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 Time Switch.
   2. Occupancy Sensors.
   3. Exterior Photocell.
   4. Z-Wave Controller

1.2 RELATED SECTIONS

A. Section 16010 - Electrical General Requirements.

B. Section 16123 – Building Wire and Cable.

C. Section 16111 – Conduit.

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 Division 1 and Section 16950.

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 Division 1 and 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 MANUFACTURERS

A. Lighting systems equipment shown on the Drawings and specified herein is based on equipment as manufactured by *Hubbell Building Automation*. Equivalent products by other manufacturers will be considered.

2.2 LIGHTING CONTROL PANEL (LC1)

A. Manufacturer: *Hubbell Building Automation* model CX-04-2-5-04-2N-N

B. Description: Surface mounted programmable control panel with four relays for control of lighting circuits. Panel shall include an astronomical and real time clock with 365 day programming for 64 schedules. Panel programming shall be accomplished via a user interface keypad and LCD view screen on the panel cover. Panel shall be UL listed according to UL916 and UL 924.

1. Relays: 120V, 20A, 1P Electrically Held, NO (14K SCCR)
2. Cabinet: NEMA 1, Surface
3. Input: 120-277VAC

LIGHTING CONTROL PANEL RELAY SCHEDULE			
Lighting Control Panel	Relay Number	Lights Controlled	Ltg. Ckt. Numbers Controlled
LC1	1	Type S1 & S2 Exterior Lights	HP1 #1
LC1	2	Type S3 Sign Lights	HP1 #3
LC1	3	Spare Relay	
LC1	4	Spare Relay	

2.3 OCCUPANCY SENSORS

A. Occupancy sensors to control lighting shall be as follows:
   1. Type 1 Sensors: *Hubbell* Model OMN11R, or approved equal. Ceiling mounted, passive infrared motion sensor with 360 degree coverage pattern extending up to 22 feet. Sensor shall have time delay adjustment from 8 to 30 minutes.
   2. Type 2 Sensors: *Hubbell* Model PIR1000H, or approved equal. Ceiling mounted, passive infrared motion sensor with 16’ BY 80’ coverage. Sensor shall have time delay adjustment from 30 seconds to 30 minutes.

B. Occupancy sensor power packs shall be *Hubbell* model UVPP.
   1. Power packs shall include an integral transformer and relay designed for switching 20-ampere loads. Power packs shall be capable of being installed within a standard 4-inch square electrical box.
      a. Input Voltage: 100-277VAC
      b. Output Rating: 24VDC, 150 mA

2.4 *Z-WAVE* WIRELESS CONTROLLER

A. Manufacturers:
   1. *Actiontec* model ZCHAV1
   2. Substitutions: or Approved Equal

B. Description: Wireless gateway certified as compatible to operate with *Z-Wave* wireless control system.

C. Features:
   1. CPU: 1.2GHz, 16KB of data cache, 8-channel DMA controller
   2. Memory: 512 MB DDR3, 400MHz; 512 MB NAND Flash
   3. Networking: Z-Wave 300 series 908.42 MHz
   4. Interface Buttons: WPS button; Z-Wave pairing button; recessed power reset switch
   5. I/O Ports: 2xUSB 2.0 ports (Type A connector); one Giga LAN port (1000 Base-t, 100-Base-T, and 10 Base-T) RJ45
   6. Power: Energy Star 10V, 1.6A power adapter

7. Software: Z-Wave Firmware version 5.02 sp3
8. Accessories: Wall mount kit

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.

H. Install *Z-Wave* wireless controllers in each living unit Utility Room.

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 occupancy sensors as follows:
   1. Type 2 Sensors:
      a. Lobby 101
      b. 2nd Floor Hall
      c. 3rd Floor Hall
      d. 4th Floor Hall
   2. Type 1 Sensors:
      a. All areas indicated with occupancy sensors not listed in paragraph 3.4.A.1.

B. Provide all equipment and cabling for a complete installed operating system.

C. All cables shall be installed in a neat and workman-like manner. Cables shall be installed parallel and perpendicular to building elements. Cables to be installed in exposed finished areas shall be installed in conduit. All other cables shall be concealed in partitions or above ceilings.

3.5 SYSTEM TESTING

A. Upon completion of the lighting control system, all components shall be tested to confirm their operation according to specification requirements and manufacturer's instructions.

3.6 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