

SECTION 16950 LIGHTING CONTROL SYSTEM

PART 1 – GENERAL

1.1 SECTION INCLUDES

- A. This section of the specification includes the furnishing, installation, connection and testing of a complete lighting control system for both interior and exterior lighting. Provide all equipment required to form a complete, operative, and coordinated system as shown on the drawings and specified herein. Components of the Lighting Control System shall include, but are not limited to, the following:
 - 1. Lighting Control Panel.
 - 2. Daylighting Controls.
 - 3. Occupancy Sensors.
 - 4. Exterior Photocell Controller.

1.2 RELATED SECTIONS

- A. Section 16010 - Electrical General Requirements.
- B. Section 16111 - Conduit.
- C. Section 16123 – Building Wire and Cable
- D. Section 16130 - Boxes.

1.3 QUALITY ASSURANCE

- A. All system materials shall be UL-listed for their intended duty.

1.4 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 16010.
- B. Shop Drawings and Product Data:
 - 1. Submit complete and at one time. Provide manufacturer's catalog information showing dimensions, colors, and configurations. Isolated items will not be considered for approval, except by prior authorization.
 - 2. A technical data sheet from the manufacturer should be included with the response for each product proposed. This data sheet shall include the physical specifications as well as the electrical characteristic.
 - 3. The following is required for approval, prior to fabrication and installation:
 - a. Catalog Data Sheets of all manufactured items, including manufacturer and model number.
 - b. Wiring diagrams indicating proposed connections of all equipment and indicating equipment types and model numbers.

1.5 TRAINING

- A. Provide sufficient training to personnel selected by the Owner on operation and basic maintenance of all systems and equipment.

1.6 PROJECT RECORD DOCUMENTS

- A. Submit record documents under provisions of Section 16010.
- B. Accurately record location of all equipment items.

1.7 PROJECT CONDITIONS

- A. Verify that field measurements are as shown on Drawings.
- B. Wire and cable routing shown on Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project Conditions.
- C. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required.

1.8 OPERATION AND MAINTENANCE DATA

- A. Submit data under provisions of Section 16010.
- B. Include operating instructions, maintenance and repair procedures.

PART 2 – MATERIALS

2.1 LIGHTING CONTROL PANELS

- A. Sequence of Operation:
 - 1. The Lighting Control Panel shall automatically turn all exterior building lights off at a pre-programmed time each day in the evening. The panel shall enable interior lights to be turned on locally at a pre-programmed time each day in the morning.
- B. Manufacturer:
 - 1. *Watt Stopper*
 - 2. *Lighting Control & Design*
 - 3. *Leviton*
 - 4. Substitutions: None Permitted.
- C. *Watt Stopper* model numbers are listed below to establish configuration and type of materials. Equal materials by *LCD* or *Leviton* will be accepted.
- D. Description: Lighting control panel shall be *Watt Stopper* model LP8S-8-115 and shall provide eight (8) automatic control channels for operating contactors controlling exterior and/or interior lighting. Each channel shall be individually configurable. Each channel shall include an LED light status indicator to provide channel status and a separate ON/OFF switch for manual channel control. The Control Panel shall consist of the following:
 - 1. Tub: Empty NEMA 1 enclosure that can accept an interior sized to accept up to 8 contactor poles.
 - 2. Cover: Surface with captive screws in a hinged, lockable configuration.

3. Interior: Metal back plate and barrier for separation of high voltage (class 1) and low voltage (class 2) wiring. Intelligence board with eight (8) channels of control provided regardless of interior size. Interiors shall be provided with up to 16 DIN rail mounted contactor poles.
4. Contactors: DIN rail mounted, four-pole, normally closed, electrically held with coil voltage to match panel control power voltage. Contactors shall be compatible with all lighting, ballast, and HID loads and be rated for 20-Amp tungsten up to 277V and rated for 30A ballast and general use up to 600V. Provide 20% spare contactor poles.
5. Auxiliary Power: 350mA at 24VDC and 350mA at 24VAC for operating system devices.
6. Time Clock: The system time clock shall provide time-based control with eight-year time backup, non-volatile memory program storage, automatic daylight savings adjustment, selectable 12/24-hour time formats and selectable date formats. All clock programming shall be accessible from the clock front display/keypad. The time clock shall provide for the following:
 - a. Control of eight control channels with status and manual ON/OFF control of each channel from the front display and keypad.
 - b. Control of eight individual override inputs that can be used to connect external devices such as photocells, switches and daylighting controllers. Each of these inputs shall be capable of being configured to operate as a photocell, as an ON/Auto switch, as a maintained ON/OFF switch, or as a momentary ON/OFF switch.
 - c. Scheduling of any combination of days of the week and/or 3 holiday types with the capacity for temporary and/or repeating schedules that are adjustable from 5 minutes to 10 hours.
 - d. Assignment of 32 perpetual holidays to any one of three holiday day schedules and continuing for 1 to 120 days. Holiday dates shall be specific day/month/year, or perpetual dates including day/month/years or day of the week in a given month every year or self-calculating Easter Sunday.
 - e. Astronomic control capability for calculating sunrise and sunset based on time, latitude, and time zones. All scheduled astronomic/time operations shall be interlocked so loads are not turned on when astronomic off time are earlier than scheduled on times or astronomic on times are later than scheduled off times. Each schedule shall have an independent astronomic offset of ± 120 minutes.

2.2 EXTERIOR PHOTOCCELL

- A. Manufacturer:
 1. *Watt Stopper*
 2. Substitutions: Or Approved Equal.
- B. Photocell shall be *Watt Stopper* model EM-24A2 and shall include a footcandle range of 1-15 and an 8-second time delay. The photocell shall mount on the exterior of a building with its light level window facing the northern sky. The photocell shall provide an ON signal when the ambient light level drops below a user-defined dark set point, and an OFF signal when the ambient light level rises above a user-defined light set point.
 1. Contacts: One set of normally open, isolated relay contacts that are rated for one Amp at 30 VAC/VDC
 2. Set point: adjustable ON/OFF dark set point.

2.3 DAYLIGHTING CONTROLS (Stair Lights)

- A. Sequence of Operation
 - 1. Photocells shall control stair lights to automatically turn on/off at a pre-determined daylight level.
- B. Manufacturer:
 - 1. *Watt Stopper*
 - 2. Substitutions: Or Approved Equal.
- C. Photocell shall be *Watt Stopper* model numbers LS-100 and shall be provided with *Watt Stopper* power pack for 24 volt control.

2.4 OCCUPANCY SENSORS

- A. Manufacturers:
 - 1. *Watt Stopper*
 - 2. *Lighting Control & Design*
 - 3. *Leviton*
 - 4. Substitutions: None Permitted.
- B. Occupancy sensors to control lighting shall be as follows (provide type at locations as indicated on the Drawings):
 - 1. Interior Sensors: Dual Technology, Passive Infrared/Ultrasonic – *Watt Stopper* # DT-200.
 - 2. Exterior Sensors: *Watt Stopper* # EN-200.

PART 3 – EXECUTION

3.1 GENERAL

- A. Do not install equipment and materials that have not been reviewed by the Architect-Engineer. Equipment and materials that are installed without the Architect-Engineer's review or without complying to comments issued with the review shall be removed from the project when so instructed by the Architect-Engineer. No payment will be made for unapproved or removal if it is ordered removed. The Installer shall be responsible for any ancillary costs incurred because of its removal and the installation of the correct equipment and materials.
- B. Obtain detailed information on installation requirements from the manufacturers of all equipment to be furnished, installed or provided. At the start of construction check all Contract Documents, including all Drawings and all Sections of the specifications for equipment requiring electrical connections and service and verify electrical characteristics of equipment prior to roughing.
- C. Equipment and systems shall not be installed without first coordinating the location and installation of equipment and systems with the General Contractor and all other Trades.

- D. Any and all material installed or work performed in violation of above requirements shall be re-adjusted and corrected by the Installer without charge.
- E. Refer to all Drawings associated with the project, prior to the installation or roughing-in of the electrical boxes, conduit and equipment, to determine the exact location of all outlets.
- F. After installation, equipment shall be protected to prevent damage during the construction period. Openings in conduits and boxes shall be closed to prevent the entrance of foreign materials.
- G. Install all systems in strict accordance with the manufacturer's instructions.

3.2 WORK

- A. Any ceilings, walls, floors, furniture, equipment, furnishings, etc., damaged by the work of this Section shall be replaced, or at the Owner's option, repaired with similar materials, workmanship and quality.
- B. Work includes field survey of existing conditions, systems, equipment and tracing of existing circuits in order to determine scope of work.
- C. Clean and touch up all equipment, materials and work sites at the completion of work in each area.

3.3 TERMINATIONS

- A. All conductors of every cable shall be completely terminated at both ends.

3.4 SYSTEM INSTALLATION

- A. Provide all equipment and cabling for a complete installed operating system.
- B. Cabling shall be installed concealed and shall be supported from the building structure.
- C. All cables shall be installed in a neat and workman-like manner. Cables shall be installed parallel and perpendicular to building elements.
- D. Install Lighting Control Panel with top of panel at 60" AFF.
- E. Install Photocell Level Sensors in stairwells as directed on-site by the Engineer.

3.5 SYSTEM TESTING

- A. Test Reports: Upon completion and testing of the installed system, test report shall be submitted showing satisfactory system operation, certified by a factory authorized representative.

3.6 ACCEPTANCE DEMONSTRATIONS

- A. Systems installed under this Section shall be demonstrated to the Owner and Architect-Engineer. Demonstrations are in addition to necessary testing and training sessions. Notify all parties at least 7 days prior to the scheduled demonstration. Schedule demonstrations in cooperation with and at times convenient to all parties and so as to not disturb ongoing activities.
- B. Systems shall be tested prior to the demonstrations and each system shall be fully operational and tested prior to arranging the Acceptance Demonstration. Final payments will be withheld until a satisfactory demonstration is provided for all systems indicated or requested.
- C. If the demonstration is not totally complete, performing all functions, features and connections or interfaces with other systems, or if there is a failure during the demonstration, additional demonstrations shall be arranged. Provide and pay for all costs, labor and expenses incurred for all attendees for each additional demonstration required for acceptance and demonstration of complete system operation.
- D. Demonstrations shall be scheduled in ample time to complete all activities prior to final acceptance and Owner occupancy. Demonstrations shall take place at least 30 days prior to the scheduled project completion date and 30 days prior to owner's use and occupancy.
- E. As a minimum, provide demonstrations for systems indicated under "Section Includes" under Part One of the Specifications. Provide demonstrations of additional systems as requested by the Owner, or Architect-Engineer.

3.7 CLEANING UP

- A. Upon completion of all work, and testing, thoroughly inspect all exposed portions of the installation and completely remove all exposed labels, markings, and foreign material.
- B. The interior of all boxes and cabinets shall be left clean; exposed surfaces shall be cleaned and plated surfaces polished.
- C. Repair damage to finish surfaces resulting from work under this Section.
- D. Remove material and equipment from areas of work and storage areas.
- E. All equipment shall be clean from dirt, dust, and fingerprints prior to final acceptance.

END OF SECTION 16950