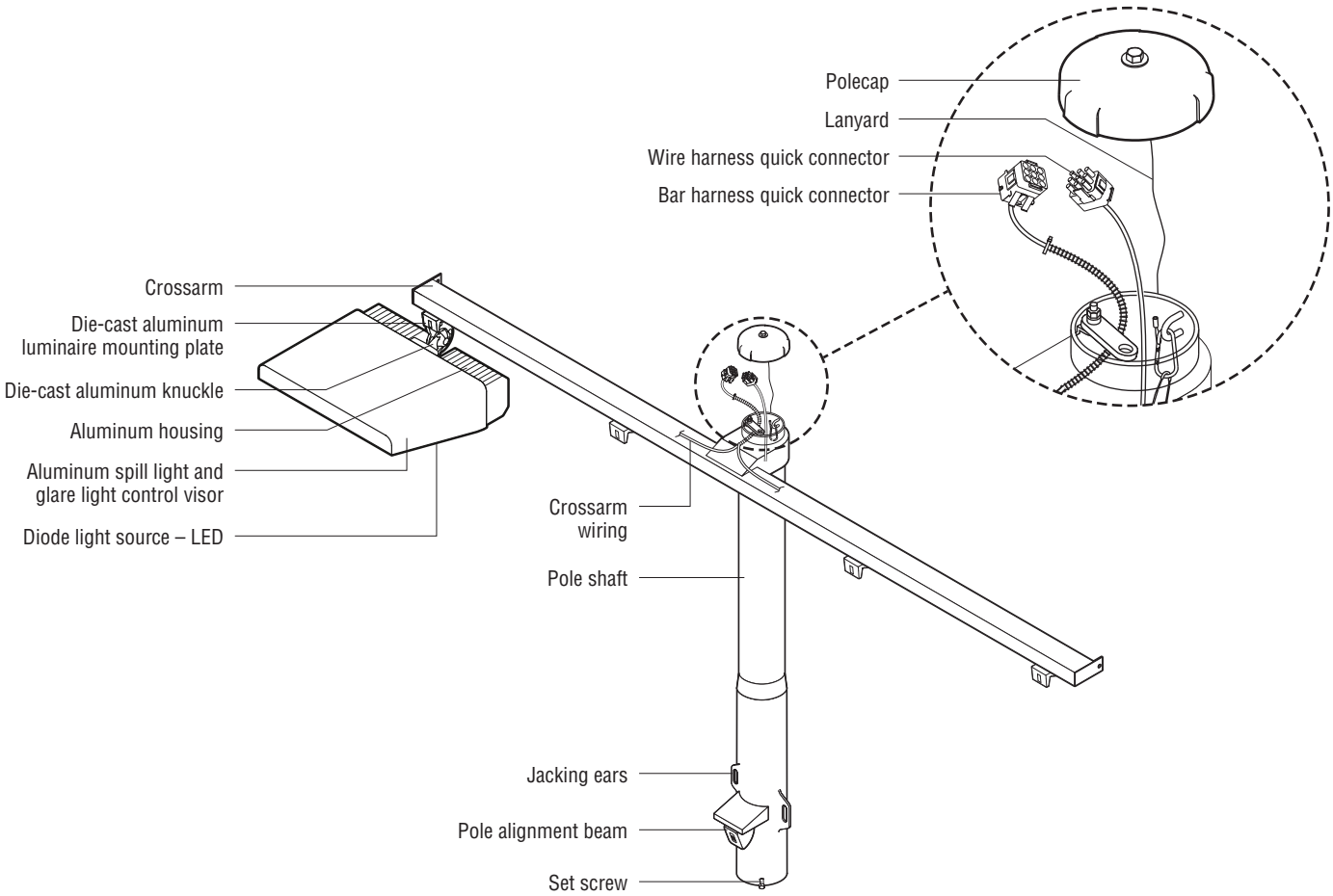
Construction

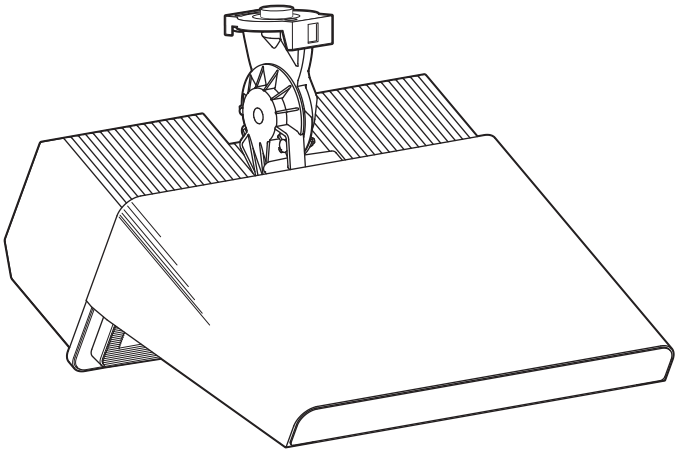
- Crossarms and pole shaft hot-dip galvanizing inside and outside after fabrication meets ASTM-A123 and EN 1461 standards
- All aluminum components are powder-coated or anodized to mil-A-8625F and BS 5599
- Luminaire and knuckle are powder-coated die-cast aluminum
- All stainless steel fasteners are passivated and coated
- Crossarms are constructed of rectangular steel tubing
- Polecap is attached with stainless steel lanyard and securing bolt

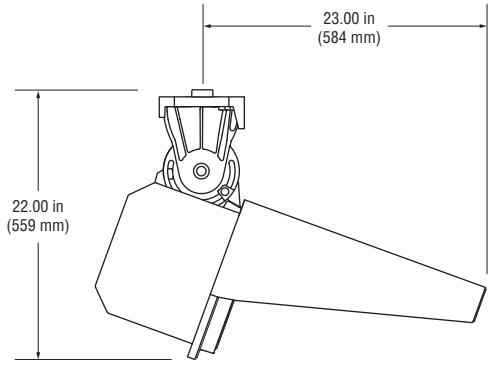
Quality Assurance Tests

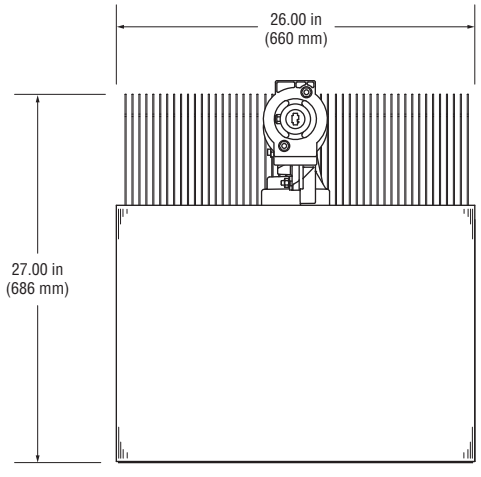
- Galvanizing thickness
- High potential dielectric withstand
- Electrical continuity

TLC for LED® – Poletop Luminaire Assembly, Weld On









Luminaire Data

Weight (luminaire)	67 lb (30 kg)
UL listing number	E338094
UL listed for USA / Canada	UL1598 CSA-C22.2 No.250.0
CE Declaration	LVD, EMC, RoHS
Ingress protection, luminaire	IP65
Impact rating	IK07
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 (20k)	>120,000 h
L80 (20k)	>120,000 h
L70 (20k)	>120,000 h
Lumens[1]	160,000
CIE correlated color temperature	5700 K
Color rendering index (CRI)	75 typ, 70 min
LED binning tolerance	7-step MacAdam Ellipse

Footnotes:

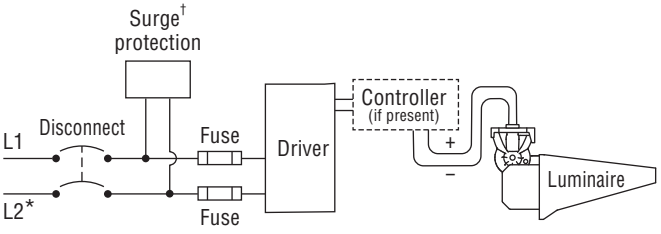
1) Incorporates appropriate dirt depreciation factor for life of luminaire.

Driver Data

Electrical Data

Rated wattage[1]	
Per driver	1430 W
Per luminaire	1430 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	50°C (122°F)
Ingress protection, electrical components enclosure	IP54
Efficiency	95%
Dimming mode	optional
Range, energy consumption	12 – 100%
Range, light output	17 – 100%
Flicker	<2%
Total harmonic distortion (THD) at full output	<20%

Typical Wiring



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

	200 Vac 50/60 Hz	208 Vac 60 Hz	220 Vac 50/60 Hz	230 Vac 50 Hz	240 Vac 50/60 Hz	277 Vac 60 Hz	347 Vac 60 Hz	380 Vac 50/60 Hz	400 Vac 50 Hz	415 Vac 50 Hz	480 Vac 60 Hz
Max operating current per luminaire[2]	8.86 A	8.52 A	8.06 A	7.71 A	7.39 A	6.40 A	5.11 A	4.67 A	4.43 A	4.27 A	3.70 A

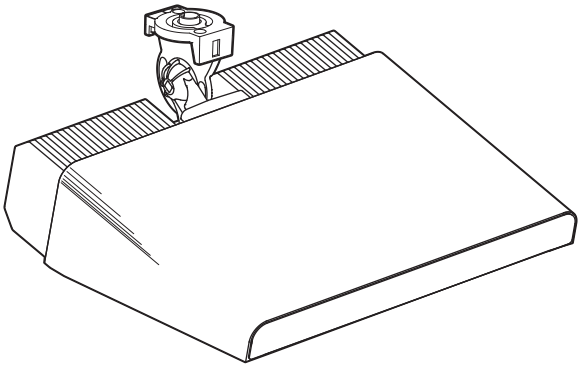
Footnotes:

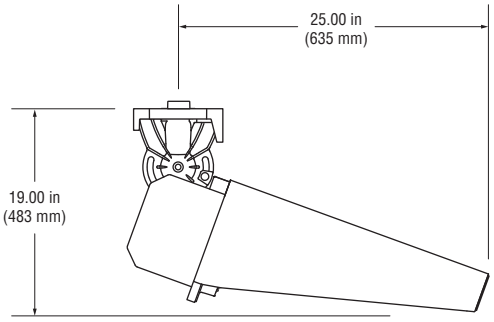
1) Rated wattage is the power consumption, including driver efficiency losses, at stabilized operation in 25°C ambient temperature environment.

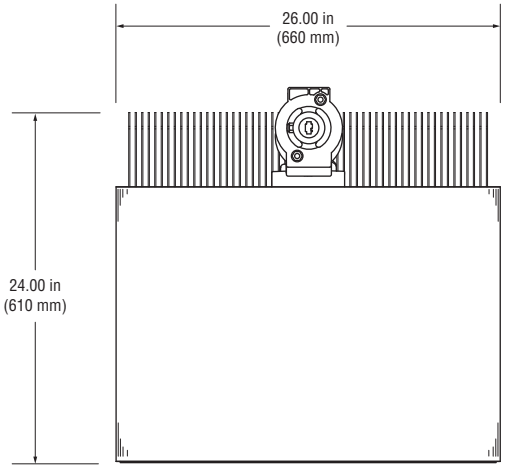
2) Operating current includes allowance for 0.90 minimum power factor, operating temperature, and LED light source manufacturing tolerances.

Notes

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







Luminaire Data

Weight (luminaire)	45 lb (20 kg)
UL listing number	E338094
UL listed for USA / Canada	UL1598 CSA-C22.2 No.250.0
CE Declaration	LVD, EMC, RoHS
Ingress protection, luminaire	IP65
Impact rating	IK07
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 (20k)	>120,000 h
L80 (20k)	>120,000 h
L70 (20k)	>120,000 h
Lumens[1]	136,000
CIE correlated color temperature	5700 K
Color rendering index (CRI)	75 typ, 70 min
LED binning tolerance	7-step MacAdam Ellipse

Footnotes:

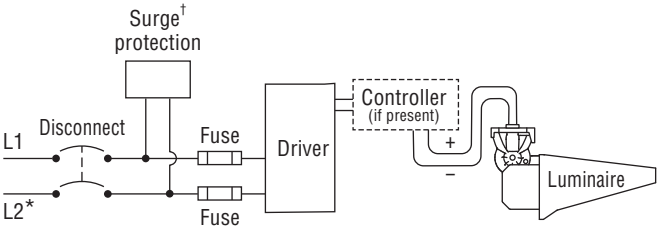
1) Incorporates appropriate dirt depreciation factor for life of luminaire.

Driver Data

Electrical Data

Rated wattage[1]	
Per driver	1170 W
Per luminaire	1170 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	50°C (122°F)
Ingress protection, electrical components enclosure	IP54
Efficiency	95%
Dimming mode	optional
Range, energy consumption	14 – 100%
Range, light output	19 – 100%
Flicker	<2%
Total harmonic distortion (THD) at full output	<20%

Typical Wiring



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

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

Footnotes:

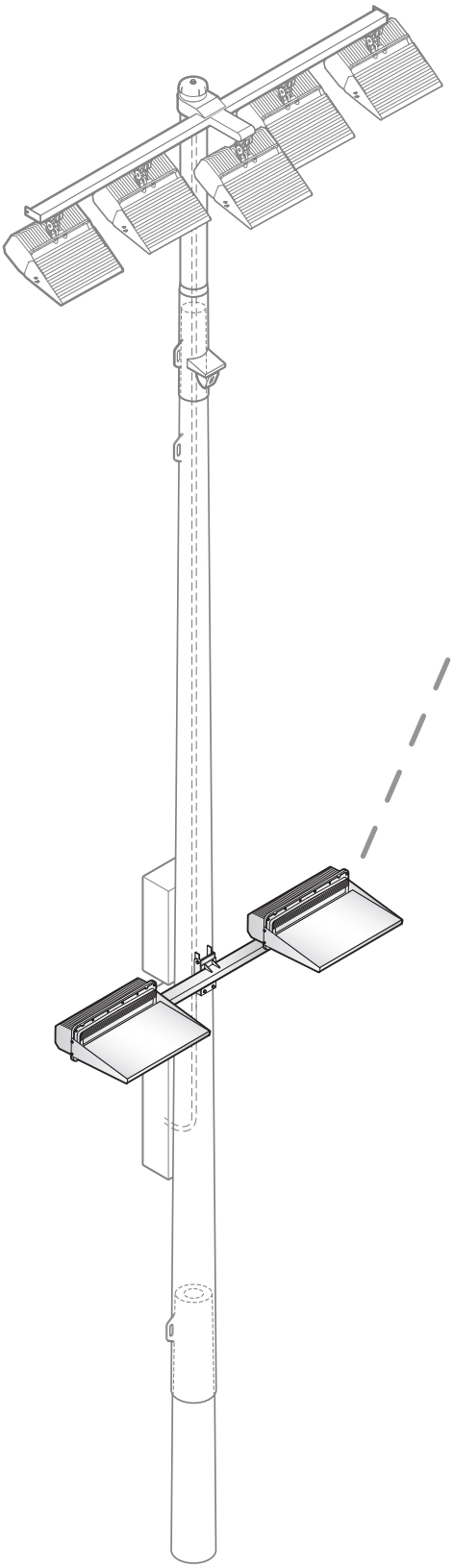
1) Rated wattage is the power consumption, including driver efficiency losses, at stabilized operation in 25°C ambient temperature environment.

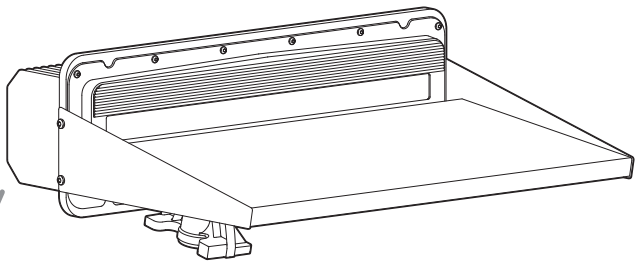
2) Operating current includes allowance for 0.90 minimum power factor, operating temperature, and LED light source manufacturing tolerances.

Notes

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

Luminaire and Driver Components – TLC-BT-575





Luminaire Data

Weight (luminaire)	34 lb (15 kg)
UL listing number	E338094
UL Listed for USA / Canada	UL1598 CSA-C22.2 No.250.0
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]	52,000

Footnotes:

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

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

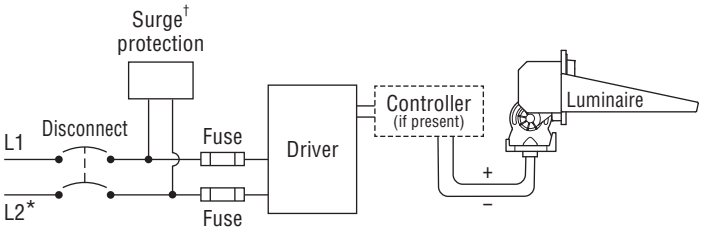
Luminaire and Driver Components – TLC-BT-575

Driver Data

Electrical Data

Rated wattage[1]	
Per driver	575 W
Per luminaire	575 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	50°C (122°F)
Ingress protection, electrical components enclosure	IP54
Efficiency	95%

Typical Wiring



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

† Not present if indoor installation.

	200 Vac 50/60 Hz	208 Vac 60 Hz	220 Vac 50/60 Hz	230 Vac 50 Hz	240 Vac 50/60 Hz	277 Vac 60 Hz	347 Vac 60 Hz	380 Vac 50/60 Hz	400 Vac 50 Hz	415 Vac 50 Hz	480 Vac 60 Hz
Max operating current[2] per luminaire	3.48 A	3.35 A	3.16 A	3.03 A	2.90 A	2.51 A	2.01 A	1.83 A	1.74 A	1.68 A	1.45 A

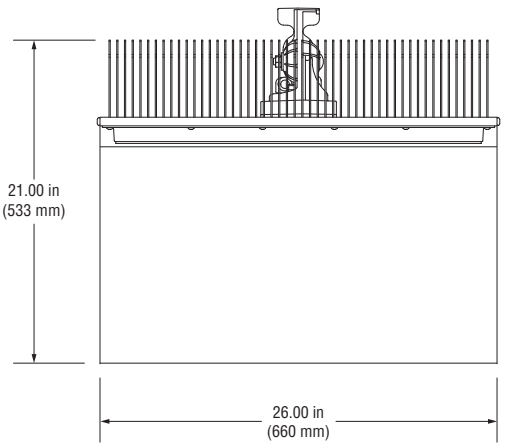
Footnotes:

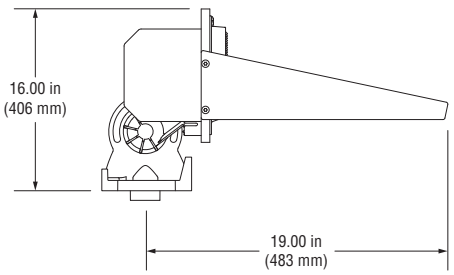
1) Rated wattage is the power consumption, including driver efficiency losses, at stabilized operation in 25˚C ambient temperature environment.

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

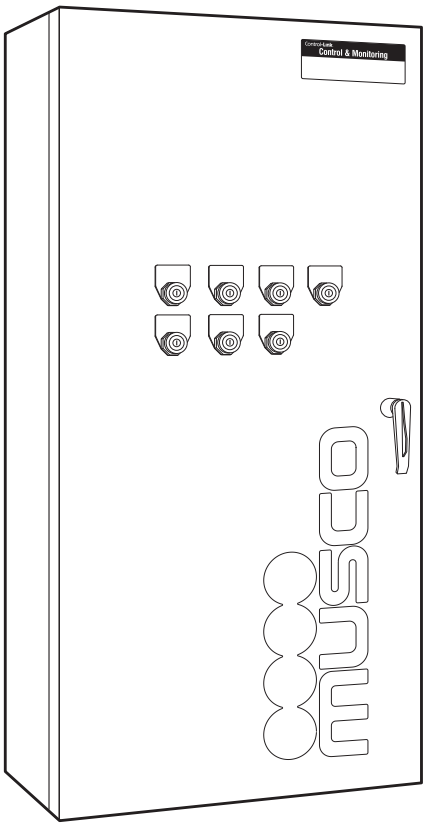
Notes

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





Datasheet: **Control-Link® Control and Monitoring System**



Overview

Control-Link® Control and Monitoring System provides remote on/off control, dimming, system monitoring, and management of your lighting system.

Features

Control

- Lighting system and auxiliary equipment
- Control with: Control-Link website, smartphone app, phone call, email, or fax up to 10 years in advance
- Seven controllable lighting zones
- Three customizable dimming levels (factory set at 100%, 50%, 15%)
- Multi-level user security settings
- Door-mounted or remote-mounted on/off/auto switches allow for manual override of automated control

Monitoring

- Detects luminaire outages and other issues that affect light quality

Management and Support

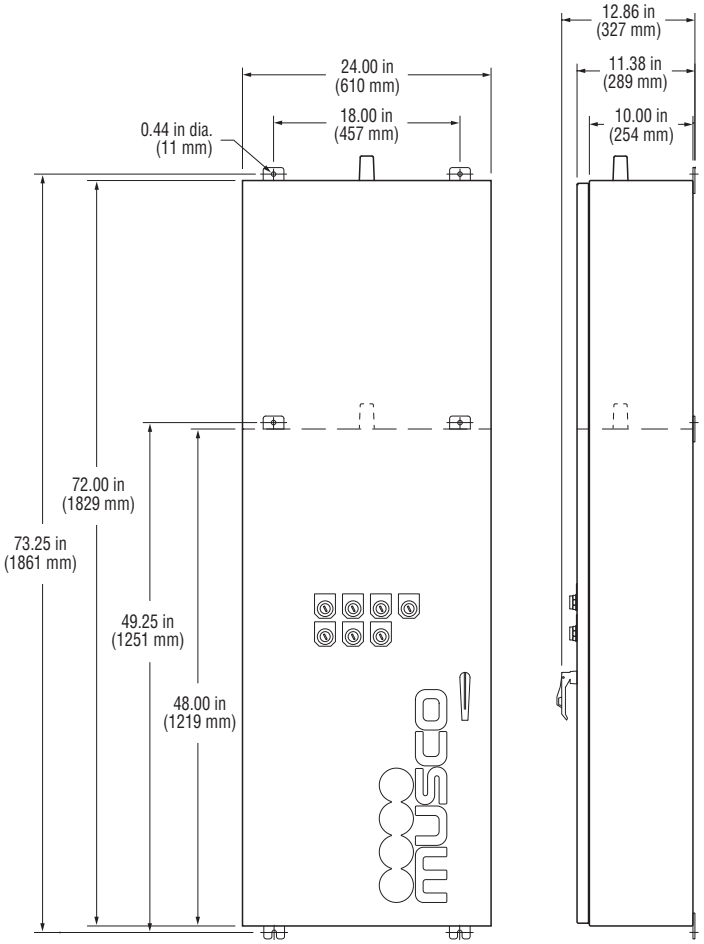
- Control-Link Central™ service center provides support 24 hours a day, 7 days a week for scheduling, monitoring, and reporting
- Luminaire outage notification within the next business day
- Customized usage reports through website

Technical Specifications

Control and Monitoring Cabinet Ratings

UL 508A Listed.....E204954
CE declaration .....LVD, EMC, RoHS
IEC 60439-1 compliant .....UL test report 05NK26317
IEC Emissions/Immunity.....Class A compliant
Operating temperature .....-4˚F to 140˚F (-20˚C to 60˚C)
FCC Part 15 .....Class A compliant
Weight for 72 inch (1829 mm) cabinet .....180 lb (82 kg)
Weight for 48 inch (1219 mm) cabinet .....140 lb (64 kg)
Short Circuit Current Rating (SCCR)
with 30 A contactors* .....18 kA
with 60 or 100 A contactors* .....25 kA

*Minimum circuit breaker interrupt rating must be greater than or equal to SCCR rating listed above.



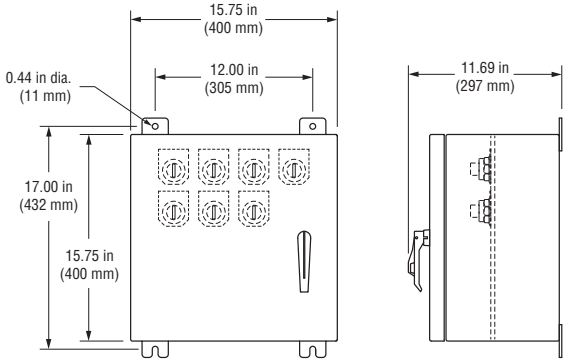
Construction

Control and Monitoring Cabinet

- NEMA type 4 (IP65) cabinet
- Powder-coated aluminum 5052 H32 cabinet and panel
- Lockable, 3-point latch
- Supports lighting system voltage up to 480 V
- Requires 120 V or 230 V phase-to-neutral control voltage
- Protective cover isolates high voltage

On/Off/Auto Manual Switches Cabinet (optional)

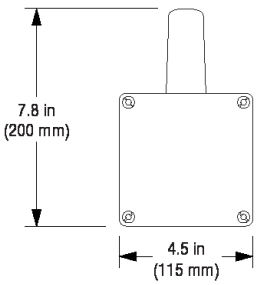
- NEMA type 4 (IP65) cabinet
- Powder-coated aluminum 5052 H32 cabinet and panel
- Lockable door
- Hinged interior panel for switch mounting



Manual switches cabinet

Remote Wireless Antenna Cabinet (for wireless communication)

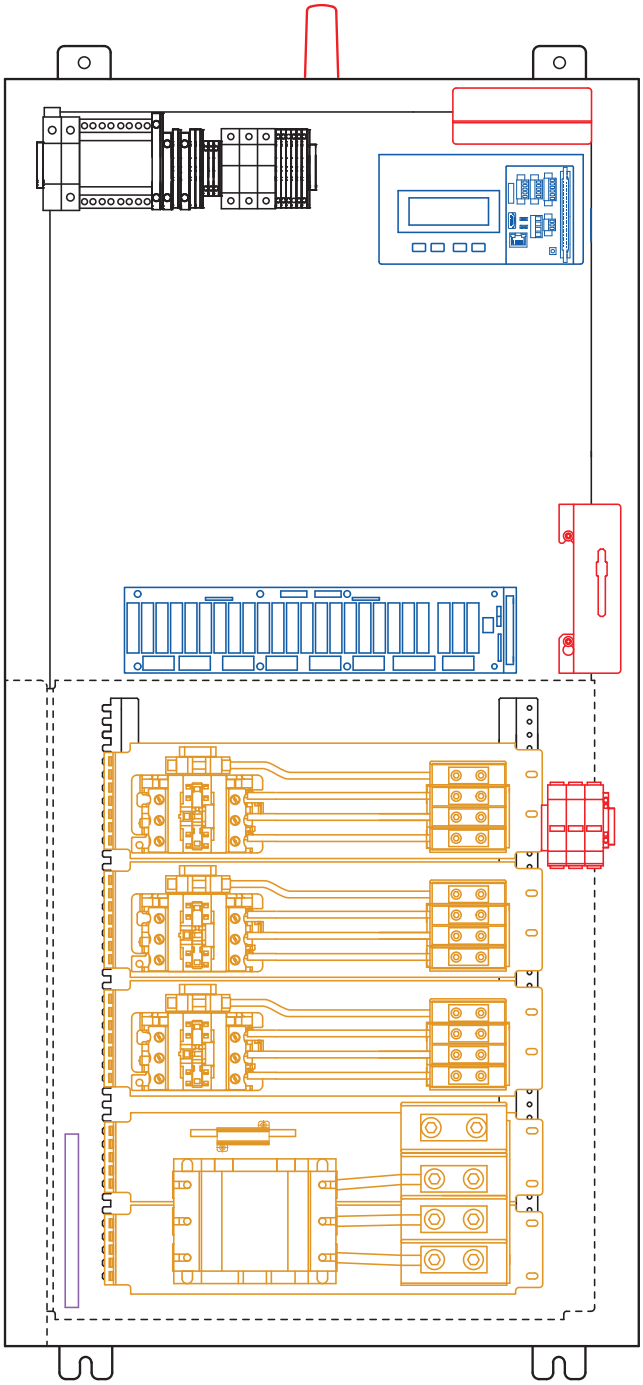
- Cast aluminum with texture gray paint finish
- Omnidirectional antenna
- Operating temperature: -40˚C (-40˚F) to 85˚C to (185˚F)
- Frequency: 900 MHz or 2.4 GHz



Remote wireless antenna cabinet

Internal Details

- Factory wired, programmed, and tested
- Internally fused
- Control power terminal blocks provided
- One control circuit operates entire cabinet
- Plug-in wire harnesses provided to connect multiple cabinets



Control Module

Receives and stores schedules from Control-Link Central™ service center, operates your equipment, and verifies schedules were carried out.

- Executes scheduled on/off or dimming events.
- Stores schedules for up to 7 days
- Reboots automatically and executes current schedule when power is restored, in case of power interruption
- Monitors Musco lighting system and reports issues to keep facilities operating and to help plan routine maintenance. Alerts Control-Link Central service center to schedule appropriate action or maintenance.

Communication Modules

Communication with Control-Link Central is done via an integrated, high speed, cellular connection with no additional monthly charges during the warranty period.

Communication with light poles is done via powerline communication or wireless communication.

- Powerline communication requires a dedicated 20A circuit (lighting circuit distribution panel)
- Wireless communication requires a dedicated antenna to be mounted at least 3 ft above the cellular antenna, and 7 ft total distance away, and line of sight to lighting poles.

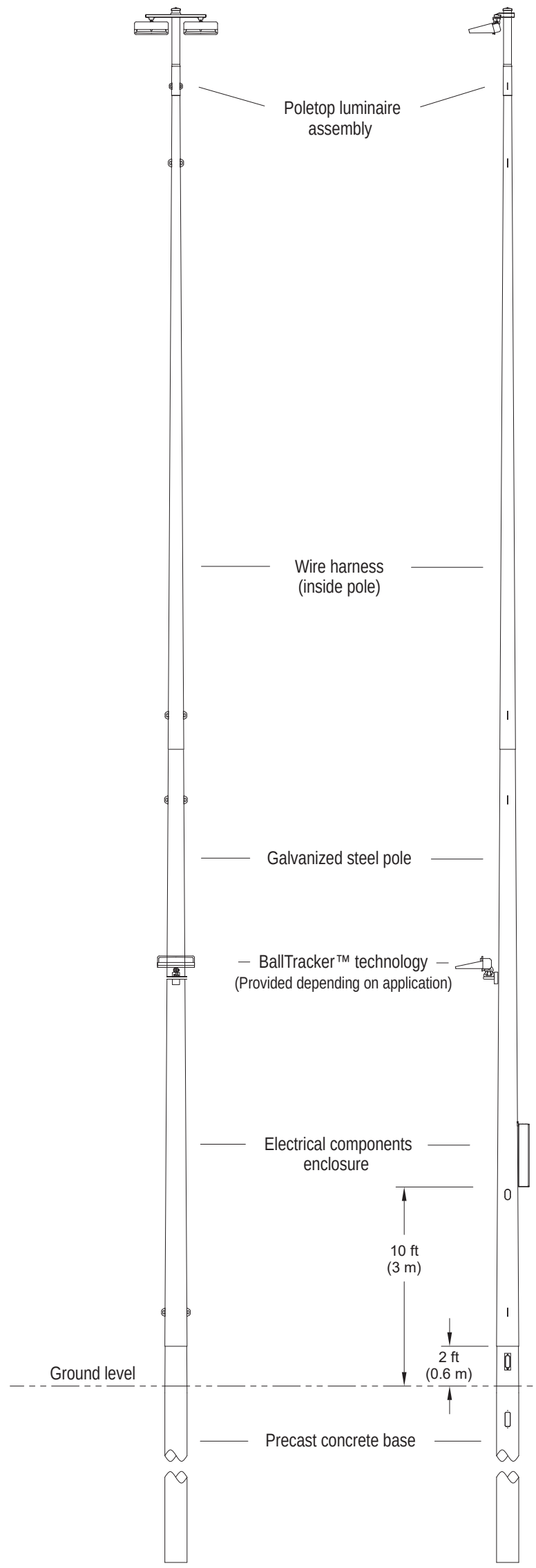
Contactor Modules

Operates equipment based on control module schedules.

- Compliant with IEC 60947-4-1 for continuous operation at 100% of rated current
- Contactors rated for 30, 60, or 100 amps

Ground Bar

Provides integral ground bar for lighting equipment grounding.



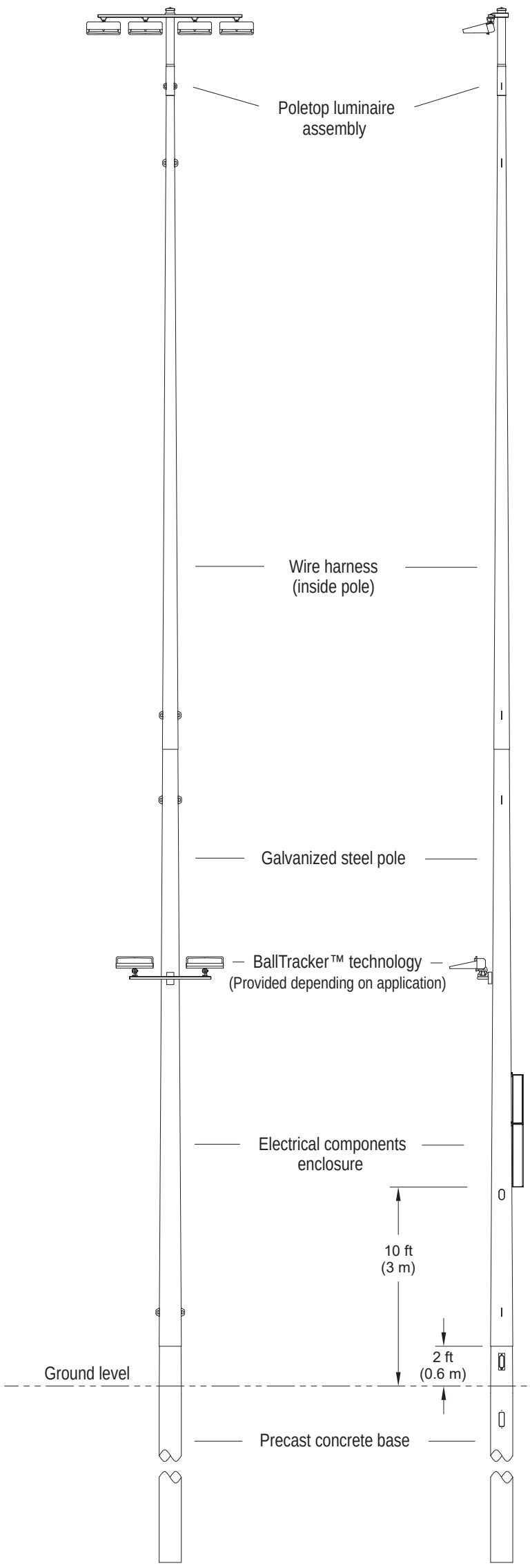
PRELIMINARY

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

CONFIGURATION:	02
DRAWN BY:	RWS
APPROVED BY:	TDM
SCALE:	Not to scale
DATE:	06/18/19
DRAWING NUMBER:	M-2151-en04-3_02

CORPORATE OFFICE:

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



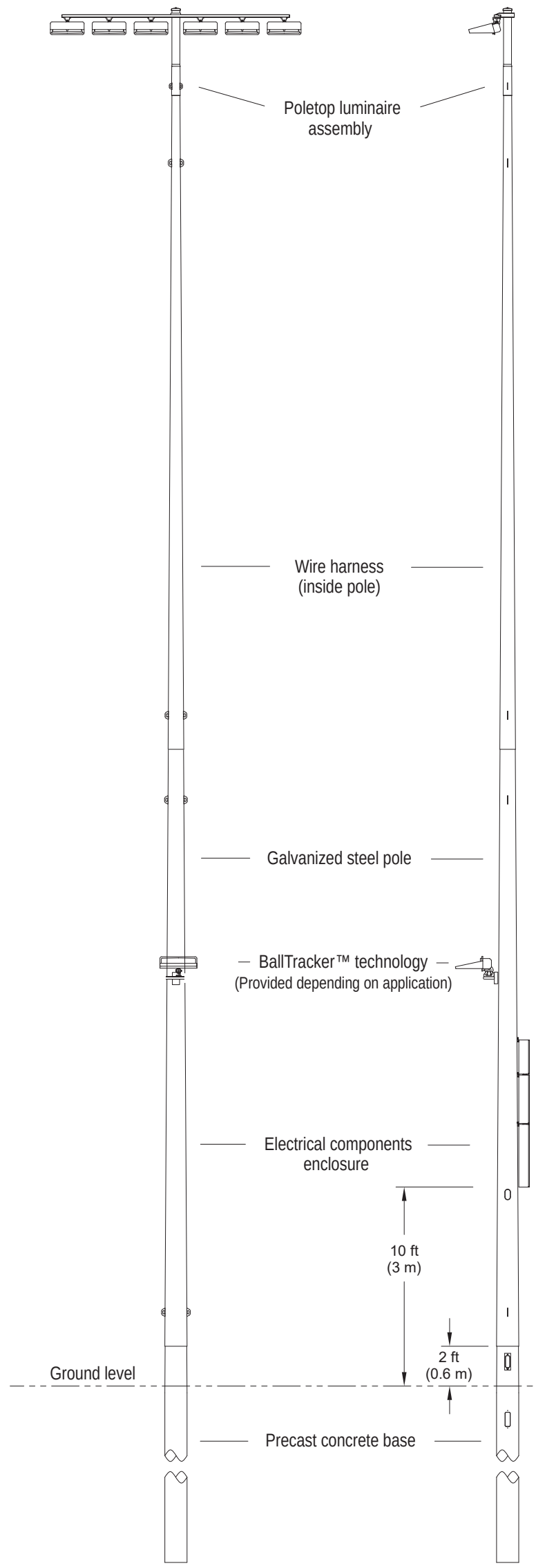
PRELIMINARY

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

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

CORPORATE OFFICE:

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



PRELIMINARY

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

CONFIGURATION:	06
DRAWN BY:	RWS
APPROVED BY:	TDM
SCALE:	Not to scale
DATE:	06/18/19
DRAWING NUMBER:	M-2151-en04-3_06

CORPORATE OFFICE:

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

Manufacturer's Certification of Corrosion Protection for Light-Structure System™ and SportsCluster® Lighting Systems

The following standard corrosion protection is provided on your equipment:

- 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, 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 grade 304 stainless steel 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).

This corrosion protection package only applies to equipment manufactured by Musco.

Musco Sports Lighting, LLC

Greg Kubbe
Director of Product Performance

Safety: **UL Product Certification**

UL Product Certification for:

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

UL Category	Covers	UL Number
High-Intensity Discharge Surface-Mounted Luminaires	• Green Generation™ luminaires and remote ballast assemblies • SportsCluster® and SportsCluster-2® luminaires and remote ballast assemblies • Light-Structure 2™ and Light-Structure System™ luminaires and remote ballast assemblies • 1000 W Light-Pak™ and Light-Pak indoor luminaires with Multi-Watt™ control system • 1000 W Show-Light™ and Show-Light Green™ luminaires with hooded light actuator system and remote ballast assemblies • 2000 W Mirtran™ luminaire • Stadium 2K Fixture™ 2000 W luminaire and Hot Restrike Green™ 2000 W hot restrike luminaire	E33316
Management Equipment, Energy	Lighting control systems for: • Control-Link® control and monitoring system • Control-Link retrofit control system	E139944
Industrial Control Panels	Control panels and enclosures for: • Control-Link® control and monitoring system • Control-Link retrofit control system • Lighting contactor cabinets • Multi-Watt™ control systems	E204954
Emergency Lighting and Power Equipment	• Auxiliary Lighting Interface Cabinet (ALIC)	E311491
Luminaire Fittings	Galvanized steel poles 12 ft (3.7 m) or less for: • Poles for Mirtran™ luminaire mounting • Rooftop poles • Special applications	E132445
Luminaire Pole in Excess of 12 ft (3.7 m)	Galvanized steel poles greater than 12 ft (3.7 m) for: • Light-Structure System™ luminaire mounting • Sportspole™ structure or mounting system and special applications	E325078

Safety: **UL Product Certification**

UL Category	Covers	UL Number
Devices, Scaffolding	Service platforms for: • Light-Structure System™ luminaires and remote ballast assemblies • SportsCluster® System luminaires and remote ballast assemblies	SA7004
Lightning Conductors, Air Terminals, and Fittings	• Light-Structure System™ pole structure concrete base	E337467
Light-Emitting-Diode Surface-Mounted Luminaires	• LED luminaires and driver assemblies • LED auxiliary luminaires	E338094

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

CERTIFICATE OF COMPLIANCE

Certificate Number	20190304-E338094
Report Reference	E338094-20130725
Issue Date	2019-MARCH-04
Issued to:	MUSCO SPORTS-LIGHTING L L C 100 1ST AVE W PO BOX 808 Oskaloosa IA 52577-0808
This certificate confirms that representative samples of	LIGHT-EMITTING-DIODE SURFACE-MOUNTED LUMINAIRES See Addendum Page
	Have been investigated by UL in accordance with the Standard(s) indicated on this Certificate.
Standard(s) for Safety:	UL 1598 and CSA C22.2 No. 250, Luminaires
Additional Information:	See the UL Online Certifications Directory at https://iq.ulprospector.com for additional information.

This *Certificate of Compliance* does not provide authorization to apply the UL Mark. Only the UL Follow-Up Services Procedure provides authorization to apply the UL Mark.

Only those products bearing the UL Mark should be considered as being UL Certified and covered under UL's Follow-Up Services.

Look for the UL Certification Mark on the product.

Bruce Mahrenholz, Director North American Certification Program

UL LLC

CERTIFICATE OF COMPLIANCE

Certificate Number	20190304-E338094
Report Reference	E338094-20130725
Issue Date	2019-MARCH-04

This is to certify that representative samples of the product as specified on this certificate were tested according to the current UL requirements.

Light Emitting Diodes Luminaires, Surface-Mounted, Type Non-IC, Models: Musco Dual Wedge Fixtures or Quad Wedge Fixtures, Musco “TLC-LED-400*” 96 LED Max.,Fixture Assemblies, Up-Light Fixture, “TLC-LED-600*” , TLC-LED-900*, LED Fixture, Remote LED Driver Enclosure for one A1060-000 LED Driver. Remote LED Driver Enclosure for up to four A1060-000 or A1060 -001 LED Drivers. Remote LED Driver Enclosure for up to 4 Schiederwerks LED Drivers, Model “LED driver 2A CC-650V D12” or “LED DRIVE 2A CC -750V D15” or “LED DRIVE 4A CC -750V D15 (480V)”. Remote LED Driver Enclosure for up to 8 Inventronics LED drivers. TLC-LED-1150* Luminaire. TLC-LED-1150* Uplight Luminaire, TLC-BT-675* Luminaire, TLC-BT-575* Luminaire, TLC-TW* Luminaire, TLC-RGBW, TLC-LED-1200* Luminaire, TLC-LED-1500* Luminaire where * may be followed by a two-digit suffix.

Remote LED Driver Enclosure for TLC-TW and TLC-RGBW Luminaires.
Remote LED Driver Enclosure for two TLC-TW and two TLC-RGBW Luminaires.

Bruce Mahrenholz, Director North American Certification Program

UL LLC

ITEM G

Musco Lighting shall deliver equipment to the job site
4-6 weeks after submittal approval.