1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplemen Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section provides general requirements for a complete and fully operational Ext Lighting System including:

1. Exterior Luminaires
2. Accessories
3. Luminaire supports
4. Poles
5. LED Arrays
6. Controls
7. Standard Fixture Schedule

B. Related Sections:

1. Section 26 5100 "Interior Lighting" for exterior luminaires normally mounted on ext surfaces of buildings.
2. Section 26 0519 “Low Voltage Electrical Power Conductors and Cables” for wire cabling.

1.3 SYSTEM DESCRIPTION

A. Catalog numbers indicated in the Luminaire Schedule are a design series reference and do necessarily represent the exact catalog number, size, voltage, wattage, type of LED, dr finish trim, mounting hardware or special requirements as specified or as required by particular installations. Provide complete luminaire to correspond with the featu accessories, number of LED’s, wattage and/or size specified in the text description of e luminaire type. Additional features, accessories and options specified shall be included.

B. Luminaire voltage shall match the voltage of the circuit serving same.

1.4 DEFINITIONS

A. CCT: Correlated color temperature.

B. CRI: Color-rendering index.

C. LER: Luminaire efficacy rating.

D. Luminaire: Complete lighting fixture, LED arrays, including driver housing.

E. Pole: Luminaire support structure, including tower used for large area illumination.

F. Standard: Same definition as "Pole" above.

1.5 STRUCTURAL ANALYSIS CRITERIA FOR POLE SELECTION

A. Dead Load: Weight of luminaire and its horizontal and vertical supports, lowering devices, and supporting structure, applied as stated in AASHTO LTS-4-M.

B. Live Load: Single load of 500 lbf, distributed as stated in AASHTO LTS-4-M.

C. Ice Load: Load of 3 lbf/sq. ft., applied as stated in AASHTO LTS-4-M Ice Load Map.

D. Wind Load: Pressure of wind on pole and luminaire and banners and banner arms, calculated and applied as stated in AASHTO LTS-4-M.

1. Basic wind speed of calculating wind load for poles 50 feet (15 M) high or less is 90 mph.

a. Wind Importance Factor: 1.3.
b. Minimum Design Life: 25 years.
c. Wind induced vibration.

1.6 SUBMITTALS

A. The authorized manufacturer’s representative for the Project area shall prepare Submittals for each luminaire type. In addition to the luminaire Submittals, a list shall be provided identifying the manufacturer representative for each luminaire type. Provide manufacturers’ names, addresses, and telephone numbers. Requests for prior approval shall also include this information. Submittals or requests for prior approval without this information will be rejected.

B. Product Data shall indicate that luminaire, LED arrays, and drivers fully comply with Contract Documents. Data shall be submitted for each type of luminaire indicated, arranged in order of luminaire designation. For standard catalog luminaires provide original product catalog sheets indicating data on features, accessories, finishes, and the following:

1. Glass, Plastic Diffusers and Lenses: 10% or one dozen (whichever is less) of each type and rating installed. Furnish at least one of each type.
2. Globes and Guards: 5% of each type and rating installed. Furnish at least one of each type.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Package poles for shipping according to ASTM B 660.

B. Store poles on decay-resistant-treated skids at least 12 inches above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.

C. Retain factory-applied pole wrappings on metal poles until right before pole installation. Handle with web fabric straps.

1.10 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by an independent agency, with the experience and capability to conduct the testing indicated, that is an NRTL as defined by OSHA in 29 CFR 1910.7.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to Authorities Having Jurisdiction, and marked for intended use.

C. Comply with IESNA TM-15-11 and Addendum A for Backlight, Uplight, and Glare (BUG) ratings.

D. Comply with ANSI C7.3777.208 Standards for chromaticity of SSL products.

E. Comply with NFPA 70.

F. All luminaires shall bear a UL or ETL label.

G. Comply with IEEE C2, “National Electrical Safety Code.”

H. Comply with most current edition of the Northwestern University Design Standards.

I. Designated manufacturers are listed in the Luminaire Schedule to define the requirements for quality and function of the specified product.

1.11 COORDINATION

A. Coordinate layout and installation of luminaires with plantings, paving, site walls, other site work elements, and existing luminaires.

B. Coordination Meetings: This Contractor shall meet at least twice with the sitework installer(s) and NU Chief Electrician (or his designee). Hold first meeting before submittal of shop drawings to coordinate each luminaire mounting condition and location. During second meeting, coordinate layout with other site components. Coordinate depth and location of all luminaire pole bases in all areas.

1. Lumen Depreciation Data: maintain greater than 95% lumen maintenance at 60,000 hours per IES TM-21.
2. LED color: neutral white, 4000 deg K, minimum CRI of 70, or as scheduled on the drawings.

C. LED arrays shall have an IP66 enclosure rating.

D. Driver + LED Life Rating not less than 100,000 hours.

E. Power supply / driver shall be field replaceable by means quick-disconnect connectors and easy access mounting hardware.

F. Drives shall accept 120 – 277 volts or 480 volts, 60 Hz.

G. Power Factor > 0.9@ full load.

H. THD < 20% @ full load.

I. Surge protection: 10kA/10kV per ANSI/IEEE C136.2-2014

J. The housing shall have an integral thermal management system with extruded aluminum radiation fins and lateral airways for passive cooling, no devices using moving parts are permitted.

K. Minimum starting temperature: minus 30 deg C, 40 deg C ambient.

L. Comply with IES LM-79-08 and LM-90-08 Approved Methods.

M. Comply with In-Situ testing for more reliable results.

N. LED’s shall be Restriction of Hazardous Substances Directive (RoHS) compliant.

2.4 LUMINAIRE-MOUNTED PHOTOELECTRIC RELAYS

A. Comply with UL 773 or UL 773A.

B. Compatible with 7 – pin socket.

C. Contact Relays: Factory mounted, single throw, designed to fail in the on position, and factory set to turn light unit on at 1.5 to 3 fc and off at 4.5 to 10 fc with 15-second minimum time delay. Relay shall have directional lens in front of photocell to prevent artificial light sources from causing false turnoff.

1. Adjustable window slide for adjusting on-off set points.

2.5 GENERAL REQUIREMENTS FOR POLES AND SUPPORT COMPONENTS

A. Structural Characteristics: Comply with AASHTO LTS-4-M.

1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article, with a gust factor of 1.3.

2.

2.7 POLE ACCESSORIES

A. Base Covers: Manufacturers' standard metal units, arranged to cover pole's mounting bolts and nuts. Finish same as pole.

B. Fusing: One in each ungrounded power supply conductor. Voltage and current ratings as recommended by driver manufacturer. Fuseholders shall be completely waterproof and shall grip the fuse in the load side section when opened. The circuit shall be fused in the base of the pole and accessible through the handhole.

C. Banner Arms: Use shall be approved by NU Chief Electrician. Coordinate with manufacturer for maximum banner size limitations to avoid banner arm or pole failure. Banner arms shall be break-away type designed to fail before over stressing the pole.

D. Wind Mitigation Devices: Provide in areas of consistent, high, uneven winds.

E. Duplex Receptacle: In central areas of congregation, provide a NEMA 5-20R Duplex Receptacle in a weatherproof assembly complying with Section 26 2726 "Wiring Devices" for ground-fault circuit-interrupter (GFCI) type.

1. Recessed, nonmetallic polycarbonate plastic or reinforced fiberglass, weatherproof in use, cover, color to match pole, with cord opening, that when mounted results in NEMA 250, Type 3R enclosure mounted 36” above finished grade. With lockable hasp and latch that complies with OSHA lockout and tag-out requirements.
2. Where noted, provide minimum 1800-W transformer, 120V secondary, protected by replaceable fuses, mounted behind access cover.

F. Outdoor Wireless Controls: Where noted, provide wireless controls for remote monitoring, control, energy measurement and GPS mapping of pole mounted exterior luminaires.

1. Products: “Light-Grid™” Outdoor Wireless Control System by General Electric.
2. Basic Description: system consists of the following components:

a. Node
b. Gateway
c. Modem
d. Central Management System server

3.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

A. Fasten luminaire to indicated structural supports.

1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

B. Adjust luminaires that require field adjustment or aiming. Include adjustment of photoelectric device to prevent false operation of relay by artificial light sources, favoring a north orientation.

1. Provide house side shields where necessary to control spill light.

3.2 POLE INSTALLATION

A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.

B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwiinghciut ht ingh [(uT-6.4(t)-13.1(n)-t)-1.1(j EMC /H2 <</M7.795 >>BDC

1. Verify operation of photoelectric controls.
2. [**Verify operation of wireless controls, test send and receive data/commands between luminaires and CMS**.]

H. Illumination Tests:

1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IESNA testing guide(s):

   a. IESNA LM-64, "Photometric Measurements of Parking Areas."
   b. IESNA LM-72, "Directional Positioning of Photometric Data."

I. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards. Submit Electronic files of site lighting maps to the Electric Shop.

Northwestern University Standard Fixture Schedule

Type	Description	Volt	Lamp	Fixture Watts	Manufacturer	Series
S1	Standard Walkway Fixture. Post-top contemporary lantern fixture. Globe: one piece satin clear polycarbonate. Guard: 356 cast aluminum, one piece, with four arms. Cast AL heat sink. IES Type III optics. 90% PF electronic driver. Tenon mounted GE motion response sensor, black finish.	M-volt Universal auto adjusting	48 White LED Module 4000 K	81	Philips - Lumec	L80 – 020 - 80W48LED4K – T – PC – CS - LE3 – 277 – DMG – SF80 – RCD7 - BKTX
S1 Pole	Four inch round extruded 6061-T6 AL pole with 4-1/2" x 10" maintenance opening 25-1/4" from the bottom of the anchor plate with receptacle –in-door option, duplex 15A-120V GFI receptacle with lockable W-I-U cast AL door. Black textured polyester powder coat finish.	__	__	__	Philips - Lumec	RA61U – 12 – FS1 – GFI – M - BKTX

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