**SECTION 26 27 26**

# WIRING DEVICES

**BASED ON DFD MASTER ELECTRICAL SPEC DATED 09/03/24**

This section has been written to cover most (but not all) situations that you will encounter. Depending on the requirements of your specific project, you may have to add material, delete items, or modify what is currently written. The Division of Facilities Development expects changes and comments from you.

***This Section may include proprietary and descriptive type specifications. Edit to avoid any conflicting requirements.***

**PART 1 - GENERAL**

**SCOPE**

This section describes the products and execution requirements relating to furnishing and installing wiring devices and related systems for the project. Included are the following topics:

PART 1 - GENERAL

Scope

Related Work

Submittals

Operation and Maintenance Data

PART 2 - PRODUCTS

Device Colors

Device Plates and Box Covers

Modularly Connected (Modular) Devices

Wall Switches

Wall Dimmers

Receptacles

Tamper-Resistant Receptacles

Hospital Grade Receptacles

Hospital Grade Tamper-Resistant Receptacles

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PART 3 - EXECUTION

Installation

Field Quality Control

Motion Sensors

ELCU Wiring

Adjusting

RELATED WORK

Applicable provisions of Division 1 govern work under this Section.

Section 01 91 01 or 01 91 02 – Commissioning Process

Section 26 09 43 – Distributed Digital Lighting Controls

**SUBMITTALS**

Provide product data showing model numbers, configurations, finishes, dimensions, and manufacturer's instructions.

For motion sensor shop drawings, the manufacturer’s actual layout of motion sensors and the wiring diagrams shall be provided.

**OPERATION AND MAINTENANCE DATA**

All operations and maintenance data shall comply with the submission and content requirements specified under section GENERAL REQUIREMENTS.

**PART 2 - PRODUCTS**

***This Section includes only basic devices. Projects may require specifications for hospital grade receptacles, special purpose receptacles, combination devices, receptacle bodies and plug caps. Add requirements as needed for the project. Edit the following descriptive paragraphs.***

**DEVICE COLORS:**

Device colors shall be selected by project architect’s interior designer and coordinated with Agency representative during shop drawing review.

All switches and convenience outlets on emergency circuits shall have a red handle or red face with matching red cover plate.

***Device plates shall be selected by project architect’s interior designer and coordinated with Agency representative prior to issuing for bid.***

**DEVICE PLATES AND BOX COVERS**

**Decorative Cover Plate:** [Smooth thermoplastic nylon.] [302/304 lined stainless steel.] Note requirement for red plates on emergency outlets and switches.

**Weatherproof Cover:** All receptacles installed in wet locations shall have an enclosure that is weatherproof whether or not the attachment plug is inserted. Covers shall be gasketed metal with hinged “in-use” device covers, powder coat painted. Non-metallic covers are not allowed. Covers shall be latching type and shall be lockable. Covers shall be identified as “extra-duty” type per NEC 406.9(B)(1).

**Damp Location Cover:** All receptacles installed outdoors in a location protected from the weather or in other damp locations shall have an enclosure that is weatherproof when the receptacle is covered (attachment plug not inserted and receptacle covers closed). Covers shall be gasketed metal with hinged device covers, powder coat painted. Non-metallic covers are not allowed.

**Surface Cover Plate:** Raised galvanized steel.

***The following security wall plates are to be specified for confinement areas of correctional facilities only. Indicate which devices are to receive security wall plates on the plans. Delete if not used.***

[**Security Wall Plates:**

Manufacturers: Morlite SWP series, Kenall WSP/WPP series, Failsafe SSB/SPC series, or equal.

Cover plate shall be 10-gauge cold rolled steel.

Provide cover plate configuration to match device shown on plans.

Provide stainless steel screws (security type per hardware specifications).

Install per manufacturer’s instructions. Install security wall plates in confinement areas.]

**MODULARLY CONNECTED (MODULAR) DEVICES:**

Modularly connected devices are allowed, but not required.

**Modular Pigtailed Connector:** Polarized connector with minimum six-inch stranded copper wire leads, polycarbonate right-angle housing, UL498 listed, with finger-safe connector housing which provides insulation from conductive surfaces. Contacts shall be brass. Connector shall be manufactured so that it provides a secure connection such that it will maintain contact with the device until the device is removed for replacement. Modular connectors shall be provided with covers which protect the contacts from paint, drywall mud, and construction dust and debris. Connectors shall be Hubbell SNAPConnect, Leviton Lev-Lok, Pass & Seymour PlugTail, or approved equal.

**WALL SWITCHES**

**General:** Heavy duty use toggle switch, rated 20 amperes and 120/277 volts AC. Switches shall be UL20 Listed and meet Federal Specification WS-896. All switches shall be heavy duty Specification Grade.

Handle: Made of nylon or high impact resistant material.

**Wall Switches for Lighting Circuits and Motor Loads Under 1/2 HP:** All switches shall be back- and side-wired, screw clamp type, suitable for solid or stranded wire up to #10 AWG, with separate green ground screw. Switches shall be as follows:

Hubbell 1221\*,

Leviton 1221-S\*,

Pass & Seymour CSB20AC1-\*,

or approved equal. (\* indicates color selection).

**Modular Wall Switches for Lighting Circuits and Motor Loads Under 1/2 HP:** Switches shall be as follows:

Hubbell SNAP1221\*NA,

Leviton M1221-\*,

Pass & Seymour PT20AC1-\*,

or approved equal. (\* indicates color selection).

**Digital Manual Controls:** Low-Voltage dimming and momentary pushbutton switches that are part of a Digital Lighting Control System: Refer to specification section 26 09 43 Distributed Digital Lighting Controls.

***Review the following descriptive specifications. Edit to remove any conflicts with the specified manufacturer’s products.***

**WALL DIMMERS**

**General:**

1. Compatible with the voltage of the circuit being controlled: 120V or 277V;
2. Compatible with the load being dimmed;
3. Linear full-range slide control;
4. ON/OFF paddle switch incorporated into the Wall Dimmer, separate from dimming slide control: single-pole, 3-way, or multiple-location operation as indicated on the drawings;
5. No derating required in multi-gang applications;
6. Polycarbonate construction;
7. Color to match receptacles and/or standard toggle switches.

**Line-voltage LED Dimmer:**

1. Forward or reverse phase dimming control as required for the application;

**Stand-alone 0-10V Dimmers:**

1. Electronic dimming;
2. Ratings: 30 mA sink current;
3. Adjustable dial allows users to trim the low-end dimming range.
4. Complete with 0-10V DC power source.

**Digital Dimmers:**

1. Low-Voltage dimming and momentary pushbutton switches that are part of a Digital Lighting Control System: Refer to specification section 26 09 43 Distributed Digital Lighting Controls.

**RECEPTACLES**

**General Requirements:** NEMA Type 5‑20R, Nylon or high impact resistant face. Receptacles shall be UL498 Listed and meet Federal Specification WC-596. All duplex receptacles shall be heavy duty Specification Grade, 20 amp rated.

Generally, all receptacles shall be duplex convenience type unless otherwise noted.

All receptacles on emergency circuits shall have a red face with matching red cover plate.

All receptacles designated as isolated ground shall have an isolated ground triangle imprint on the face of the receptacle.

***The consultant shall identify all GFCI outlets on drawings.***

All receptacles installed in bathrooms, kitchens, and within 6 feet of the outside edge of sinks shall be GFCI type.

All receptacles installed in outdoor locations, garages, rooftops, and in other damp or wet locations shall be GFCI type with a weather-resistant (WR) rating.

**Convenience and Straight‑blade Receptacles:** All receptacles shall be back- and side-wired, screw clamp type, suitable for solid or stranded wire up to #10 AWG, with a separate green ground screw. Receptacles shall be as follows:

Hubbell 5362\*,

Leviton 5362-S\*,

Pass & Seymour 5362\*,

or approved equal. (\* indicates color selection).

**GFCI Receptacles:** Duplex convenience receptacle with integral ground fault current interrupter meeting the requirements of UL standard 943 Class A, including self-test functionality and reverse line-load misfire function repeatability. GFCI receptacles shall be as follows:

Hubbell GFR5362SG\*,

Leviton GFNT2-\*,

Pass & Seymour 2097\*,

or approved equal. (\* indicates color selection).

**GFCI Receptacles with a weather-resistant (WR) rating:** Weather-Resistant duplex convenience receptacle with integral ground fault current interrupter meeting the requirements of UL standard 943 Class-A, including self-test functionality and reverse line-load misfire function repeatability. WR GFCI receptacles shall be as follows:

Hubbell GFR5362SG\*,

Leviton GFWR2-\*,

Pass & Seymour 2097TRWR\*,

or approved equal. (\* indicates color selection).

**USB Charger and Duplex Tamper-Resistant Receptacles:** Do not use combination duplex receptacles with USB chargers. Use duplex receptacles as required for the application and as specified herein. Use separate 4-port USB charging devices.

**USB Charging Devices:**

Single-gang 4-port USB charging station with four (4) Type-A USB ports. USB ports shall meet UL94 for 5V flammability rating, and shall comply with battery charging specification USB BC1.2. USB ports shall be compatible with USB 1.1/2.0/3.0 devices, including Apple® products. USB ports shall be rated 5VDC, 4.2A minimum. Devices shall be as follows:

Hubbell USB4\*,

Leviton USB4P-\*,

Pass & Seymour TM8USB4\*CC6,

or approved equal. (\* indicates color selection).

Single-gang 4-port USB charging station with two (2) Type-A and two (2) Type-C USB ports. USB ports shall meet UL94V-2 for 5V flammability rating, and shall comply with battery charging specification USB BC1.2. USB ports shall be compatible with USB 1.1/2.0/3.0 devices, including Apple® products. USB ports shall be rated 5VDC, 4.2A minimum. Devices shall be as follows:

Hubbell USB4AC\*,

Leviton equal\*,

Pass & Seymour equal\*,

or approved equal. (\* indicates color selection).

**Locking‑Blade Receptacles:** As indicated on drawings.

***Review NEMA WD-1 and the manufacturer's charts to determine the appropriate NEMA configuration for receptacles.***

**Specific‑use Receptacle Configuration:** As indicated on drawings.

**Modular Convenience and Straight‑blade Receptacles:** Receptacles shall be as follows:

Hubbell SNAP5362\*A,

Leviton M5362-S\*,

Pass & Seymour PT5362\*,

or approved equal. (\* indicates color selection).

**Modular GFCI Receptacles:** Duplex convenience receptacle with integral ground fault current interrupter meeting the requirements of UL standard 943 Class A, including self-test functionality and reverse line-load misfire function repeatability. GFCI receptacles shall be as follows:

Hubbell GFRST83SNAP\*,

Leviton MGFN2-\*,

Pass & Seymour PT2097\*,

or approved equal. (\* indicates color selection).

**Modular GFCI Receptacles with a weather-resistant (WR) rating:** Use back- and side-wired devices in lieu of modular weather-resistant rated GFCI receptacles.

***Tamper-resistant devices are required for dwelling units (including dormitories) and pediatric areas of healthcare facilities. Review codes for other locations that may require tamper-resistant devices. The requirement for tamper-resistant devices shall be noted on the drawings. Do not use tamper-resistant devices where they are not needed. Delete this section if not used.***

**TAMPER-RESISTANT RECEPTACLES**

**Tamper-Resistant Convenience and Straight‑blade Receptacles:** Tamper-resistant receptacles shall be back- and side-wired, screw clamp type, suitable for solid or stranded wire up to #10 AWG, with a separate green ground screw. Receptacles shall be as follows:

Hubbell 8300\*TR,

Leviton T5362-\*,

Pass & Seymour TR5362\*,

or approved equal. (\* indicates color selection).

**Tamper-Resistant Arc-Fault Receptacles:** Tamper-resistant duplex convenience receptacle with integral arc fault current interrupter meeting the requirements of UL standard 1699A. Device shall include an LED indicator. Receptacles shall be as follows:

Hubbell AFR20TR\*

Leviton AFTR2-\*

Pass & Seymour AF20TR\*

or approved equal. (\* indicates color selection).

**Tamper-Resistant GFCI Receptacles:** Tamper-Resistant duplex convenience receptacle with integral ground fault current interrupter meeting the requirements of UL standard 943 Class A, including self-test functionality and reverse line-load misfire function repeatability. Receptacles shall be as follows:

Hubbell GFR5362SG\*,

Leviton GFTR2-\*,

Pass & Seymour 2097TR\*,

or approved equal. (\* indicates color selection).

**Tamper-Resistant GFCI Receptacles with a weather-resistant (WR) rating:** Tamper-Resistant and weather-resistant duplex convenience receptacle with integral ground fault current interrupter meeting the requirements of UL standard 943 Class A, including self-test functionality and reverse line-load misfire function repeatability. Receptacles shall be as follows:

Hubbell GFR5362SG\*,

Leviton GFWT2-\*,

Pass & Seymour 2097TRWR\*,

or approved equal. (\* indicates color selection).

**Modular Tamper-Resistant Convenience and Straight‑blade Receptacles:** Tamper-resistant receptacles shall be as follows:

Hubbell SNAP5362\*TR,

Leviton MT563-S\*,

Pass & Seymour PTTR5362\*,

or approved equal. (\* indicates color selection).

**Modular Tamper-Resistant GFCI Receptacles:** Tamper-resistant duplex convenience receptacle with integral ground fault current interrupter meeting the requirements of UL standard 943 Class A, including self-test functionality and reverse line-load misfire function repeatability. Receptacles shall be as follows:

Hubbell GFTWRST83SNAP\*,

Leviton MGFT2-\*,

Pass & Seymour PT2097TR\*,

or approved equal. (\* indicates color selection).

***Do not use Hospital Grade Receptacles for facilities other than hospitals or required healthcare facilities. Delete the Hospital Grade Receptacles and Hospital Grade Tamper-Resistant Receptacles sections if not used.***

**HOSPITAL GRADE RECEPTACLES**

**General Requirements:** NEMA Type 5‑20R, Nylon or high impact resistant face. Receptacles shall be UL498 Listed and meet Federal Specification WC-596. All duplex receptacles shall be Hospital Grade, 20 amp rated.

Generally, all receptacles shall be duplex convenience type unless otherwise noted.

All receptacles on emergency circuits shall have a red face with matching red cover plate.

All receptacles designated as isolated ground shall have an isolated ground triangle imprint on the face of the receptacle.

***The consultant shall identify all GFCI outlets on drawings.***

All receptacles installed in bathrooms, kitchens, and within 6 feet of the outside edge of sinks shall be GFCI type.

All receptacles installed in outdoor locations, garages, rooftops, and in other damp or wet locations shall be GFCI type with a weather-resistant (WR) rating.

**Hospital Grade Convenience and Straight‑blade Receptacles:** All receptacles shall be back- and side-wired, screw clamp type, suitable for solid or stranded wire up to #10 AWG, with a separate green ground screw. Receptacles shall be as follows:

Hubbell HBL8300\*,

Leviton 8300-H\*,

Pass & Seymour 8300\*,

or approved equal. (\* indicates color selection).

**Hospital Grade GFCI Receptacles:** Duplex convenience receptacle with integral ground fault current interrupter meeting the requirements of UL standard 943 Class A, including self-test functionality and reverse line-load misfire function repeatability. GFCI receptacles shall be as follows:

Hubbell GFRST83\*,

Leviton GFNT2-HG\*,

Pass & Seymour 2097HG\*,

or approved equal. (\* indicates color selection).

**Hospital Grade GFCI Receptacles with a weather-resistant (WR) rating:** Weather-Resistant duplex convenience receptacle with integral ground fault current interrupter meeting the requirements of UL standard 943 Class-A, including self-test functionality and reverse line-load misfire function repeatability. WR GFCI receptacles shall be as follows:

Hubbell GFR8300SG\*,

Leviton GFWT2-HG\*,

or approved equal. (\* indicates color selection).

**USB Charger and Hospital Grade Duplex Tamper-Resistant Receptacles:** Do not use combination duplex receptacles with USB chargers. Use duplex receptacles as required for the application and as specified herein. Use separate 4-port USB charging devices.

**USB Charging Devices:** Single-gang 4-port USB charging station. USB ports shall meet UL94 for 5V flammability rating, and shall comply with battery charging specification USB BC1.2. USB ports shall be compatible with USB 1.1/2.0/3.0 devices, including Apple products. USB ports shall be rated 5VDC, 4.2A minimum. Devices shall be as follows:

Hubbell USB4\*,

Leviton USB4P-\*,

Pass & Seymour TM8USB4\*CC6,

or approved equal. (\* indicates color selection).

**Locking‑Blade Receptacles:** As indicated on drawings.

***Review NEMA WD-1 and the manufacturer's charts to determine the appropriate NEMA configuration for receptacles.***

**Specific‑use Receptacle Configuration:** As indicated on drawings.

**Hospital Grade Modular Convenience and Straight‑blade Receptacles:** Receptacles shall be as follows:

Hubbell SNAP8300\*A,

Leviton M8300-H\*,

Pass & Seymour PT8300\*,

or approved equal. (\* indicates color selection).

**Hospital Grade Modular GFCI Receptacles:** Duplex convenience receptacle with integral ground fault current interrupter meeting the requirements of UL standard 943 Class A, including self-test functionality and reverse line-load misfire function repeatability. GFCI receptacles shall be as follows:

Hubbell GFRST83SNAP\*,

Leviton MGFN2-HG\*,

Pass & Seymour PT2097HG\*,

or approved equal. (\* indicates color selection).

**Hospital Grade Modular GFCI Receptacles with a weather-resistant (WR) rating:** Use back- and side-wired devices in lieu of modular weather-resistant rated GFCI receptacles.

***Tamper-resistant devices are required for dwelling units (including dormitories) and pediatric areas of healthcare facilities. Review codes for other locations that may require tamper-resistant devices. The requirement for tamper-resistant devices shall be noted on the drawings. Do not use tamper-resistant devices where they are not needed. Delete this section if not used.***

**HOSPITAL GRADE TAMPER-RESISTANT RECEPTACLES**

**Hospital Grade Tamper-Resistant Convenience and Straight‑blade Receptacles:** Tamper-resistant receptacles shall be back- and side-wired, screw clamp type, suitable for solid or stranded wire up to #10 AWG, with a separate green ground screw. Receptacles shall be as follows:

Hubbell 8300\*TR,

Leviton T8300-\*,

Pass & Seymour TR63H\*,

or approved equal. (\* indicates color selection).

**Hospital Grade Tamper-Resistant GFCI Receptacles:** Tamper-Resistant duplex convenience receptacle with integral ground fault current interrupter meeting the requirements of UL standard 943 Class A, including self-test functionality and reverse line-load misfire function repeatability. Receptacles shall be as follows:

Hubbell GFR8300SG\*,

Leviton GFTR2-HG\*,

Pass & Seymour 2097HGTR\*,

or approved equal. (\* indicates color selection).

**Hospital Grade Tamper-Resistant GFCI Receptacles with a weather-resistant (WR) rating:** Tamper-Resistant and weather-resistant duplex convenience receptacle with integral ground fault current interrupter meeting the requirements of UL standard 943 Class A, including self-test functionality and reverse line-load misfire function repeatability. Receptacles shall be as follows:

Hubbell GFR8300SG\*,

Leviton GFWT2-HG\*,

or approved equal. (\* indicates color selection).

**Hospital Grade Modular Tamper-Resistant Convenience and Straight‑blade Receptacles:** Tamper-resistant receptacles shall be as follows:

Hubbell SNAP8300\*TR,

Leviton MT830-\*,

Pass & Seymour PTTR8300\*,

or approved equal. (\* indicates color selection).

**Hospital Grade Modular Tamper-Resistant GFCI Receptacles:** Tamper-resistant duplex convenience receptacle with integral ground fault current interrupter meeting the requirements of UL standard 943 Class A, including self-test functionality and reverse line-load misfire function repeatability. Receptacles shall be as follows:

Hubbell GFTWRST83SNAP\*,

Leviton MGFT2-HG\*,

Pass & Seymour PT2097HGTR\*,

or approved equal. (\* indicates color selection).

***Corrosion-resistant devices are required for harsh environments such as pool equipment rooms. Devices that need to be corrosion-resistant shall be identified on the drawings. Delete this section if not used.***

**CORROSION-RESISTANT RECEPTACLES**

**General Requirements:** NEMA Type 5‑20R, Nylon or high impact resistant yellow face. Receptacles shall be UL498 Listed. All duplex receptacles shall be Industrial Extra Heavy Duty Specification Grade, Corrosion Resistant, 20 amp rated.

Generally, all receptacles shall be duplex convenience type unless otherwise noted.

***The consultant shall identify all GFCI outlets on drawings.***

All receptacles that are required to be GFCI type shall be served from a GFCI style circuit breaker.

**Convenience and Straight‑blade Receptacles:** All receptacles shall be back- and side-wired, screw clamp type, suitable for solid or stranded wire up to #10 AWG, with a separate green ground screw. Receptacles have one-piece brass mounting strap with integral ground, 0.036-inch-thick brass triple-wipe power contacts, and nickel-plated straps and contacts for corrosion resistance. Receptacles shall be as follows:

Hubbell: equal to Pass & Seymour CR6300,

Leviton: equal to Pass & Seymour CR6300,

Pass & Seymour CR6300,

or approved equal. Color shall be yellow.

***A/E shall determine if line-voltage occupancy or vacancy sensors as indicated below are required versus Digital Motion Sensors (vacancy sensors) per section 26 09 43 Distributed Digital Lighting Controls. Delete the paragraph below and associated paragraphs if not used. If different types are used, identify the different types on the plans.***

**MOTION SENSORS (OCCUPANCY and VACANCY)**

**Digital Motion Sensors:** Low-Voltage motion sensors that are part of a Digital Lighting Control System: Refer to specification section 26 09 43 Distributed Digital Lighting Controls.

**General Requirements:**

All motion sensors shall be hardwired type; battery type shall not be permitted.

Sensors shall use either passive infrared, or if dual technology, passive infrared and passive acoustic sensing or passive infrared and ultrasonic sensing for detecting room motion.

Sensitivity shall be user adjustable or self-adjusting type.

The delay timer shall be adjusted within a range of 6 to 30 minutes by the contractor in the field. The sensor shall have a test mode for performance testing.

The test LED shall indicate motion.

Line voltage sensors are acceptable, especially in exposed ceiling areas where all wiring shall be installed in conduit, including low voltage cabling if power packs are used. Provide power pack as required for low voltage sensors.

See drawings for actual types of sensors.

Vacancy sensors shall allow for manual-ON and automatic-ON operation.

Motion sensors and power packs shall have five-year warranties.

**Wall Mounted (Wall Switch Type):** The unit shall fit in/on a standard single gang switch box.

Rated capacity: 600 watts minimum at 120 volts, 60 Hz; 1000 watts minimum at 277 volts, 60 Hz.

The sensor shall have two switches where dual-level lighting is required. The switch shall have manual override for positive OFF and automatic ON.

The area of coverage shall be approximately 180 degrees by 35-40 feet.

**Zero-10 Volt Dimming Wall Switch Sensor:** The unit shall fit in/on a standard single gang switch box.

Device allows the user to increase or decrease the lighting levels via 0-10 Vdc output. Device sinks up to 50mA for control of compatible drivers. DIP switch settings enable a variety of control options such as Auto-ON operation, high and low trim, ramp up and fade down times, power loss mode, smart light level, walk-through and test modes. Additional DIP switch settings allow the user to choose which sensing technologies turn ON, hold ON or retrigger the lighting.

The area of coverage shall be approximately 180 degrees by 35-40 feet.

***A/E shall include a line voltage ceiling mounted motion sensor in their schedule for exposed ceiling areas.***

**Ceiling Mounted:** The unit shall fit in/on a standard octagon box. All ceiling mounted sensors shall be installed to a box with ring and box support.

The coverage area shall be 360 degrees by approximately 15 feet radius when mounted at 9-foot height. The sensor shall have provisions, such as masking, to block out problem areas.

**Ceiling/Corner Mounted:** The unit shall fit in/on a standard octagon box. All ceiling mounted sensors shall be installed to a box with ring and box support.

The coverage area shall be 90 degrees or greater by approximately 40 feet radius when mounted at 9-foot height. The sensor shall have provisions, such as masking, to block out problem areas.

**Power Packs:** Provide power packs as required for low voltage sensors. Rated capacity shall be 20 amps at 120 or 277 volts for fluorescent lamps.

The unit shall fit on a standard octagon box. All power packs shall be installed onto a supported box.

Low voltage cabling shall be plenum rated or installed in conduit in plenum-rated areas.

**Auxiliary Contacts for HVAC Interlock:** Provide auxiliary dry contacts for HVAC BAS interlock when required. Refer to the “Occ Sensor Interlock” column in the Air Terminal Schedule(s) on the HVAC drawings. When required, provide auxiliary contacts regardless if the motion sensors are line- or low-voltage.

The motion sensors and auxiliary contacts shall be wired such that the sensor still detects motion and controls the auxiliary contacts regardless if the light switch(es) are in the OFF position (e.g., the occupant has turned the lights OFF because there is enough daylight, but the occupant is still occupying the space, and the motion sensor senses the occupant and closes the auxiliary contacts for BAS input).

The BAS wiring to the auxiliary contacts shall be by the Division 23 contractor.

**EMERGENCY LIGHTING CONTROL UNITS (ELCUs)**

**General Requirements:** Emergency Lighting Control Units (ELCUs) shall automatically illuminate connected emergency lighting upon utility power interruption, regardless of room switch position or motion sensor state.

ELCUs shall be UL 924 listed.

Warranty shall be 5-year replacement warranty.

Local room switch or lighting control shall turn both normal and emergency luminaires ON at the same time (no dedicated emergency room switch required).

The ELCU shall have a minimum load rating of 20 Amps at 120V or 277V, 1800W Tungsten at 120V,

1500W Tungsten at 277V, 1 HP, or general use 20 Amp circuits.

The ELCU shall accept 120V or 277V, 60Hz Input & Output (voltage tolerance +/- 15%).

The ELCU shall include emergency power and normal power indicator LEDs, and a manual test switch. The unit shall monitor the branch circuit associated with its controlled load(s)

The ELCU shall accept separate phases on the constant hot and switched hot inputs.

The ELCU shall utilize zero crossing circuitry to protect relay contacts from the damaging effects of inrush current generated by switching electronic loads. The unit shall include high voltage input surge protection up to 50,000V.

Load contacts shall be able to withstand 10 direct shorts while connected to a 20 Amp breaker without permanent damage.

The ELCU shall not generate any objectionable electrical or mechanical noise.

The ELCU shall have UL 94-VO or UL 94-5VA flame rating and be approved for installation above the suspended ceiling.

**Dimming Applications:** The ELCU shall automatically illuminate connected emergency lighting to full brightness upon utility power interruption, regardless of dimmer or switch position or motion sensor state.

The ELCU shall be compatible with 2-wire, 3-wire, 0-10V, and DALI dimming systems and ballasts.

The same local room switch, dimmer, or lighting control shall dim both normal and emergency luminaires at the same level during normal operation.

***The following two paragraphs should be edited to meet the requirements of the specific project.***

**PHOTOCELLS**

The controller shall be rated 2000 watts tungsten at 120, 240 or 277 volts. The cell shall be cadmium sulfide, 1" diameter.

The enclosure shall be die-cast zinc, gasketed for maximum weather proofing.

The enclosure shall include the positioning lug on the top of the enclosure.

The unit shall have a delay of up to two minutes to prevent false switching. ON/Off adjustment shall be done by moving a light selector with a range from 2 to 50 foot-candles.

Mounting shall be for a 1/2" conduit nipple.

The unit shall have a 5-year warranty.

The contacts shall be SPST normally closed.

The operational temperature range shall be -40 to 140 degrees F (-40 to +60 degrees C).

***Coordinate with user agency the control of site and exterior lighting by building automation system.***

**TIME CLOCKS**

Unit shall be a multi-purpose, 7-day, 365-day advance single and skip a day, combination 2-channel electronic time clock with a SPDT switching configuration and astronomic dial.

The contacts shall be rated 10 amp resistive at 120/250 VAC, 7.5 amps inductive at 120/250 VAC, 5 amps inductive at 30 VDC and up to 1/2 HP at 250 VAC. The unit shall be rate for 30 VDC, 120 VAC, 250 VAC and 277 VAC.

The controller shall be capable of programming in the AM/PM or 24-hour format by jumper selection, in one minute resolution, using 2 buttons only for all basic settings.

Display shall be LED type.

The unit shall have 365 day and or holiday selection capabilities, with 16 single date and 5 holiday selection options and user selectable daylight savings/standard time functions.

The unit shall have 72-hour memory backup with rechargeable battery and charger.

The unit shall be capable of manual override, ON and OFF to the next scheduled event, using 1 button for each channel.

The enclosure shall be rated for indoor or outdoor installation.

***Time switches shall NOT be used for mechanical rooms, electrical rooms or telecommunication closets.***

**TIME SWITCH**

The switch shall be programmed to automatically turn lights off after a preset time.

The delay timer shall be adjustable with a range of 5 minutes to 12 hours.

Switch shall be rated for 120/277V, 1200W load.

The switch shall beep warning every 5 seconds during the last minute of countdown. Also, the switch shall flash lights (for warning) at one minute before timer expires.

Time scrolling shall be provided to override preset time by pressing the ON/OFF switch for four seconds.

LCD provided to show count down time.

The switch shall have zero crossing circuitry.

**PART 3 - EXECUTION**

***Indicate mounting height of devices on the symbols list on the plans. Indicate whether the noted heights are to the top, center, or bottom of the device. Mounting heights shall conform to ADA guidelines: no more than 48” to the top of a device or 15” to the bottom of a device.***

**INSTALLATION**

Device installations shall be per ADA requirements.

See plans for device mounting heights.

Install wall switches with OFF position down.

Wall dimmers: de-rate ganged dimmers as instructed by manufacturer; do not use common neutral.

Install convenience receptacles with grounding pole **ON TOP**.

Install box for information outlet at the same height as adjacent convenience receptacles. Locate boxes for information outlet as close as practical to duplex power outlet, approximately 2-inches apart.

Install box for telephone jack for wall telephone at 46-inches to center above finished floor.

Install specific‑use receptacles at heights shown on Contract Drawings.

Install decorative plates on switch, receptacle, and blank outlets in finished areas.

Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface‑mounted outlets.

Install devices and wall plates flush and level.

Receptacles shall have a bonding conductor from grounding terminal to the metal conduit system. Self-grounding receptacles using mounting screws as bonding means are not approved.

**FIELD QUALITY CONTROL**

Inspect each wiring device for defects.

Operate each wall switch and sensor with circuit energized, and verify proper operation.

Verify operation of each ELCU by turning off the normal power circuit breaker at the panelboard.

Verify that each receptacle device is energized.

Test each receptacle device for proper polarity.

Test each GFCI receptacle device for proper operation.

The user agency and DFD personnel reserve the right to be present at all tests.

***A/E shall include the following two paragraphs regarding Receptacle Testing and Record Keeping for Healthcare-type facilities. Delete if not applicable.***

**Receptacle Testing in Patient Care Rooms:**

1. The physical integrity of each receptacle shall be confirmed by visual inspection.
2. The continuity of the grounding circuit in each electrical receptacle shall be verified.
3. Correct polarity of the hot and neutral connections in each electrical receptacle shall be confirmed.
4. The retention force of the grounding blade of each electrical receptacle (except locking-type receptacles) shall be not less than 115 g (4 oz).

**Record Keeping of Receptacle Testing:**

1. Documentation of the tests required above shall be provided to the Engineer of Record for review.
2. At a minimum, documentation shall include the following:
   1. Tester’s name, credentials, and signature.
   2. Date(s) of testing.
   3. Specific criteria per NFPA 99 that were tested.
   4. A list of all receptacle locations identified individually.
   5. A record of the test result with indication of pass/fail.

**MOTION SENSORS**

***Consultant to identify return-air plenums on drawings.***

Power packs used in return air plenum ceiling areas shall be installed in an approved enclosure or UL listed for return air plenum.

Provide a minimum of 4’ of coiled cable for ceiling-mounted sensors.

Motion sensors shall be installed at locations indicated on the manufacturer’s submittal layout drawings. Sensors shall be located to prevent false “ON” tripping of the lights.

Sensitivity Test: After the sensor has been energized for at least 15 minutes, walk to the middle of the room (if conference room), or sit at the normal desk position (if an office). Make no motion for 20 seconds. Move one arm up and down slowly. The test LED should blink.

Time Delay Test: Set the time delay for 10 minutes. Walk into the room to activate the sensor then leave room. Sensor must turn lights off at approximately 10 minutes. Walk into the room again to reactivate the lights. Lights should activate within 1 second.

**ELCU WIRING**

For lights on emergency power *without* an emergency lighting control unit (ELCU), use the *emergency* circuit to energize the motion sensor’s power pack or Digital Load Controller. Route the emergency circuit through the motion sensor’s power pack or Load Controller’s relay to the light fixtures. Route any non-emergency circuits controlled by the same motion sensor/Load Controller through separate auxiliary relays/Digital Auxiliary I/O Interface Modules.

For lights on emergency power *with* an ELCU, route the *normal* power through the switches and motion sensor or Load Controller relay to the ELCU, then to the normal power lighting fixtures. Connect the emergency circuit to the ELCU’s emergency power terminals, then to the emergency lighting fixtures. The ELCU will control the emergency lighting along with the normal lighting controls, but will turn the emergency lights ON in a power outage, regardless of the position of the switches or Load Controller relays (ON or OFF).

**ADJUSTING**

Adjust devices and wall plates to be flush and level.

Mark all conductors with the panel and circuit number serving the device with a machine generated label, at the device, and on the back of the device cover.

END OF SECTION