SECTION 16500 – LIGHTING

PART 1 - GENERAL

1.1 SCOPE This section covers the furnishing and installation of all lighting as indicated on the Contract Documents, including all associated equipment, devices, and controls necessary for proper operation.

1.2 GENERAL Equipment and accessories furnished and installed under this section shall be fabricated, assembled, erected, and placed in proper operating condition in full conformity with drawings, specifications, engineering data, instructions, and recommendations of the equipment manufacturer, unless Engineer notes exceptions.

1.2.01 Coordination Contractor shall verify that each component of the system is compatible with all other parts of the system and that all devices necessary for a properly functioning system have been provided.

1.2.02 General Equipment Requirements The General Equipment Stipulations in Master Specification Section 01180, Equipment, Materials, Parts, and Tools, shall apply to all equipment furnished under this section.

1.2.03 Abbreviations Reference to standards and organizations in the Specifications shall be by the following abbreviated letter designations:

ANSI American National Standards Institute

IEEE Institute of Electrical and Electronics Engineers

NEC National Electrical Code

NEMA National Electrical Manufacturers Association

UL Underwriters' Laboratories

1.2.04 Governing Standards. All lighting equipment furnished under this section shall be designed, constructed, and tested in accordance with applicable ANSI, NEMA,NEC and UL standards. Fixtures shall be listed and labeled by UL or an equivalent testing laboratory acceptable to the Engineer. Fixtures shall also meet the requirements of the latest edition of the National Appliance Energy Conservation Act (NAECA) and all amendments thereto, Federal Communications Commission (FCC) Rules and Regulations - Part18, and IEEE Standard 587 for transient protection.

All lighting fixtures with plastic lenses shall comply with the Michigan State Fire Safety Board ruling dated July 22, 1970.

1.3 SUBMITTALS. Data covering the materials used and the parts, devices, and other accessories forming a part of the equipment furnished shall be submitted in accordance with Master Specification Section 01080, Project Submittals. The equipment submittals shall include the following:

Shop drawings for each type of lighting fixture with identity of each item by fixture specification, type/model number, manufacturer and catalog number.

Fixture photometric curves.

Certification of listing by UL.

1.4 SPARE PARTS. Provide the following spare parts, with quantities rounded up to the nearest whole number, ready to install as direct replacements for the same item included in the work specified in the Contract Documents:

DESCRIPTION	QUANTITY
High Intensity Discharge Lamps.	20% of the number of lamps installed
High Intensity Discharge Ballasts.	25% of the number of ballasts installed
High Intensity Discharge Lenses.	10% of the number of lenses installed

All spare parts furnished shall comply with the requirements of Master Specification Section 01180, Equipment, Materials, Parts, and Tools.

Submit a list of recommended spare parts in addition to the items listed herein. These spare parts shall be as recommended by the manufacturer for maintenance of each unit. Each item on the list of recommended spare parts shall include a price of the item packaged and delivered to the Owner in Detroit, including all markups, taxes and other costs.

PART 2 - PRODUCTS

2.1 LIGHTING FIXTURES. Lighting fixtures shall be furnished as described in the fixture schedule in the Contract Documents. Lighting fixtures shall be furnished complete with lamps.

All lighting fixtures shall be Lithonia Lighting Model No. TWH 175M or approved equal.

Fixtures using metal halide lamps shall have a tempered glass shield below the lamp to contain broken lamp parts and to contain ultra-violet radiation.

Exterior fixtures shall be factory equipped with waterproof gaskets and dark bronze anodized aluminum frames, unless indicated otherwise on the Contract Documents, and shall be designed to be completely waterproof. The finish shall be free of scratches and other surface blemishes.

Other materials required for the lighting system such as conduit, raceway, wire and cable, support devices, fasteners, and control devices shall be as specified in Master Specification Section 16050, Electrical General Requirements.

2.1.01 Lamps. Provide lamps of the proper type, wattage, voltage, and socket size for all lighting fixtures.

All lighting equipment furnished under this section for outdoor use shall be installed with photovoltaic sensors to control illumination of the lighting fixture.

All lighting fixtures shall be of the type and minimum efficiency as shown on the Table below, unless otherwise indicated on the drawings:

LUMENS, LIFE, AND EFFICACY FOR VARIOUS LAMPS			
Lamp Type (Watts)	**Initial Lumens**	**Life (hours)**	**Efficacy (lumens/watts)**
Metal-Halide			
175	14000	7500	93
250	20500	7500	137
400	34000	15000	227
1000	105000	10000	700
High-pressure sodium			
50	3300	20000	66
70	5800	20000	83
100	9500	20000	95
150	16000	240000	107
150	12000	12000	80

200	22000	24000	110
215	*19000*	*12000*	*88*
250	*27500*	*24000*	*110*
400	*50000*	*24000*	*125*
1000	*140000*	*24000*	*140*

2.1.02 Fuses. Each fixture having a ballast shall be fused according to the ballast manufacturer's recommendations. The fuse shall be wired to the primary ballast lead on the ungrounded side and shall be accessible for replacement.

2-1.03. Ballasts. Ballasts shall be CBM certified as meeting requirements of ANSI C82.11 with a Total Harmonic Distortion (THD) level of not more than 10 percent.

Ballasts for metal halide fixtures shall be electronic or high power factor, non-PCB regulator type. Ballasts for indoor fixtures shall be rated for operation in 122 F (50 C) ambient. Ballasts for outdoor fixtures shall provide reliable starting down to minus –20 F (-29 C).

Ground ballasts in accordance with NEC and provide in-fixture automatic resetting thermal protection for ballasts and capacitors.

PART 3 - EXECUTION

3.1 GENERAL. All work shall be installed as indicated on the drawings, and in accordance with the manufacturer's diagrams and recommendations, except where otherwise indicated.

3.2 LIGHTING FIXTURE INSTALLATION. The Contract Documents indicate the general locations and arrangements of the lighting fixtures. Fixtures in rows shall be aligned both vertically and horizontally unless otherwise specified. Fixtures shall be clear of pipes, mechanical equipment, structural openings, indicated future equipment and structural openings, and other obstructions.

Conduit and wire for lighting fixture installation that is not shown on the Contract Documents shall be sized, furnished and installed by the Contractor. Conductors shall be minimum 12 AWG and conduit shall be minimum 3/4 inch (mm) for lighting fixture installation.

3.2.01 Fixture Relamping. Lamp those permanent light fixtures, as used for temporary lighting during construction, with Contractor's own lamps. Remove temporary lamps at acceptance of Work and install new proper lamps in each fixture. New lamps shall be in perfect working order.

3.2.02 Fixture Cleaning. Vacuum accumulations of dust from suspended light fixtures, as well as recessed style fixtures. Do not air blow dust from fixtures. Dusting of fixtures with dust cloths may be performed where accumulation of dust is light.

Follow the cleaning procedures as recommended by the fixture manufacturer for new fixture cleaning for construction work practice. Use only those products for cleaning as outlined in the fixture manufacturer's literature.

3.3 LIGHTING CONTROLS. All lighting equipment furnished under this section for outdoor use shall be installed with photoelectric sensors to control illumination of the lighting fixture.

END OF SECTION 16500