Product Specifications – Dialog® System

1.   PART 1 - General

1.1   Overview

1.1.1   Provide a complete low voltage lighting control system for the building as shown on the plans and specified herein.

1.1.2   Lighting control system shall utilize networking technology connecting relay panels, switches and sensors based upon a 2-wire data line providing both power and data to all field devices. The network shall be free topology; therefore a serial loop is not necessary to achieve maximum network distance. The system shall utilize a web server device complete with a touch screen located in a relay panel so that programming and viewing of status can be accomplished at the panel or by any PC connected to the same LAN or via the internet.

1.1.3   All relay panel interiors shall be pre-assembled complete with the necessary relays, transformers and devices. Relay panels that are wall mounted shall have interiors separate from enclosure so as to permit easy mounting, conduit installation and wire pull to enclosures. Enclosures mounted in the ceiling space are not required to have separate interiors.

1.2   Manufacturers

1.2.1   All components are to be supplied by same manufacturer. Manufacturer to be a supplier of this type of equipment for over 10 years.

1.2.2   Lighting control system shall be the Dialog system manufactured by **Douglas Lighting Controls Inc.**

1.3   Prior Approval Submissions

1.3.1   Manufacturers wishing to submit quotations on the lighting control system must pre-qualify. Pre-qualification information must be submitted to the electrical consulting engineer not later than ten (10) working days prior to the final closing of tenders for this project.

1.3.2   The manufacturer must be prepared to demonstrate the equipment being proposed before the closing of tender.

1.3.3   Submit a one-line diagram of the proposed system configuration for review.

1.4   Instruction Manuals

1.4.1   Supply manuals on system components to permit ease of installation, system operation and maintenance including, but not limited to the following:
   • Lighting control system step-by-step operating instructions.

- Relay panel schedules indicating circuits connected, inputs assigned, area controlled, panel location and panel equipment details.

2. PART 2 - Materials

2.1 Relays

2.1.1 Lighting control relays shall be mechanically latching and shall come complete with a manual ON/OFF switch. The mechanical switch shall continuously display the true state of the relay's internal contacts.

2.1.2 Single pole relays shall be rated and UL/CSA listed for 120VAC, 277VAC and 347VAC lighting loads at 20 amps (30A General Use) and have a general, tungsten, standard and electronic ballast rating. Use **Douglas Lighting Controls** WR-6161.

2.1.3 Double pole relays shall be rated and UL listed for 208VAC, 240VAC and 480VAC and CSA for up to 347VAC lighting loads at 20 amps and have a general, tungsten, standard and electronic ballast rating. Use **Douglas Lighting Controls** WR-6172.

2.1.4 The relays shall have a label indicating the short circuit fault current rating as per the NEC 2005. The relays shall have passed UL 508 short circuit tests at 14,000 amperes.

2.1.5 Each lighting control relay shall be capable of controlling incandescent, fluorescent, electronic ballast and H.I.D. lighting loads and have an inrush capability of 3000 amperes. Relays shall be complete with a 5-year Manufacturer's Limited Warranty.

2.1.6 Lighting control relays shall include captive screw terminals for both the line voltage and the low voltage connections. Switching the relay shall be accomplished with ONE signal wire and a common return. The signal wire shall be able to signal ON and OFF and shall carry status current that indicates if the relay is ON or OFF.

2.2 Pre-assembled Relay Panels: PWEx Series

2.2.1 Where indicated on the drawings, provide a factory pre-assembled relay panel. The panel's enclosure shall be for surface or flush installation, with a screw-on cover or a hinged door assembly as required.

2.2.2 The panel shall consist of a pre-assembled interior insert; UL/CSA approved **Douglas Lighting Controls** CxxM or WxxM series with capacities for 6, 12, 24, 48 or 72 relays as required. Panel enclosure must be UL/CSA Approved.

2.2.3 Panel interior shall have the following pre-assembled and pre-wired:
- Suitable divider separating class 1 and class 2 compartments.
- Dual-Tapp Control transformer, UL/CSA approved for class 2 circuits, Douglas Lighting Controls WR-4075-xxx where xxx = primary voltage.
- Low voltage relays as required by switched circuits shown on plans or schedules.
- Control devices as required.

2.3   Device Network Controls - Lighting Control Unit: WLC-3150

2.3.1   The **Douglas Lighting Controls** Dialog WLC-3150 Lighting Control Unit (LCU) shall be able to operate the local lighting control system on a stand-alone basis. For large installations that require multiple LCUs up to 25, all units must be able to operate on a stand-alone basis should they become disconnected from the network.

2.3.2   The LCU shall provide the following user interfaces for viewing and editing data:
- Built-in touch screen with editable IP address field for convenient at panel configuration and providing web accessible configuration.
- Built-in web server, accessed via TCP/IP connection.
- LCU shall be accessible via a web browser with no additional software required.

2.3.3   Each LCU shall provide the following standard lighting control functions:
- Program and control up to 252 relays and 252 dimmers.
- Link Outputs to switches and/or sensors to provide ON/OFF, Preset, or Dim Up/Down commands. In addition, functions such as Flick Warn, Time Out, Natural Daylight, Enable/Disable and Quiet Time can be associated with switches, sensors and relays and have these features scheduled by time-of-day or date.
- Be able to group Outputs and Inputs to facilitate various control schemes.
- Be able to program peripheral devices (switches, sensors, etc.) to function differently based on specific situations such as time-of-day, demand response status, user intervention, etc.
- Photo Sensor to provide Dusk-to-Dawn (switching) and/or Natural Daylight (dimming) with multiple set points to different groups.
- Astronomic Controls for Dusk-to-Dawn applications not requiring Photo Sensor.
- Provide Log Reports for diagnostic and run-time tracking purposes.
- Time Schedule types include: 7-day weekly scheduling, 365-day date specific, Holiday, and event scheduling.

2.3.4   The system shall have pre-defined logical applications for lighting controls.
- Astronomical Time Clock
- Natural Daylight (CLC) – Open Loop & Close Loop
- Exterior Threshold Photo Control
- Time Out (Unoccupied Mode)
- Quiet Mode
- Permanent Block
- Flick Warn

2.3.5   The system must shall the ability to operate multiple items and modes with a single action and sequence them with time offsets.

2.3.6   **Behaviors**: The system shall have the ability to program multiple actuations and modes with a single activation. Each item must be able to be

programmed with a time offset. When the deactivation occurs a separate and unique list of actuations can be programmed.

2.3.7 **Triggers:** The system shall be able to utilize the status or the one or many relay/group statuses to send an actuation to the system. The statuses must be able to be programmed in an AND or OR logic.

2.3.8 Each LCU shall provide the following system functions:
- Demand response: connection via contact input.
- Accept configuration updates via USB port or Ethernet connection.
- Backup data via Ethernet or USB port.

2.4 Dialog Room Controller: WRC-3160

2.4.1 Where indicated on the drawings provide a pre-configured, digitally addressable, plenum-rated room controller.

2.4.2 The Dialog Room Controller shall be capable of:
- Autonomously controlling a space.
- Networking to a central Dialog control system.
- Networking to a central BACnet based management system.

2.4.3 The Dialog Room Controller shall consist of:
- A universal voltage type (120Vac/277Vac/347Vac) power supply.
- Four 20A rated relays complete with manual override. Circuit Load rating dependent on usage. One circuit dedicated for 20A receptacle control.
- Four 0-10V control channels, capable of 100mA current sinking
- A port to connect downstream switches, occupancy sensors and daylight sensors. All downstream devices shall connected via two #18AWG, non-polarized, non-shielded, non-twisted conductors. See Section 3.4 for wiring specifications.
- A port to connect to an upstream Dialog Lighting Control Unit.
- A port to connect upstream to BACnet IP building management system. The Controller shall communicate using native BACnet command objects appropriate for the application.
- An indicating LED to aid in locating the controller in a darkened ceiling space.
- Circuit testing buttons
- Capable of connecting with WUL-3924
- Output 24Vac 120mA
- Relay Ratings
  - 20A Suitable for General Purpose Loads @ 120/277/247VAC
  - 20A Suitable for Standard Ballasts and Tungsten Loads @ 120/277VAC
  - 15A Suitable for Standard Ballasts Only @ 347VAC
  - 16A Suitable for Electronic Ballasts @ 120/277VAC
  - 0.5HP @120/277Vac
- US & Canada Plenum Rated

2.4.4 The Dialog Room Controller relays shall be connected such that 120Vac plug load(s) and 277Vac/347Vac lighting loads can be switched by a single Controller with no additional add-ons or remote modules

2.4.5   The Dialog Room Controller shall mount to electrical junction box via threaded ½" chase nipple. No other mounting hardware shall be required.

2.5   Dialog Room Controller UL924 Relay Expansion Pack: WUL-3924

2.5.1   Where indicated on the drawings provide a 2-relay expansion pack consisting of two independently controllable, 20A relays capable of emergency lighting circuit control.

2.5.2   Expansion pack relays shall force EM lights on when the Dialog Room Controller loses power.

2.5.3   The expansion pack shall connect to the Dialog Room Controller. No wires or tools shall be required to add an expansion pack to a Dialog Room Controller. The Dialog Room Controller will include a means for remote mounting if required.

2.5.4   Circuit testing buttons

2.5.5   Capable of connecting directly to WRC-3160

2.6   Relay controls installed in relay panels - Relay Drivers: WRD-3408

2.6.1   The low voltage relays shall be connected to the Dialog system by a Douglas Lighting Controls WRD-3408 relay driver unit. Each WRD-3408 relay driver has 8 outputs and shall provide enough relay driver units so that each relay in the system is connected to an output.

2.6.2   Relay drivers shall be able to control relays ON and OFF, determine relay status, provide feedback as to whether a relay is connected and be addressable within the Dialog network.

2.7   Dimming Ballast Control - Ballast Drivers: WDB-3314

2.7.1   The Dialog system shall be able to control industry standard 0-10VDC dimming ballasts or 0-10VDC LED drivers by using the **Douglas Lighting Controls** WDB-3314 Dimming Ballast Module. Each WDB-3314 shall have 4 dimming address outputs, be able to support 35 ballasts per output and support sink current of 100mA per output.

2.8   Telephone Interface: WTI-3101

2.8.1   Provide a Douglas Lighting Controls WTI-3101 telephone interface for direct code communication via the regular TOUCHTONE® telephone system, so that dialing a special number and entering a definable code shall allow various zone control from any regular push button telephone. A password module shall protect the system from unauthorized access.

2.9   BACnet IP Gateway: WNG-3131

2.9.1   If required, the system shall have the ability to communicate to a system integrator or other software specialist to program the system through a **Douglas Lighting Controls** WNG-3131. It shall be possible to view/control

the system via the BACnet integration software through TCP/IP connection. The system shall provide the following features:

- Program and control up to 252 relays and dimming points.
- Control and receive status for Groups
- Control and receive status for Presets
- Receive status from Occupancy Sensors

2.10   Global Web Server: GWS-xxxx

2.10.1   The **Douglas Lighting Controls** GWS-xxxx shall be able to operate the entire lighting control system from a single interface.

2.10.2   The GWS shall provide the built-in web server interfaces for viewing and editing data, accessed via TCP/IP connection and connect to a PC/laptop using IE9+.

2.10.3   The GWS will give access to up to 25 LCUs and shall provide the following standard lighting control functions within each LCU:

- Program and control up to 252 relays and 252 dimmers.
- Link Outputs to switches and/or sensors to provide ON/OFF, Preset, or Dim Up/Down commands. In addition, functions such as Flick Warn, Time Out, Natural Daylight, Enable/Disable and Quiet Time can be associated with switches, sensors and relays and have these features scheduled by time-of-day or date.
- Be able to group Outputs and Inputs to facilitate various control schemes.
- Be able to program peripheral devices (switches, sensors, etc.) to function differently based on specific situations such as time-of-day, demand response status, user intervention, etc.
- Photo Sensor to provide Dusk-to-Dawn (switching) and/or Natural Daylight (dimming) with multiple set points to different groups.
- Astronomic Controls for Dusk-to-Dawn applications not requiring Photo Sensor.
- Provide log reports for diagnostic and run-time tracking purposes.
- Time schedule types include: 7-day weekly scheduling, 365-day date specific and event scheduling.

2.10.4   The **GWS-xxxx** shall provide the additional following system functions:

- Centralized Programming
- Synchronization of time clocks
- Download and upload of all system files
- OPC Server Deployment
- The ability to operate with an GUI interactive floor plan

2.11   Graphics Package

2.11.1   In normal operation / manual command mode, the computer shall enable the viewing of one or more graphic drawings of the controlled building along with the status of each of the controlled sectors. Using the mouse or optional Touch Screen, the operator can view into various portions of the

building and switch relays, groups, presets, and active modes. No special control code memorization shall be necessary.

2.11.2   The owner shall provide direction on colors and logos

2.11.3   The lighting symbols shall be established by the user through the graphic editor and shall change color in order to display the real time status of that particular relay or zone.

2.11.4   The Graphics shall be deployed on the **Douglas Lighting Controls** GWS-xxxx Global Web Server (GWS) and served up via a mobile app or desktop app.

2.12   Wall Switch – WSW-35xx series Data Line Switches

2.12.1   Switches shall be **Douglas Lighting Controls** WSW-35xx and connect to the lighting control network via a common 2-wire, non-polarized data line. Switches shall be configured and programmed to control one or more outputs in the lighting control system.

2.12.2   Switches shall have the capability to be configured an **Douglas Lighting Controls** WIR-3110 infrared setting unit that accesses programming fields of the switch without removing the switch from the wall box.

2.12.3   Switches are linked to a single output or a group of outputs.

2.12.4   Switches, Occupancy Sensors and Photo Sensors can be set to a common output address to permit multiple points of control for a single relay or dimming output.

2.12.5   Switches, Occupancy Sensors and Photo Sensors can be set to a common group address to permit multiple points of control for a group of outputs.

2.12.6   Each switch can be programmed for ON/OFF control of outputs, UP/DOWN control of 0-10VDC dimming ballasts, 0-10VDC LED drivers and/or preset control to set a specific lighting scene.

2.12.7   Switches, with LED indicators to indicate both ON and OFF output/group status, shall be available with 1, 2, 3, 4 or 8 single button switches per gang. Switch to fit standard Decora opening.

2.12.8   Switches and switch hardware shall mount to standard wall boxes.

2.12.9   Each switch shall provide a location for a label to identify function. The label shall be under a clear plastic cover and shall be field replaceable should the operation of the switch change. Permanently etched switches are not acceptable.

2.12.10 Adhere to the factory recommended wiring practices so that physical removal of any single switch shall still permit communication between relay panels in the rest of the Dialog lighting control network.

2.13   Keyed Switch: WSK-3502 series

2.13.1   Keyed switches shall be **Douglas Lighting Controls** WSK-3502 and connected to the lighting control network via a 2-wire, non-polarized data line.

2.13.2   Keyed ON/OFF switches shall include LED indicators for ON and OFF status.

2.13.3 Keyed switches can be programmed to control individual outputs or groups of output and can also be programmed to enable/disable peripheral devices such as switches or sensors.

2.13.4 Each keyed action, clockwise and counter-clockwise, shall allow for independently programmed functions.

2.13.5 Keyed switches can be programmed with a **Douglas Lighting Controls** WIR-3110 infrared setting unit.

2.14 Dimmer Switch: WSD-3501 series

2.14.1 Dimmer switches shall be **Douglas Lighting Controls** WSD-3501 and connected to the lighting control network via a 2-wire, non-polarized data line. Each switch shall be capable of raising or lowering light levels of individual or groups of lighting fixtures.

2.14.2 Switches shall include integral LED indication for light levels as well as a switch for ON/OFF control.

2.14.3 Dimmer switch can be programmed with a **Douglas Lighting Controls** WIR-3110 infrared setting unit.

2.15 Ceiling Sensor – Low Voltage WORSDG Series

2.15.1 Sensors shall be **Dialog** WOR series Dual Technology with Passive Infrared (PIR) and ADI-Voice detection.

2.15.2 Ceiling sensors shall mount recessed in to the ceiling space.

2.15.3 Sensors shall have a 360 degree coverage pattern with an adjustable tilt head to maximize coverage, focus on particular areas, or provide adjustment when mounted on sloped ceilings.

2.15.4 Sensors shall provide an adjustable time out period of 30 seconds to 30 minutes.

2.15.5 Sensors shall operate with the **Diversa** WP-PP20-D / WP-PP20-2P-D / WP-PP20-347-D Power Pack using diode pulse technology.

2.15.6 A **Douglas Lighting Controls** WR-4075 transformer shall be used if required.

2.15.7 If a Photo Sensor is required, it shall be incorporated into the Occupancy Sensor device and operate so that when occupancy is detected, the sensor will only allow the load to be switched ON if the light level is below the daylight level set by the user.

2.15.8 A Manual Override Switch is to be provided on the sensor to allow the load to be manually switched ON and OFF for the purpose of testing during installation.

2.15.9 Where 2 level switching is required, a 2-pole sensor shall be provided. The sensors must be able to be set to activate alternating poles to provide even lamp wear.

2.15.10 Provide as required on the plans, options that are available from the following list:

- 0-10VDC outputs for dimming ballast option for Natural Daylight with user settable light levels
- Configurable high and low light level set points so that the sensor can toggle between light levels upon occupancy
- Auxiliary relay, for signaling other systems, which can be configured so that it synchronizes with the ON/OFF status of the load or the status of occupancy/vacancy
- Remote Manual Override Switch, Douglas Lighting Controls WR-86xx series switch

2.16   Contact Input WCI-3928

2.16.1 Use a **Douglas Lighting Controls** WCI-3928 when inputs from other devices (including other manufacturers) are required. Each unit shall provide DC power for each sensor and will accept a momentary or maintained contact signal from each sensor that can be assigned to any relay or group. Check with factory to ensure compatibility.

2.16.2 Devices connected to WCI-3928 input unit shall include the following features:

- Adjustable Timeout (3 min to 30 min).
- Function selection: ON only, OFF only, toggle (ON/OFF)
- Multiple sensors may work together using either direct connection to sensors or via multi-sensor function built into WCI-3928 units.

2.17   Photo Sensor & Daylight Controls - WPS-3741B Exterior Daylight Sensor

2.17.1 Provide where required a **Douglas Lighting Controls** WPS-3714B Exterior Daylight Sensor capable of sensing from 0 to 65,000 lux (0 to 6500 fc) of direct light. The sensor shall derive both its power and data information from the **Dialog** data line.

2.17.2 The ambient light level shall be continuously monitored in lux by the sensor. The sensor shall broadcast to the network the existing light level when requested or when there is a change in detected light level.

2.17.3 Set point adjustments can be made via a touch screen or web server interface to the **Douglas Lighting Controls** WLC-3150 LCU or on the WLC-3150.

2.17.4 Each sensor can be programmed to provide ON/OFF control of relays, raise/lower of 0-10vdc ballasts and LED drivers via a touch screen or web server interface to the **Douglas Lighting Controls** WLC-3150 LCU or on the WLC-3150.

2.17.5 One sensor shall permit different outputs to switch and/or control light levels as ambient light changes. Light levels shall be controlled by 'sensor only' or in combination with a time schedule or with a dimming switch.

2.17.6 It shall be possible to set a maximum light level which cannot be exceeded during Natural Daylight operations or for non-daylight controlled areas, a permanent or "tuned" light level to maximize energy savings.

2.18   Photo Sensor & Daylight Controls - WPS-3711 Interior Daylight Sensor

2.18.1 Provide where required a **Douglas Lighting Controls** WPS-3711 Interior Daylight Sensor capable of sensing from 0 to 65,000 lux (0 to 6500 fc) of direct light. The sensor shall derive both its power and data information from the **Dialog** data line.

2.18.2 The ambient light level shall be continuously monitored in lux by the sensor. The sensor shall broadcast to the network the existing light level when requested or when there is a change in detected light level.

2.18.3 Set point adjustments can be made via a touch screen or web server interface to the **Douglas Lighting Controls** WLC-3150 LCU or on the WLC-3150.

2.18.4   Each sensor can be programmed to provide ON/OFF control of relays, raise/lower of 0-10vdc type or ballasts and LED drivers via a touch screen or web server interface to the **Douglas Lighting Controls** WLC-3150 LCU or on the WLC-3150.

2.18.5   One sensor shall permit different outputs to switch and/or control light levels as ambient light changes. Light levels shall be controlled by 'sensor only' or in combination with a time schedule or with a dimming switch.

2.18.6   It shall be possible to set a maximum light level which cannot be exceeded during Natural Daylight operations or for non-daylight controlled areas, a permanent or "tuned" light level to maximize energy savings.

2.19   Infrared Setting Unit - WIR-3110

2.19.1   Provide a **Douglas Lighting Controls WIR-3110** Infrared Setting Unit to facilitate the following functions:
- Set input device and address
- Configure input device presets, group, and individual control
- Set local or global functionality

2.20   Wireless Devices – Bluetooth Dimmer Switch

2.20.1   Dimmer switches shall be **Douglas Lighting Controls BT-DMSW-***

2.20.2   Wireless dimmer switches shall communicate with Douglas Lighting Controls wireless devices via Douglas Lighting Controls' wireless Bluetooth mesh.

2.20.3   Each wireless dimmer switch shall be capable of raising or lowering light levels of individual or groups of lighting fixtures.

2.20.4   Wireless dimmer switches shall include integrated LED indicators for light levels as well as an ON/OFF switch.

2.20.5   Wireless dimmer switches shall be configurable with a Douglas Lighting Controls' smartphone Bluetooth App – **BT-APP**.

2.21   Wireless Devices – Bluetooth 4 & 8 Button Switches

2.21.1   Wireless Switches shall be **Douglas Lighting Controls BT-4BTSW-* and BT-8BTSW-*** switches.

2.21.2   Wireless switches shall communicate with Douglas Lighting Controls wireless devices via Douglas Lighting Controls' wireless Bluetooth mesh.

2.21.3   Wireless switches shall be configured and programmed to control one or more outputs in the lighting control system.

2.21.4   Wireless Switches shall be programmed with a Douglas Lighting Controls' smartphone Bluetooth App – **BT-APP**.

2.21.5   Each wireless switch can be programmed for ON/OFF control of outputs, UP/DOWN control of 0-10VDC dimming ballasts, 0-10VDC LED drivers and/or preset control to set a specific lighting scene.

2.21.6   Wireless Switches, with LED indicators to indicate both ON and OFF output/group status, shall be available with 4 or 8 single button switches per gang.

2.21.7   Wireless Switches to fit standard Decora opening.

2.21.8   Wireless Switches and switch hardware shall mount to standard wall boxes.

2.21.9   Each wireless switch shall provide a location for a label to identify function. The label shall be under a clear plastic cover and shall be field replaceable

should the operation of the switch change. Permanently etched switches are not acceptable.

2.22   Wireless Devices – Bluetooth Sensor

2.22.1   Wireless Occupancy and Daylight Sensors shall be Douglas Lighting Controls Dual Technology **BT-WOR-*** ceiling mounted sensors.

2.22.2   Wireless switches shall communicate with Douglas Lighting Controls wireless devices via Douglas Lighting Controls' wireless Bluetooth mesh.

2.22.3   Wireless ceiling sensors shall have an integrated ceiling tile cutting tool for mounting the sensor without tools.

2.22.4   Wireless ceiling sensors shall have a friction mount surface to eliminate a mounting bracket or screws to hold the sensor in place.

2.22.5   Wireless Sensors shall have a 13/16" lens that provides a 360 degree coverage pattern to maximize coverage.

2.22.6   Wireless Sensors shall provide an adjustable time-out period of 30 seconds to 30 minutes.

2.22.7   Wireless Sensors shall have power provided from a 12VDC source.

2.22.8   The ambient light level shall be continuously monitored in lux by the wireless sensor.

2.22.9   The wireless sensor shall broadcast to the Douglas Lighting Controls wireless network the existing light level when requested or when there is a change in detected light level.

2.22.10 Set point adjustments can be made via Smartphone App from **Douglas Lighting Controls** BT-APP.

2.22.11 Each wireless sensor shall have the ability to send wireless Bluetooth messages to a Douglas Lighting Controls **BT-PP20-*** wireless Bluetooth controller to provide ON/OFF control of relays; raise/lower 0-10VDC ballasts and LED drivers; and operate a close loop controlled daylight harvesting system.

2.22.12 It shall be possible to set a maximum light level which cannot be exceeded during Natural Daylight operations or for non-daylight controlled areas, a permanent or "tuned" light level to maximize energy savings.

2.23   Wireless Devices – Bluetooth Controller

2.23.1   A wireless controller from Douglas Lighting Controls BT-PP20-* shall be used for providing wireless Bluetooth mesh network control to one or multiple fixtures.

2.23.2   Wireless controller shall communicate with Douglas Lighting Controls wireless devices via a Bluetooth mesh network

2.23.3   Wireless controllers shall be powered by 120VAC, 277VAC or 347VAC line voltages.

2.23.4   Wireless controllers shall provide 0-10V dimming control

2.23.5   Wireless adapters shall provide a 12VDC output for powering a Douglas Lighting Controls occupancy and daylight sensor – **BT-WOR-***

2.23.6   Wireless controllers shall have a threaded chase nipple for installation into a standard ½" knockout and have flying leads for connecting to line voltage and to the fixture's 0-10V dimming.

Wireless Devices – Bluetooth Fixture Mounted Sensor and Controller

2.23.7   A wireless fixture mounted sensor and controller from Douglas Lighting Controls **FMS-DLC001-*** shall be used for providing wireless Bluetooth mesh network control and occupancy / daylight control to a fixture.

2.23.8   Wireless fixture mounted sensor and controller shall communicate with Douglas Lighting Controls wireless devices via Bluetooth mesh network

2.23.9   Wireless fixture mounted sensor and controller shall be powered by 120VAC, 277VAC or 347VAC line voltages.

2.23.10 Wireless fixture mounted sensor and controller shall have an extended length threaded chase nipple with a break point and spacer to provide occupancy lens with unobstructed beam coverage

2.23.11 Wireless fixture mounted sensor and controller shall have a threaded chase nipple that fits in a standard ½" knockout on a fixture and have flying leads for connecting to line voltage and to the fixture's 0-10V dimming.

2.23.12 Wireless fixture mounted sensor and controller shall be Douglas Lighting Controls **FMS-DLC001-*** fixture mounted sensor and controller.

2.23.13 Wireless fixture mounted sensor and controller shall have a 360 degree coverage pattern to maximize coverage.

2.23.14 Wireless fixture mounted sensor and controller shall provide an adjustable time out period of 30 seconds to 30 minutes.

2.23.15 The fixture mounted sensor and controller shall continuously monitor the ambient light level as measured in lux. Set point adjustments on the wireless fixture mounted sensor and controller can be made via Smartphone App from **Douglas Lighting Controls BT-APP**.

2.23.16 Each wireless fixture mounted sensor and controller can be programmed to provide ON/OFF control of relays, bi-level lighting, raise/lower of 0-10VDC type or ballasts and LED drivers, via a wireless Bluetooth mesh network **Douglas Lighting Controls and communication to the BT-PP20-*.**

2.23.17 It shall be possible to set a maximum light level which cannot be exceeded during Natural Daylight operations or for non-daylight controlled areas, a permanent or "tuned" light level to maximize energy savings.

2.24   Wireless Devices – Bluetooth App

2.24.1   A wireless Bluetooth Smartphone App shall be used for field commissioning of Douglas Lighting Controls Wireless Bluetooth devices

2.24.2   A wireless Bluetooth Smartphone App shall be used by the end-user for controlling the wireless Bluetooth mesh network.

2.24.3   A wireless Bluetooth smartphone app for commissioning shall be available for download.

2.24.4   A wireless Bluetooth app for end-user control shall be available for download.

3.   PART 3 - Installation

3.1   Relay panels and conduit.

3.1.1   Ensure that conduit for line voltage wires enters panel in line voltage areas and conduit for low voltage control wires enters panel on low voltage areas. Check manufacturer's drawings for location of line and low voltage areas.

3.2   Daylight Sensors

3.2.1   Install **Douglas Lighting Controls** WPS-3711 or WPS-3741B daylight sensors as per manufacturer's recommendations for closed loop and open loop applications. Ensure there is no artificial light shining directly into the sensor head.

3.2.2   Adhere to manufacturer's recommendations for wiring and programming.

3.3   Occupancy Sensors

3.3.1   Install **Douglas Lighting Controls** Dialog WORSDG1-P-N or WORXDG1-P-NOccupancy Sensors so objects do not block the coverage area. Keep away from HVAC vents and light directly from light fixtures.

3.3.2   Adhere to manufacturer's recommendations for location, wiring and programming.

3.4   Wiring

3.4.1   For low voltage wiring, provide wire type as recommended by the manufacturer.

3.4.2   Adhere to manufacturer's recommendations as to maximum wire length and maximum quantity of relays per switch.

3.4.3   Dialog Data line shall be single pair #18AWG LVT wire type or equivalent.

3.5   Line Voltage Wiring

3.5.1   Use wire gauges from #12AWG to #14AWG as appropriately sized for the branch circuit.

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