

MICRO

GROUP MACKENZIE
 Architecture
 Interior Design
 Land Use Planning
 Civil Engineering
 Structural Engineering
 Transportation Planning
 Landscape Architecture
 Vancouver 600 681-8800
 Portland OR 503 224-9600
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ELECTRICAL SYMBOL LIST

* This is a standard list and not all symbols and abbreviations may be used.

LIGHTING	
	SPORTS FIELD LIGHTING
	AREA LUMINAIRE ARM MOUNTED WITH POLE AND CONCRETE BASE
	WALL MOUNTED LUMINAIRE
	RECESSED FLUORESCENT 2 X 4 LUMINAIRE
	SURFACE MOUNTED FLUORESCENT 2 X 4 LUMINAIRE
	RECESSED LUMINAIRE
	SURFACE OR PENDANT MOUNTED FLUORESCENT 1 X 4 LUMINAIRE
	SURFACE OR PENDANT MOUNTED FLUORESCENT 1 X 8 LUMINAIRE
	SURFACE OR PENDANT MOUNTED FLUORESCENT STRIPLIGHT
	WALL MOUNTED FLUORESCENT LUMINAIRE
	SURFACE MOUNTED LUMINAIRE CONNECTED TO EMERGENCY CIRCUIT OR WITH INTEGRAL EMERGENCY BATTERY CONNECTED TO UNSWITCHED CIRCUIT
	EXIT SIGN WALL MOUNTED ARROW(S) INDICATES DIRECTION IF SHOWN
	EXIT SIGN CEILING MOUNTED ARROW(S) INDICATES DIRECTION IF SHOWN
SWITCHES AND RECEPTACLES	
	SINGLE POLE SWITCH
	2 = DOUBLE POLE SWITCH
	3 = THREE-WAY SWITCH
	D = DIMMER
	K = KEY OPERATED SWITCH
	M = MANUAL MOTOR STARTER WITH THERMAL OVERLOAD
	W = WEATHER PROOF SWITCH
	V = LOW VOLTAGE SWITCH
	? = DESIGNER DEFINED SWITCH
	PHOTO ELECTRIC SWITCH
	S = SWITCHED PHOTOCELL
	CEILING MOUNTED OCCUPANCY SENSOR
	WALL MOUNTED OCCUPANCY SENSOR
	WALL MOUNTED OCCUPANCY SENSOR/SWITCH
	SPECIAL PURPOSE RECEPTACLE. SEE LETTER CODE LIST AT DUPLEX RECEPTACLE FOR OPTIONS
	DUPLEX RECEPTACLE
	DOUBLE DUPLEX RECEPTACLE. SEE LETTER CODE LIST AT DUPLEX RECEPTACLE FOR OPTIONS
	DUPLEX RECEPTACLE FLUSH FLOOR
	ABOVE GROUND WEATHER PROOF CONTINUOUS COVER AND GFCI PROTECTED DUPLEX RECEPTACLE. SEE DETAIL 2/E1 D
CONNECTIONS / EQUIPMENT	
	MOTOR CONNECTION
	NON-FUSED DISCONNECT SWITCH
	HEAVY DUTY FUSED DISCONNECT SWITCH
	COMBINATION ADJUSTABLE FREQUENCY DRIVE WITH SAFETY DISCONNECT SWITCH
	JUNCTION BOX
	TRANSFORMER
FIRE ALARM	
	CONTROL PANEL
	ANNUNCIATOR WITH REMOTE MICROPHONE
	MICROPHONE
	VOICE EVACUATION PANEL
	SMOKE DETECTOR
	MANUAL PULL STATION

	STROBE (# INDICATES MINIMUM CANDELA SETTING)
	FIRE ALARM CEILING MOUNTED SPEAKER/STROBE (# INDICATES MINIMUM CANDELA SETTING)
	FIRE ALARM WALL MOUNTED SPEAKER/STROBE (# INDICATES MINIMUM CANDELA SETTING)
TELECOMMUNICATIONS	
	TELEPHONE OUTLET WITH 3/4 C AND PULLSTRING TO ACCESSIBLE CEILING SPACE
FIRE PROTECTION	
	FIRE ALARM FLOW SWITCH CONNECTION
	FIRE ALARM TAMPER SWITCH CONNECTION
MISCELLANEOUS	
	CONDUIT ELLED UP
	CONDUIT ELLED DOWN
	CONDUIT/WIRING STUBBED OUT WITH END CAP OR INSULATED PLASTIC BUSHING
	GROUNDING POINT
	BRANCH PANEL
	FLUSH WALL MOUNTED BRANCH PANEL
	MAIN DISTRIBUTION PANEL / SUB DISTRIBUTION PANEL
	FLEXIBLE CONDUIT
	BRANCH CIRCUIT WIRING ARROW INDICATES HOME RUN TO PANEL WITH CIRCUITS AS NOTED
	WIRE SIZE IS #12 AND MINIMUM UNLESS NOTED OTHERWISE. SHORT TICK MARKS INDICATE PHASE CONDUCTORS. LONG TICK MARKS INDICATE NEUTRAL CONDUCTORS. A SINGLE CURVED TICK MARK INDICATES INSULATED GREEN GROUND CONDUCTOR. SECOND CURVED TICK MARK INDICATES ISOLATED GROUND (GREEN INSULATION WITH YELLOW STRIPE) CONDUCTOR.
	CONDUIT CONCEALED IN WALL OR CEILING SPACE
	CONDUIT ROUTED BELOW FLOOR / GRADE
	EXISTING CONDUIT CONCEALED IN WALL OR CEILING SPACE
	EXISTING CONDUIT ROUTED BELOW FLOOR / GRADE
	SUBGRADE VAULT
	REFERENCE NOTE
	MECHANICAL EQUIPMENT CONNECTION ITEM REFER TO SCHEDULE

ABBREVIATIONS	
A	AMPERES AMBER
AF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AIC	AVAILABLE INTERRUPTING CAPACITY
BCU	BUILDING CONTROL UNIT
C	CONDUIT CLOSE CONTROL
CLG	CEILING
CU	COPPER
(E)	EXISTING
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
IG	ISOLATED GROUND
KV	KILOVOLT
KVA	KILOVOLT AMPERES
KW	KILOWATT
MCA	MINIMUM CIRCUIT AMPS
MOCP	MAXIMUM OVERCURRENT PROTECTION
PH	PHASE
TTB	TELEPHONE TERMINAL BOARD
TYP	TYPICAL
UL	UNDERWRITERS LABORATORIES
V	VOLTS VOLTAGE
WG	WIRE GUARD
WP	WEATHERPROOF

LUMINAIRE SCHEDULE

THIS LUMINAIRE SCHEDULE IS NOT COMPLETE WITHOUT A COPY OF THE PROJECT MANUAL CONTAINING THE ELECTRICAL SPECIFICATIONS.

TYPE A	DESCRIPTION: SURFACE MOUNTED FLUORESCENT LENSED VANDAL RESISTANT LUMINAIRE. NOMINAL 4' BY 4' BY LENGTH ON DRAWING ROLLED STEEL HOUSING. IMPACT RESISTANT UV STABILIZED POLYCARBONATE DIFFUSER. BALLAST ELECTRONIC. TWO F32T8. 58. INPUT WATTS MANUFACTURERS SLS LINDA SERIES BEGHELLI OR APPROVED.	TYPE B0	DESCRIPTION: EXTERIOR POLE ARM MOUNTED H I D SITE LUMINAIRE. IMPACT RESISTANT TEMPERED GLASS LENS. ANODIZED ALUMINUM HYDROFORMED/SEGMENTED DISTRIBUTION MOUNTING FINISH AS SELECTED BY ARCHITECT. -20 DEGREE CWA, HIGH POWER FACTOR BALLAST UL LISTED WET. NOTE: PROVIDE THREE HEADS PER POLE. ONE 175 WATT GLASS ARC TUBE METAL HALIDE LAMP PER HEAD.
TYPE A1	DESCRIPTION: SAME AS TYPE A EXCEPT SINGLE LAMP.	TYPE B1	DESCRIPTION: GARIBO GULLWING SERIES OR APPROVED. 25' HIGH STRAIGHT STEEL POLE. POLE TO WITHSTAND 100 MILE PER HOUR WINDS WITH A GUST FACTOR OF 1.3 LITHONIA SSS SERIES MCGRAW-EDISON EMCO STERNER OR APPROVED.
TYPE B	DESCRIPTION: SURFACE MOUNTED FLUORESCENT INDUSTRIAL. 4' COLD ROLLED STEEL CHANNEL. PENDANT/CHAIN MOUNTING. WHITE FINISH. BALLAST ELECTRONIC. PROVIDE 11GA WHITE WIRE GUARD. TWO F32T8. 58. INPUT WATTS MANUFACTURERS METALUX FRAY SERIES LITHONIA OR APPROVED.	TYPE T	DESCRIPTION: MATCH EXISTING LIBRARY PEDESTRIAN POLE.
TYPE C	DESCRIPTION: RECESSED HORIZONTAL LAMP COMPACT FLUORESCENT DOWNLIGHT LUMINAIRE. 6' NOMINAL DIAMETER HOUSING. CLEAR ACRYLIC LENS. MATTE CLEAR REFLECTOR. SELF FLANGED. BALLAST ELECTRONIC. ONE 32 WATT COMPACT FLUORESCENT. 35. INPUT WATTS MANUFACTURERS KURT VERSEN P931 SERIES GOTHAM LIGHTING EDISON PRICE, PORTFOLIO OR APPROVED.	TYPE B4	DESCRIPTION: SPORTS FIELD LIGHTING. SEVEN 1500 WATT METAL HALIDE LAMPS. MUSCO LIGHT STRUCTURE. GREEN OR APPROVED.
TYPE D	DESCRIPTION: SURFACE MOUNTED FLUORESCENT STRIPLIGHT. 4' COLD ROLLED STEEL CHANNEL. WHITE FINISH. BALLAST ELECTRONIC. PROVIDE 11GA WIRE GUARD. TWO F32T8. 58. INPUT WATTS MANUFACTURERS LITHONIA C SERIES METALUX SS DAYBRITE, HUBBELL, COLUMBIA, LIGHTOLIER, HE WILLIAMS OR APPROVED.	TYPE B4B	DESCRIPTION: SPORTS FIELD LIGHTING. ELEVEN 1500 WATT METAL HALIDE LAMPS. MUSCO LIGHT STRUCTURE. GREEN OR APPROVED.
TYPE D1	DESCRIPTION: SAME AS TYPE D EXCEPT CHAIN HUNG.	TYPE B4C	DESCRIPTION: SPORTS FIELD LIGHTING. EIGHTEEN 1500 WATT METAL HALIDE LAMPS. MUSCO LIGHT STRUCTURE. GREEN OR APPROVED.
TYPE F	DESCRIPTION: SURFACE MOUNTED DECORATIVE SCONCE. 11' NOMINAL SQUARE ALUMINUM. 4' THICK SODIA LIME GLASS. WALL OR CEILING MOUNTING. FINISH TEXTURED METALIC GRAY. BALLAST ELECTRONIC. WET. ONE 28W 2D COMPACT FLUORESCENT. 30. INPUT WATTS MANUFACTURERS PRISMA QUATRIX OR APPROVED.	TYPE B4D	DESCRIPTION: SPORTS FIELD LIGHTING. TWELVE 1500 WATT METAL HALIDE LAMPS. MUSCO LIGHT STRUCTURE. GREEN OR APPROVED.
TYPE G	DESCRIPTION: RECESSED LINEAR PERIMETER SLOT WITH CROSSBLADE LOUVER. 8' NOMINAL SQUARE. BY LENGTH SHOWN ON DRAWING. 300A STEEL HOUSING. WHITE CROSS BLADE. LOUVER FINISH WHITE. BALLAST ELECTRONIC. ONE 32W T8. 30 PER 4' SECTION. NEORAY SERIES 78 ALERA OR APPROVED.	TYPE B4E	DESCRIPTION: SPORTS FIELD LIGHTING. EIGHTEEN 1500 WATT METAL HALIDE LAMPS. MUSCO LIGHT STRUCTURE. GREEN OR APPROVED.
TYPE H	DESCRIPTION: EXTERIOR POLE ARM MOUNTED H I D SITE LUMINAIRE. IMPACT RESISTANT TEMPERED GLASS LENS. ANODIZED ALUMINUM HYDROFORMED/SEGMENTED TYPE II WITH HOUSE SIDE SHIELD. 4' EXTRUDED ALUMINUM ARM AS SELECTED BY ARCHITECT. -20 DEGREE CWA, HIGH POWER FACTOR BALLAST UL LISTED WET. ONE 175 WATT GLASS ARC TUBE METAL HALIDE LAMP. INPUT WATTS MANUFACTURERS 205 GARIBO GULLWING SERIES OR APPROVED. 25' HIGH STRAIGHT STEEL POLE. POLE TO WITHSTAND 100 MILE PER HOUR WINDS WITH A GUST FACTOR OF 1.3 LITHONIA SSS SERIES MCGRAW-EDISON EMCO STERNER OR APPROVED.	TYPE B4F	DESCRIPTION: RECESSED IN-GRADE ASYMMETRIC UP LIGHT. 5' BY 3.75' BY 36' EXTRUDED ALUMINUM CLEAR TEMPERED GLASS ASYMMETRIC MOUNTING FINISH STAINLESS STEEL. BALLAST ELECTRONIC. WET. ONE 39W TSHO. 45. INPUT WATTS MANUFACTURER DESIGN PLAN CSL SERIES 32W OR APPROVED.
TYPE H1	DESCRIPTION: EXTERIOR POLE ARM MOUNTED H I D SITE LUMINAIRE. IMPACT RESISTANT TEMPERED GLASS LENS. ANODIZED ALUMINUM HYDROFORMED/SEGMENTED TYPE II. 4' EXTRUDED ALUMINUM ARM AS SELECTED BY ARCHITECT. -20 DEGREE CWA, HIGH POWER FACTOR BALLAST UL LISTED WET. ONE 175 WATT GLASS ARC TUBE METAL HALIDE LAMP. INPUT WATTS MANUFACTURERS 205 GARIBO GULLWING SERIES OR APPROVED. 25' HIGH STRAIGHT STEEL POLE. POLE TO WITHSTAND 100 MILE PER HOUR WINDS WITH A GUST FACTOR OF 1.3 LITHONIA SSS SERIES MCGRAW-EDISON EMCO STERNER OR APPROVED.	TYPE B4G	DESCRIPTION: EXTERIOR SURFACE MOUNTED COMPACT FLUORESCENT FLOODLIGHT. HOUSING NOMINAL 12" WIDE BY 6" DEEP DIE CAST ALUMINUM. CLEAR TEMPERED GLASS LENS. INTERCHANGEABLE SPECULAR ALUMINUM REFLECTOR ASSEMBLY. FLOOD YOKES. AS SELECTED BY ARCHITECT. LOW TEMPERATURE ELECTRONIC. WET. ONE 42W COMPACT FLUORESCENT. 47. HYDREL 7000 SERIES OR APPROVED.
TYPE H2	DESCRIPTION: EXTERIOR POLE ARM MOUNTED H I D SITE LUMINAIRE. IMPACT RESISTANT TEMPERED GLASS LENS. ANODIZED ALUMINUM HYDROFORMED/SEGMENTED TYPE II. 4' EXTRUDED ALUMINUM ARM AS SELECTED BY ARCHITECT. -20 DEGREE CWA, HIGH POWER FACTOR BALLAST UL LISTED WET. PROVIDE TWO HEADS PER POLE. ONE 175 WATT GLASS ARC TUBE METAL HALIDE LAMP PER HEAD. INPUT WATTS MANUFACTURERS 425 GARIBO GULLWING SERIES OR APPROVED. 25' HIGH STRAIGHT STEEL POLE. POLE TO WITHSTAND 100 MILE PER HOUR WINDS WITH A GUST FACTOR OF 1.3 LITHONIA SSS SERIES MCGRAW-EDISON EMCO STERNER OR APPROVED.	TYPE H3	DESCRIPTION: EXTERIOR WALL MOUNTED FLUORESCENT LUMINAIRE. 16"-1/4" WIDE BY 7" HIGH BY 9" DEEP DIE CAST ALUMINUM HOUSING IN A TRIANGULAR SHAPE WITH A DIE CAST ALUMINUM DOOR FRAME. HEAT AND IMPACT RESISTANT TEMPERED GLASS LENS. 1/8" THICK SPECULAR EXTRUDED ALUMINUM REFLECTOR. MEDIUM DISTRIBUTION. FINISH AS SELECTED BY ARCHITECT. -20 DEGREE CWA, HIGH POWER FACTOR BALLAST UL LISTED WET. COORDINATE MOUNTING HEIGHT AND LOCATION WITH ARCHITECTURAL PLANS. ONE 42 WATT COMPACT FLUORESCENT LAMP. INPUT WATTS MANUFACTURER 47 GARIBO LIGHTING 101 SERIES, DESIGN PLAN, GUTH INVAUE OR APPROVED.
TYPE H4	DESCRIPTION: SAME AS TYPE H3 EXCEPT WITH TWO LAMPS. TWO 42 WATT COMPACT FLUORESCENT LAMPS. INPUT WATTS 94.	TYPE H4	DESCRIPTION: EXTERIOR WALL MOUNTED FLUORESCENT LUMINAIRE. 16"-1/4" WIDE BY 7" HIGH BY 9" DEEP DIE CAST ALUMINUM HOUSING IN A TRIANGULAR SHAPE WITH A DIE CAST ALUMINUM DOOR FRAME. HEAT AND IMPACT RESISTANT TEMPERED GLASS LENS. 1/8" THICK SPECULAR EXTRUDED ALUMINUM REFLECTOR. MEDIUM DISTRIBUTION. FINISH AS SELECTED BY ARCHITECT. -20 DEGREE CWA, HIGH POWER FACTOR BALLAST UL LISTED WET. COORDINATE MOUNTING HEIGHT AND LOCATION WITH ARCHITECTURAL PLANS. ONE 42 WATT COMPACT FLUORESCENT LAMP. INPUT WATTS MANUFACTURER 47 GARIBO LIGHTING 101 SERIES, DESIGN PLAN, GUTH INVAUE OR APPROVED.

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 EXPIRES 12/31/09

REVISIONS	
#	REVISION DATE
1	
2	
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6	
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10	

COVER SHEET - ELECTRICAL

DRAWN BY JEM
CHECKED BY HN
SHEET

E01

Constant Huang Nguyen
 Project 2007-0722
INTERFACE ENGINEERING
 208 S W 34th AVE, SUITE 400, PORTLAND OR 97204
 PHONE 503.988.2266 FAX 503.988.2264

REBID SET 12-14-2010

BID SET - FEBRUARY 4, 2009

08-164268 Dfs o1 Co

GENERAL NOTES

- A. MINIMUM #10 COPPER CONDUCTORS FOR SITE LIGHTING AND POWER OUTLET CIRCUITS
- SHEET KEYNOTES**
- ① EXISTING PAD MOUNTED UTILITY TRANSFORMER #1760023
 - ② PROVIDE UTILITY VAULT TO INTERCEPT AND EXTEND (3) EXISTING 4" CONDUITS TO NEW ELECTRICAL ROOM IN CONCESSION/TEAM BUILDING
 - ③ EXISTING PEDESTRIAN LIGHTING POLE INSTALLED UNDER THE LIBRARY PROJECT
 - ④ NEW PEDESTRIAN LIGHTING POLE TO MATCH EXISTING INTERCEPT EXISTING PEDESTRIAN LIGHTING CIRCUIT TO PROVIDE POWER TO NEW POLE
 - ⑤ ROUTE PARKING LOT LIGHTING TO LIGHTING RELAY PANEL CIRCUIT SHOWN LIGHTING RELAY PANEL LOCATED IN LIBRARY MAIN ELECTRICAL ROOM
 - ⑥ PROVIDE #12 WIRE FOR TERMINATION BETWEEN HOMERUN AND RECEPTACLE

GROUP MACKENZIE
 Architecture
 Interior Design
 Land Use Planning

GROUP MACKENZIE
 Civil Engineering
 Structural Engineering
 Landscapes Architecture

Portland, OR 97204
 Vancouver, WA 98666
 Seattle, WA 98108

Client:
CONCORDIA UNIVERSITY



Project:
CONCORDIA ATHLETIC FIELDS

REVISED FOR CODE COVERAGE
 APR 19 2011
 Permit Number

INCOMING ELECTRICAL SERVICE
DIVISION OF RESPONSIBILITY

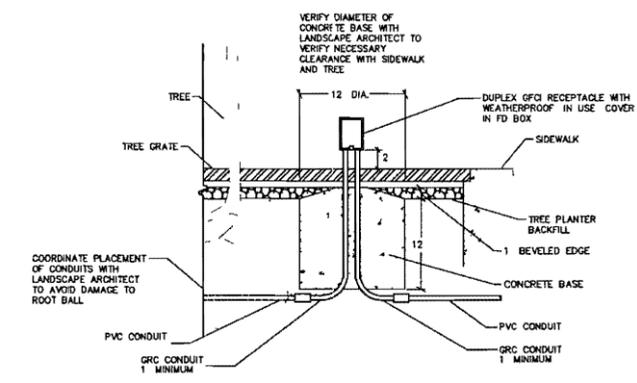
	ELEC CONTR	UTILITY CO
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SECONDARY CONDUCTORS	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C/T ENCLOSURE	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C/T*	<input type="checkbox"/>	<input checked="" type="checkbox"/>
METER BASE	<input checked="" type="checkbox"/>	<input type="checkbox"/>
METER	<input type="checkbox"/>	<input checked="" type="checkbox"/>
ELECTRIC ROOM DOOR LOCK BOX (OBTAIN FROM POWER COMPANY)	<input checked="" type="checkbox"/>	<input type="checkbox"/>

NOTES:

- CONTACT AND COORDINATE ALL REQUIREMENTS AND RESPONSIBILITIES WITH SERVING UTILITY COMPANIES PRIOR TO SUBMITTING BID
- ALL SERVICE INSTALLATION WORK SHALL BE IN STRICT COMPLIANCE WITH THE REQUIREMENTS OF THE SERVING UTILITIES

POWER UTILITY CONTACT:
 JUSTIN MOORE
 PACIFIC POWER
 7544 NE 33RD DRIVE
 PORTLAND OR 97211
 PHONE: (503) 280 2709
 FAX: (503) 280 2745

INTERFACE ENGINEERING INC HAS CONTACTED THE UTILITIES BUT HAS NOT RECEIVED IN WRITING THE FINAL REQUIREMENTS FROM THE POWER UTILITY THESE DRAWINGS INDICATE OUR BEST ESTIMATION OF THEIR REQUIREMENTS PRIOR TO BID CONTACT THE UTILITY AND OBTAIN IN WRITING THEIR REQUIREMENTS



2 LANDSCAPE RECEPTACLE AT TREE WELL
 NO SCALE



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REVISIONS

NO.	REVISION	DATE

SHEET-TITLE

SITE PLAN - ELECTRICAL

DRAWN BY JEM
 CHECKED BY HN
 SHEET

Contact:
 Huong Nguyen
 Project:
 2007-0722

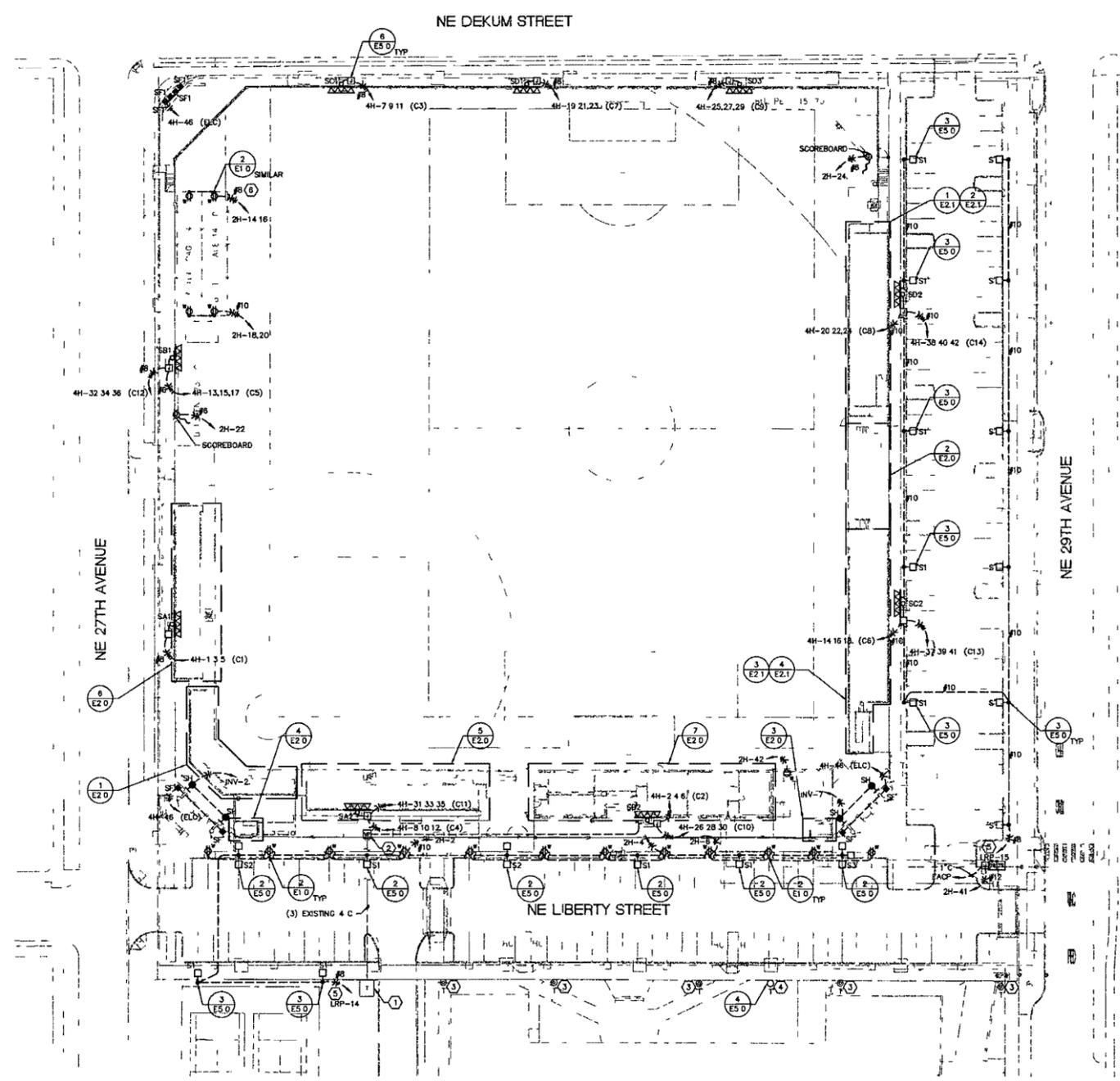
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E10

JOB NO 205013104

REBID SET 12-14-2010

BID SET - FEBRUARY 4, 2009



1 SITE PLAN - ELECTRICAL
 SCALE 1"=30'-0"

POLE FOUNDATION SCHEDULE

TYPE	FORCES (MAXIMUM)			PIER	
	MOMENT (M) KIP-FT	SHEAR (V) KIPS	VERTICAL (P) KIPS *	DIAMETER INCHES	EMBEDMENT FEET
LS70-B	68.02	1.452	1.883	30"	12'-0"
LS80-B	125.03	2.540	3.704	36"	16'-0"
LS80-C	182.41	3.412	4.592	36"	18'-0"

* VERTICAL FORCE DOES NOT INCLUDE WEIGHT OF PRECAST BASE

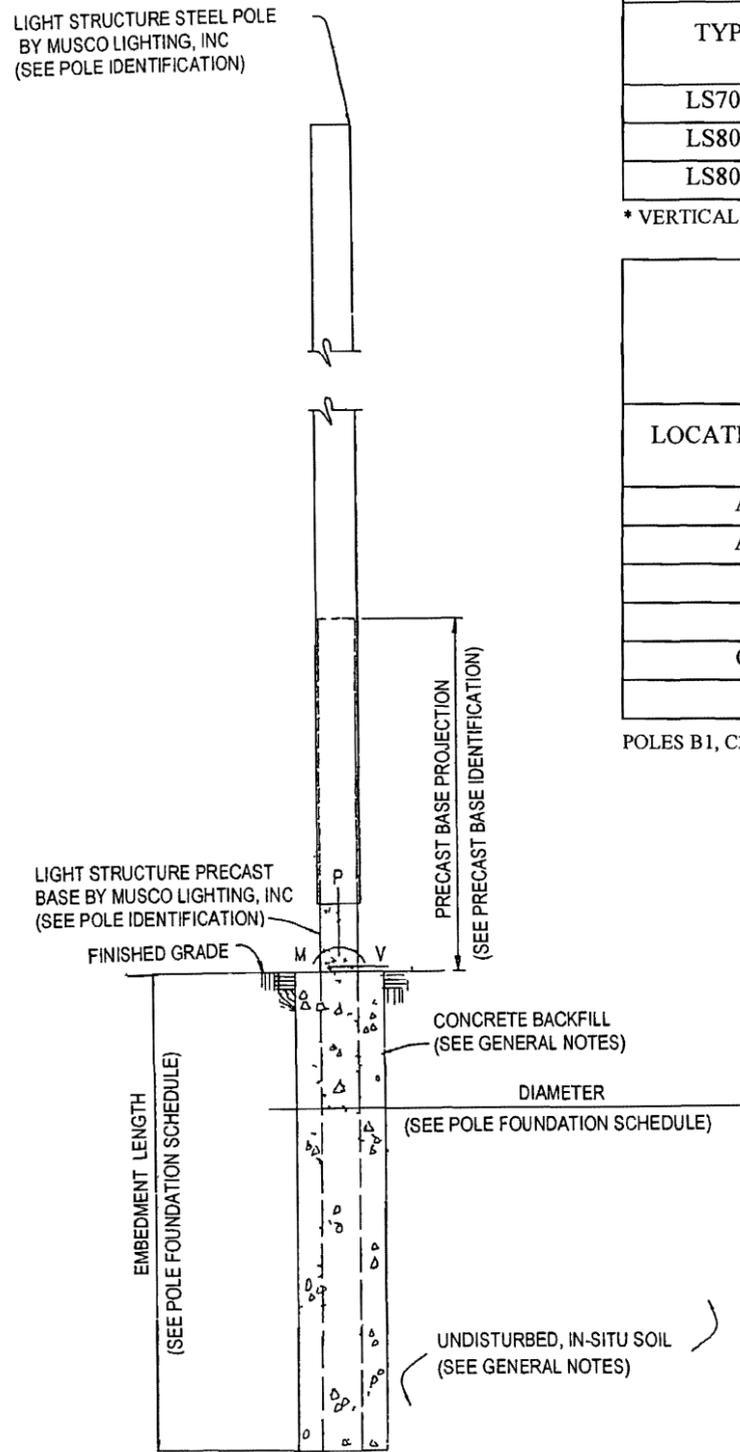
POLE IDENTIFICATION

LOCATION/MARK	POLE TYPE	PRECAST BASE TYPE	FIXTURE CONFIGURATION (FIXTURES PER CROSSARM)	FIXTURE EPA (MAX)
A1, D3	LS70-B	3B	7(4+3)	18.2
A2, D2	LS80-B	5B	11(6+5)	25.3
B1	LS80-C	6B	18(6+6+6)	48.6
B2	LS80-B	5B	12(6+6)	28.8
C1, D1	LS70-B	3B	8(4+4)	20.0
C2	LS80-B	5B	13(7+6)	26.0

POLES B1, C2 & D2 HAVE A MOUNTING BRACKET FOR THREE SPEAKERS AT 30'-0" AGL

PRECAST BASE TYPE	WEIGHT LBS	OVERALL LENGTH FEET	HEIGHT ABOVE GRADE FEET	EMBEDMENT IN PIER FEET	OUTSIDE DIAMETER INCHES
3B	2,670	20'-0"	8'-0"	12'-0"	13.38"
5B	5,180	23'-11"	7'-11"	16'-0"	18.25"
6B	8,020	26'-1"	8'-1"	18'-0"	20.56"

LIGHT STRUCTURE STEEL POLE BY MUSCO LIGHTING, INC (SEE POLE IDENTIFICATION)



LIGHT POLE FOUNDATION DETAIL

GENERAL NOTES

GENERAL

ALL CONSTRUCTION AND WORKMANSHIP SHALL CONFORM TO THE INTERNATIONAL BUILDING CODE 2006 EDITION

WIND 80 MPH, EXPOSURE C, (PER 1998 OREGON STRUCTURAL SPECIALTY CODE)

REFERENCE POLE LOCATION DRAWING FOR ACTUAL POLE PLACEMENT AND SITE LOCATION

THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL CONSTRUCTION PROCEDURES AND SAFETY CONDITIONS AT THE JOB SITE

SOIL DESIGN PARAMETERS

ALLOWABLE VERTICAL BEARING CAPACITY 1,500 PSF OR 250 PSF SKIN FRICTION

ALLOWABLE LATERAL PASSIVE SOIL BEARING PRESSURE 200 PSF/FT (AT LEVEL GRADE)

REFERENCE CHAPTER 18, SECTION 1805 AND TABLE 1804.2 OF THE 2006 EDITION OF THE INTERNATIONAL BUILDING CODE ASSUME CLASS 5 SOILS

DESIGN SOIL PARAMETERS ARE AS NOTED ACTUAL ALLOWABLE SOIL PARAMETERS MUST BE VERIFIED BY A GEOTECHNICAL ENGINEER

ENCOUNTERING SOIL FORMATIONS THAT WILL REQUIRE SPECIAL DESIGN CONSIDERATIONS OR EXCAVATION PROCEDURES MAY EXIST POLE FOUNDATIONS MAY NEED TO BE REANALYZED ACCORDING TO THE SOIL CONDITIONS THAT EXIST

IF ANY DISCREPANCIES OR INCONSISTENCIES ARISE, NOTIFY THE ENGINEER OF SUCH DISCREPANCIES FOUNDATIONS WILL THEN BE REVISED ACCORDINGLY

ALL PIERS AND CONCRETE BACKFILL MUST BEAR ON AND AGAINST FIRM, UNDISTURBED SOIL OR AS APPROVED BY A GEOTECHNICAL ENGINEER

ALL EXCAVATIONS MUST BE FREE OF LOOSE SOIL AND DEBRIS PRIOR TO FOUNDATION INSTALLATION AND PLACEMENT OF CONCRETE BACKFILL CASING MAY BE REQUIRED IF CAVING OCCURS IN SUCH A CASE, APPROVAL BY A GEOTECHNICAL ENGINEER IS REQUIRED

ALL EXCAVATIONS MUST BE FREE OF WATER OR CONCRETE SHALL BE PLACED WITH A TREMIE PIPE IN ACCORDANCE WITH ACI STANDARD 336 CONCRETE PLACED BY THE TREMIE METHOD SHALL HAVE A MINIMUM ULTIMATE STRENGTH OF 1,000 PSI GREATER THAN REQUIRED UNDER "CONCRETE BACKFILL" BELOW

CONCRETE BACKFILL

CONCRETE BACKFILL SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH AT 28 DAYS OF 3,000 PSI SPECIAL INSPECTION IS NOT REQUIRED (3,000 PSI IS SPECIFIED FOR EARLY POLE ERECTION, NOT FOR STRUCTURAL DESIGN PURPOSES)

CONCRETE BACKFILL SHALL ATTAIN A MINIMUM STRENGTH OF 2,000 PSI PRIOR TO STEEL POLE ERECTION

USE TYPE II/V PORTLAND CEMENT OR AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER

MIX IN CONFORMANCE WITH ASTM C-94

AGGREGATES PER ASTM C-33 (1" MAX AGG SIZE)

PLACE CONCRETE IMMEDIATELY AFTER COMPLETION OF EXCAVATION AND INSPECTION BY THE GEOTECHNICAL ENGINEER NO EXCAVATIONS SHALL BE LEFT UNPROTECTED OR OPEN OVERNIGHT

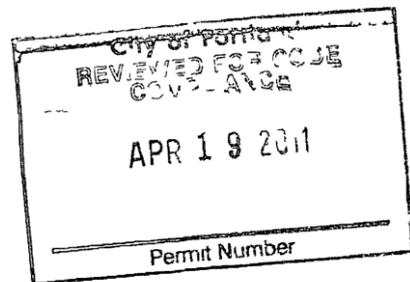
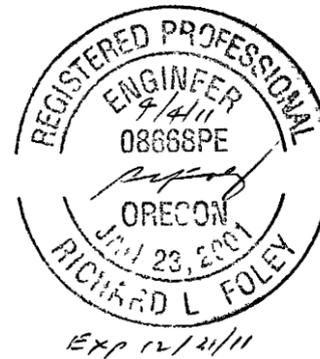
CONCRETE SHALL BE PLACED IN ONE CONTINUOUS OPERATION (NO CONSTRUCTION JOINT) WITH SPECIAL EQUIPMENT WITH A MAXIMUM FREEFALL OF 5 FT AND TO PREVENT CONCRETE FROM STRIKING THE SIDES OF THE EXCAVATION VIBRATE TOP 5 FT

MISCELLANEOUS

FIXTURES MUST BE LOCATED TO MAINTAIN 10'-0" MINIMUM HORIZONTAL CLEARANCE FROM ANY OBSTRUCTION

POLES, FIXTURES, PRECAST BASES, ELECTRICAL ITEMS, PLATFORMS, SPECIFICATIONS AND INSTALLATION PER MUSCO LIGHTING INC

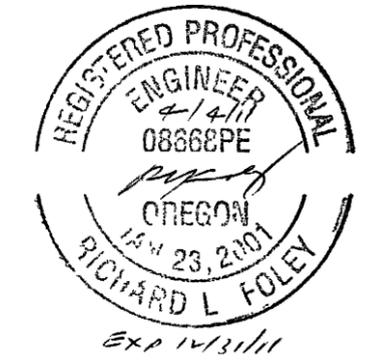
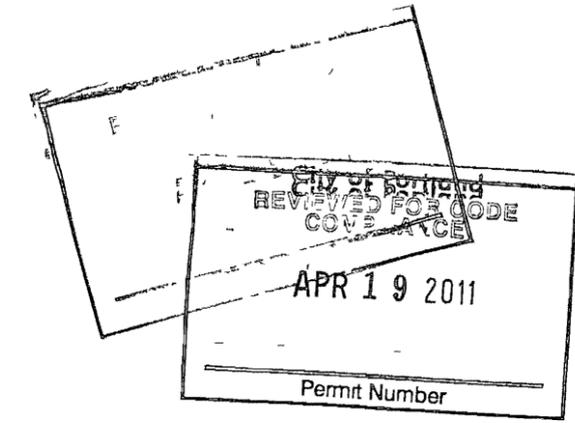
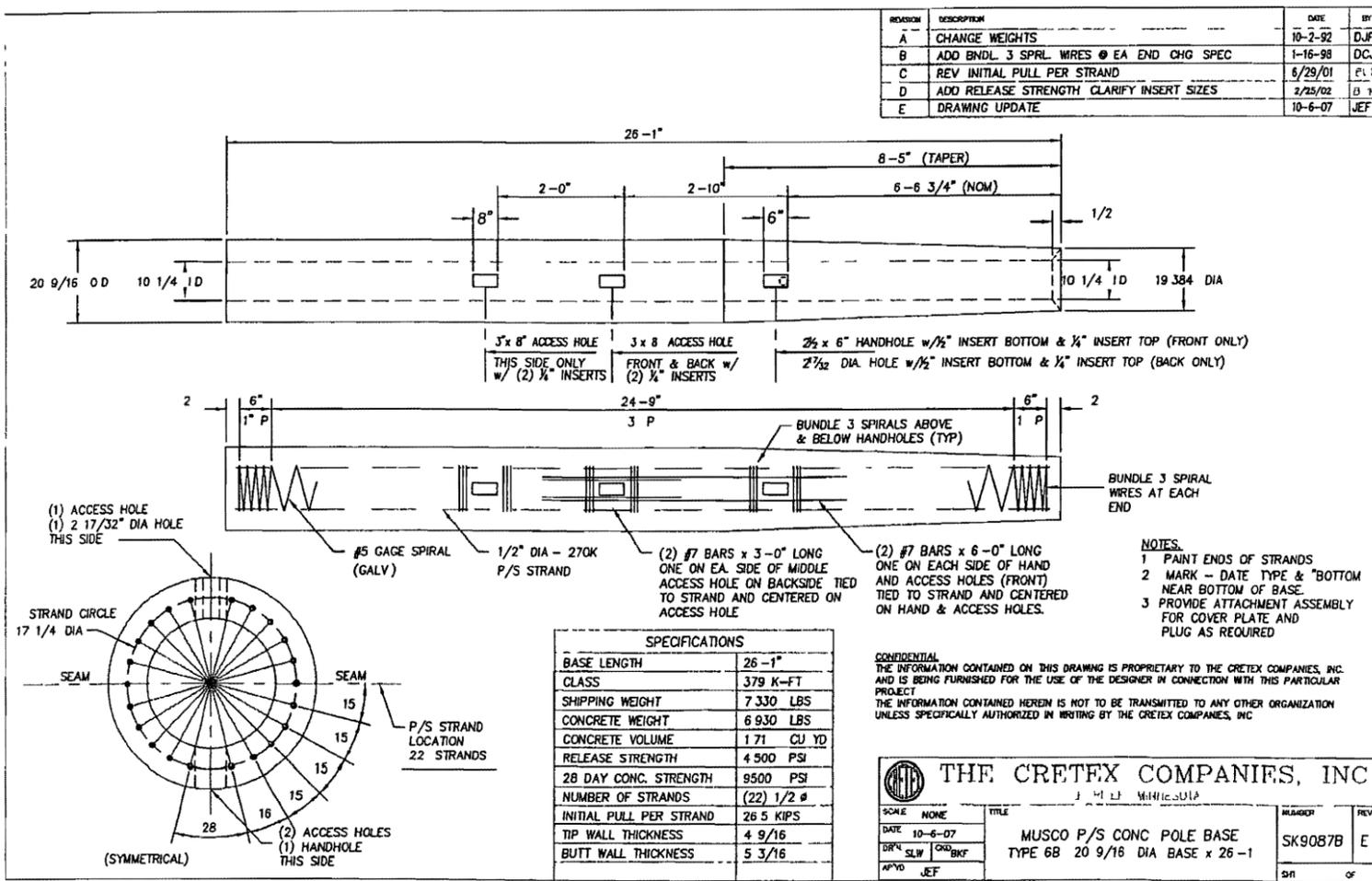
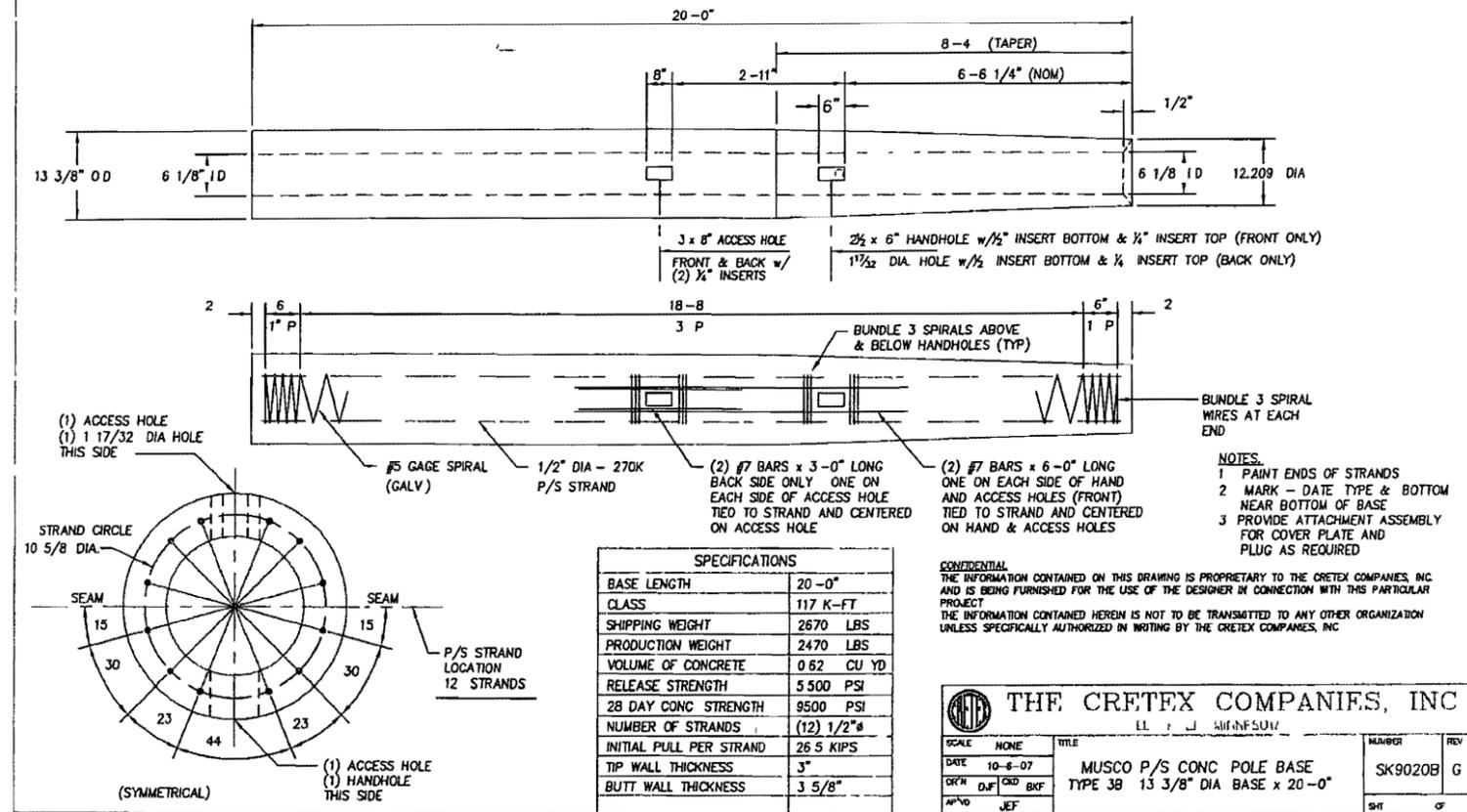
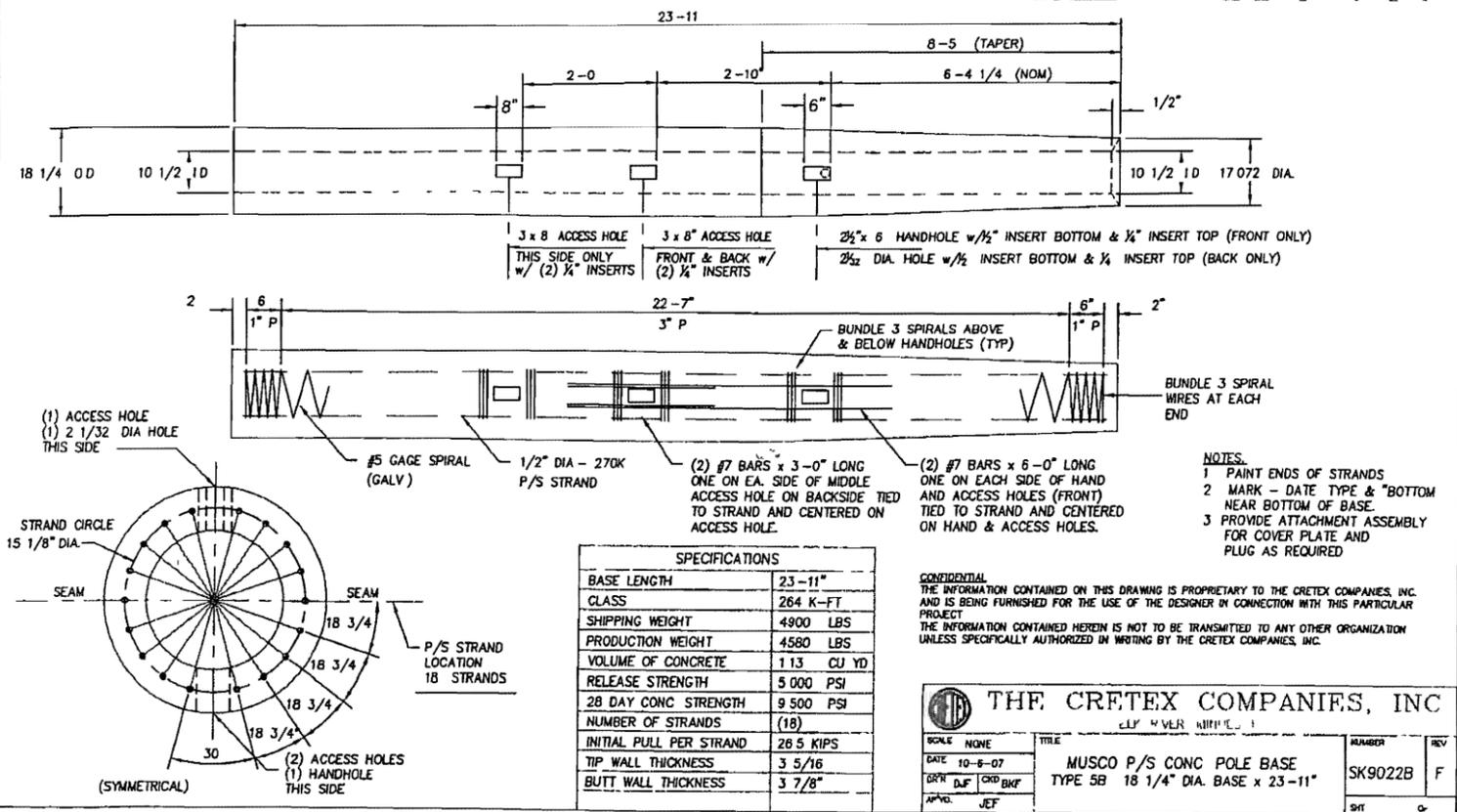
FIXTURE EPA = 2.7 MAX SQ FT, WEIGHT = 40 LBS (PER MUSCO LIGHTING, INC)



POLE SUPPORT FOUNDATION	MUSCO LIGHTING, INC 2107 STEWART ROAD MUSCATINE, IOWA 52761	DATE 05/20/09 Revised 04/04/11
CONCORDIA UNIVERSITY BASEBALL/ SOCCER FIELD LIGHTING PORTLAND, OR	R L FOLEY & ASSOCIATES, INC STRUCTURAL ENGINEERS 25652 ASHBY WAY LAKE FOREST, CA 92630	SHEET C1 OF 2

REVISION	DESCRIPTION	DATE	BY
C	ADD BUNDLE 3 SPIRAL WIRES @ EA. END CHG SPEC	1-16-98	DCJ
D	REV INITIAL PULL PER STRAND	6/29/01	CLV
E	ADD RELEASE STRENGTH CLARIFY INSERT SIZES	2/25/02	BJ
F	DRAWING UPDATE	10-6-07	JEF

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PRODUCT MICRO INFORMATION

Presented to

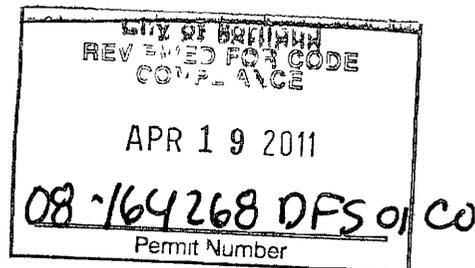
Concordia University
Baseball/Soccer Lighting Project
Portland, OR
March 8, 2011

Project #19561660

Light-Structure
GREEN.

Submitted by

Musco Sports Lighting, LLC
2107 Stewart Road
Muscatine, Iowa 52761
Local Phone 563-263-2281
Toll Free 800-756-1205
Fax 800-374-6402



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DFS-164268-DFS of CO



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Concordia University
Baseball/Soccer Lighting Project
Portland, OR

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 - Computer Model - Light Level Scans
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 - Control-link Central Contact Information
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 - Control Link Sample Usage
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- J PRODUCT INFORMATION**
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 - UL Letter
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A. SCOPE OF WORK

SCOPE OF WORK

Owner/Electrical Contractor Responsibilities

- 1 Complete access to the site for construction utilizing 2 wheel drive rubber tired equipment
- 2 Locate existing underground utilities and irrigation systems and verify pole locations, home plates and field boundary lines per Musco supplied layout
- 3 Extra costs associated with foundation excavation in non-standard soils (rock, caliche, high water table, collapsing holes, etc) Standard soils are defined as soils that can be excavated using standard earth auguring equipment
- 4 Electrical design & installation
- 5 Provide materials and equipment to mount the Musco Supplied Surge Protection Device to the distribution panel and terminate necessary wiring
- 6 Provide equipment and materials to install the new Lighting Contactor Cabinet and terminate all necessary wiring Contactor cabinets will be delivered with poles and fixtures
- 7 Contractor will commission Control Link by contacting Control Link Central at (877-347-3319) and going through the following steps
- 8 Check all Zones to make sure they work in both auto and manual mode
- 9 1 hour comprehensive burn of all lights on each zone
- 10 Set base line for the DAS (Diagnostic Acquisition System)
- 11 Provide on site are for disposal of spoils

Musco Responsibilities

- 1 Provide required poles, fixtures, and foundations
- 2 Provide layout of pole locations and aiming diagram
- 3 Provide Project Management assistance as needed
- 4 Musco shall provide Performance and Payment Bonds in an amount equal to the total amount of bid **(Only if Required)**

Musco Subcontractor Responsibilities

- 1 Provide equipment and materials to off load equipment at jobsite per scheduled delivery Lighting Contactor Cabinets will need to be given to on-site electrical contractor
- 2 Provide storage containers for equipment as needed and disposal of all packing cardboard and debris
- 3 Provide adequate security to protect Musco delivered products from theft, vandalism or damage during the installation
- 4 Provide required permitting
- 5 Confirm the existing underground utilities and irrigation systems have been located and are clearly marked so as to avoid damage from construction equipment Repair any such damage during construction
- 6 Provide materials and equipment to install (7) LSS foundations as specified on Layout
- 7 Provide and install ground rods for lightning protection per NFPA 780 Code, NEC Section 250, and local building codes Poles 75' or shorter should use a #2 bare copper conductor to the ground rod Poles taller than 75' should use a #2/0 bare copper conductor For standard clay soil, the ground rod must not be less than 5/8"x 8' long, driven vertically into the soil until point is 10' below grade Ground rods must be installed in soil, not in the concrete backfill Measure resistance per NEC 250 56 If greater than 25 ohms, then install 2nd ground rod Ground conductor to be attached by exothermic fusion welding
- 8 Remove spoils to owner designated location at jobsite
- 9 Provide materials and equipment to assemble (95) LSG fixtures
- 10 Provide equipment and materials to assemble and erect (9) LSS Poles
- 11 Keep all heavy equipment off of playing fields when possible Repair damage to grounds which exceeds that which would be expected Indentations caused by heavy equipment traveling over dry ground would be an example of expected damage Ruts and sod damage caused by equipment traveling over wet grounds would be an example of damage requiring repair

B. EQUIPMENT LAYOUT



GUARANTEED PERFORMANCE

EQUIPMENT LAYOUT

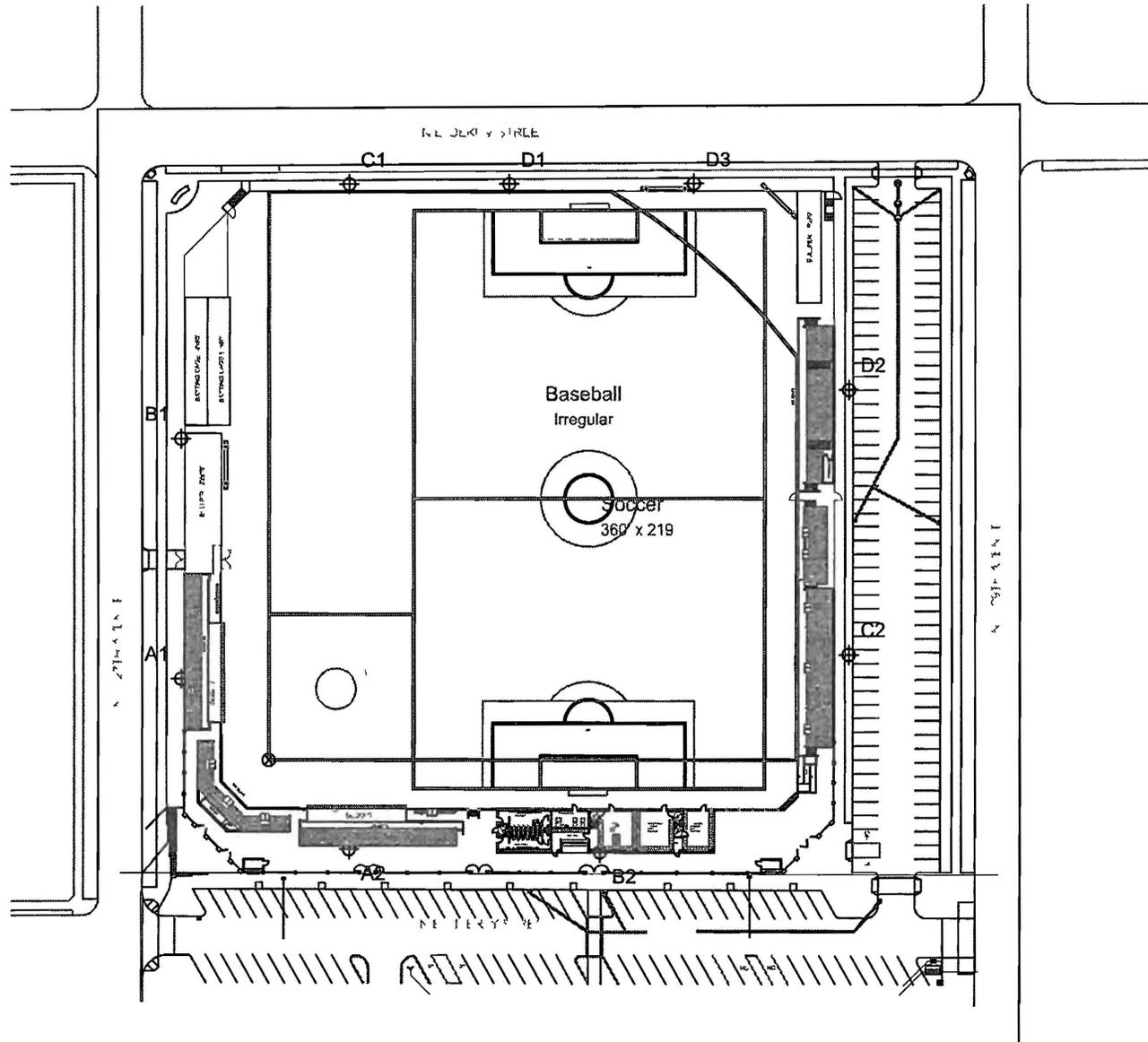
Concordia University BB/SO
Portland, OR

INCLUDES

- Baseball
- Soccer

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

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



EQUIPMENT LIST FOR AREAS SHOWN

QTY	LOCATION	Pole		Luminaires			QTY/POLE
		SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE		
2	A1 D3	70'	-	70'	1500W MZ	7	
2	A2 D2	80'	-	80'	1500W MZ	11	
1	B1	80'	-	80'	1500W MZ	18	
1	B2	80'	-	80'	1500W MZ	12	
2	C1 D1	70'	-	70'	1500W MZ	8	
1	C2	80'	-	80'	1500W MZ	13	
9	TOTALS						95

SINGLE LUMINAIRE AMPERAGE DRAW CHART

Ballast Specifications (90 min power factor)	Line Amperage Per Luminaire (max draw)								
	120 (60)	208 (60)	220 (60)	240 (60)	277 (60)	347 (60)	380 (60)	415 (60)	480 (60)
Single Phase Voltage									
1500 watt MZ	Max	-	8.6	7.7	7.5	6.5	5.1	4.7	- 3.7
	Min	11.7	6.7	6.0	5.9	5.1	4.0	3.7	X 2.9

By Eric Svenby

File # 61660r2

Date 18-Dec-07

Pole location(s) ⊕ dimensions are relative to 00 reference point(s) ⊗

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C. ON FIELD LIGHTING DESIGN

EQUIPMENT LIST FOR AREAS SHOWN

Pole		Luminaires						
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY/POLE	THIS GRID	OTHER GRIDS
2	A1, D3	70	-	70	1500W MZ	7	7	0
2	A2, D2	80	-	80	1500W MZ	11	11	0
1	B1	80	-	80	1500W MZ	18	18	0
1	B2	80	-	80	1500W MZ	12	12	0
2	C1, D1	70	-	70	1500W MZ	8	8	0
1	C2	80	-	80	1500W MZ	13	13	0
9	TOTALS					95	95	0



GUARANTEED PERFORMANCE

ILLUMINATION SUMMARY

Baseball

Concordia University BB/SO
Portland, OR

Baseball

Size Irregular
Grid Spacing = 30' 0" x 30' 0"
Values given at 3' 0" above grade

Luminaire Type Green Generation
Rated Lamp Life 5000 hours
Avg Lumens/Lamp 134,000

CONSTANT ILLUMINATION HORIZONTAL FOOTCANDLES

	Infield	Outfield
No of Target Points	25	123
Average	70.8	64.6
Maximum	83	82
Minimum	45	33
Avg/Min	1.57	1.94
Max/Min	1.84	2.46
UG (Adjacent Pts)	1.94	1.94
CV	0.13	0.17

Average Lamp Tilt Factor	1 000
Number of Luminaires	95
Avg KW over 5000 hours	148 58
Max KW	161 5

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

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

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

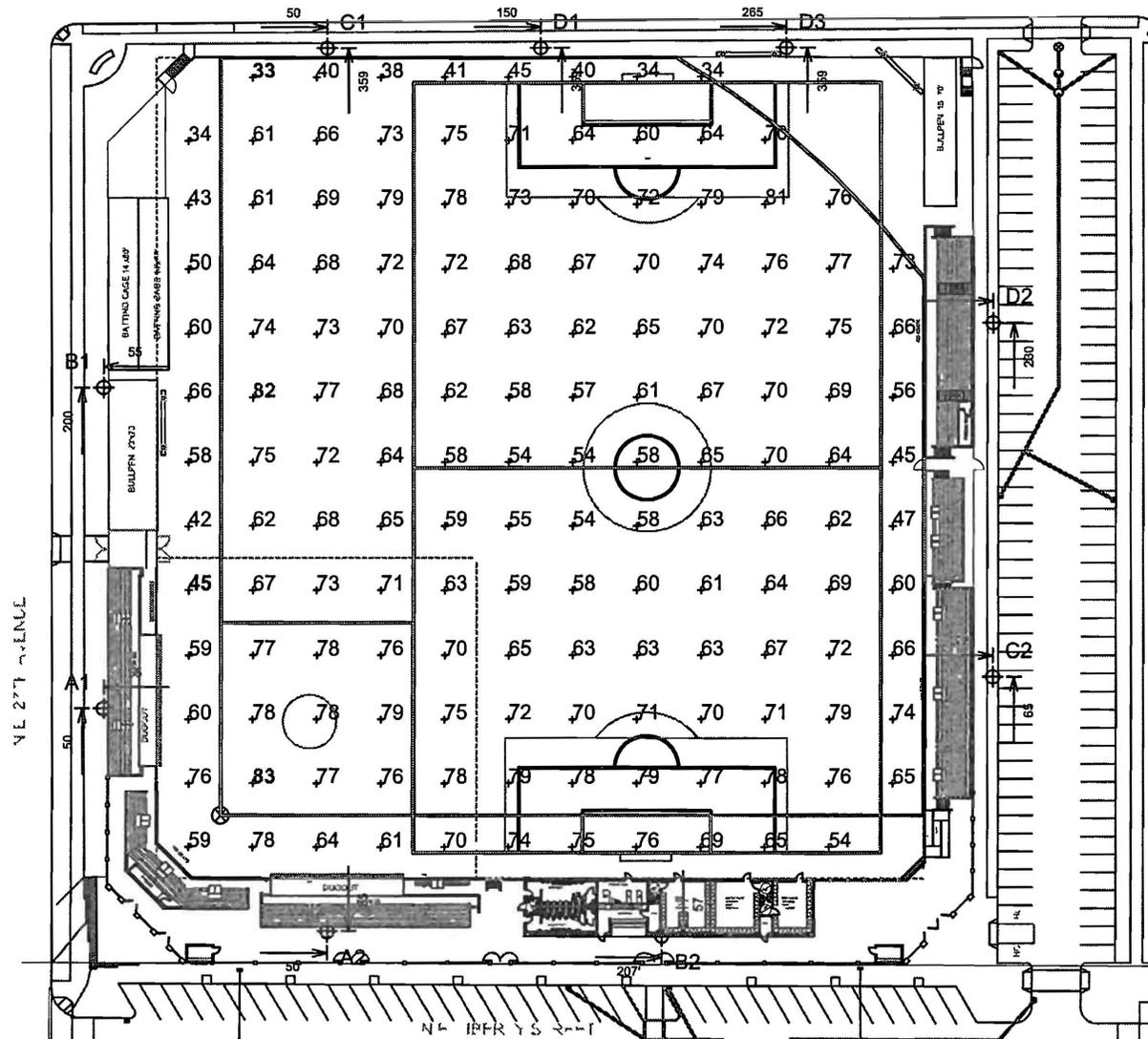
Installation Requirements Results assume +/- 3% nominal voltage at line side of the ballast and structures located within 3 feet (1m) of design locations

By Eric Svenby

File # 61660r2

Date 18-Dec-07

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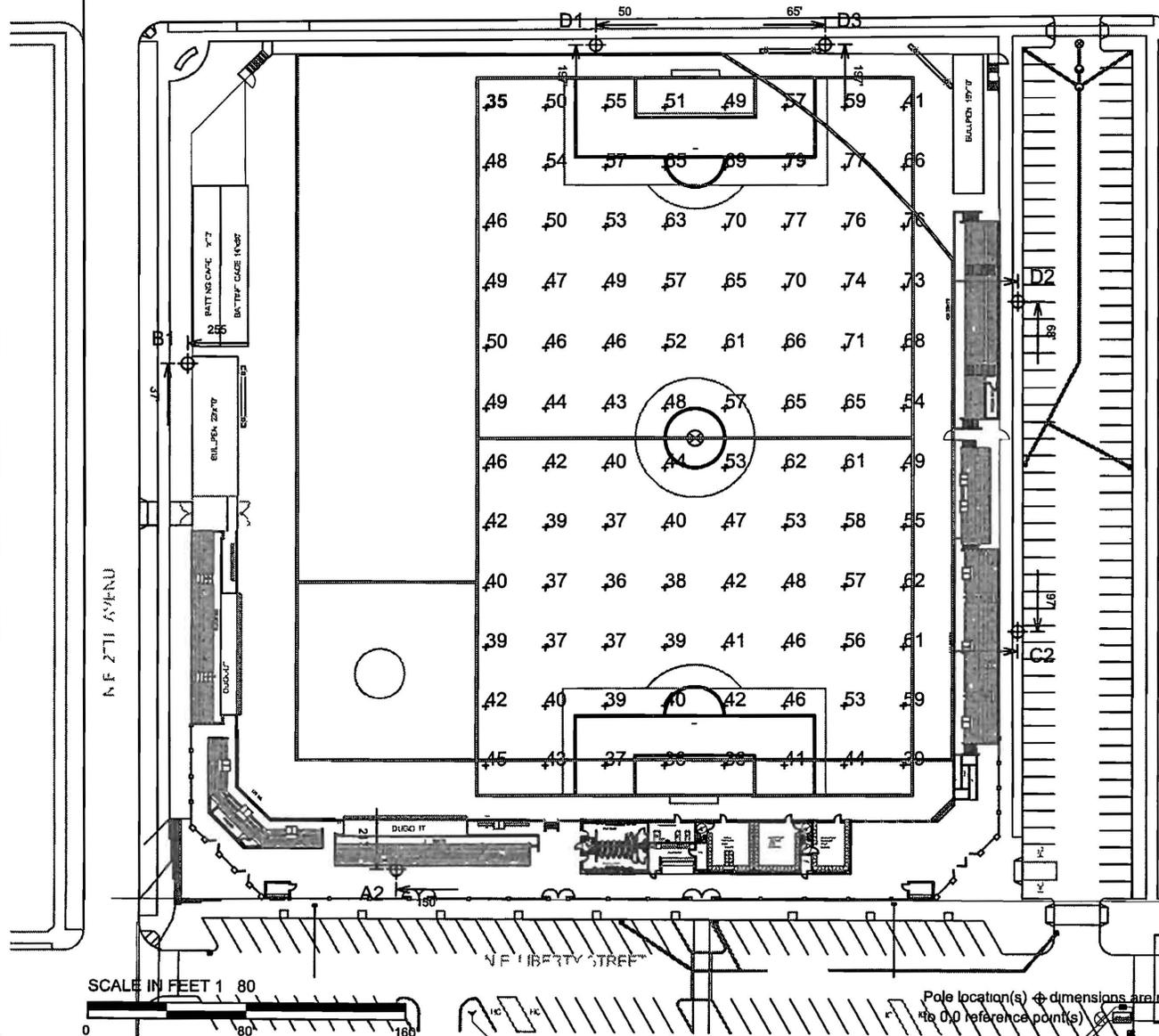
SCALE IN FEET 1" = 80'

Pole location(s) & dimensions are relative to 00 reference points

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY/POLE	THIS GRID	OTHER GRIDS
2	A2, D2	80'	-	80'	1500W MZ	11	11	0
1	B1	80'	-	80'	1500W MZ	18	18	0
1	C2	80	-	80'	1500W MZ	13	13	0
1	D1	70'	-	70'	1500W MZ	8	8	0
1	D3	70'	-	70'	1500W MZ	7	7	0
6	TOTALS					68	68	0

N - JFK M 518E-1



GUARANTEED PERFORMANCE

ILLUMINATION SUMMARY

Soccer

Concordia University BB/SO
Portland, OR

Soccer

Size 360' x 219'
Grid Spacing = 30 0' x 30 0'
Values given at 3 0' above grade

Luminaire Type Green Generation
Rated Lamp Life 5000 hours
Avg Lumens/Lamp 134,000

**CONSTANT ILLUMINATION
HORIZONTAL FOOTCANDLES**

		Entire Grid	
No of Target Points		96	
Average		51.6	
Maximum		79	
Minimum		35	
Avg/Min		1.45	
Max/Min		2.22	
UG (Adjacent Pts)		1 61	
CV		0 23	
Average Lamp Tilt Factor			1 000
Number of Luminaires			68
Avg KW over 5000 hours			106 35
Max KW			115 6

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

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

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

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

By Eric Svenby

File # 61660r2

Date 18-Dec-07

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D. OFF FIELD LIGHTING DESIGN

EQUIPMENT LIST FOR AREAS SHOWN								
Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY / POLE	THIS GRID	OTHER GRIDS
2	A1, D3	70	-	70'	1500W MZ	7	7	0
2	A2, D2	80	-	80'	1500W MZ	11	11	0
1	B1	80'	-	80'	1500W MZ	18	18	0
1	B2	80'	-	80	1500W MZ	12	12	0
2	C1 D1	70'	-	70'	1500W MZ	8	8	0
1	C2	80	-	80	1500W MZ	13	13	0
9	← TOTALS					95	95	0



GUARANTEED PERFORMANCE

ILLUMINATION SUMMARY

Spill at Street (near)

Concordia University BB/SO
Portland, OR

Spill at Street (near)

Grid Spacing = 30 0'
Values given at 3 0' above grade

Luminaire Type Green Generation
Rated Lamp Life 5000 hours
Avg Lumens/Lamp 134,000

CONSTANT ILLUMINATION HORIZONTAL FOOTCANDLES

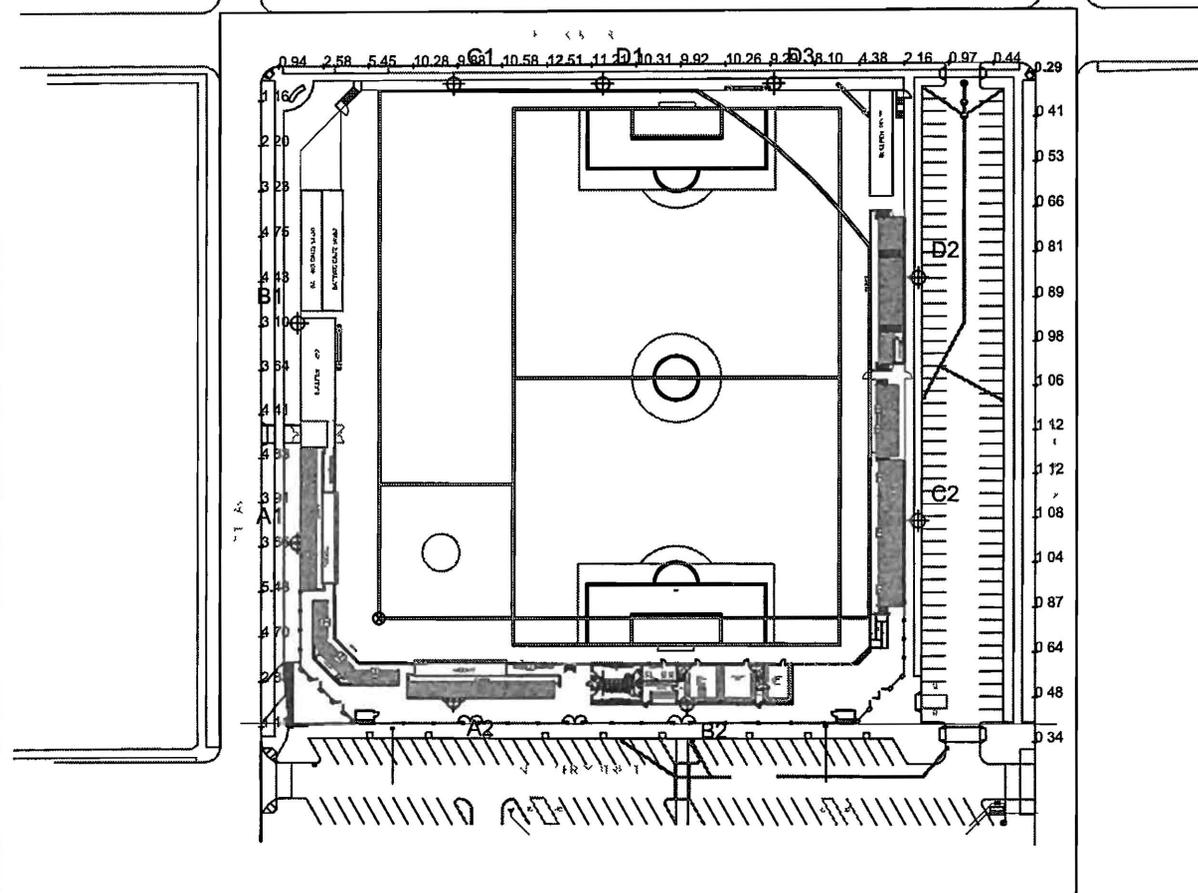
Entire Grid	
No of Target Points	48
Average	3.843
Maximum	12.51
Minimum	0.29
Average Lamp Tilt Factor	1 000
Number of Luminaires	95
Avg KW over 5000 hours	148 58
Max KW	161 5

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

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

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

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



SCALE IN FEET 1 120



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

By Eric Svenby

File # 61660r2

Date 18-Dec-07

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EQUIPMENT LIST FOR AREAS SHOWN

Pole			Luminaires					
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY/POLE	THIS GRID	OTHER GRIDS
2	A1, D3	70'	-	70'	1500W MZ	7	7	0
2	A2, D2	80'	-	80'	1500W MZ	11	11	0
1	B1	80'	-	80'	1500W MZ	18	18	0
1	B2	80'	-	80'	1500W MZ	12	12	0
2	C1, D1	70'	-	70'	1500W MZ	8	8	0
1	C2	80'	-	80'	1500W MZ	13	13	0
9	TOTALS					95	95	0



GUARANTEED PERFORMANCE

ILLUMINATION SUMMARY

Spill at Street (near)

Concordia University BB/SO
Portland, OR

Spill at Street (near)

Grid Spacing = 30 0'
Values given at 3 0' above grade

Luminaire Type Green Generation
Rated Lamp Life 5000 hours
Avg Lumens/Lamp 134 000

**CONSTANT ILLUMINATION
MAX VERTICAL FOOTCANDLES**

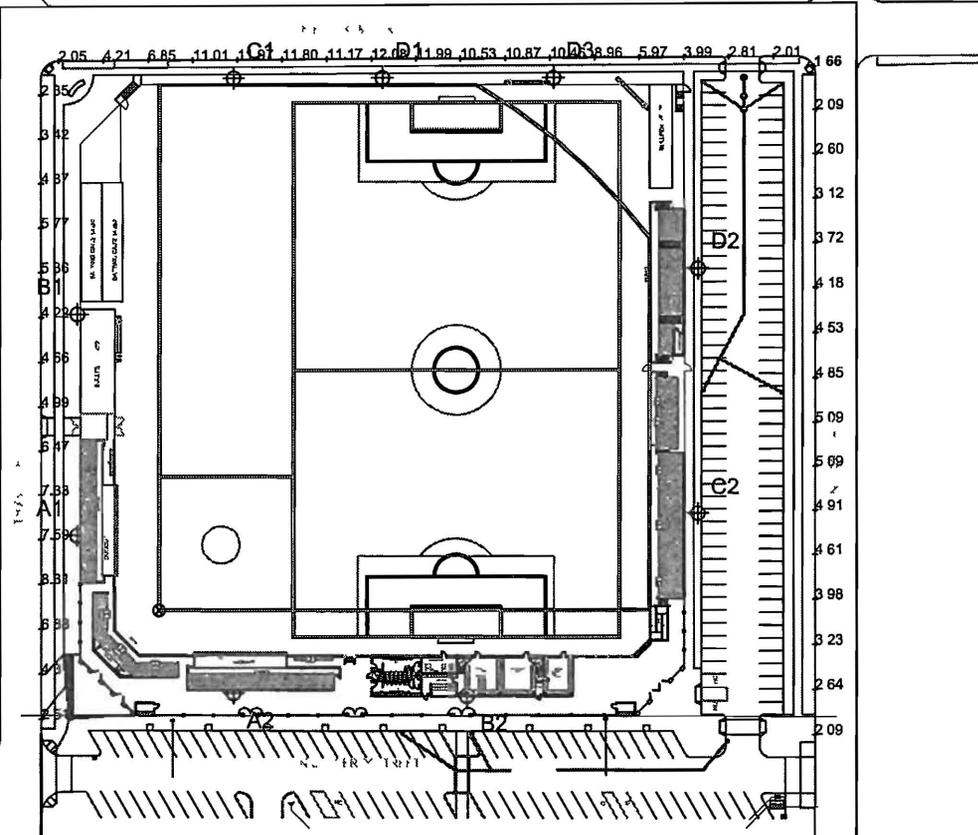
Entire Grid	
No of Target Points	48
Average	5.743
Maximum	12.08
Minimum	1.66
Average Lamp Tilt Factor	1 000
Number of Luminaires	95
Avg KW over 5000 hours	148 58
Max KW	161 5

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

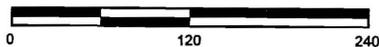
Field Measurements Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4 Individual measurements may vary from computer predictions

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

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



SCALE IN FEET 1 120



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

By Eric Svenby

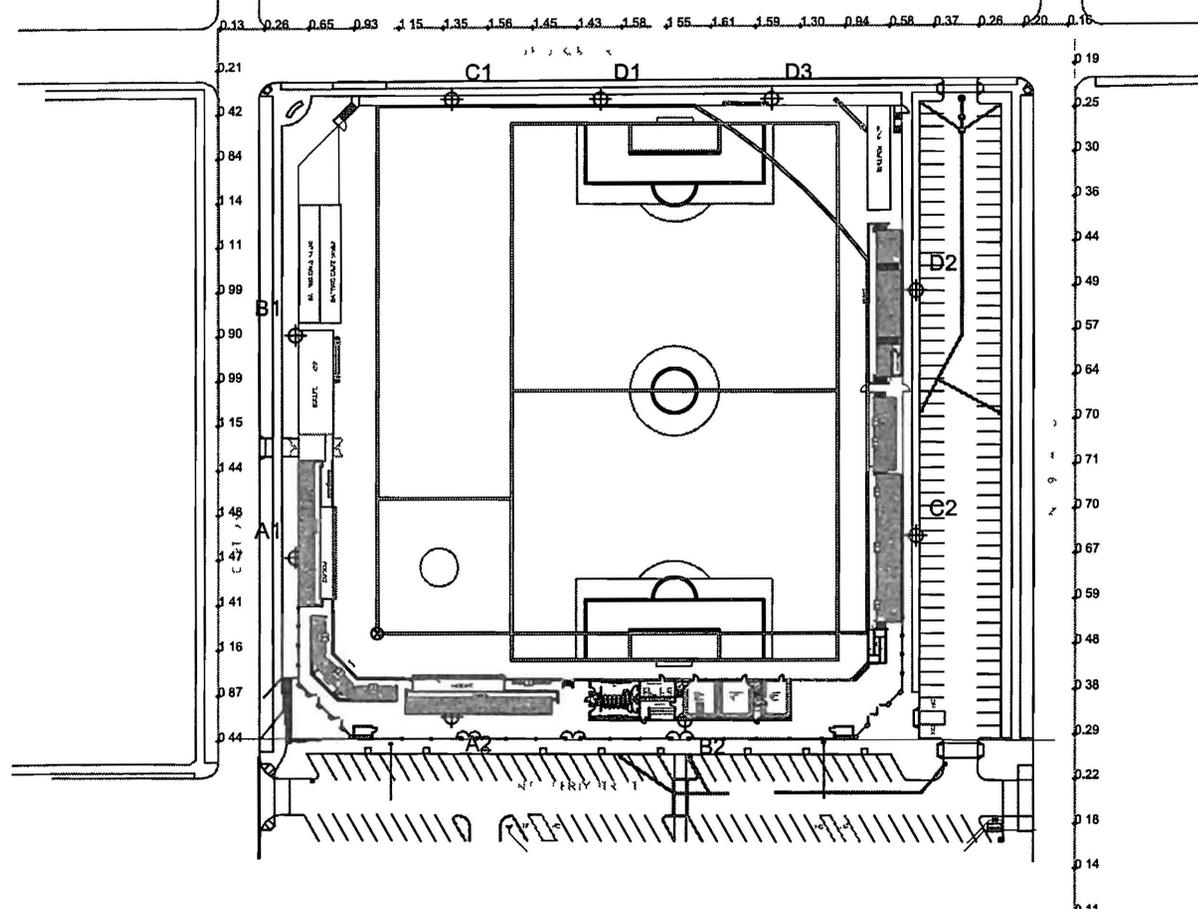
File # 61660r2

Date 18-Dec-07

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EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY/POLE	THIS GRID	OTHER GRIDS
2	A1, D3	70'	-	70	1500W MZ	7	7	0
2	A2, D2	80	-	80'	1500W MZ	11	11	0
1	B1	80'	-	80	1500W MZ	18	18	0
1	B2	80'	-	80'	1500W MZ	12	12	0
2	C1 D1	70'	-	70	1500W MZ	8	8	0
1	C2	80	-	80'	1500W MZ	13	13	0
9	TOTALS					95	95	0



SCALE IN FEET 1 120



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



GUARANTEED PERFORMANCE

ILLUMINATION SUMMARY

Spill @ PL
 Concordia University BB/SO
 Portland, OR

Spill @ PL
 Grid Spacing = 30 0'
 Values given at 3 0' above grade

Luminaire Type Green Generation
 Rated Lamp Life 5000 hours
 Avg Lumens/Lamp 134 000

**CONSTANT ILLUMINATION
 HORIZONTAL FOOTCANDLES**

Entire Grd	
No of Target Points	56
Average	0.776
Maximum	1.61
Minimum	0.11

Average Lamp Tilt Factor	1 000
Number of Luminaires	95
Avg KW over 5000 hours	148 58
Max KW	161 5

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

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

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

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

By Eric Svenby

File # 61660r2

Date 18-Dec-07

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EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires					
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY/POLE	THIS GRID	OTHER GRIDS	
2	A1, D3	70'	-	70'	1500W MZ	7	7	0	
2	A2, D2	80'	-	80'	1500W MZ	11	11	0	
1	B1	80	-	80	1500W MZ	18	18	0	
1	B2	80'	-	80'	1500W MZ	12	12	0	
2	C1 D1	70	-	70'	1500W MZ	8	8	0	
1	C2	80	-	80'	1500W MZ	13	13	0	
9	TOTALS						95	95	0



GUARANTEED PERFORMANCE

ILLUMINATION SUMMARY

Spill @ PL
 Concordia University BB/SO
 Portland, OR

Spill @ PL
 Grid Spacing = 30 0'
 Values given at 3 0' above grade

Luminaire Type Green Generation
 Rated Lamp Life 5000 hours
 Avg Lumens/Lamp 134,000

**CONSTANT ILLUMINATION
 MAX VERTICAL FOOTCANDLES**

Entire Grid
 No of Target Points 56
 Average: 2.481
 Maximum: 4.12
 Minimum 0.68

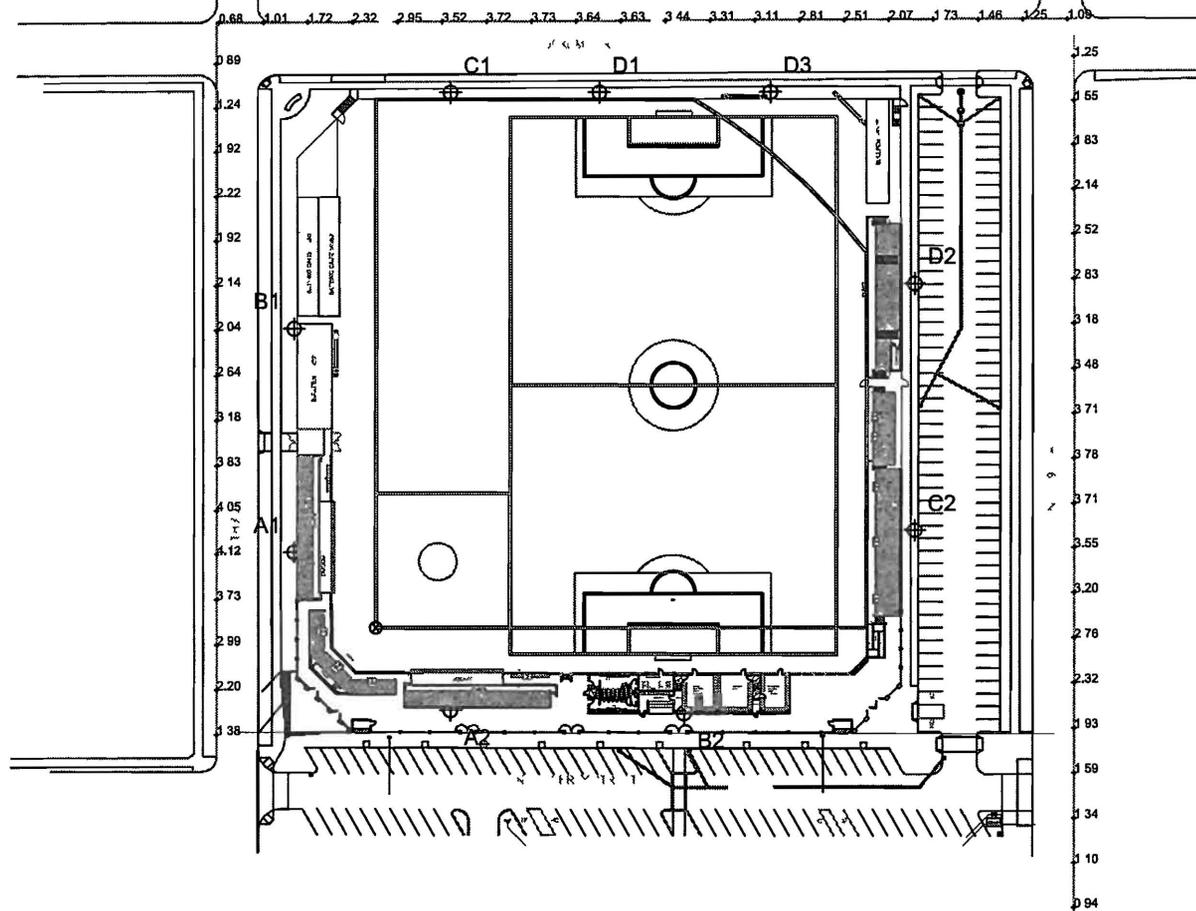
Average Lamp Tilt Factor 1 000
 Number of Luminaires 95
 Avg KW over 5000 hours 148.58
 Max KW 161.5

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

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

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

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



SCALE IN FEET 1 120



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

By Eric Svenby

File # 61660r2

Date 18-Dec-07

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MUSCO
GREEN GENERATION LIGHTING™

GUARANTEED PERFORMANCE SUMMARY

Blanket Grid
Concordia University B&ISO
Portland OR

Blanket Grid
Grid Spacing = 30' 0" x 30' 0"
Values given at 3.0' above grade

Luminaire Type: Green Generation
Raled Lamp Life: 5000 hours
Avg Lumens/Lamp: 134,000

CONSTANT ILLUMINATION

HORIZONTAL FOOTCANDLES

No. of Footcandle Measurements: 1640
Minimum: 0.84
Maximum: 4498.41
Avg/W/L: 2292.65
UG (Adjacent Pts): 6.70
CV: 2.73

Average Lamp Till Factor: 1.000
Number of Luminaires: 95
Avg KW over 5000 hours: 148.58
Max KW: 161.5

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

Field Measurements Averages shall be +/- 10% in accordance with IESNA RP-01 and CIBSE LC4. Individual measurements may vary from computer predictions.

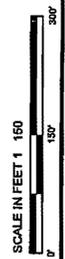
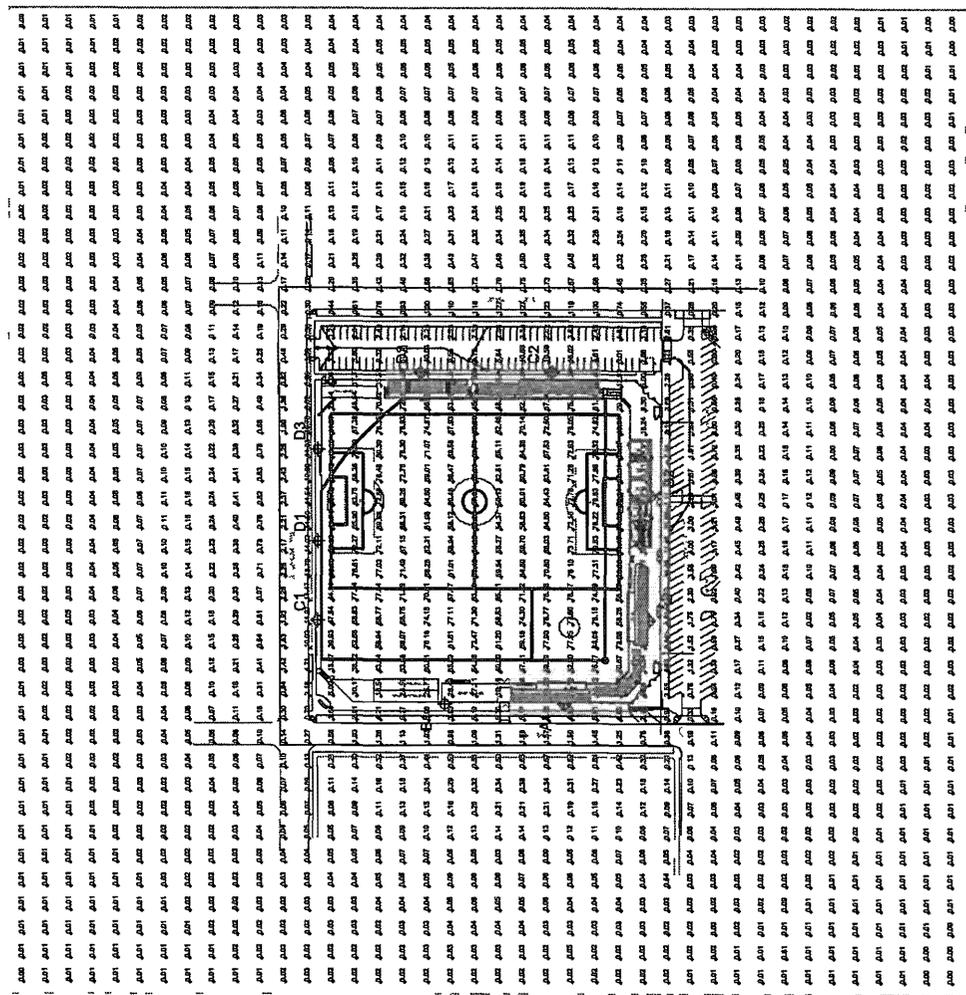
Electrical System Requirements Refer to Ampereage Draw Chart and/or the "Musco Control System Summary" for electrical sizing.

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

By: Eric Svenby
File #: 616802
Date: 18-Dec-07
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Print Date: 18/Dec/2007 & Time: 14:23

EQUIPMENT LIST FOR AREAS SHOWN

CITY	LOCATION	SIZE	WAVELENGTH	QUANTITY									
1	A1	80'	80'	15000W	NZ	11	11	0					
1	B1	80'	80'	15000W	NZ	18	18	0					
1	B2	80'	80'	15000W	NZ	12	12	0					
2	C1	D1	70'	70'	15000W	NZ	8	8	0				
1	C2	80'	80'	15000W	NZ	13	13	0					
TOTALS											95	85	0



E. LIFE CYCLE COST SAVINGS

25-Year Life-Cycle Cost

Concordia University
Baseball/Soccer
Prepared for Bill Melrose

	Typical Floodlighting Equipment		Your Savings
	Hours	Average kW	
	5000	5000	
	256.0	148.6	
Energy	\$102,384	\$59,432	\$42,952
Group Relamp	\$32,917	\$0	\$32,917
Lamp Maintenance	\$3,750	\$0	\$3,750
Controls - Energy	\$5,119	\$0	\$5,119
Controls - Labor	\$0	\$0	\$0
25-Year Life-Cycle Cost	\$144,170	\$59,432	\$84,738



Assumptions

Customer Provided Energy Data

Energy Cost per kWh	\$0.080
Annual Operating Hours	200

Technology Specific Data

Green Generation™ Fixture Qty	95
Average kW demand per fixture	1.564
Useful lamp life (hours)	5000
Typical Floodlighting Fixture Qty	158
Average kW demand per fixture	1.62
Useful lamp life (hours)	3000

Controls Information

Controls Energy Savings	5%
Labor Rate per Hour	\$0.00
# On/Off Cycles per Year	0
Labor Hours per Cycle	0

Lamp Maintenance Data

Lamp replacement cost	\$125
including parts, equipment & labor	

NOTE

Life-cycle costs are based upon the assumptions given by the customer above. Any variation in this data will change the life-cycle cost proportionately. Musco guarantees the average Green Generation system kW per hour and useful life of the lamp.



F. STRUCTURAL INFORMATION

LIGHT STRUCTURE STEEL POLE
BY MUSCO LIGHTING, INC
(SEE POLE IDENTIFICATION)

LIGHT STRUCTURE PRECAST
BASE BY MUSCO LIGHTING, INC.
(SEE POLE IDENTIFICATION)

FINISHED GRADE

PIER EMBEDMENT LENGTH
(SEE POLE FOUNDATION SCHEDULE)

PRECAST BASE PROJECTION
(SEE PRECAST BASE IDENTIFICATION)

CONCRETE BACKFILL
(SEE GENERAL NOTES)

PIER DIAMETER
(SEE POLE FOUNDATION SCHEDULE)

UNDISTURBED IN-SITU SOIL
(SEE GENERAL NOTES)

LIGHT POLE FOUNDATION DETAIL

POLE FOUNDATION SCHEDULE

TYPE	FORCES (MAXIMUM)			PIER	
	MOMENT (M) KIP-FT	SHEAR (V) KIPS	VERTICAL (P) KIPS *	DIAMETER INCHES	EMBEDMENT FEET
LS70-B	68.02	1.452	1.883	30"	12'-0"
LS80-B	125.03	2.540	3.704	36"	16'-0"
LS80-C	182.41	3.412	4.592	36"	18'-0"

* VERTICAL FORCE DOES NOT INCLUDE WEIGHT OF PRECAST BASE.

POLE IDENTIFICATION

LOCATION/MARK	POLE TYPE	PRECAST BASE TYPE	FIXTURE CONFIGURATION (FIXTURES PER CROSSARM)	FIXTURE EPA (MAX)
A1, D3	LS70-B	3R	7(4+3)	18.2
A2, D2	LS80-B	5B	11(6+5)	25.3
B1	LS80-C	6B	18(6+6+6)	48.6
B2	LS80-B	5B	12(6+6)	28.8
C1, D1	LS70-B	3B	8(4+4)	20.0
C2	LS80-B	5B	13(7+6)	26.0

POLES B1, C2 & D2 HAVE A MOUNTING BRACKET FOR THREE SPEAKERS AT 30°-0" AGL.

PRECAST BASE TYPE	WEIGHT LBS	OVERALL LENGTH FEET	HEIGHT ABOVE GRADE FEET	EMBEDMENT IN PIER FEET	OUTSIDE DIAMETER INCHES
3B	2,670	20'-0"	8'-0"	12'-0"	13.38"
5B	5,180	23'-11"	7'-11"	16'-0"	18.25"
6B	8,020	26'-1"	8'-1"	18'-0"	20.56"



GENERAL NOTES

GENERAL

ALL CONSTRUCTION AND WORKMANSHIP SHALL CONFORM TO THE INTERNATIONAL BUILDING CODE, 2006 EDITION

WIND 80 MPH EXPOSURE C, (PER 1998 OREGON STRUCTURAL SPECIALTY CODE)

REFERENCE POLE LOCATION DRAWING FOR ACTUAL POLE PLACEMENT AND SITE LOCATION

THE CONTRACTOR IS SOLELY RESPONSIBLE FOR ALL CONSTRUCTION PROCEDURES AND SAFETY CONDITIONS AT THE JOB SITE.

SOIL DESIGN PARAMETERS

ALLOWABLE VERTICAL BEARING CAPACITY 1,500 PSF OR 250 PSF SKIN FRICTION

ALLOWABLE LATERAL PASSIVE SOIL BEARING PRESSURE 200 PSF/FT (AT LEVEL GRADE)

REFERENCE CHAPTER 18, SECTION 1805 AND TABLE 1804.2 OF THE 2006 EDITION OF THE INTERNATIONAL BUILDING CODE ASSUME CLASS 5 SOILS

DESIGN SOIL PARAMETERS ARE AS NOTED. ACTUAL ALLOWABLE SOIL PARAMETERS MUST BE VERIFIED BY A GEOTECHNICAL ENGINEER.

ENCOUNTERING SOIL FORMATIONS THAT WILL REQUIRE SPECIAL DESIGN CONSIDERATIONS OR EXCAVATION PROCEDURES MAY EXIST. POLE FOUNDATIONS MAY NEED TO BE REANALYZED ACCORDING TO THE SOIL CONDITIONS THAT EXIST

IF ANY DISCREPANCIES OR INCONSISTENCIES ARISE, NOTIFY THE ENGINEER OF SUCH DISCREPANCIES. FOUNDATIONS WILL THEN BE REVISED ACCORDINGLY.

ALL PIERS AND CONCRETE BACKFILL MUST BEAR ON AND AGAINST FIRM, UNDISTURBED SOIL OR AS APPROVED BY A GEOTECHNICAL ENGINEER.

ALL EXCAVATIONS MUST BE FREE OF LOOSE SOIL AND DEBRIS PRIOR TO FOUNDATION INSTALLATION AND PLACEMENT OF CONCRETE BACKFILL. CASING MAY BE REQUIRED IF CAVING OCCURS. IN SUCH A CASE, APPROVAL BY A GEOTECHNICAL ENGINEER IS REQUIRED.

ALL EXCAVATIONS MUST BE FREE OF WATER OR CONCRETE SHALL BE PLACED WITH A TREMIE PIPE IN ACCORDANCE WITH ACT STANDARD 336. CONCRETE PLACED BY THE TREMIE METHOD SHALL HAVE A MINIMUM ULTIMATE STRENGTH OF 1,000 PSI GREATER THAN REQUIRED UNDER "CONCRETE BACKFILL" BELOW.

CONCRETE BACKFILL

CONCRETE BACKFILL SHALL HAVE A MINIMUM ULTIMATE COMPRESSIVE STRENGTH AT 28 DAYS OF 3,000 PSI. SPECIAL INSPECTION IS NOT REQUIRED (3,000 PSI IS SPECIFIED FOR EARLY POLE ERECTION, NOT FOR STRUCTURAL PURPOSES).

CONCRETE BACKFILL SHALL ATTAIN A MINIMUM STRENGTH OF 2,000 PSI PRIOR TO STEEL POLE ERECTION.

USE TYPE II/V PORTLAND CEMENT OR AS RECOMMENDED BY THE GEOTECHNICAL ENGINEER.

MDX IN CONFORMANCE WITH ASTM C 94

AGGREGATES PER ASTM C-33 (1" MAX AGG SIZE)

PLACE CONCRETE IMMEDIATELY AFTER COMPLETION OF EXCAVATION AND INSPECTION BY THE GEOTECHNICAL ENGINEER. NO EXCAVATIONS SHALL BE LEFT UNPROTECTED OR OPEN OVERNIGHT.

CONCRETE SHALL BE PLACED IN ONE CONTINUOUS OPERATION (NO CONSTRUCTION JOINT) WITH SPECIAL EQUIPMENT WITH A MAXIMUM FREEFALL OF 5 FT AND TO PREVENT CONCRETE FROM STRIKING THE SIDES OF THE EXCAVATION VIBRATE TOP 5 FT.

MISCELLANEOUS

FIXTURES MUST BE LOCATED TO MAINTAIN 10'-0" MINIMUM HORIZONTAL CLEARANCE FROM ANY OBSTRUCTION.

POLES, FIXTURES, PRECAST BASES, ELECTRICAL ITEMS, PLATFORMS SPECIFICATIONS AND INSTALLATION PER MUSCO LIGHTING, INC.

FIXTURE EPA = 2.7 MAX SQ FT; WEIGHT = 40 LBS (PER MUSCO LIGHTING, INC.)

POLE SUPPORT FOUNDATION	MUSCO LIGHTING, INC 2107 STEWART ROAD MUSCATINE, IOWA 52761	DATE 05/20/09
CONCORDIA UNIVERSITY BASEBALL/ SOCCER FIELD LIGHTING PORTLAND, OR	R. L. FOLEY & ASSOCIATES, INC STRUCTURAL ENGINEERS 25652 ASHBY WAY LAKE FOREST, CA 92630	SHEET C1 OF 1

G. CONTROLS AND MONITORING



Control-Link Central™

Concordia University
Baseball/Soccer Lighting Project
Portland, OR

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

Contact Information

Internet - www.control-link.com

Fax - 800-853-8847

Phone - 877-347-3319

Email - schedule@musco.com



Control System Summary

Project Information

Project Specific Notes:

Project # 19561660
 Project Name Concordia University BB/SO
 Date 03/08/11
 Project Engineer Eric Svenby
 Sales Representative Tim Butz
 Control System Type Control and Monitoring
 Communication Type Digital Cellular
 Scan 61660r3
 Distribution Panel Location or ID Concordia University
 Total # of Distribution Panel Locations for Project 1
 Design Voltage/Hertz/Phase 480/60/3
 Control Voltage 120

Equipment Listing

DESCRIPTION	APPROXIMATE SIZE
1 Control and Monitoring Cabinet	24 X 72
2 Control and Monitoring Cabinet	24 X 48
Total Contactors	14 30 AMP
Total Off/On/Auto Switches	14

See all details - voltage, # of distribution panels, etc.

Materials Checklist

Contractor/Customer Supplied:

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

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

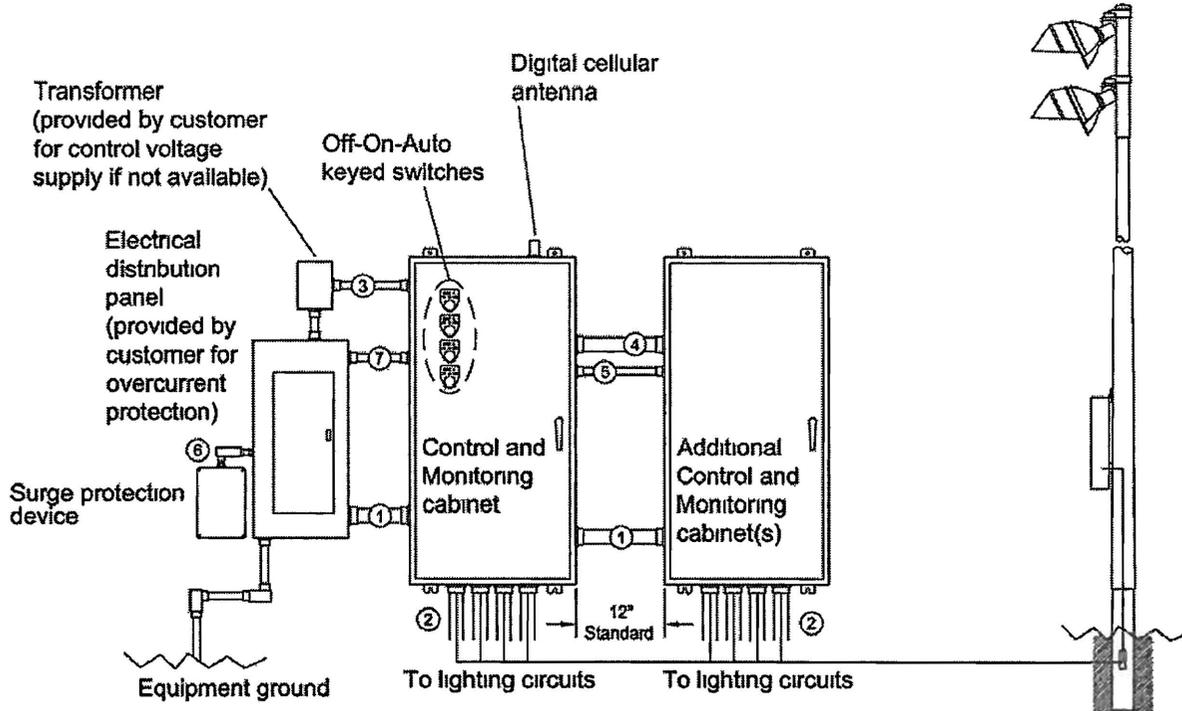
IMPORTANT NOTES

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

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

Control-Link. Control and Monitoring System - Digital Cellular

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



WIRE	DESCRIPTION	# OF WIRES	TYP WIRE SIZE (AWG)	MAX WIRE LENGTH (FT)	WIRE FROM MUSCO	NOTES
1	LINE POWER & GROUND TO CONTACTORS (AS REQUIRED)	NOTE A	NOTE B	27	NO	A-E
2	LOAD POWER TO LIGHTING CIRCUITS (AS REQUIRED)	NOTE A	NOTE B	N/A	NO	A-D
3	CONTROL POWER (DEDICATED, 20A)	3	12	N/A	NO	C, D
4	CONTROL HARNESSSES (AS REQUIRED)	--	--	8*	YES*	C, D
5	COMMUNICATION CABLE (RS-485) (AS REQUIRED)	1	--	8*	YES*	C, D
6	SURGE PROTECTION DEVICE TO DISTRIBUTION PANEL	--	--	N/A	YES	D
7	SURGE PROTECTION DEVICE MONITORING	2	14	N/A	NO	D

R60-11-00_E

- Notes
- A. Voltage and phasing per the notes on cover page
 - B. Calculate per load and voltage drop
 - C. Minimum conduit diameter
 - a. Wire 4 requires 2" (for connector ends to pass though)
 - b. Wire 5 requires 1" (for connector ends to pass though)
 - c. All other conduit diameters should be per code
 - D. Refer to Control and Monitoring System Installation Instructions for more details on equipment information and the installation requirements
 - E. No contactor should be more than 27 feet from its circuit breaker. Contact Musco if max wire length exceeds the value shown in the chart

IMPORTANT Communication wire (5) must be in separate conduit from any AC power wiring (1,2,3,4,6,7). Control (3,4,6) and monitoring (7) wire must be in separate conduit from line and load power wiring (1,2).

*Musco supplied wire harnesses are supplied in standard 8-foot lengths



Control System Summary

Concordia University BB/SO / 19561660 - 61660r3
 Concordia University - Page 3 of 4

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 Form T 5030-1

SWITCHING SCHEDULE

Field Type	Zones	Zone Description
Baseball-Softball	1	Baseball [A]
Baseball	2	Baseball/Soccer [B]
Baseball	3	Baseball [C]
Baseball	4	Baseball/Soccer [D]

CONTROL POWER CONSUMPTION	
120V Single Phase	
VA loading of Musco Supplied Equipment	INRUSH 3530 0
	SEALED 464 0

BALLAST SPECIFICATIONS 90 Minimum Power Factor	VOLTAGE 480v THREE PHASE						
	208	240	277	347	380	415	480
Single Phase Voltage (Also applicable to each single phase of a 3 phase system)							
1500 Watt Metal Halide Lamp Operating line amperage per fixture, max draw	8 6	7 5	6 5	5 1	4 7	4 2	3 7
1000 Watt Metal Halide Lamp Operating line amperage per fixture, max draw	6 5	5 8	4 9	4 0	3 6	3 2	2 9

CIRCUIT SUMMARY BY ZONE

POLE	CIRCUIT DESCRIPTION	# OF FIXTURES	FULL LOAD AMPS	CONTACTOR SIZE (AMPS)	CONTACTOR ID	ZONE
A1	Baseball (A)	7	18 5	30	C1	1
B2	Baseball (A)	6	14 8	30	C2	1
C1	Baseball (A)	8	22 2	30	C3	1
A2	Baseball/Soccer (B)	6	14 8	30	C4	2
B1	Baseball/Soccer (B)	12	29 6	30	C5	2
C2	Baseball/Soccer (B)	7	18 5	30	C6	2
D1	Baseball/Soccer (B)	8	22 2	30	C7	2
D2	Baseball/Soccer (B)	6	14 8	30	C8	2
D3	Baseball/Soccer (B)	7	18 5	30	C9	2
B2	Baseball (C)	6	14 8	30	C10	3
A2	Baseball/Soccer (D)	5	14 8	30	C11	4
B1	Baseball/Soccer (D)	6	14 8	30	C12	4
C2	Baseball/Soccer (D)	6	14 8	30	C13	4
D2	Baseball/Soccer (D)	5	14 8	30	C14	4



Control System Summary

Concordia University BB/SO / 19561660 - 61660r3
 Concordia University - Page 4 of 4

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 Form T 5030-1

PANEL SUMMARY						
CABINET #	CONTROL MODULE LOCATION	CONTACTOR ID	CIRCUIT DESCRIPTION	FULL LOAD AMPS	DISTRIBUTION PANEL ID (BY OTHERS)	CIRCUIT BREAKER POSITION (BY OTHERS)
1	1	C1	Pole A1	18 5		
1	1	C2	Pole B2	14 8		
1	1	C3	Pole C1	22 2		
1	1	C4	Pole A2	14 8		
1	1	C5	Pole B1	29 6		
1	1	C6	Pole C2	18 5		
1	1	C7	Pole D1	22 2		
1	1	C8	Pole D2	14 8		
1	1	C9	Pole D3	18 5		
1	1	C10	Pole B2	14 8		
1	1	C11	Pole A2	14 8		
1	1	C12	Pole B1	14 8		
2	1	C13	Pole C2	14 8		
2	1	C14	Pole D2	14 8		

ZONE SCHEDULE				
ZONE	SELECTOR SWITCH	ZONE DESCRIPTION	CIRCUIT DESCRIPTION	
			POLE ID	CONTACTOR ID
Zone 1	1	Baseball (A)	A1	C1
			B2	C2
			C1	C3
Zone 2	2	Baseball/Soccer (B)	A2	C4
			B1	C5
			C2	C6
			D1	C7
			D2	C8
			D3	C9
Zone 3	3	Baseball (C)	B2	C10
Zone 4	4	Baseball/Soccer (D)	A2	C11
			B1	C12
			C2	C13
			D2	C14

Musco Control-Link Usage Report (Auto Only)
 Pasco County Land O Lakes, FL
 By Facility, Field with User Group Totals
 Usage Type of Light Usage
 May, 2008

Summary by Facility	
<u>Facility</u>	<u>Total Auto Hours Usage</u>
Land O Lakes Complex	645 32
Wesley Chapel District Park	570 45
Pasco County	1216 17

Summary by Facility, Field		
<u>Facility</u>	<u>Field</u>	<u>Total Auto Hours Usage</u>
Land O Lakes Complex	Baseball 7	121 15
Land O Lakes Complex	Baseball 8	121 45
Land O Lakes Complex	Baseball 9	122 00
Land O Lakes Complex	Courts 1	72 01
Land O Lakes Complex	Courts 2-3-4	72 01
Land O Lakes Complex	Football 1	6 00
Land O Lakes Complex	Football 2	6 00
Land O Lakes Complex	Soccer 5	2 00
Land O Lakes Complex	Softball 10	122 30
Wesley Chapel District Park	Baseball 1	50 00
Wesley Chapel District Park	Baseball 2	41 30
Wesley Chapel District Park	Baseball 3	27 45
Wesley Chapel District Park	Baseball 4	42 30
Wesley Chapel District Park	Basketball C	69 45
Wesley Chapel District Park	Basketball D	69 45
Wesley Chapel District Park	Fb so A	8 15
Wesley Chapel District Park	Fb so B	7 00
Wesley Chapel District Park	So Field #5	11 30
Wesley Chapel District Park	So Field #6	24 15
Wesley Chapel District Park	Softball	35 15
Wesley Chapel District Park	T-ball	43 45
Wesley Chapel District Park	Tennis A	69 45
Wesley Chapel District Park	Tennis B	69 45
Pasco County		1216 17

Summary by User Group	
<u>User Group</u>	<u>Total Auto Hours Usage</u>
[None]	1057 47
Pop Warner	9 00
WCAA Basebal	149 30
Pasco County	1216 17

Summary by Field, User Group			
<u>Facility</u>	<u>Field</u>	<u>User Group</u>	<u>Total Auto Hours Usage</u>
Land O Lakes Complex	Baseball 7	[None]	121 15
Land O Lakes Complex	Baseball 8	[None]	121 45
Land O Lakes Complex	Baseball 9	[None]	122 00
Land O Lakes Complex	Courts 1	[None]	72 01

Land O Lakes Complex	Courts 2-3-4	[None]	72 01
Land O Lakes Complex	Football 1	[None]	1 30
Land O Lakes Complex	Football 1	Pop Warner	4 30
Land O Lakes Complex	Football 2	[None]	1 30
Land O Lakes Complex	Football 2	Pop Warner	4 30
Land O Lakes Complex	Soccer 5	[None]	2 00
Land O Lakes Complex	Softball 10	[None]	122 30
Wesley Chapel District Park	Baseball 1	[None]	23 30
Wesley Chapel District Park	Baseball 1	WCAA Baseball	26 30
Wesley Chapel District Park	Baseball 2	[None]	16 00
Wesley Chapel District Park	Baseball 2	WCAA Baseball	25 30
Wesley Chapel District Park	Baseball 3	[None]	11 30
Wesley Chapel District Park	Baseball 3	WCAA Baseball	16 15
Wesley Chapel District Park	Baseball 4	[None]	13 45
Wesley Chapel District Park	Baseball 4	WCAA Baseball	28 45
Wesley Chapel District Park	Basketball C	[None]	69 45
Wesley Chapel District Park	Basketball D	[None]	69 45
Wesley Chapel District Park	Fb so A	[None]	8 15
Wesley Chapel District Park	Fb so B	[None]	7 00
Wesley Chapel District Park	So Field #5	[None]	11 30
Wesley Chapel District Park	So Field #6	[None]	24 15
Wesley Chapel District Park	Softball	[None]	12 45
Wesley Chapel District Park	Softball	WCAA Baseball	22 30
Wesley Chapel District Park	T-ball	[None]	13 45
Wesley Chapel District Park	T-ball	WCAA Baseball	30 00
Wesley Chapel District Park	Tennis A	[None]	69 45
Wesley Chapel District Park	Tennis B	[None]	69 45
Pasco County			1216 17

Another Musco Innovation

Control-Link®

**Flexible control and
solid management
of your facility —
saves operating cost
and improves service**

*Get fingertip control of
your facilities from*

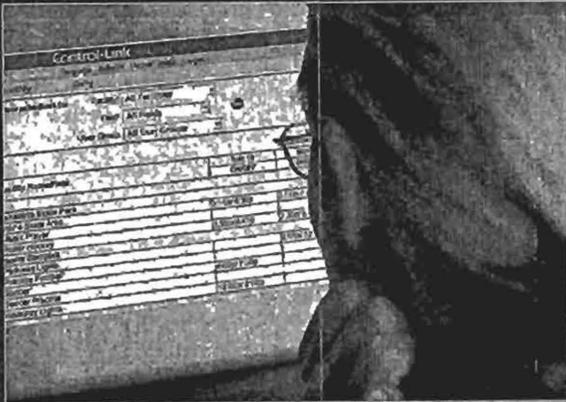
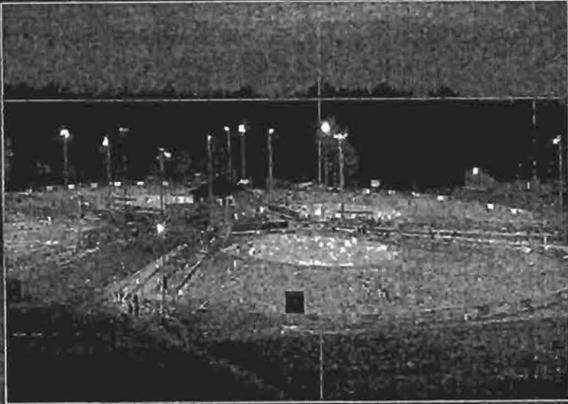
your desk

your field

your home

your phone

from anywhere



Musco Control-Link Usage Report
City of Campbellton, PA
By Facility, Field
Usage Type of Light Usage
March, 2007

Facility	Total Hours Usage
City of Campbellton	6:00
Ernst	28:45
Porter	13:25
Jessy Park	40:33
Macdonald Park	5:08
McClellan Park	
Thomson Park	195:40

Facility, Field	Total Hours Usage
Jessy Park	Field 4 Red
Jessy Park	Field 2 Blue
Jessy Park	Field 3 Orange
Jessy Park	Field 4 Yellow
Jessy Park	Field 5 Football
Jessy Park	Field 1 Red
Jessy Park	Field 2 Blue
Jessy Park	Field 3 Orange
Jessy Park	Field 4 Yellow



We Make It Happen.

Musco's Control-Link System for new and existing sports facilities

With cities and recreational needs growing faster than ever, it's critical to maximize your available resources and make solid decisions about managing and expanding your facilities

Control-Link® is the reliable, cost-effective system that helps control, monitor, and manage your new recreational facility lighting. In addition, it can control your existing lighting systems and other electrically-operated equipment. Whether for new lighting systems or to upgrade existing lights, the Control-Link System includes our Control-Link Central™ team, the on-site Control-Link equipment, and an industry-leading warranty. Our exclusive Control-Link Central team is staffed 24/7 to assist with your scheduling and reporting needs.

Reduce energy cost and staff legwork

Control-Link reduces energy usage by operating lights and equipment only when needed. This helps curtail taxpayers' concerns about lights operating when fields are not in use. The automated system does not require staff to travel from field to field to turn lights on and off. It also eliminates distributing and tracking multiple sets of keys and reduces time coordinating staff and facility schedules.

Flexible control simplifies operational needs

Lighting schedules are entered into an easy-to-use Control-Link Central website or by email, phone, or fax. User passwords have varying access levels that you specify. Passwords, unlike keys, can be issued or cancelled at any time – making seasonal personnel or volunteer changes easier to manage.

Emergency schedule changes can be made through Control-Link Central, and on-site manual controls are provided for your maintenance staff.

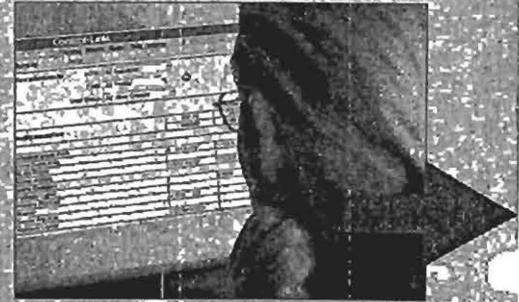
Solid management tools reduce hassle

Control-Link saves you time overseeing facility operations, scheduling staff, and planning routine maintenance. Control-Link Central accumulates information for you about your facility usage, including operating history by facility and user group. The Control and Monitoring System provided with new lighting systems provides proactive monitoring of your lighting system, reporting fixture outages to help plan routine maintenance. A preseason light check helps assure your fields are ready for play.

Our Control-Link Central team can assist you in generating reports and analyzing your data to provide tools for efficient operations, allocation of costs, assessment of user fees, proactive maintenance, and facility expansion planning.

These capabilities provide for significant long-term cost savings and the potential for providing better customer service and innovative uses of your facilities without adding staff.

Manage you

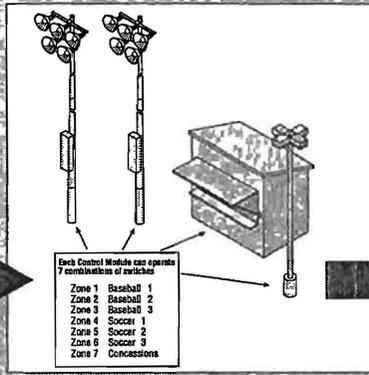
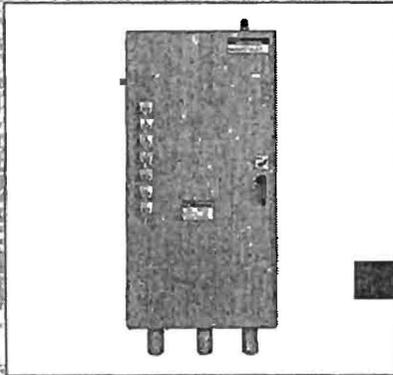


1 Enter schedules at your convenience

Enter schedules from any location via our easy-to-use Control-Link Central web site, or by email, phone, or fax.

- *Saves Energy and Staff Costs*
- *Allows Flexible Control*
- *Provides Usage Data*
- *Increases Security*
- *Provides Reliable Operation*
- *Monitors System Performance*

r lights without the late-night hours



2 Schedules are stored on-site, backed-up, at Control-Link Central™

Schedules are transmitted from Control-Link Central via digital cellular technology and stored in the on-site equipment controller.

3 Equipment is controlled automatically

Lights and other equipment such as door locks, concession stands, and security lights are operated per your schedules.

4 Control-Link Central™ provides support, monitoring, and usage data

Control-Link Central supports you every step of the way. Trained staff provide scheduling support and verification, and monitor your lighting system for fixture outages. Control-Link Central's database stores field usage data by facility and user group.

“Thank you so much for providing such an effective and advanced system for scheduling our lights, it has truly revolutionized the way we work.”

— Kelly Barker
Athletic Field Permit Coordinator
Dept. of Parks, Recreation and Manne
City of Long Beach, CA

“It’s like being an umpire. If people don’t know you’re there, you did a great job. If there aren’t any complaints about the lights, I know the system is doing its job.”

— Roger Russomanno
Ballfield Operations Supervisor
Denver, CO, Parks and Recreation Dept

“I use Control-Link Central™ to enter the weekly schedules so I can spend my time taking care of other things. They do a great job, week after week.”

— John Banks
Park and Recreation Supervisor
Laguna Niguel, CA

Control-Link Central™

Trained Staff Available 24/7

Meet Our Control-Link Central Team

Control-Link Central provides trained technical assistance with the helpful, "can-do" attitude you expect from Musco, to solve any last-minute change or issue

Control-Link Central operators oversee on/off control of over 5000 fields per night and have experience with controlling over 17 million schedules per year worldwide



"We strive to provide a level of service where every customer reaches a live operator, rather than a voice mail system, when they call in. We can make your last minute scheduling changes happen in just a few minutes."

Ryan Tighe
Control-Link Central Manager

Control-Link Central™

Efficient Management Tools

Operations Support

Control-Link Central provides three options for management and control of your facilities

- Directly control your fields via an easy-to-use website
- Enter, edit, and update your schedules from your web-enabled smart phone
- Contact Control-Link Central's team of trained operators 24/7 to enter your schedules and request last minute changes

Data Management

Control-Link Central offers effective tools to manage and analyze the extensive amount of stored information. Standard reports include usage reports by facility, field, and/or end-user

System and Schedule Monitoring

The Control-Link Control and Monitoring System provided with new lighting systems checks your system performance each time your lights are turned on. If the system detects fixture outages that affect playability, your warranty specialist is notified and will contact you. Preseason checks can be a part of your proactive maintenance program to help make sure your lights are operating properly before the first game.

Control-Link Central staff monitors all schedules entered to make sure they are successfully received by the controller. In addition, they monitor the status of the system on a daily basis to ensure it is ready to run your schedules. If any system issues are detected, the Control-Link Central staff will contact you to resolve them before they become a problem.

Control-Link Activation

Once the on-site equipment is installed, a Musco technician will call the installing contractor and assist them in commissioning the system. The technician will send sample schedule commands to the Control-Link system to test each lighting zone and its associated control and lighting equipment. The technician will also collect baseline diagnostic data, allowing the lighting system to be monitored for correct operation from that point on.

Customer Training

Control-Link Central staff provides customer training via telephone, conference, or on-line tutorial covering Control-Link operation, scheduling, website access, and all user functions.

"We greatly appreciate your super-friendly service."

— Kelly Barker
Athletic Field Permit Coordinator
Dept. of Parks, Recreation and Marine
City of Long Beach, CA

Facility	Field	Sun 25	Mon 26	Tue 27	Wed 28	Thu 29	Fri 30	Sat 31
Field 1 Blue		8:47p-10:15p						
Field 2 Blue		8:47p-10:15p						
Field 3 Orange		8:47p-10:15p						
Field 4 Yellow		8:47p-10:15p						
Field 5 Green		8:47p-10:15p						
Field 6								
Field 7								
Field 8								
Field 9								
Field 10								
Soccer 13		8:47p-10:15p						
Soccer 12		8:47p-10:15p						

This is a partial sample of a customer's weekly schedule as entered on Musco's Control-Link website. The current day is always highlighted.

Musco Control-Link Usage Report (Auto Only)
By Facility, Field
Usage Type of Light Usage
June 2010

Summary by Facility		Total Auto Hours Usage	Total Hours Saved from Early Offs
Facility			
Cowley		112 50	17 08
Dunbar		64 53	29 46
Garland Parklet		49 48	0 00
Herschel Field		256 47	26 05
Total		484 18	72 59

Summary by Facility, Field			
Facility	Field	Total Auto Hours Usage	Total Hours Saved from Early Offs
Cowley	Baseball	63 04	17 08
Cowley	Basketball	49 48	0 00
Dunbar	Baseball	64 53	29 46
Garland Parklet	Courts	49 48	0 00
Herschel Field	(Lower) Baseball FB	81 22	10 23

Control-Link Central's database stores usage data by field and user group.

A Message from the Control-Link Staff

This web-site was developed as a tool for managing your lighting facilities. Your scheduling and reporting needs are a high priority to us at Control-Link Central. Any time you have a question or a new idea, please contact our online support.

We've been to help you!
of Hours a Day - 7 Days a Week - 365 Days a Year

My Schedules **Reports** **Scheduler Security**

Control-Link® Creates Cost Savings; Eliminates Errors and Complaints.

For 18 years, lights at Disney's new-theme magical bus stop are being managed through a remote control with a global operational and by technicians in exchange for twelve of us.

Using our Control-Link created cost savings and increased efficiency for the Disney Parks and Recreational projects.

The Control-Link website provides easy and efficient scheduling of fields, reports, and control over the access levels of your Control-Link website users.

New System: On-Site Equipment Overview

The Control-Link Control and Monitoring System provides reliable, cost-effective control, monitoring, and management of your new recreational facility lighting

Your factory-built and tested Control-Link equipment includes

- Digital cellular communication equipment
- Control and Monitoring cabinet(s)
- Surge protection device

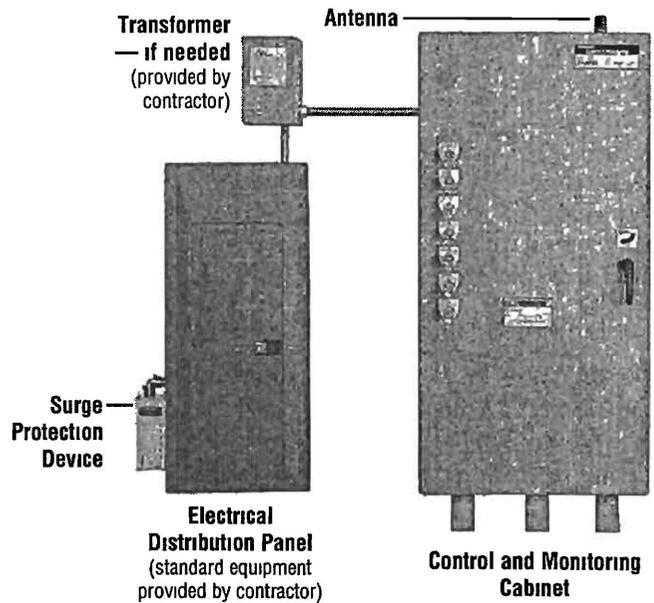
Optional Equipment

- Remote Manual Switches cabinet

Supplied by Contractor

- Main disconnect (electrical distribution panel), conduit, and power wiring
- 20A control circuit
- Transformer if control voltage supply not available
- Mounting hardware for cabinets
- Conduit and NEMA Type 4 hubs

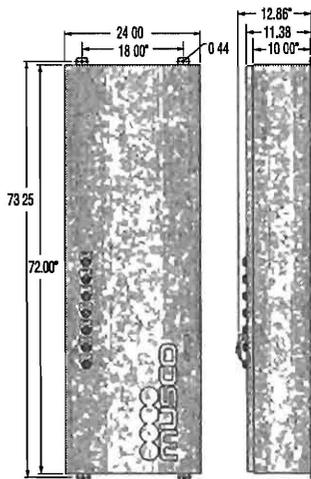
Control-Link® Control and Monitoring System



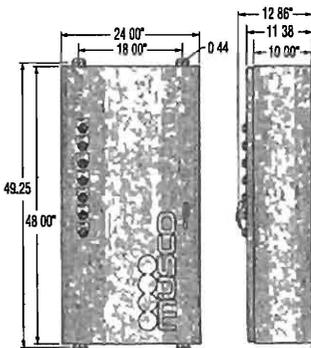
Control and Monitoring Cabinet

Enclosure

Large Enclosure



Small Enclosure



Technical Features

Assembled Cabinet

- Entire assembly UL 508 LISTED (Industrial Control Equip.) #E204954
- Meets FCC Part 15 Class A
- Factory wired, programmed, and tested
- Controls up to 7 zones per cabinet
- Operating temperature -20°C to +60°C (-4°F to +140°F)
- Internal time clock with battery back-up
- Database memory protected from power outages or fluctuations
- Typical enclosure and component weight: 72 inch - 150 lbs; 48 inch - 125 lbs. Project specific details available upon request

Enclosures

- NEMA Type 4, 5052 H32 aluminum
- Powder-coat finish after fabrication
- External mounting feet
- Lockable, 3-point latching assembly
- Door grounded enclosure

Manual Off-On-Auto Switches

- Keyed, maintain position
- Make-before-break contacts
- Factory wired to terminal blocks
- Mounted to maintain NEMA 4 rating
- Legend plate clearly identifies zone
- Switches may be placed in optional remote Manual Switches cabinet; see page 10 for details

Manual Off-On-Auto Switch detail



Control and Monitoring Cabinet

The on-site Control and Monitoring cabinet operates and monitors your new lighting system. It allows you to manage your schedules and facility usage from your home, office, or anywhere.

On/Off Control Module

Receives and stores schedules from Control-Link Central to operate your equipment and verify that schedules were carried out.

Monitoring Module

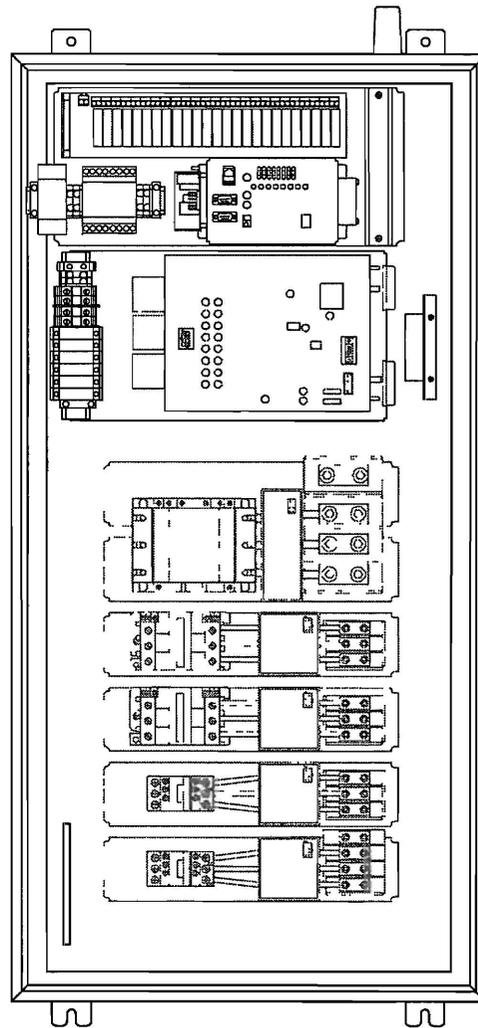
Monitors your lighting system and reports any fixture outages to help plan routine maintenance and keep your facilities operating.

Contacting Switching Modules

Switches your equipment on and off based on schedules stored in the control module.

Communication Modem Module

Reliable, high-speed integrated communication system provides two-way communication to Control-Link Central.



(Small Enclosure shown)

Technical Features

Panel

- 5052 H32 aluminum
- Pre-punched, modular configuration
- Powder-coat finish after fabrication

Communication Modem

- Digital cellular technology
- No additional monthly charges

Contactors

- Sized for 30, 60, or 100 amp lighting loads
- Electrically held
- 120 volt or 240 phase to neutral volt coil options

Ground Bar

- 15 grounding terminals provided
- Holds size #14 to #4 gauge wires

Internal Control Wiring

- Fuse holder 600 volt 30 amp IEC type
- Control terminal blocks mounted to DIN rail
- Plug-in wire harnesses for multiple cabinets (if required)

Contacting Module Options

Rated Lighting Capacity	Line Side Wire Size Range*	Load Side Wire Size Range*	Maximum Per Small Cabinet	Maximum Per Large Cabinet
30 amp	3-10 AWG	2/0-14 AWG	6	12
60 amp	2-10 AWG	2/0-14 AWG	6	12
100 amp	2/0-14 AWG	350mcm-6 AWG	3	6

* Stranded cable, single conductor, without cable end

Retrofit System: On-Site Equipment Overview

The Control-Link Control System provides reliable, cost effective control of your existing recreational facility lighting and other electrically-operated equipment

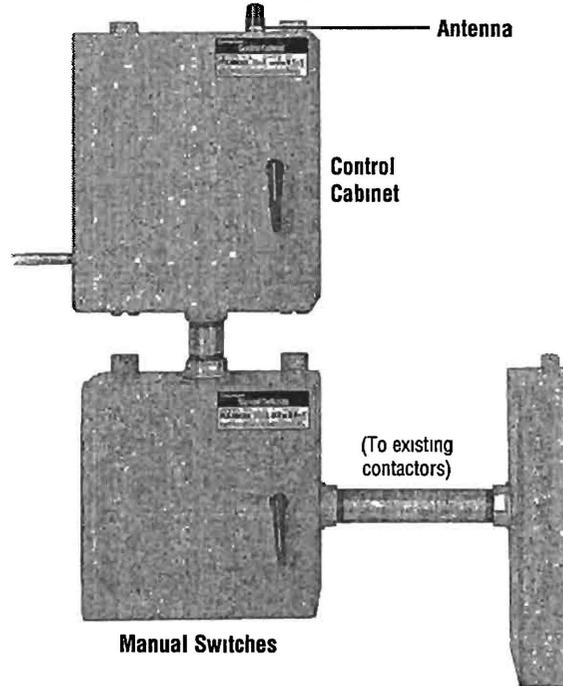
Your factory-built and tested Control-Link equipment includes

- Digital cellular communication equipment
- Control cabinet(s)
- Remote Manual Switches cabinet

Supplied by Contractor

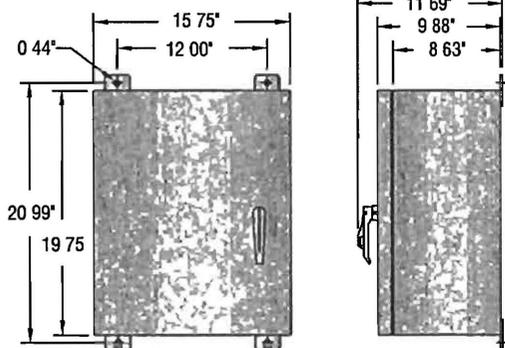
- Main disconnect (electrical distribution panel), conduit, and power wiring
- 20A control circuit
- Transformer if control voltage supply not available
- Mounting hardware for cabinets
- Conduit and NEMA Type 4 hubs

Control-Link® System

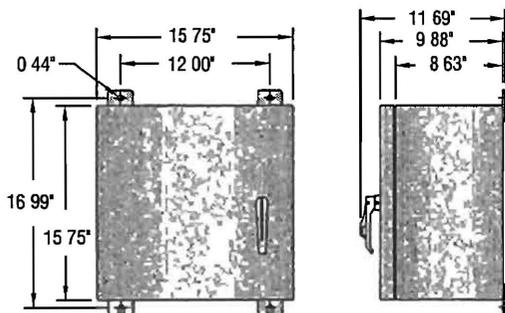


Control Cabinet

Enclosure



Control Cabinet



Manual Switches Cabinet

Technical Features

Assembled Cabinet

- Entire assembly UL 508 LISTED (Industrial Control Equip.) #E204954
- Meets FCC Part 15 Class A
- Factory wired, programmed, and tested
- Controls up to 7 zones per cabinet
- Operating temperature -20°C to +60°C (-4°F to +140°F)
- Internal time clock with battery back-up
- Database memory protected from power outages or fluctuations
- Typical enclosure and component weight: 28 lbs
- Project specific details available upon request

Enclosures

- NEMA Type 4, 5052 H32 aluminum enclosure
- Powder-coat finish after fabrication
- External mounting feet
- Lockable door
- Door grounded enclosure

Control Cabinet

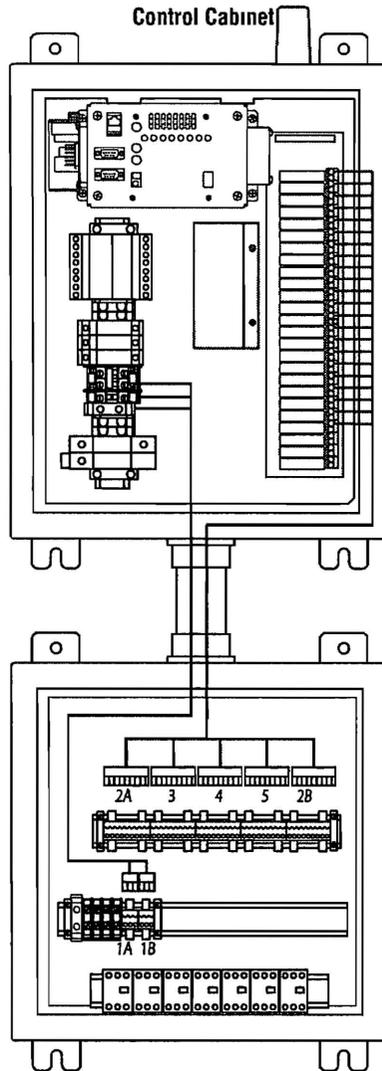
The on-site Control Cabinet operates your existing sports facility's lights and equipment, allowing you to manage your schedules and facility usage from your home, office, or anywhere

On/Off Control Module

Receives and stores schedules from Control-Link Central to operate your equipment and verifies schedules were carried out

Communication Modem Module

Reliable, high-speed integrated communication system provides two-way communication to Control-Link Central



Manual Switches Cabinet
(connections behind switches)

Technical Features

Panel

- 5052 H32 aluminum
- Pre-punched, modular configuration
- Powder-coat finish after fabrication

Communication Modem

- Digital cellular technology
- No additional monthly charges

Internal Control Wiring

- Control terminal blocks mounted to DIN rail
- Plug-in wire harnesses for multiple cabinets

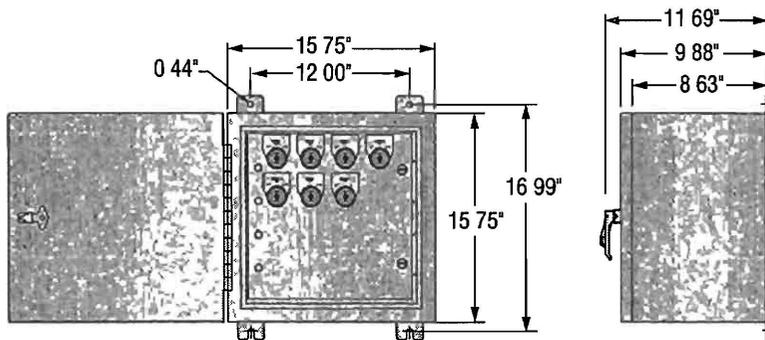
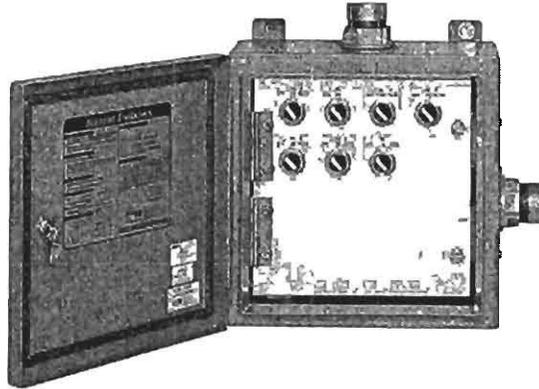
Manual Off-On-Auto Switch Detail (Remote Manual Switches Cabinet)



Remote Manual Switches Cabinet

The remote Manual Switches cabinet comes standard with the Retrofit System for operating your existing facility lighting

Optional for the Control and Monitoring system, it provides for special switching requirements or for more convenient Off-On-Auto switch location for maintenance staff Lockable cabinet helps prevent tampering for outdoor mounted equipment



Manual Switches Cabinet

Technical Features

Remote Manual Switches Cabinet

- NEMA Type 4, 5052 H32 aluminum enclosure
 - Operating temperature -20°C to +60°C (-4°F to +140°F)
 - Powder-coat finish after fabrication
 - External mounting feet
 - Lockable, latching assembly
 - Door electrically bonded to enclosure
 - Locate up to 300 feet from Control Cabinet
 - Typical enclosure and component weight 33 lbs.
- Project specific details available upon request

Manual Off-On-Auto Switches

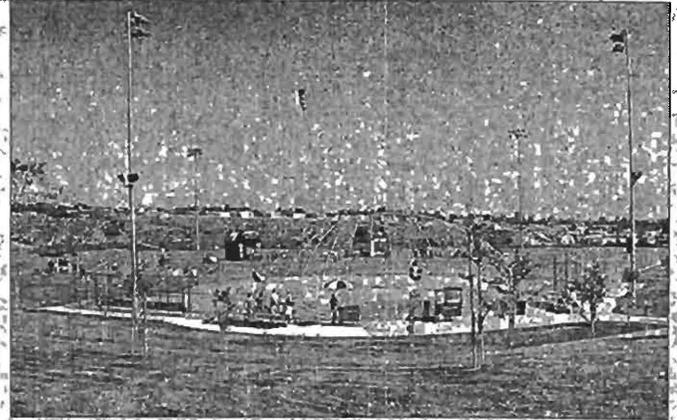
- Factory wired to terminal blocks
- Mounted to maintain NEMA 4 rating
- Legend plate clearly identifies zone

What Our Customers Have to Say

Usage Data is Great

"It's been great. It's ten times better than anything we've tried before. The field usage data is great. Our monthly reports needed for financial planning are more accurate and easy to do. That makes setting user fees much easier. The customer service we continue to get from Musco is excellent. I know I can call them anytime, from anywhere, and they're right there to help, 24 hours a day, 7 days a week."

Judy Flynn
*Former Recreation Supervisor
City of Corona, California*



Corona Park, California

Neighbors Appreciate Control Link

"We used to get calls from neighbors every once in a while that the lights had been left on, and someone would have to go out in the middle of the night to turn them off. Neighbors have called us saying how much they appreciate the lights being on only when someone is actually using the field."

Scott Whitaker
*Park & Recreation Director
City of Carrollton, Texas*



Carrollton Sports Complex, Texas

Easy to Operate

"Musco's Control and Monitoring System is definitely a more proactive approach than our previous system. When there is a problem, the monitoring system allows a warranty specialist to immediately notify us. This is a huge asset, as problems are resolved right away. The system is user friendly, very efficient, and easy to operate. Using a phone to call Control-Link Central is much easier than our previous system, which required a laptop to dial in and make changes to a particular facility. The simplicity of this system is very refreshing."

Joe Ross
*Recreation Programmer
City of Rialto, Recreation and Community Services
Rialto, CA*

Customer Service Second to None

"We enjoy the great customer service. The staff answering the phones are so polite and we really appreciate that. We value being able to monitor the usage of the facilities through the website. Control-Link helps ensure that field lights are turned off when they are supposed to be. We no longer receive calls at 1:00 in the morning that the lights were left on. The monitoring system has also been impressive. We received a call during the day that there was a problem with one of the fixtures. After checking the fuses, we replaced one and the system was back to go. The problem was resolved before we would have even been aware there was a problem."

Stephen Cooke
*Sports Manager, Greenville County Recreation Dept
Assistant District Administrator SC District 7 Little League
Greenville, SC*

Musco Systems to Meet Your Sports-Lighting Needs

Light-Structure Green™

Outdoor: New Lighting Applications

Still engineered as 5 Easy Pieces™, Light-Structure Green™ offers unequaled performance for your budget, for the environment

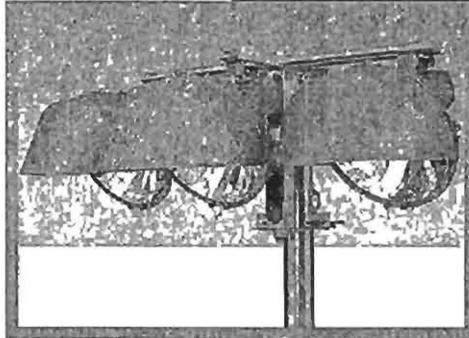
- Cuts operating costs in half
- Reduces off-site spill light by 50%
- Eliminates 100% maintenance costs for 25 years, including lamp replacements
- Provides guaranteed Constant Light™ levels

SportsCluster Green™

Outdoor & Indoor: Retrofit Applications

A modular photometric unit, factory aimed and tested, to perform from your choice of structures, making retrofit of old equipment easy

- Cuts operating costs in half
- Reduces off-site spill light by 50%
- Eliminates 100% maintenance costs for 10 years, including lamp replacements
- Provides guaranteed Constant Light™ levels

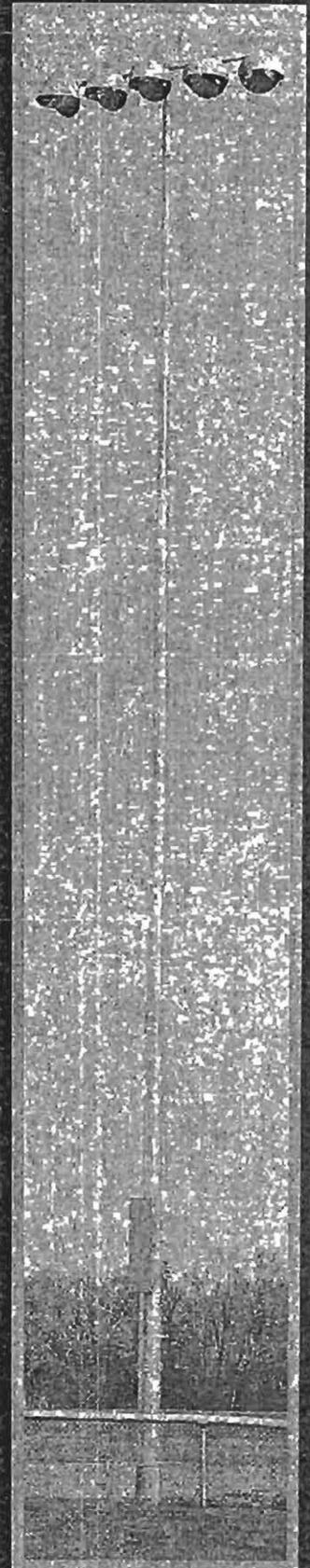
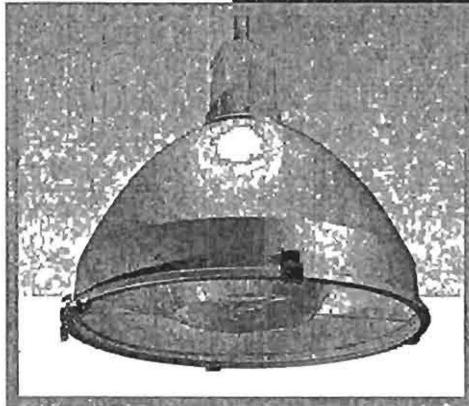


Light-Pak™

Indoor: New and Retrofit Applications

Energy-efficient, indoor sports lighting that operates at your choice of two energy levels for improved cost control

- Saves energy costs over alternative systems



We Make It Happen.

www.musco.com

email lighting@musco.com

United States Patents D411096 D567422 D567433 D573752 D574098 D577149 D593883
5398478 5426577 5600537 6036338 6203176 6250596 6681110 6969034 7059572
7176635 7209958 7452108 7500764 7527393 7547118 7675251 7600901 7736024
7740381 Chinese Patents ZL200530139426 7 ZL200680008460.2 ZL200680008829 X
ZL200680008830 2 ZL200680008832 1 U.S. and foreign patents pending [033R40_101510]

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B-5050-11

H. PERFORMANCE GUARANTEE



Performance Guarantee

Concordia University
Baseball/Soccer Lighting Project
Portland, OR

Musco hereby guarantees compliance with the following specifications for your project. Furthermore, Musco guarantees the constant light levels for 25 years +/-10% of the predicted mean in accordance with IESNA RP-6-01

Field	Constant Average Illumination		Uniformity		Lamp Tilt Factor	Average kW Demand
	Infield	Outfield	Infield	Outfield		
Baseball	70fc	50fc	2 0 1 0	2 5 1 0	1 0	148 58

Field	Constant Average Illumination	Uniformity	Lamp Tilt Factor	Average kW Demand
Soccer	50fc	2 5 1 0	1 0	106 35

This guarantee is dependent upon the following

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

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

We trust this meets with your approval

Musco Sports Lighting, LLC

Luann Ferreira
Vice-President Sales

I. WARRANTY



Musco Constant 25™

25-Year Product Assurance & Warranty Program

Musco Sports Lighting, LLC will provide all materials and labor to maintain operation of your lighting system to original design criteria for 25 years, or until maximum hours of coverage have accumulated, whichever comes first. Musco products and services are guaranteed to perform on your project as detailed in this document.

Light

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

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

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

Energy Consumption

Average and maximum energy consumptions for your lighting system are guaranteed. Exhibit A provides a 25-year energy cost model based upon the customer provided utility rate and anticipated hours of usage. Changes in rates or usage will proportionately change the costs.

Monitoring, Maintenance and Control Services

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

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

Spill Light Control

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

Structural Integrity

Your project has been designed to IBC-C, 2003, 85 MPH Windspeed.
Structural integrity of equipment manufactured by Musco is guaranteed.

Musco has a team of people to ensure fulfillment of our product and services warranty (Exhibit C) and maintains financial reserves dedicated to support our fulfillment of this warranty. Please keep this document as your signed contract guaranteeing comprehensive service for the 25-year period.



Musco Constant 25™

25-Year Product Assurance & Warranty Program

Project Details

Project Name Concordia University Baseball/Soccer Project Number 19561660

Owner Concordia University City Portland State OR

Product(s) Covered Light-Structure Green System™, Auxiliary Mounting Brackets

Date Issued date of shipment

Expiration date of shipment + 25 years or maximum hours of coverage noted below, whichever occurs first

Total Average kW per hour 148.6 Total Maximum kW per hour 161.5

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

Field/Zone	Fixture Quantity	Lamp Type/ Lamp Hours	Average Target Constant Light Level	Uniformity Max/Min	Total Relamps Included	Estimated Annual/25- Year Estimated Usage Hours	Maximum Hours of Coverage
Baseball	95	1500W MZ/5,000	70fc infield/50fc outfield	2 0 1 0/2 5 1 0	1	200/5,000	10,000
Soccer Overlay	68	1500W MZ/5,000	50fc for Soccer	2 5 1 0	1	200/5,000	10,000



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 Green Generation Lighting, with Control-Link® and any additional Musco manufactured product as listed on page 2.

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

Additional Provisions

- 1 **Availability of Service** Control-Link Central operators shall be available 24/7 via web site, phone, fax, or email. Maintenance service specialists shall be available 8AM to 5PM Central Time, and services shall be rendered during these same hours in your local time zone, Monday through Friday (with the exception of national holidays). Hours of operation are subject to change without notice to you. Musco will exercise all reasonable efforts to perform service under this Contract, but will not be responsible for delays or failure in performing such services caused by adverse weather conditions, acts of any government, failure of transportation, accidents, riots, war, labor actions or strikes or other causes beyond its control.
- 2 **Determination of Repairs** Musco will utilize the field monitoring system and any information provided by the customer to determine when the usage of the field is materially impacted. From this information, Musco will determine needed repair and/or replacement of Covered Product(s) and parts. Repair will be with product(s) of like kind and quality.
- 3 **Your Requirements Under this Contract** You must meet all electrical and installation requirements as specified by the manufacturer. In addition, you promise and assure full cooperation with Musco, Musco's technicians and authorized servicers during telephone diagnosis and repair of the Covered Product(s), reasonable accessibility of the Covered Product(s), a non-threatening and safe environment for service.

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

You agree to keep your Green Generation Lighting system online. This means keeping the required control voltage to the control system at all times. Any deviation from this practice must be discussed with the 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 Products parts or components, failure of existing structures, supporting electrical systems or any non-Musco equipment, or acts of God/nature (including, but not limited to earthquake, flood, tornadoes, typhoons, hurricanes or lightning).

5 Contract Limitations

- a **EXCLUSIONS FROM COVERAGE** IN NO EVENT WILL MUSCO BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES WHICH INCLUDE, BUT ARE NOT LIMITED TO, ANY DELAY IN RENDERING SERVICE OR LOSS OF USE DURING THE REPAIR PERIOD OF THE COVERED PRODUCT(S) OR WHILE OTHERWISE AWAITING PARTS.
 - b **Limitation of Liability** To the extent permitted by applicable law, the liability of Musco, if any, for any allegedly defective Covered Product(s) or components shall be limited to repair or replacement of the Covered Product(s) or components at Musco's option. THIS CONTRACT IS YOUR SOLE EXPRESS WARRANTY WITH RESPECT TO THE COVERED PRODUCT(S). ALL IMPLIED WARRANTIES WITH RESPECT TO THE COVERED PRODUCT(S) INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY EXPRESSLY EXCLUDED.
 - c For the purposes of and by your acceptance of this Contract you acknowledge and agree that if a surety bond ("Bond") is provided the warranty and/or maintenance guarantee provided for in this Contract and any corresponding liability on behalf of the issuing surety under the Bond is limited to the first twelve (12) months of said warranty and/or maintenance guarantee coverage period. Any warranty and/or guarantee coverage period in excess of said initial 12 month period does not fall within the scope of the Bond and shall be the sole responsibility of Musco.
 - d Musco requires reasonable access for a crane or man lift equipment to service the lighting system. Musco will not be responsible for damage from operating the vehicle on the property when the equipment is operated in the prescribed manner over the designated access route.
- 6 **Transfer and Assignment.** Except to owners, you shall not have the right to assign or otherwise transfer your rights and obligations under this Contract except with the prior written consent of Musco, however, a successor in interest by merger, operation of law, assignment or purchase or otherwise of your entire business shall acquire all of your interests under this Contract.
 - 7 **Governing Law** Unless otherwise governed by applicable state law, the Contract shall be interpreted and enforced according to the laws of the State of Iowa.
 - 8 **Subrogation** In the event Musco repairs or replaces any Covered Product(s), parts or components due to any defect for which the manufacturer or its agents or suppliers may be legally responsible, you agree to assign your rights of recovery to Musco. You will be reimbursed for any reasonable costs and expenses you may incur in connection with the assignment of your rights. You will be made whole before Musco retains any amounts it may recover.

Signature _____

Vice President of Sales

Exhibit A

25-Year Life-Cycle Cost

Concordia University
Baseball/Soccer
Prepared for Bill Melrose

	Typical Floodlighting Equipment		MUSCO GREEN [®]	Your Savings
Hours	5000	5000		
Average kW	256.0	148.6		
Energy	\$102,384	\$59,432		\$42,952
Group Relamp	\$32,917	\$0		\$32,917
Lamp Maintenance	\$3,750	\$0		\$3,750
Controls - Energy	\$5,119	\$0		\$5,119
Controls - Labor	\$0	\$0		\$0
25-Year Life-Cycle Cost	\$144,170	\$59,432		\$84,738

Assumptions

Customer Provided Energy Data

Energy Cost per kWh	\$0.080
Annual Operating Hours	200

Technology Specific Data

Green Generation™ Fixture Qty	95
Average kW demand per fixture	1.564
Useful lamp life (hours)	5000
Typical Floodlighting Fixture Qty	158
Average kW demand per fixture	1.62
Useful lamp life (hours)	3000

Controls Information

Controls Energy Savings	5%
Labor Rate per Hour	\$0.00
# On/Off Cycles per Year	0
Labor Hours per Cycle	0

Lamp Maintenance Data

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

NOTE

Life-cycle costs are based upon the assumptions given by the customer above. Any variation in this data will change the life-cycle cost proportionately. Musco guarantees the average Green Generation system kW per hour and useful life of the lamp.



Exhibit B

EQUIPMENT LIST FOR AREAS SHOWN

Pole				Luminaires				
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY/POLE	THIS GRID	OTHER GRIDS
2	A1 D3	70'	-	70'	1500W MZ	7	7	0
2	A2, D2	80'	-	80'	1500W MZ	11	11	0
1	B1	80'	-	80'	1500W MZ	18	18	0
1	B2	80'	-	80'	1500W MZ	12	12	0
2	C1 D1	70'	-	70'	1500W MZ	8	8	0
1	C2	80'	-	80'	1500W MZ	13	13	0
9	TOTALS					95	95	0



GUARANTEED PERFORMANCE

ILLUMINATION SUMMARY

Spill at Street (near)

Concordia University BB/SO
Portland, OR

Spill at Street (near)

Grid Spacing = 30 0'
Values given at 3 0' above grade

Luminaire Type Green Generation
Rated Lamp Life 5000 hours
Avg Lumens/Lamp 134,000

**CONSTANT ILLUMINATION
HORIZONTAL FOOTCANDLES**

Entire Grid	
No of Target Points	48
Average	3.843
Maximum	12.51
Minimum	0.29

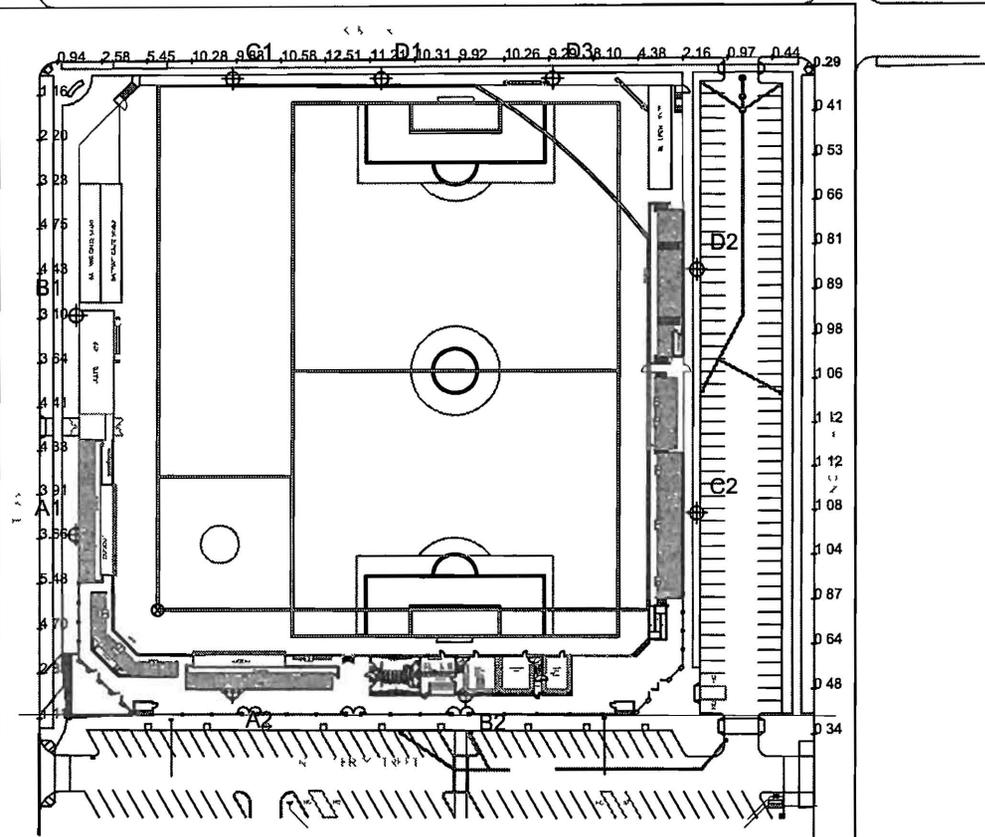
Average Lamp Tilt Factor	1 000
Number of Luminaires	95
Avg KW over 5000 hours	148 58
Max KW	161 5

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

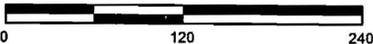
Field Measurements Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4 Individual measurements may vary from computer predictions

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

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



SCALE IN FEET 1 120



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

By Eric Svenby

File # 61660r2

Date 18-Dec-07

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EQUIPMENT LIST FOR AREAS SHOWN

Pole		Luminaires						
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY/POLE	THIS GRID	OTHER GRIDS
2	A1, D3	70	-	70	1500W MZ	7	7	0
2	A2, D2	80	-	80	1500W MZ	11	11	0
1	B1	80	-	80	1500W MZ	18	18	0
1	B2	80	-	80	1500W MZ	12	12	0
2	C1 D1	70	-	70	1500W MZ	8	8	0
1	C2	80	-	80	1500W MZ	13	13	0
9	TOTALS					95	95	0



GUARANTEED PERFORMANCE

ILLUMINATION SUMMARY

Spill at Street (near)

Concordia University BB/SO
Portland, OR

Spill at Street (near)

Grid Spacing = 30 0'
Values given at 3 0' above grade

Luminaire Type Green Generation
Rated Lamp Life 5000 hours
Avg Lumens/Lamp 134,000

**CONSTANT ILLUMINATION
MAX VERTICAL FOOTCANDLES**

Entire Grid	
No of Target Points	48
Average	5.743
Maximum	12.08
Minimum	1.66

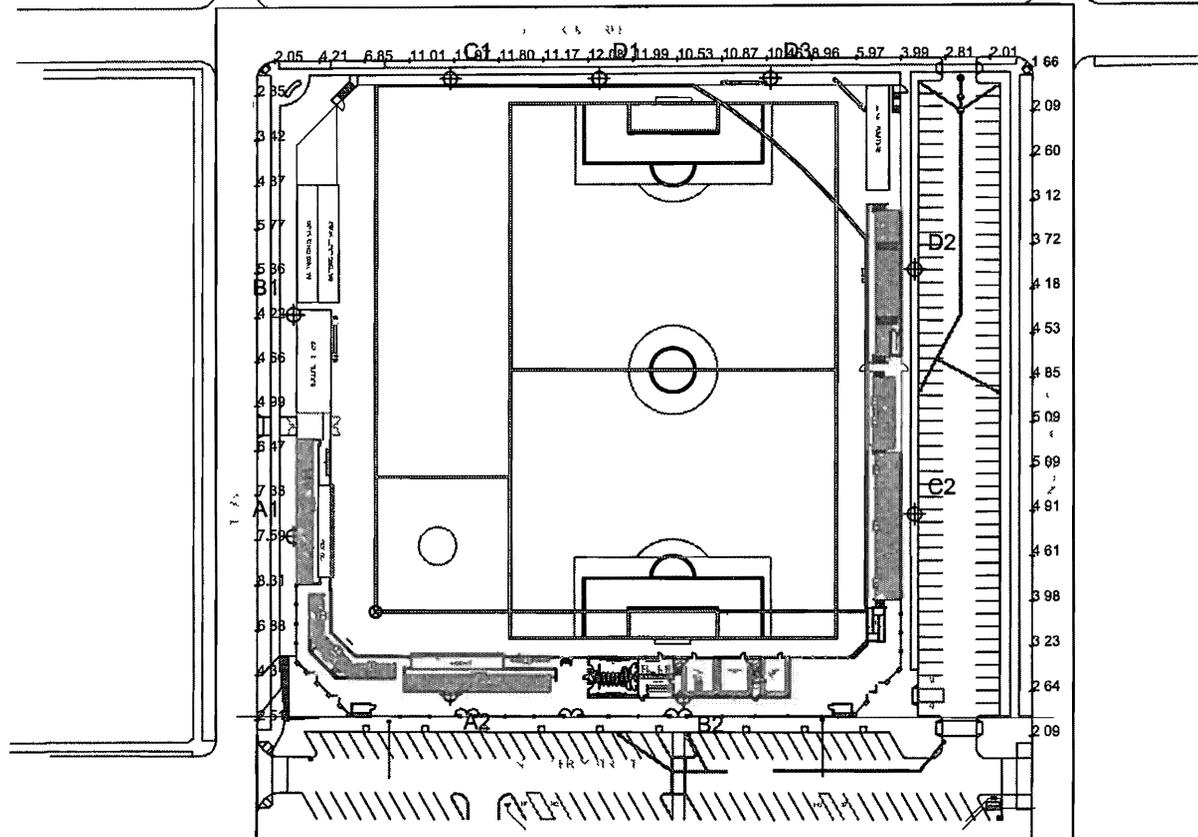
Average Lamp Tilt Factor	1 000
Number of Luminaires	95
Avg KW over 5000 hours	148 58
Max KW	161 5

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

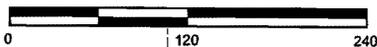
Field Measurements Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4 Individual measurements may vary from computer predictions

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

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



SCALE IN FEET 1 120



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

By Eric Svenby

File # 61660r2

Date 18-Dec-07

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EQUIPMENT LIST FOR AREAS SHOWN

Pole		Luminaires						
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY/ POLE	THIS GRID	OTHER GRIDS
2	A1, D3	70'	-	70'	1500W MZ	7	7	0
2	A2, D2	80'	-	80	1500W MZ	11	11	0
1	B1	80'	-	80'	1500W MZ	18	18	0
1	B2	80	-	80	1500W MZ	12	12	0
2	C1, D1	70'	-	70'	1500W MZ	8	8	0
1	C2	80	-	80'	1500W MZ	13	13	0
9	TOTALS					95	95	0



GUARANTEED PERFORMANCE

ILLUMINATION SUMMARY

Spill @ PL
 Concordia University BB/SO
 Portland, OR

Spill @ PL
 Grid Spacing = 30 0'
 Values given at 3 0' above grade

Luminaire Type Green Generation
 Rated Lamp Life 5000 hours
 Avg Lumens/Lamp 134,000

**CONSTANT ILLUMINATION
 HORIZONTAL FOOTCANDLES**

Entire Grid
 No of Target Points 56
 Average 0.776
 Maximum 1.61
 Minimum 0.11

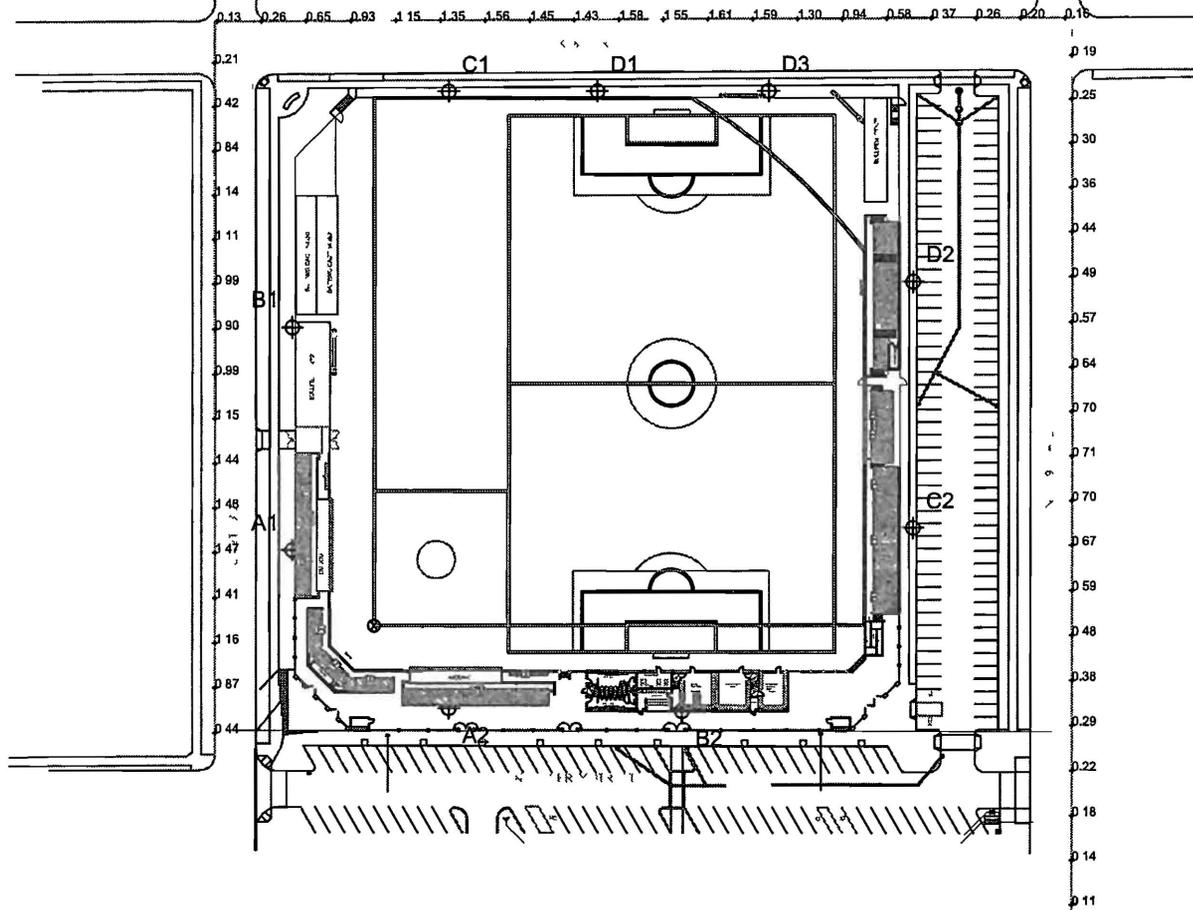
Average Lamp Tilt Factor 1 000
 Number of Luminaires 95
 Avg KW over 5000 hours 148.58
 Max KW 161.5

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

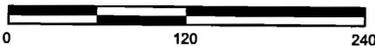
Field Measurements Averages shall be +/-10% in accordance with IESNA RP-6-01 and CIBSE LG4 Individual measurements may vary from computer predictions

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

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



SCALE IN FEET 1 120



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

By Eric Svenby

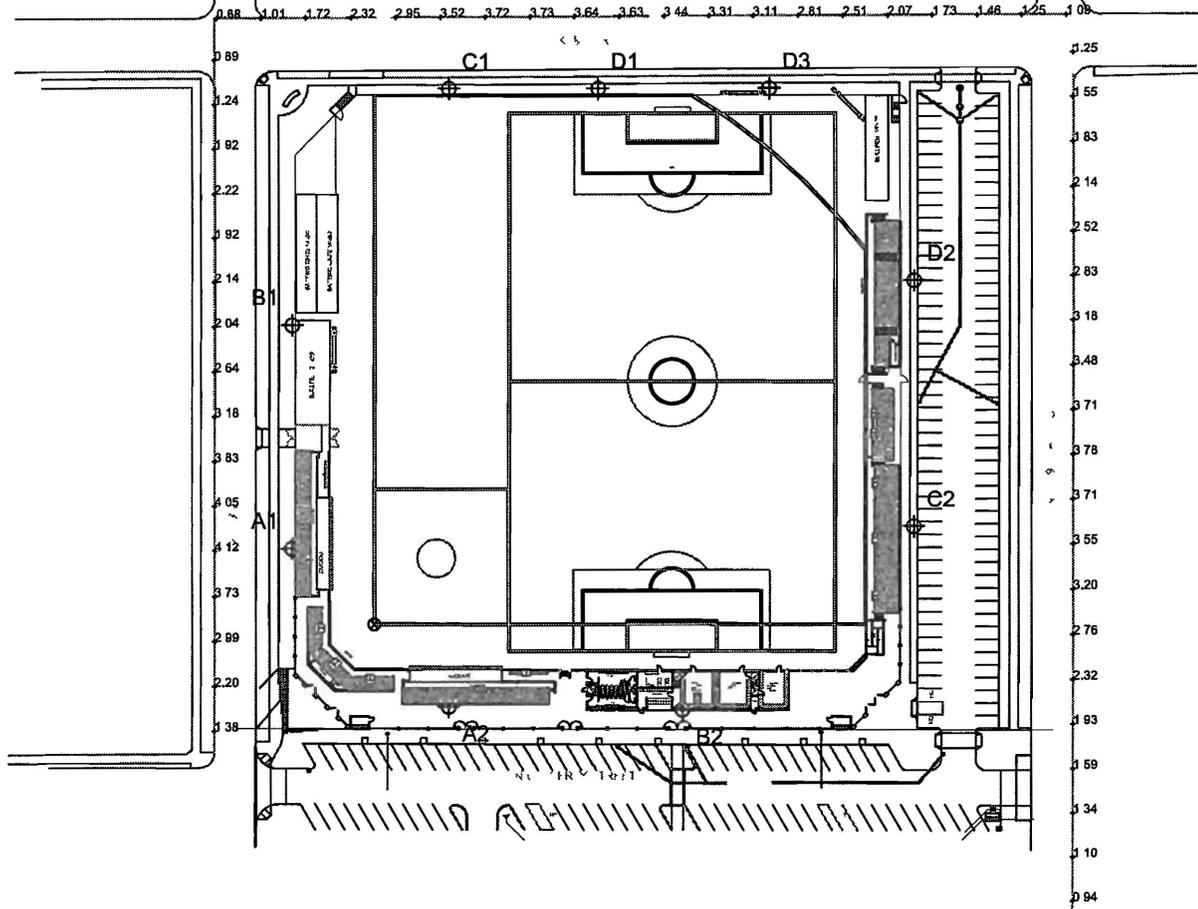
File # 61660r2

Date 18-Dec-07

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EQUIPMENT LIST FOR AREAS SHOWN

Pole			Luminaires						
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY/POLE	THIS GRID	OTHER GRIDS	
2	A1 D3	70'	-	70'	1500W MZ	7	7	0	
2	A2, D2	80'	-	80'	1500W MZ	11	11	0	
1	B1	80'	-	80'	1500W MZ	18	18	0	
1	B2	80'	-	80'	1500W MZ	12	12	0	
2	C1 D1	70'	-	70'	1500W MZ	8	8	0	
1	C2	80'	-	80'	1500W MZ	13	13	0	
9	TOTALS						95	95	0



SCALE IN FEET 1 120



GUARANTEED PERFORMANCE

ILLUMINATION SUMMARY

Spill @ PL

Concordia University BB/SO
Portland, OR

Spill @ PL

Grid Spacing = 30 0'
Values given at 3 0' above grade

Luminaire Type Green Generation
Rated Lamp Life 5000 hours
Avg Lumens/Lamp 134,000

**CONSTANT ILLUMINATION
MAX VERTICAL FOOTCANDLES**

Entire Grid	
No of Target Points	56
Average	2.481
Maximum	4.12
Minimum	0.68

Average Lamp Tilt Factor	1 000
Number of Luminaires	95
Avg KW over 5000 hours	148 58
Max KW	161 5

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

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

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

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

By Eric Svenby

File # 61660r2

Date 18-Dec-07

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

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EQUIPMENT LIST FOR AREAS SHOWN									
Pole			Luminaires						
QTY	LOCATION	SIZE	GRADE ELEVATION	MOUNTING HEIGHT	LAMP TYPE	QTY/POLE	THIS GRID	OTHER GRIDS	OTHER ORDER
2	A1 D3	70'		70'	1500W MZ	7	7	0	
2	A2 D2	80'		80'	1500W MZ	11	11	0	
1	B1	80'		80'	1500W MZ	18	18	0	
1	B2	80'		80'	1500W MZ	12	12	0	
2	C1 D1	70'		70'	1500W MZ	8	8	0	
1	C2	80'		80'	1500W MZ	13	13	0	
TOTALS							95	95	0



GUARANTEED PERFORMANCE

ILLUMINATION SUMMARY

Blanket Grid
Concordia University BB/SO
Portland OR

Blanket Grid
Grid Spacing = 30' 0" x 30'
Values given at 3' 0" above grade

Luminaire Type Green Generation
Rated Lamp Life 5000 hours
Avg Lumens/Lamp 134,000

CONSTANT ILLUMINATION HORIZONTAL FOOTCANDLES

Entire Grid
No of Target Points 1640
Avg Message 1752
Maximum 54
Minimum 0
Avg/Min 4488.41
Max/Min 52682.45
UG (Adjacent Pts) 6 70
CV 2 73

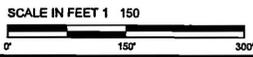
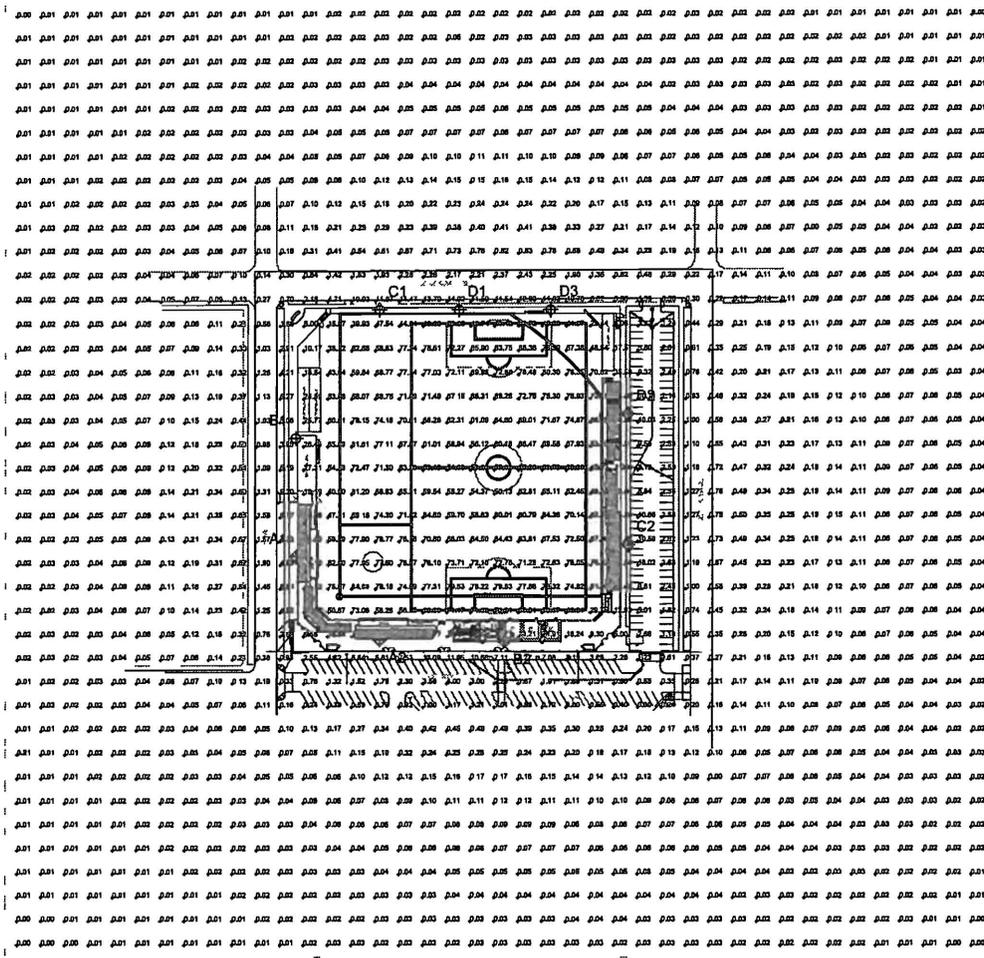
Average Lamp Till Factor 1 000
Number of Luminaires 95
Avg KW over 5000 hours 148 58
Max KW 161 5

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

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

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

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



Pole location(s) & dimensions are relative to 0 0 reference point(s)

By Eric Svenby
File # 61660r2
Date 18 Dec-07

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Musco's Controls & Lighting Services Teams

UNEQUALED. ACCESSIBLE. KNOWLEDGABLE. ACCOUNTABLE.

Over 120 team members dedicated to operating and maintaining your sports lighting



Control-Link Central™ • (877) 347-3319
www.control-link.com • schedule@musco.com • FAX (800) 853-8847

- Staffed 24/7 with several easy ways to contact us
- Trained operators provide scheduling and reporting assistance and one-on-one phone training
- Conducts proactive nightly tests to assure your control system is operating properly, even when the lights aren't in use
- Easy access to field usage data
- Field operation monitoring

"We strive to provide a level of service where every customer reaches a live operator, rather than a voice mail system, when they call in. We can make your last minute schedule changes happen in just a few minutes."

— Ryan Tighe, Control-Link Central™ Manager



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- Trained technicians specializing in sports lighting provide field maintenance, warranty work, consulting, and temporary lighting
- Regionally based to effectively provide lighting services in every state plus a network of over 1800 contractors
- Ongoing field inspection program

"Our technicians have an unequalled expertise in sports lighting. With our field monitoring, we'll contact you within one business day of detecting a fixture outage on your field — often before you even know about it."

— Jeff McNulty, Director of Field Operations



Control-Link Central™ operators oversee the on/off control of over 3700 fields per night nationwide and have experience with controlling over 1.4 million schedules per year



Our lighting services team travels over 1 million miles each year. They inspect, fine tune, or provide yearly maintenance on more than 4000 fields and supply temporary lighting for over 250 hours of live television broadcasts annually



If you could stack every pole that our technicians go to the top of each year, they would be over 182 miles high! That is equivalent to 465 times the height of the world's tallest building, Burj Dubai

Specific funds are set aside to provide solid financial resources to fulfill the maintenance and warranty needs for every Musco Lighting project

Musco Service ... We Make It Happen.

J. PRODUCT INFORMATION



Manufacturer's Model Number

Concordia University
Baseball/Soccer Lighting Project
Portland, OR

# of Poles	Pole Designation	Catalog #
1	B1	LSG - 80 - 1500W MZ - 18
2	C1,D1	LSG - 70 - 1500W MZ - 8
2	A1,D3	LSG - 70 - 1500W MZ - 7
1	B2	LSG - 80 - 1500W MZ - 12
1	C2	LSG - 80 - 1500W MZ - 13
2	A2,D2	LSG - 80 - 1500W MZ - 11



Manufacturer's Model Number

Concordia University
Baseball/Soccer Lighting Project
Portland, OR

Controls and Monitoring

Catalog #
CM - 24 X 72 - 12
CM - 24 X 48 - 2

UL Listed Under

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



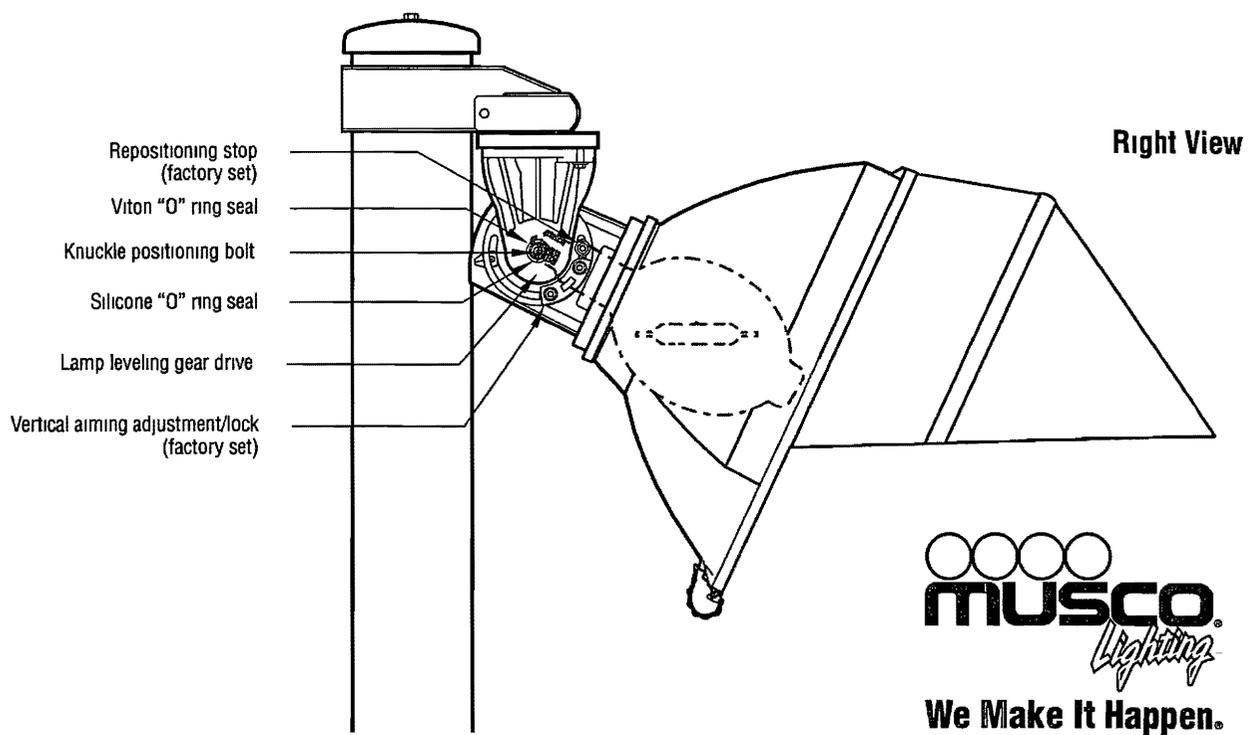
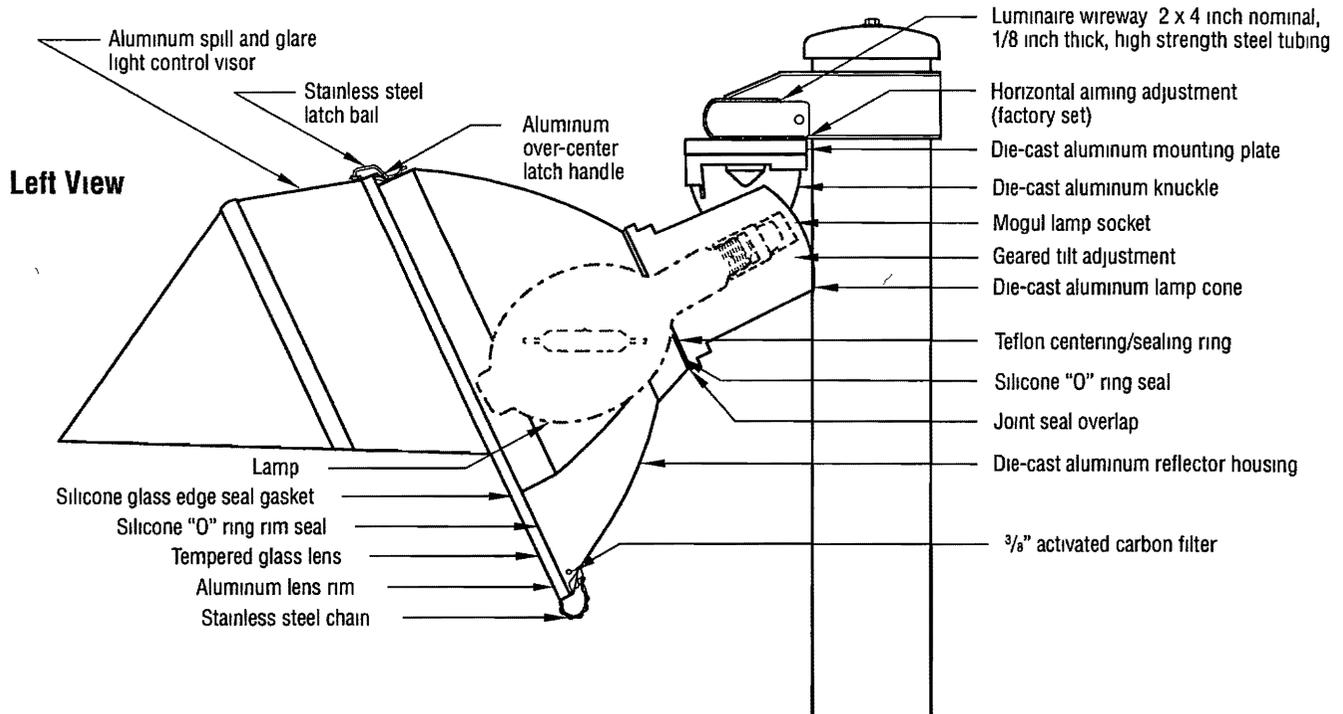
**Underwriters
 Laboratories Inc.®**
 LISTED

UL Category	Covers	UL Number
High-Intensity Discharge Surface-Mounted Luminaires	<ul style="list-style-type: none"> • SportsCluster Green™ and Light-Structure Green™ luminaires and remote ballast assemblies • Sports Cluster® 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 with Multi-Watt™ indoor luminaires • 1000 W ShowLight™ and ShowLight Green™ 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 <ul style="list-style-type: none"> • Control-Link® Control and Monitoring System • Control-Link Retrofit Control System 	E139944

UL Listing

UL Category	Covers	UL Number
Industrial Control Panels	Control panels and enclosures for <ul style="list-style-type: none"> • Control-Link Control and Monitoring System • Control-Link Retrofit Control System • Lighting Contactor Cabinets • Multi-Watt systems 	E204954
Emergency Lighting and Power Equipment	<ul style="list-style-type: none"> • Control-Link Automatic Transfer Switch (ATS CL) 	R311491
Luminaire Fittings	Galvanized steel poles 12 feet or less for <ul style="list-style-type: none"> • Mirtran poles • Rooftop poles • Special applications 	E132445
Luminaire Pole in excess of 12 feet	Galvanized steel poles greater than 12 feet for <ul style="list-style-type: none"> • Light-Structure Green System • Light-Structure System • Sportspole™ and special applications 	E325078
Devices, Scaffolding	Service platforms for <ul style="list-style-type: none"> • Light-Structure Green System • Light-Structure System • SportsCluster Green System • Sports Cluster System 	SA7004

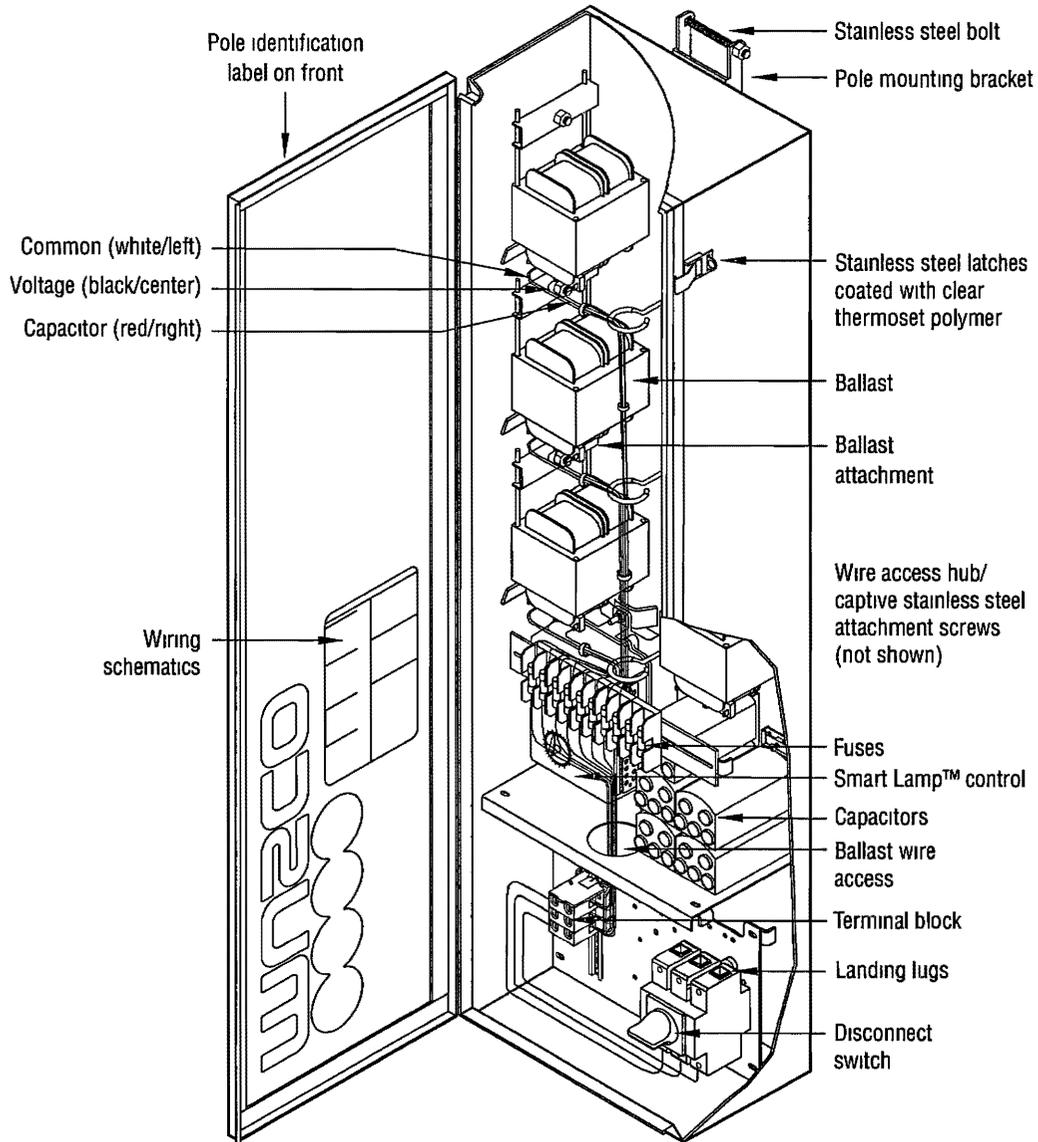
A copy of the UL Certificate of Compliance is available upon your request



We Make It Happen.

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

Musco products referenced or shown are protected by one or more of the following U S Patents 4450507 4725934 4729077 4811181 4816974 4947303, 4994718 5012398 5075828 5134557 5161883 5211473 5229681 5377611 5398478 5423281 5426577 5600537 5707142 5794387 5800048 5816691 5856721 6036338 6203176 6250596 6340790 6398392 6446408 6692142 D337168 D353797 D353911 D411096 Australia Patents 708912 Canada Patents 70479 73755 74939 89366 2009749 2026850 2027033 2035014 2060585 2110014 2204958 2200511 2200515 2217872 2378279 EPC Patents 440531 821776 Germany Patents 69601867 5 Mexico Patents 175863 183225 New Zealand Patents 307705 333806 South Korea Patents 405147 Other patents pending
 © 2005 Musco Lighting SLA1

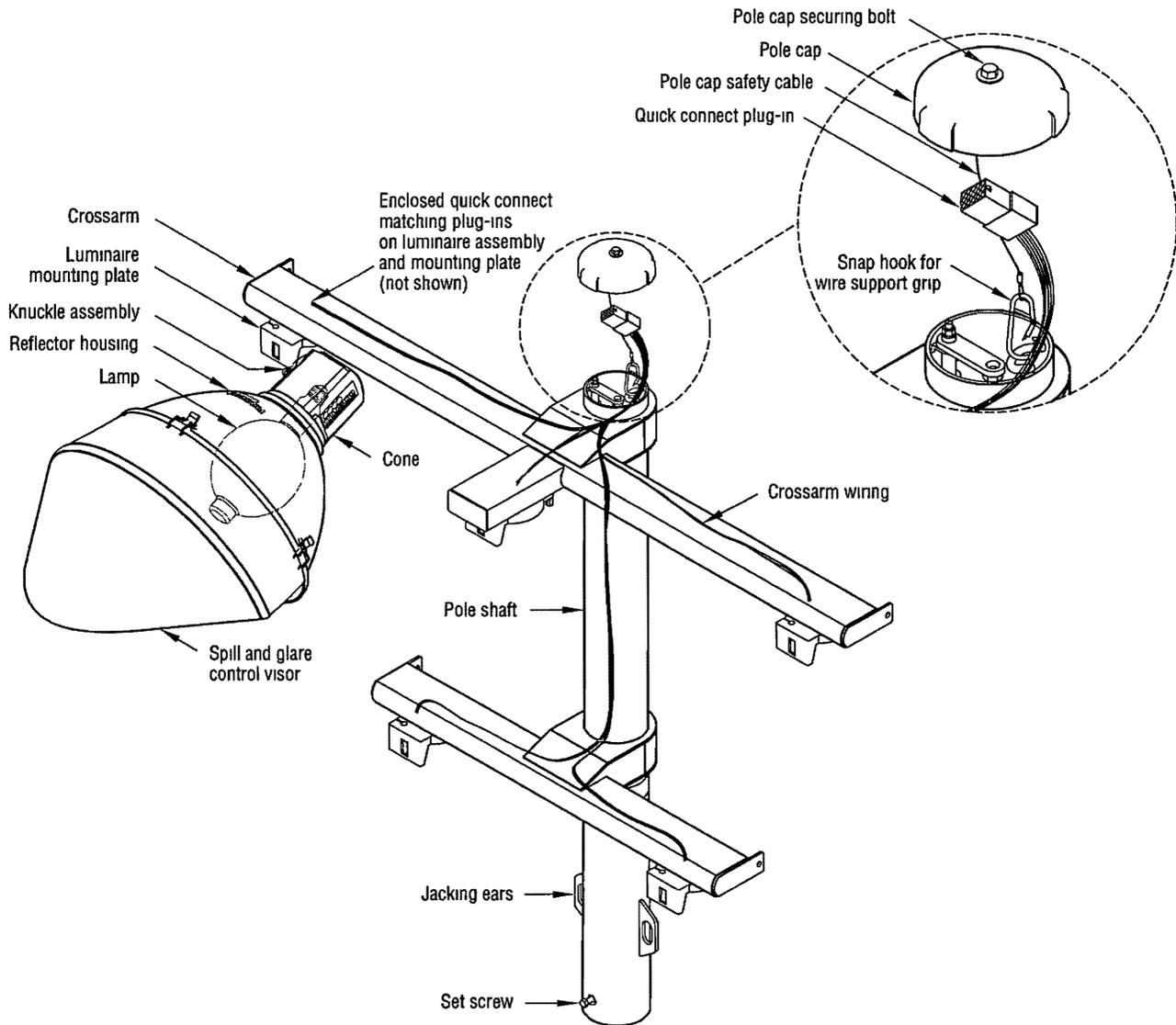


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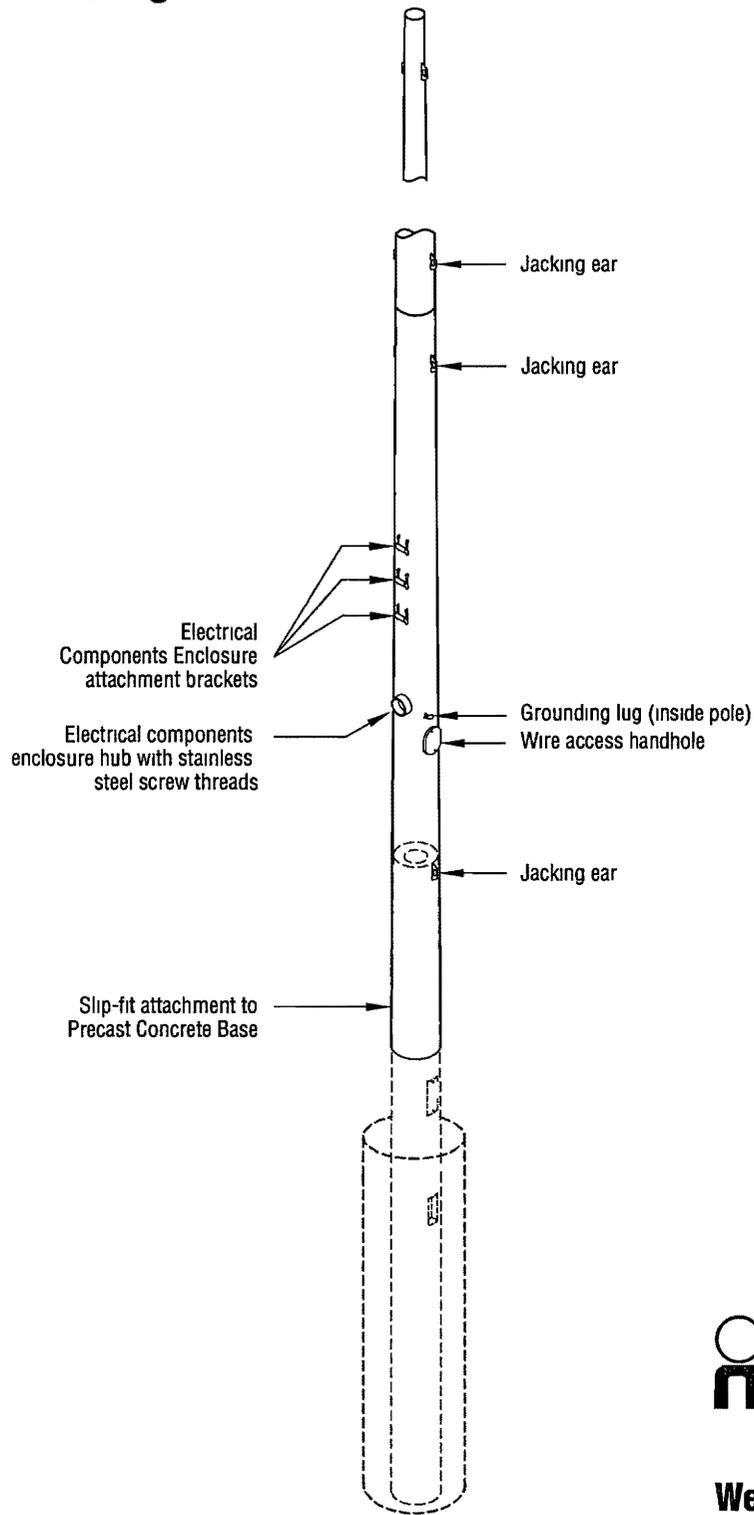
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Manufacturer's Certification of Corrosion Protection for Light-Structure Green™ and SportsCluster Green™

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

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

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

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

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

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

Musco Sports Lighting, LLC

A handwritten signature in black ink, appearing to read "Greg Kubbe". The signature is fluid and cursive.

Greg Kubbe
Product Development Manager