South King Fire and Rescue
Fire Station 65

South King Fire and Rescue Facility Improvements

ADDENDUM # 01
February 10, 2020

TO ALL BIDDERS:

The Bid Documents issued January 10, 2020 for the project noted above are amended by this Addendum # 01

Receipt of this addendum shall be acknowledged by inserting its number in the space provided on the bid form.

PROJECT MANUAL ITEMS

ITEM 1. Table of Contents, Division 26 – Electrical: Add Section 260923
ITEM 2. ADD Specification Section 260923 Network Digital Lighting Control.

DRAWINGS

ARCHITECTURAL

ITEM 3. A21.02, Reflected Ceiling Demo Plan: Revise demo portion to include area above existing murphy beds. Remove and salvage existing ceiling-hung curtain partitions.
ITEM 4. A22.01, Reflected Ceiling Plan: revised new suspended ceiling to include area above existing murphy beds.
ITEM 5. Enlarged Plan 5/A2.11: add note for panel signage mounted in Lobby 122 for ADA Public Restroom 121:
   a. ADA-complying panel signage
   b. Text: 1 inch high “optima” semi-bold
   c. Braille: Grade 2
   d. Construction: Acrylic, 1/8 inch thick
   e. Color: As Selected by Architect from Manufacturer’s standard line of colors. Border and text/pictograms to contrast with background
   f. Border with radiused corners
   g. Size: 6” x 6”
   h. Mounting: 1/16-inch vinyl foam tape on wall surface adjacent door. Comply with ADA mounting guidelines.
   i. Schedule: Room 121, ADA Public Restroom
      i. Text: “Restroom”
      ii. Pictogram: Man/Woman, wheelchair
      iii. Braille: Yes.

ELECTRICAL

ITEM 6. E-101 – Electrical Site Plan

a. REVISE demolition note 1 first sentence to read as follows: "Existing surface mount conduit(s) to fuel station."

ITEM 7. E-501 – Electrical One-Line Diagram

b. REVISE feeder number 400N on conduit/copper feeder schedule to read: "(2) sets of 2" C., (4) #3/0 cu and (1) #2 GR."

SUBSTITUTION REQUESTS

ITEM 8. Sections 265000 Lighting and 260932 Network Digital Lighting Control as follows:

Approval applies to manufacturer only and does not relieve the Contractor/Supplier from the responsibility of meeting all applicable requirements of the Plans and Specifications.

The following representatives and manufacturers have further agreed upon the following:

1. The proposed substitution does not affect dimensions shown on drawings.
2. The undersigned will pay for changes to the building design, including engineering design, detailing and construction costs caused by the requested substitution.
3. The proposed substitution will have no adverse effect on other trades, the construction schedule, or specified warranty requirements.
4. Maintenance and service parts will be locally available for the proposed substitution.
5. The proposed substitution will have no effect on applicable codes.
6. The manufacturer's guarantees or warranties of proposed product are equivalent to, or exceed, that of the specified product.

Specification Section	Product	Proposed Substitution	Comment
26 5000	Lighting – RL1	Portfolio, Lithonia	APPROVED
26 5000	Lighting – RL2	Pinnacle lighting, Mark Architectural lighting	APPROVED
26 5000	Lighting – SL1	Metalux, Columbia lighting; Fail-Safe	APPROVED
26 5000	Lighting – AL1/AL2	Gardco/SIGNIFY; Visionaire Lighting	APPROVED
26 5000	Lighting – WL1/WL1E	Gardco/SIGNIFY; McGraw Edison	APPROVED
26 5000	Lighting – WL2	Gardco/SIGNIFY; Visionaire Lighting	APPROVED
26 5000	Lighting – RL1/RL1E	Lithonia, HE Williams; Pinnacle Architectural Lighting	APPROVED
26 5000	Lighting – RL2/RL2E	Lithonia, HE Williams; Pinnacle Architectural Lighting	APPROVED
26 5000	Lighting – RL4	Halo	APPROVED
26 5000	Lighting – RL5	Halo	APPROVED
26 5000	Lighting – SL1/SL1E	HE Williams	APPROVED

Specification Section	Product	Proposed Substitution	Comment
26 5000	Lighting – SL2/SL2E	HE Williams; Metalux	APPROVED
26 5000	Lighting – SL3/SL3E	Lithonia; Pinnacle Architectural Lighting	APPROVED
26 5000	Lighting – SL4/SL4E	Fail-Safe	APPROVED
26 5000	Lighting – FL1	HE Williams	APPROVED
26 5000	Lighting – EX1	HE Williams; Emergilite	APPROVED
26 5000	Lighting – EX2	Emergilite, Dual lite	APPROVED
26 0923	Network Digital Lighting Control	Acuity - NLight	APPROVED

ITEM 9. Section 233400 HVAC Fans
a. Not accepted: Penn Barry, Louvered Penthouse
ITEM 10. Section 233700 Air Outlets and Inlets
a. Accepted: Penn Barry Domex and SX inliner

ATTACHMENTS

1. Pre-Bid Walkthrough Sign-In Sheet (1 page).
2. Architectural Sheets A21.02 and A22.01.
3. Specification Section 260923 Network Digital Lighting Control (24 pages).

END OF ADDENDUM # 01

SIGN-IN SHEET

Project Name:	**South King Fire and Rescue Station 65**	Date: January 23, 2020	
Architect:	**Rice Fergus Miller**	**Location**: Station 65	

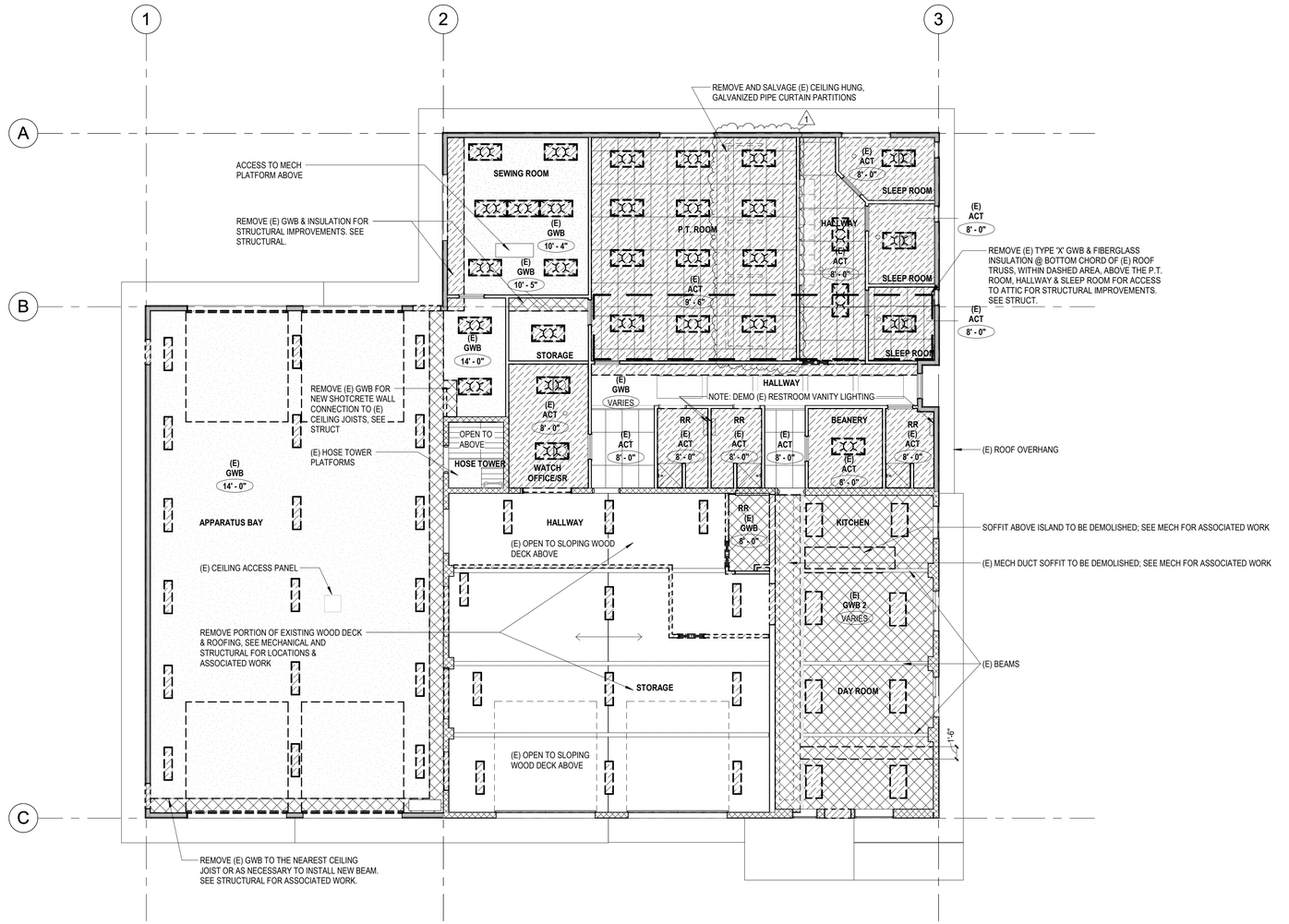
Name	Phone	Email
DICK McCullough	206-243-2000	DICK @ OPTIMUSCONST. COM
		JEANNIE @ OPTIMUSCONSTRUC.COM
Shawn Hughes Olympic Peninsula	360-764-0035 Const Bids	Olympic Peninsula Construction.com
DON HORTON EMTECH	(360) 748-4891	donh@emtechinc.us
Josh McCoy	(360) 556-1152	joshmccoy@jamconstructioninc.net
Jeff Ramers	253-282-9889	jeff@jamconstrucnion inc.net
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MIKE LAWSON	206-247-9251	michael.lawson@wachter.com
KEVIN MILLIKIN	425-640-5050	Bids@westernventures.com
SCF GC. BRODY STOHR	253-770-5858	BRODY@SCFGENERAL CONTRACTOR.COM
Oak Hills Construction Ryan Covington	253-218-2288	bids@oakhillsbuilds.com
ALEGIS CONSTRUCTION DAN MILLER	206.334.5820	DAN.MILLER@ALEGISCONSTRUCTION.COM
DAN MCCULLOUGH	425-799-9441	BIDS@CDKCONSTRUCTION.COM
Reed Christensen Christensen Inc	360709-0330	info@cincgc.com

GENERAL DEMO NOTE

1. WHERE INSTALLATION OF NEW STRUCTURAL IMPROVEMENTS OCCUR IN THE ATTIC, REMOVE EXISTING TYPE 'X' GWB & INSULATION. SEE LOCATION ON DRAWINGS.

LEGEND DEMO RCP

- EXISTING GWB CEILING TO REMAIN
- EXISTING SUSPENDED ACOUSTICAL TILE CEILING TO REMAIN
- EXISTING ROOF DECK TO REMAIN
- EXISTING LIGHTING FIXTURES TO REMAIN
- DEMO EXISTING GWB CEILING/SOFFIT
- DEMO EXISTING CEILING TILES, GRID, AND LIGHTING.
- EXISTING WALL OPENING TO BE FILLED AND PATCHED, SEE ARCHITECTURAL DEMOLITION PLAN FOR INFORMATION
- NEW OPENING IN EXISTING WALL FOR NEW MECHANICAL DUCT, SEE ARCHITECTURAL DEMOLITION PLAN FOR INFORMATION



N

1 LEVEL 1 - REFLECTED CEILING DEMO PLAN

1/8" = 1'-0"

RICE ARCHITECTURE & PLANNING fergus MILLER

275 FIFTH STREET
SUITE 100
BREMERTON, WA 98337
(360) 377-8773
FAX 792-1385
INFO@RFMARCH.COM

4794 REGISTERED ARCHITECT

DAVID A. FERGUS
STATE OF WASHINGTON

SOUTH KING FIRE & RESCUE FACILITY IMPROVEMENTS

FIRE STATION 65 4966 SOUTH 298th STREET,
AUBURN, WA 98001

PROJECT # 2015137

BID SET

ISSUED: JANUARY 10, 2020

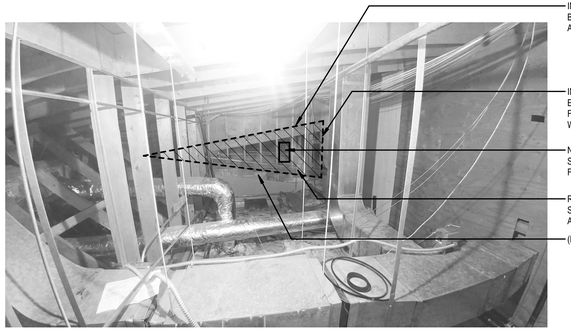
REVISION SCHEDULE

1	ADDENDUM #1	02/07/2020

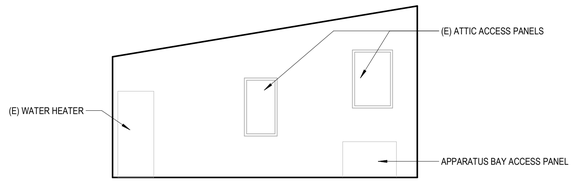
DEMO CEILING PLAN

SHEET:

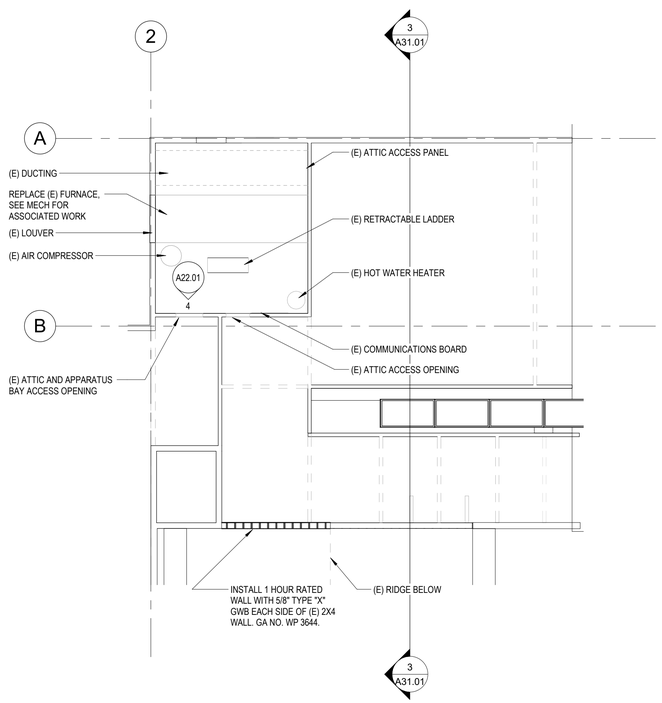
A21.02



ATTIC - FIRE RATED WALL



4 (E) ATTIC ACCESS PANELS - PLATFORM
1/4" = 1'-0"



N 2 ATTIC PLAN
1/8" = 1'-0"

RCP LEGEND

- EXISTING GWB CEILING TO REMAIN
- NEW SUSPENDED ACOUSTICAL TILE CEILING
- NEW GWB CEILING
- REPLACE ACT TILE, (E) GRID TO REMAIN
- ELECTRICAL INFRA RED HEATER
- RADIANT CEILING PANEL
- EXHAUST
- RETURN GRILLE
- SUPPLY GRILLE
- SURFACE OR RECESSED DOWNLIGHT
- WALL SCONCE LIGHT FIXTURE
- RECESSED TROFFER
- RECESSED TROFFER
- SURFACE OR PENDANT MOUNT LIGHT

GENERAL NOTES - RCP

1. ARCHITECTURAL RCP PROVIDED FOR COORDINATION PURPOSES ONLY. REFER TO MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS FOR DETAILED SCOPE OF SYSTEMS. NOTIFY ARCHITECT OF ANY DISCREPANCIES PRIOR TO CONSTRUCTION.

2. CENTER ALL CEILING FIXTURES IN CEILING TILE, UNLESS NOTED OTHERWISE.

3. REFER TO STRUCTURAL SHEETS FOR SEISMIC REQUIREMENTS

4. SEISMIC BRACE ALL NEW CEILING HUNG EQUIPMENT, SOFFITS AND ACOUSTICAL CEILINGS.

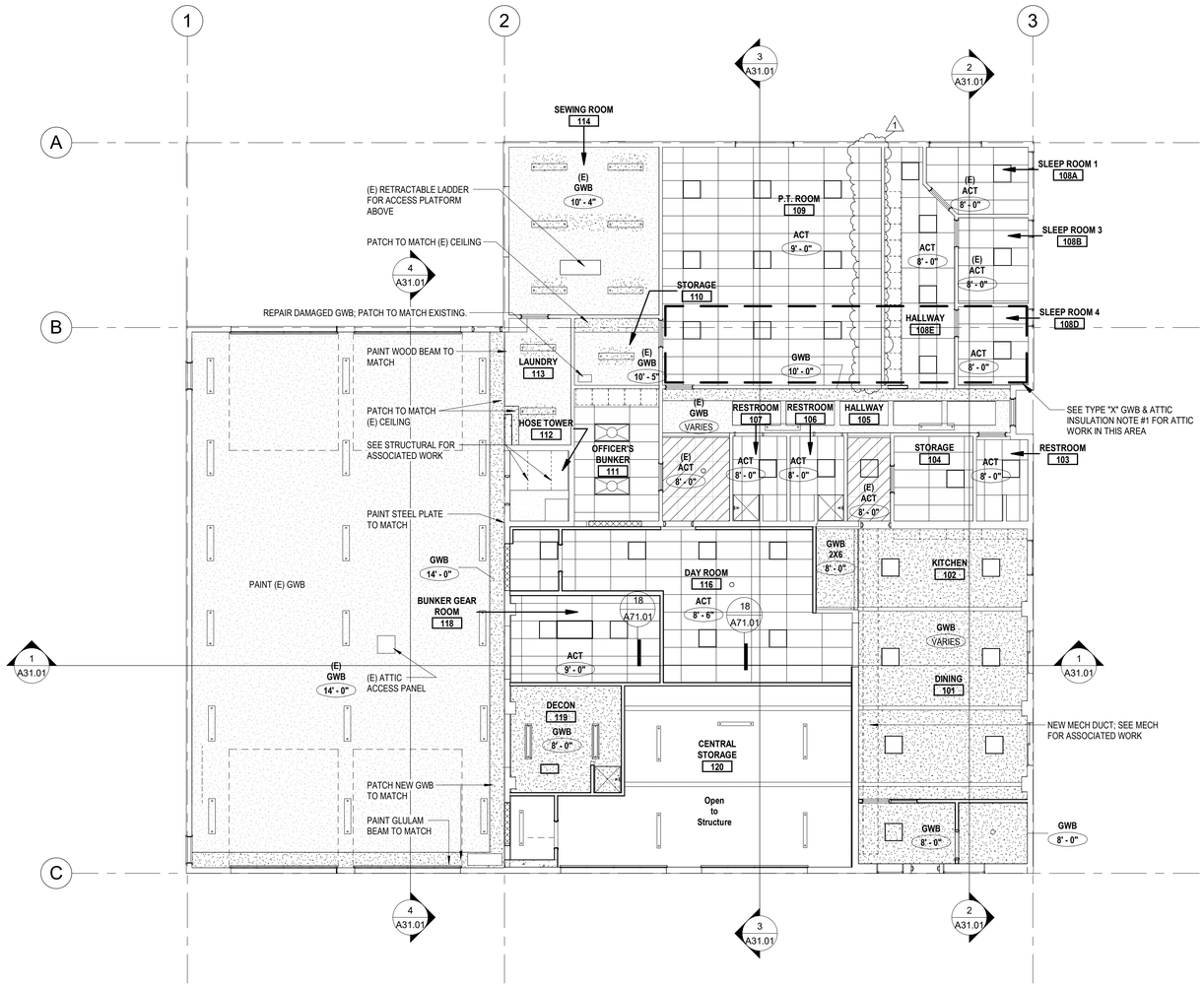
5. REFER TO FINISH PLAN & FINISH SCHEDULE FOR MANUFACTURER, STYLE, COLOR, ETC.

6. NEW SUSPENDED CEILING SHALL BE PER CODE AND HAVE SEISMIC RESTRAINTS.

TYPE 'X' GWB & ATTIC INSULATION

1. INSTALL R-38 BATT INSULATION & 5/8" TYPE 'X' INSULATION, FIRE TAPE, WHERE REMOVED IN THE ATTIC AREA, FOR IMPROVEMENTS, ABOVE THE P.T. ROOM, HALLWAY & SLEEP ROOM.

2. INSTALL R-38 BATT INSULATION, IN ATTIC, WHERE REMOVED FOR ASSOCIATED IMPROVEMENTS



N 1 LEVEL 1 - REFLECTED CEILING PLAN
1/8" = 1'-0"

RICE ARCHITECTURE & PLANNING fergus MILLER
275 FIFTH STREET
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PROJECT # 2015137

BID SET

ISSUED: JANUARY 10, 2020

REVISION SCHEDULE

1	ADDENDUM #1	02/07/2020

REFLECTED CEILING PLAN

SHEET:

A22.01

SECTION 260923 - NETWORK DIGITAL LIGHTING CONTROL SYSTEM

PART 1 - GENERAL

1.1 INTRODUCTION

A. The work covered in this section is subject to all of the requirements in the general conditions of the specifications. Contractor shall coordinate all of the work in this section with all the trades covered in the other sections of the specification to provide a complete and operative system.

1.2 DESCRIPTION OF WORK

A. Extent of lighting control system work is indicated by drawings and by the requirements of this section. It is defined to include low voltage lighting control panels, switch inputs, and wiring.

B. The work covered by this section of the specifications shall be coordinated with the related work as specified elsewhere under the project specifications.

1.3 QUALITY ASSURANCE

A. UL & ULC Approvals: The control panels shall be tested and listed under the UL 916 Energy Management Equipment standards by a nationally recognized testing laboratory.

B. NEC Compliance: The control system shall comply with all applicable National Electrical Codes regarding electrical wiring standards.

C. NEMA Compliance: The control system shall comply with all applicable portions of the NEMA standards regarding the types of electrical equipment enclosures.

D. Component Pre-Testing: All control equipment shall undergo strict inspection standards. The equipment shall be previously tested and burned-in at the factory prior to installation.

E. System Checkout: A factory-trained technician or factory-authorized personnel or Contractor shall functionally test the control system and verify performance after installation.

F. Manufacturer: Manufacturer shall have a minimum of 10 years experience in control systems. These specifications are based on Watt Stopper Distributed Digital Lighting Management Control System. Substitutions of the specified equipment will be considered providing

sufficient documentation is provided to the Engineer which certifies that the equipment qualification meets the requirements of this specification.

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's data on lighting control system and components.

B. Shop Drawings: Submit drawings of lighting control system and accessories including, but not necessarily limited to, the low voltage relay panels, power wiring, and switch inputs.

1. Complete layout of every space with the parts identified and wire routing

2. Riser Diagram/System Diagram

3. Switch Input Wiring

C. Example Contractor Startup/Commissioning Worksheet

D. Hardware and Software Operation Manuals

1.5 COORDINATION

A. Coordinate lighting control components to form an integrated interconnection of compatible components.

B. Coordinate lighting controls with BAS (building automation system) either through IP based intercommunication of system or hardwired auxiliary relay outputs.

C. The installing contractor shall be responsible for a complete and functional system in accordance with all applicable local and national codes.

1.6 WARRANTY

A. All devices in lighting control system shall have a 5-year warranty.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

A. System shall have an architecture that is based upon three main concepts;

1. Intelligent lighting control devices

2. Standalone lighting control zones

3. Network backbone for remote or time-based operation.

B. Intelligent lighting control devices shall consist of one or more basic lighting control components; occupancy sensors, photocell sensors, relays, dimming outputs, manual switch stations, and manual dimming stations. Combining one or more of these components into a single device enclosure should be permissible so as to minimize overall device count of system.

C. System must be able to interface directly with intelligent LED luminaires such that only CAT-5e cabling is required to interconnect luminaires with control components such as sensors and switches.

D. Intelligent lighting control devices shall communicate digitally, require <4 mA of current to function (Graphic wall stations excluded), and possess RJ-45 style connectors.

E. Lighting control zones shall consist of one or more intelligent lighting control components, be capable of stand-alone operation, and be capable of being connected to a higher-level network backbone.

F. Devices within a lighting control zone shall be connected with CAT-5e low voltage cabling in any order.

G. Lighting control zone shall be capable of automatically configuring itself for default operation without any start-up labor required.

H. Individual lighting zones must continue to provide a user defined default level of lighting control in the event of a system communication failure with the backbone network or the management software becoming unavailable.

I. Power for devices within a lighting control zone shall come from either resident devices already present for switching (relay device) or dimming purposes, or from the network backbone. Standalone “bus power supplies” shall not be required in all cases.

J. All switching and dimming for a specific lighting zone shall take place within the devices located in the zone itself (i.e. not in a remotely located devices such as panels) to facilitate system robustness and minimize wiring requirements. Specific applications that require centralized or remote switching shall be capable of being accommodated.

K. System shall have one primary wall mounted network control “gateway” devices that are capable of accessing and controlling connected system devices and linking into an Ethernet LAN.

L. System shall use “bridge” devices that route communication and distribute power for up to 8 directly connected lighting zones together for purposes of decreasing system wiring requirements.

M. System shall have a web-based software management program that enables remote system control, status monitoring, and creation of lighting control profiles.

N. Individual lighting zones shall be capable of being segmented into several “local” channels of occupancy, photocell, and switch functionality for more advanced configurations and sequences of operation.

O. Devices located in different lighting zones shall be able to communicate occupancy, photocell, and switch information via either the wired backbone.

P. System shall be capable of operating a lighting control zone according to several sequences of operation. System shall be able to change a spaces sequence of operation according to a time schedule so as to enable customized time-of-day, day-of-week utilization of a space. Note operating modes should be utilized only in manners consistent with local energy codes.

1. Auto-On / Auto-Off (via occupancy sensors)

    a. Zones with occupancy sensors automatically turn lights on when occupant is detected.

    b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.

    c. Pressing a switch will turn lights off. The lights will remain off regardless of occupancy until switch is pressed again, restoring the sensor to Automatic On functionality.

2. Manual-On / Auto-Off (also called Semi-Automatic)

    a. Pushing a switch will turn lights on.

b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.

3. Manual-On to Auto-On/Auto-Off

   a. Pushing a switch will turn lights on.

   b. After initial lights on, zones with occupancy and/or photocell sensors turn lights on/off according to occupancy/vacancy and/or daylight conditions.

   c. Sequence can be reset via scheduled (ex. daily each morning) events

4. Auto-to-Override On

   a. Zones with occupancy sensors automatically turn lights on when occupant is detected.

   b. Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.

   c. Sequence can be reset via scheduled (ex. daily each morning) events

5. Manual-to-Override On

   a. Pushing a switch will turn lights on.

   b. Zone lighting then goes into an override on state for a set amount of time or until the next time event returns the lighting to an auto-off style of control.

   c. Sequence can be reset via scheduled (ex. daily each morning) events

6. Auto On / Predictive Off

   a. Zones with occupancy sensors automatically turn lights on when occupant is detected.

   b. Zones with occupancy and/or photocell sensors turn lights off when vacancy or sufficient daylight is detected.

      1) If switch is pressed, lights turn off and a short “exit timer” begins. After timer expires, sensor scans the room to detect whether occupant is still present. If no occupancy is detected, zone returns to auto-on. If occupancy is detected, lights must be turned on via the switch.

Q. Control software shall enable logging of system performance data and presenting useful information in a web-based graphical format and downloadable to .CSV files.

R. Control software shall enable integration with a BMS via BACnet IP.

S. Desktop or Laptop Computer shall be furnished by the school district, and software will be loaded, and tested, during system start-up and programming by factory authorized technician.

2.2 INDIVIDUAL DEVICE SPECIFICATIONS

A. Local Room Communication Network:

1. DLM communications in room to be over a wired Cat 5e network.

2. Wired Room Network LMRJ-Series: DLM local network is a free topology lighting control physical connection and communication protocol designed to control a small area of a building.

a. Features of the wired DLM local network include:

1) Plug n' Go automatic configuration and binding of occupancy sensors, switches and lighting loads to the most energy-efficient sequence of operation based upon the device attached.

2) Simple replacement of any device in the local DLM network with a standard off the shelf unit without requiring significant commissioning, configuration or setup.

3) Push n' Learn configuration to change the automatic configuration, including binding and load parameters without tools, using only the buttons on the digital devices in the local network.

4) Two-way infrared communications for control by handheld remotes, and configuration by a handheld tool including adjusting load parameters, sensor configuration and binding, within a line of sight of up to 30 feet from a sensor, wall switch or IR receiver.

b. Digital room devices connect to the local network using pre-terminated Cat 5e cables with RJ-45 connectors, which provide both data and power to room devices. Systems that utilize RJ-45 patch cords but do not provide serial communication data from individual end devices are not acceptable.

c. If manufacturer's pre-terminated Cat5e cables are not used for the installation each cable must be individually tested and observed by authorized service representative following installation.

B. Wired Digital Load Controllers (Room, Plug Load And Fixture Controllers):

1. Digital Load Controllers: Digital controllers for lighting zones, fixtures and/or plug loads automatically bind room loads to the connected control devices in the space without commissioning or the use of any tools. Provide controllers to match the room lighting and plug load control requirements. Controllers are simple to install, and do not have dip switches/potentiometers, or require special configuration for standard Plug n' Go applications. Control units include the following features

a. Automatic room configuration to the most energy-efficient sequence of operation based upon the devices in the room.

b. Simple replacement using the default automatic configuration capabilities, a room controller may be replaced with an off-the-shelf device.

c. Multiple room controllers connected together in a local network must automatically arbitrate with each other, without requiring any configuration or setup, so that individual load numbers are assigned starting with load 1 to a maximum of 64, assigned based on each controller's device ID's from highest to lowest.

d. Device Status LEDs to indicate:

1) Data transmission

2) Device has power

3) Status for each load

4) Configuration status

e. Quick installation features including:

1) Standard junction box mounting

2) Quick low voltage connections using standard RJ-45 patch cable

f. Based on individual configuration, each load shall be capable of the following behavior on power up following the loss of normal power:

1) Turn on to 100 percent

2) Turn off

3) Turn on to last level

g. Each load be configurable to operate in the following sequences based on occupancy:

1) Auto-on/Auto-off (Follow on and off)

2) Manual-on/Auto-off (Follow off only)

h. Polarity of each load output shall be reversible, via digital configuration, so that on is off and off is on.

i. BACnet object information shall be available for the following objects:

1) Load status

2) Schedule state, normal or after-hours

3) Demand Response enable and disable

4) Room occupancy status

5) Total room lighting and plug loads watts

6) Electrical current

7) Total watts per controller

8) Total room watts/sq. ft.

9) Force on/off all loads

j. UL 2043 plenum rated

k. Manual override (dimming verification) and LED indication for each load

l. Zero cross circuitry for each load

m. All digital parameter data programmed into an individual room controller or plug load controller shall be retained in non-volatile FLASH memory within the controller itself. Memory shall have an expected life of no less than 10 years.

2. Dimming Room Controllers shall share the following features:

a. Each load shall have an independently configurable preset on level for Normal Hours and After-Hours events to allow different dimmed levels to be established at the start of both Normal Hours and After-Hours events.

b. Fade rates for dimming loads shall be specific to bound switch buttons, and the load shall maintain a default value for any bound buttons that do not specify a unique value.

c. The following dimming attributes may be changed or selected using a wireless configuration tool:

1) Establish preset level for each load from 0-100 percent

2) Set high and low trim for each load

3) Initiate lamp burn in for each load of either 0, 12 or 100 hours

d. Override button for each load provides the following functions:

1) Press and release for on/off control

2) Press and hold for dimming control

e. Each dimming output channel shall have an independently configurable minimum and maximum calibration trim level to set the dimming range to match the true dynamic range of the connected ballast or driver. LED level indicators on bound dimming switches shall utilize this new maximum and minimum trim.

f. Each dimming output channel shall have an independently configurable minimum and maximum trim level to set the dynamic range of the output within the new 0-100 percent dimming range defined by the minimum and maximum calibration trim.

g. Calibration and trim levels must be set per output channel. Devices that set calibration or trim levels per controller (as opposed to per load) are not acceptable.

h. All configuration shall be digital. Devices that set calibration or trim levels per output channel via trim pots or dip-switches are not acceptable.

3. On/Off Room Controllers shall include:

a. Dual voltage (120/277 VAC, 60 Hz) capable rated for 20A total load

b. One or two relay configurations.

c. Simple 150 mA switching power supply (Only 4 100 series devices on a Cat 5e local network)

d. Three RJ-45 DLM local network ports with integral strain relief and dust cover

e. Wattstopper product numbers: LMRC-101, LMRC-102

4. On/Off/0-10V Dimming KO Mount Room Controllers shall include:

   a. Dual voltage (120/277 VAC, 60 Hz) capable rated for 10A total load

   b. Optional real time current and voltage monitoring (with –M Monitoring option).

   c. One or two relays configurations

   d. Smart 150 mA switching power supply

   e. Two RJ-45 DLM local network ports. Provide molded strain relief ring

   f. One dimming output per relay

      1) 0-10V Dimming - Where indicated, one 0-10-volt analog output per relay for control of compatible ballasts and LED drivers. The 0-10-volt output shall automatically open upon loss of power to the Room Controller to assure full light output from the controlled lighting

   g. Units capable of providing both Class 1 or Class 2 wiring for the 0-10V output

   h. Wattstopper product numbers: LMRC-111, LMRC-111-M, LMRC-112, or LMRC-112-M.

5. On/Off/0-10V Dimming Enhanced Room Controllers shall include:

   a. Dual voltage (120/277 VAC, 60 Hz) capable or 347 VAC, 60 Hz. 120/277-volt models rated for 20A total load; 347-volt models rated for 15A total load

   b. Built in real time current monitoring

   c. One, two or three relays configurations

   d. Smart 250 mA switching power supply

   e. Four RJ-45 DLM local network ports. Provide integral strain relief

   f. One dimming output per relay

      1) 0-10V Dimming - Where indicated, one 0-10-volt analog output per relay for control of compatible ballasts and LED drivers. The 0-10-volt output shall automatically open upon loss of power to the Room Controller to assure full light output from the controlled lighting (LMRC-110 series and 210 series).

   g. Wattstopper product numbers: LMRC-211, LRMC-212, LRMC-213.

6. Plug Load Controllers shall include:

    a. 120 VAC, 60 Hz rated for 20A total load. Controller carries application-specific UL 20 rating for receptacle control.

    b. One relay configuration with additional connection for unswitched load

    c. Configurable additive time delay to extend plug load time delay beyond occupancy sensor time delay (e.g. a 10-minute additive delay in a space with a 20-minute occupancy sensor delay ensures that plug loads turn off 30 minutes after the space is vacated).

    d. Factory default operation is Auto-on/Auto-off, based on occupancy

    e. Real time current monitoring of both switched and un-switched load (LMPL-201 only)

    f. Switching power supply

        1) Simple 150mA - Only 4 100 series devices on a Cat 5e local network (LMPL-101)

        2) Smart 250mA (LMPL-201)

    g. RJ-45 DLM local network ports

        1) Three RJ-45 ports (LMPL-101)

        2) Four RJ-45 ports (LMPL-201)

    h. Wattstopper product numbers:

        1) Plug Load Controllers: LMPL-101, LMPL-201.

C. Wired Digital Wall or Ceiling Mounted Occupancy Sensor:

1. Digital Occupancy Sensors shall provide LCD display for digital calibration and electronic documentation. Features include the following:

    a. Digital calibration and pushbutton configuration for the following variables:

        1) Sensitivity, 0-100 percent in 10 percent increments

        2) Time delay, 1-30 minutes in 1-minute increments

        3) Test mode, Five second time delay

4) Detection technology, PIR, Ultrasonic or Dual Technology activation and/or re-activation.

5) Walk-through mode

b. Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.

c. Programmable control functionality including:

1) Each sensor may be programmed to control specific loads within a local network.

2) Sensor shall be capable of activating one of 16 user-definable lighting scenes or implementing a Partial on or Partial Off Sequence of Operation.

3) Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically within a configurable period of time (default 10 seconds) after turning off.

4) On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:

5) Ultrasonic and Passive Infrared

6) Ultrasonic or Passive Infrared

7) Ultrasonic only

8) Passive Infrared only

9) Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.

d. One or two RJ-45 port(s) for connection to DLM local network.

e. Two-way infrared (IR) transceiver to allow remote programming through handheld commissioning tool and control by remote personal controls.

f. Device Status LEDs, which may be disabled for selected applications, including:

1) PIR detection

2) Ultrasonic detection

3) Configuration mode

4) Load binding

g. Assignment of occupancy sensor to a specific load within the room without wiring or special tools.

h. Manual override of controlled loads.

i. All digital parameter data programmed into an individual occupancy sensor shall be retained in non-volatile FLASH memory within the sensor itself. Memory shall have an expected life of no less than 10 years.

j. BACnet object information shall be available for the following objects:

1) Detection state

2) Occupancy sensor time delay

3) Occupancy sensor sensitivity, PIR and Ultrasonic

k. Units shall not have any dip switches or potentiometers for field settings

l. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.

m. Wattstopper product numbers: LMPX, LMDX, LMPC, LMUC, LMDC

D. Wired Digital Wall Switch Occupancy Sensors:

1. Digital Occupancy Sensors shall provide scrolling LCD display for digital calibration and electronic documentation. Features include the following:

a. Digital calibration and pushbutton configuration for the following variables:

1) Sensitivity: 0-100 percent in 10 percent increments

2) Time delay: 1-30 minutes in 1-minute increments

3) Test mode: Five second time delay

4) Detection technology: PIR, Dual Technology activation and/or re-activation.

5) Walk-through mode

6) Load parameters including Auto/Manual-ON, blink warning, and daylight enable/disable when photosensors are included in the DLM local network.

b. Programmable control functionality including:

1) Each sensor may be programmed to control specific loads within a local network.

2) Sensor shall be capable of activating one of 16 user-definable lighting scenes.

3) Adjustable retrigger time period for manual-on loads. Load will retrigger (turn on) automatically during the configurable period of time (default 10 seconds) after turning off.

4) On dual technology sensors, independently configurable trigger modes are available for both Normal (NH) and After Hours (AH) time periods. The retrigger mode can be programmed to use the following technologies:

a) Ultrasonic and Passive Infrared

b) Ultrasonic or Passive Infrared

c) Ultrasonic only

d) Passive Infrared only

c. Independently configurable sensitivity settings for passive infrared and ultrasonic technologies (on dual technology sensors) for both Normal (NH) and After Hour (AH) time periods.

d. Two RJ-45 ports for connection to DLM local network.

e. Two-way infrared (IR) transceiver to allow remote programming through handheld configuration tool and control by remote personal controls.

f. Device Status LEDs including

1) PIR detection

2) Ultrasonic detection

3) Configuration mode

4) Load binding

g. Assignment of any occupancy sensor to a specific load within the room without wiring or special tools.

h. Assignment of local buttons to specific loads within the room without wiring or special tools

i. Manual override of controlled loads

j. All digital parameter data programmed into an individual wall switch sensor shall be retained in non-volatile FLASH memory within the wall switch sensor itself. Memory shall have an expected life of no less than 10 years.

2. Units shall not have any dip switches or potentiometers for field settings.

3. Multiple occupancy sensors may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration will be required.

4. Two-button wall switch occupancy sensors, when connected to a single relay dimming room or fixture controller, shall operate in the following sequence as a factory default:

   a. Left button

      1) Press and release - Turn load on

      2) Press and hold - Raise dimming load

   b. Right button

      1) Press and release - Turn load off

      2) Press and hold - Lower dimming load

5. Low voltage momentary pushbuttons shall include the following features:

   a. Load/Scene Status LED on each switch button with the following characteristics:

      1) Bi-level LED

      2) Dim locator level indicates power to switch

      3) Bright status level indicates that load or scene is active

6. The following button attributes may be changed or selected using a wireless configuration tool:

    a. Load and Scene button function may be reconfigured for individual buttons (from Load to Scene, and vice versa).

    b. Individual button function may be configured to Toggle, On only or Off only.

    c. Individual scenes may be locked to prevent unauthorized change.

    d. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.

    e. Ramp rate may be adjusted for each dimmer switch.

    f. Switch buttons may be bound to any load on any load controller or relay panel and are not load type dependent; each button may be bound to multiple loads.

    g. Wattstopper part numbers: LMPW, LMDW. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening.

E. Wired Digital Wall Switches:

1. Low voltage momentary pushbutton switches in 1, 2, 3, 4, 5 and 8 button configurations. Wall switches shall include the following features:

2. Two-way infrared (IR) transceiver for use with personal and configuration remote controls.

3. Removable buttons for field replacement with engraved buttons and/or alternate color buttons. Button replacement may be completed without removing the switch from the wall.

4. Configuration LED on each switch that blinks to indicate data transmission.

5. Load/Scene Status LED on each switch button with the following characteristics:

    a. Bi-level LED

    b. Dim locator level indicates power to switch

    c. Bright status level indicates that load or scene is active

d. Dimming switches shall include seven bi-level LEDs to indicate load levels using 14 steps.

6. Programmable control functionality including:

   a. Button priority may be configured to any BACnet priority level, from 1-16, corresponding to networked operation allowing local actions to utilize life safety priority

   b. Scene patterns may be saved to any button other than dimming rockers. Once set, buttons may be digitally locked to prevent overwriting of the preset levels.

7. All digital parameter data programmed into an individual wall switch shall be retained in non-volatile FLASH memory within the wall switch itself. Memory shall have an expected life of no less than 10 years.

8. BACnet object information shall be available for the following objects:

   a. Button state

   b. Switch lock control

   c. Switch lock status

9. Two RJ-45 ports for connection to DLM local network.

10. Multiple digital wall switches may be installed in a room by simply connecting them to the free topology DLM local network. No additional configuration shall be required to achieve multi-way switching.

11. Load and Scene button function may be reconfigured for individual buttons from Load to Scene, and vice versa.

    a. Individual button function may be configured to Toggle, On only or Off only.

    b. Individual scenes may be locked to prevent unauthorized change.

    c. Fade Up and Fade Down times for individual scenes may be adjusted from 0 seconds to 18 hours.

    d. Ramp rate may be adjusted for each dimmer switch.

    e. Switch buttons may be bound to any load on any load controller or relay panel and are not load type dependent; each button may be bound to multiple loads.

f. Wattstopper product numbers: LMSW-101, LMSW-102, LMSW-103, LMSW-104, LMSW-105, LMSW-108, LMDM-101. Available in white, light almond, ivory, grey, red and black; compatible with wall plates with decorator opening.

F. Wired Digital Daylighting Sensors:

1. Digital daylighting sensors shall work with load controllers and relay panels to provide automatic switching, bi-level, or tri-level or dimming daylight harvesting capabilities for any load type connected to the controller or panel. Daylighting sensors shall be interchangeable without the need for rewiring.

   a. Closed loop sensors measure the ambient light in the space and control a single lighting zone.

   b. Open loop sensors measure incoming daylight in the space, and are capable of controlling up to three lighting zones.

   c. Dual loop sensors measure both ambient and incoming daylight in the space to ensure that proper light levels are maintained as changes to reflective materials are made in a single zone

2. Digital daylighting sensors shall include the following features:

   a. Sensor’s internal photodiode shall only measure lightwaves within the visible spectrum. The photodiode’s spectral response curve shall closely match the entire photopic curve. Photodiode shall not measure energy in either the ultraviolet or infrared spectrums. Photocell shall have a sensitivity of less than 5 percent for any wavelengths less than 400 nanometers or greater than 700 nanometers.

   b. Sensor light level range shall be from 1-6,553 foot-candles (fc).

   c. Capability of ON/OFF, bi-level or tri-level switching, or dimming, for each controlled zone, depending on the selection of load controller(s) and load binding to controller(s).

   d. For switching daylight harvesting, the photosensor shall provide a field-selectable deadband, or a separation, between the “ON Setpoint” and the “OFF Setpoint” that will prevent the lights from cycling excessively after they turn off.

e. For dimming daylight harvesting, the photosensor shall provide the option, when the daylight contribution is sufficient, of turning lights off or dimming lights to a field-selectable minimum level.

f. Photosensors shall have a digital, independently configurable fade rate for both increasing and decreasing light level in units of percent per second.

g. Photosensors shall provide adjustable cut-off time. Cut-off time is defined by the number of selected minutes the load is at the minimum output before the load turns off. Selectable range between 0-240 minutes including option to never cut-off.

h. Optional wall switch override shall allow occupants to reduce lighting level to increase energy savings or, if permitted by system administrator, raise lighting levels for a selectable period of time or cycle of occupancy.

i. Integral infrared (IR) transceiver for configuration and/or commissioning with a handheld configuration tool, to transmit detected light level to wireless configuration tool, and for communication with personal remote controls.

j. Configuration LED status light on device that blinks to indicate data transmission.

k. Status LED indicates test mode, override mode and load binding.

l. Recessed switch on device to turn controlled load(s) ON and OFF.

m. BACnet object information shall be available for the following daylighting sensor objects, based on the specific photocell's settings:

    1) Light level

    2) Day and night setpoints

    3) Off time delay

    4) On and off setpoints

    5) Up to three zone setpoints

    6) Operating mode – on/off, bi-level, tri-level or dimming

n. One RJ-45 port for connection to DLM local network.

o. A choice of accessories to accommodate multiple mounting methods and building materials. Photosensors may be mounted on a ceiling tile, skylight light well, suspended lighting fixture or backbox. Standard tube photosensors accommodate mounting materials from 0-0.62 inch thick (LMLS-400, LMLS-500). Extended tube photosensors accommodate mounting materials from 0.62 to 1.25 inches thick (LMLS-400-L, LMLS-500-L). Mounting brackets are compatible with J boxes (LMLS-MB1) and wall mounting (LMLS-MB2). LMLS-600 photosensor to be mounted on included bracket below skylight well.

p. Any load or group of loads in the room can be assigned to a daylighting zone

q. Each load within a daylighting zone can be individually enabled or disabled for discrete control (load independence).

r. All digital parameter data programmed into a photosensor shall be retained in non-volatile FLASH memory within the photosensor itself. Memory shall have an expected life of no less than 10 years.

3. Closed loop digital photosensors shall include the following additional features:

a. An internal photodiode that measures light in a 100-degree angle, cutting off the unwanted light from bright sources outside of this cone.

b. Automatic self-calibration, initiated from the photosensor, a wireless configuration tool or a PC with appropriate software.

c. Automatically establishes application-specific setpoints following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of loads.

d. Wattstopper Product Number: LMLS-400, LMLS-400-L.

4. Open loop digital photosensors shall include the following additional features:

a. An internal photodiode that measures light in a 60-degree angle (cutting off the unwanted light from the interior of the room).

b. Automatically establishes application-specific setpoints following manual calibration using a wireless configuration tool or a PC with appropriate software. For switching operation, an adequate deadband between the ON and OFF setpoints for each zone shall prevent the lights from cycling; for dimming operation, a proportional control algorithm shall maintain the design lighting level in each zone.

c. Each of the three discrete daylight zones can include any non-overlapping group of loads in the room.

d. Wattstopper Product Number: LMLS-500, LMLS-500-L.

5. Dual loop digital photosensors shall include the following additional features:

a. Close loop portion of dual loop device must have an internal photodiode that measures light in a 100-degree angle, cutting off the unwanted light from sources outside of this con

b. Open loop portion of dual loop device must have an internal photodiode that can measure light in a 60-degree angle, cutting off the unwanted light from the interior of the room.

c. Automatically establishes application-specific set-points following self-calibration. For switching operation, an adequate deadband between the ON and OFF setpoints shall prevent the lights from cycling; for dimming operation a sliding setpoint control algorithm with separate Day and Night setpoints shall prevent abrupt ramping of load.

d. Device must reference closed loop photosensor information as a base line reference. The device must be able to analyze the open loop photosensor information to determine if an adjustment in light levels is required.

e. Device must be able to automatically commission setpoints each night to provide adjustments to electrical lighting based on changes in overall lighting in the space due to changes in reflectance within the space or changes to daylight contribution based on seasonal changes.

f. Device must include extendable mounting arm to properly position sensor within a skylight well.

g. Wattstopper product number LMLS-600

G. Wired Digital Input and Output Low Voltage Control Modules:

1. Wired input and output low voltage modules allow for control of the DLM lighting control system by other devices and systems, or allow the DLM system to send signals to other devices and system for simple integration. The method of interfacing between the systems can either be a dry (unpowered) contract closure, or via RS-232.

2. Modules shall be plastic with a clamshell hinged lid, two Cat 5e wiring terminals for connection to a DLM wired local Cat 5e network, and be provided with an accessory DIN mounting bracket. LEDs on the unit shall provide information about the status of the inputs or outputs, and a configuration button shall be provided to allow easy entry into PnL programming sequence. Devices shall include a removable terminal block, and label identifying use of each terminal contact.

3. Wired Low Voltage Input Module features shall include:

    a. Ability to switch the module between three operating modes, allowing it to be used as a load control device (Normal use), a partition interface device, or an input for interior or exterior photocells.

    b. When set in normal usage, the DLM Input Module shall accept up to 4 separate inputs, either 2-wire maintained or momentary inputs or 24VDC inputs. Additionally, two inputs pairs can be used as a 3-wire input to emulate a dimmer rocker.

    c. In normal usage, the 4 inputs can be used to control loads, trigger a scene, send a network group command, or emulate an occupancy action so an occupied/unoccupied message is sent to loads.

    d. Input modules can trigger special load scenarios, taking advantage of DLM system's priority-based functions such as Force On, Force Off, Shed, Cleaning, Normal/After Hours, and Key Switch functions.

    e. Inputs can trigger different load and scene modes for controlled outputs, so loads can toggle status, go on, go off, or toggle dim. Scenes can be set to Recall, Recall/Off, or Scene Off.

    f. All listed functionality to be accessible from IR handheld remote or from front end system software. Products that require functions to be set at the device, or that incorporate dip switches to select functions, shall not be allowed.

    g. Wattstopper product number LMIN-104

4. Wired Low Voltage Output Module features shall include:

    a. Two individual Form C contact relays rated from 0-24VAC or DC.

    b. Module relays shall act like standard line voltage relays in that they can be assigned (bound) to turn on and off based on any DLM system input including switch buttons, occupancy sensors, photocells, timeclocks, and/or low voltage input modules.

    c. In addition to acting as maintained devices, relays can be set to a “pulse” mode so that when they turn on, they do so for only a short duration and then they automatically return to their normal state, allowing the module to interact with other devices that require momentary inputs from 1-60 seconds.

    d. Two small override buttons shall be included so each relay can be triggered On and Off for testing.

    e. Wattstopper product number LMOR-104

5. Wired RS-232 Interface Module features shall include:

    a. Ability to communicate with other devices and systems via standard RS-232 wiring.

    b. Via a standardized set of host commands, other systems can send messages to the RS-232 Interface and in the connected room they can control loads on and off (taking advantage of optional message parameters to dim over time), set scene, execute button lockout, changing room profiles, Forcing Loads On or Off, or sending out a Normal Hours/After Hours command.

    c. By using a “status” command the RS-232 interface module can be instructed to share information with connected systems whenever changes occur in the room. Examples of message alerts include relay status chance, occupancy status change (by room or by sensor), scene status change, buttons are pressed, room profiles chance based on partitions, or daylight levels monitored by an interior photocell change.

    d. Wattstopper product number LMDI-100

2.3 EMERGENCY LIGHTING CONTROL DEVICES

A. Provide an Emergency Lighting Control Unit to allows standard lighting control device to control emergency lighting in conjunction with normal lighting in any area within a building. Emergency Lighting Control Unit shall be a UL 924 listed device that monitors a switched circuit providing normal lighting to an area. The unit provides normal ON/OFF control of emergency lighting along with the normal lighting. Upon normal power failure the emergency lighting circuit will close, forcing the emergency lighting ON until normal power is restored. Features include:

1. 120/277 volts, 50/60 Hz, 20 amp ballast rating
2. Push to test button
3. Auxiliary contact for remote test or fire alarm system interface

2.4 LMCP LIGHTING CONTROL PANELS AND LMZC ZONE CONTROLLER

A. Hardware: Provide LMCP lighting control panels in the locations and capacities as indicated on the Drawing and schedules. Each panel shall be of modular construction and consist of the following components:

B. Enclosure/Tub shall be NEMA 1, sized to accept an interior with 1 - 8 relays, 1 - 24 relays and 6 four-pole contactors, or 1 - 48 relays and 6 four-pole contactors.

C. Cover shall be configured for surface or flush wall mounting of the panel as indicated on the plans. LMCP panel cover shall have a hinged and lockable door with restricted access to line voltage section of the panel.

D. Interior assembly shall be supplied as a factory assembled component specifically designed and listed for field installation. Interior construction shall provide total isolation of high voltage (Class 1) wiring from low voltage (Class 2) wiring within the assembled panel. Interior assembly shall include intelligence boards, power supply, DIN rails for mounting optional Class 2 control devices, and individually replaceable latching type relays. Panel interiors shall include the following features:

E. Removable, plug-in terminal blocks with connections for all low voltage terminations.

F. Individual terminal block, override pushbutton, and LED status light for each relay.

G. Direct wired switch inputs associated with each relay shall support 2-wire momentary switches only.

H. Digital inputs (four RJ-45 jacks) shall support 1-, 2-, 3-, 4-, and 8-button digital switches; digital IO modules capable of receiving 0-5V or 0-10V analog photocell inputs; digital IO modules capable of receiving momentary or maintained contact closure inputs or analog sensor inputs; digital daylighting sensors; and digital occupancy sensors. Inputs are divided into two separate digital networks, each capable of supplying 250mA to connected devices.

I. True relay state shall be indicated by the on-board LED and shall be available to external control devices and systems via BACnet.

J. Automatically sequenced operation of relays to reduce impact on the electrical distribution system when large loads are controlled simultaneously.

K. Group and pattern control of relays shall be provided through a simple keypad interface from a handheld IR programmer. Any set of relays can be associated with a group for direct on/off control or pattern (scene) control via a simple programming sequence using the relay override pushbuttons and LED displays for groups 1-8 or a handheld IR programmer for groups 1-99.

L. Relay group status for shall be provided through LED indicators for groups 1-8 and via BACnet for groups 1-99. A solid LED indicates that the last group action called for an ON state and relays in the group are on or in a mixed state.

1. Single-pole latching relays with modular plug-in design. Relays shall provide the following ratings and features:

a. Electrical:

1) 30-amp ballast at 277V

2) 20-amp ballast at 347V

3) 20amp tungsten at 120V

4) 30 amp resistive at 347V

5) 1.5 HP motor at 120V

6) 14,000-amp short circuit current rating (SCCR) at 347V

7) Relays shall be specifically UL 20 listed for control of plug-loads

M. Mechanical:

1. Replaceable, 1/2-inch KO mounting with removable Class 2 wire harness.

2. Actuator on relay housing provides manual override and visual status indication, accessible from Class 2 section of panel.

3. Dual line and load terminals each support two #14 - #12 solid or stranded conductors.

4. Tested to 300,000 mechanical on/off cycles.

N. Isolated low voltage contacts provide for true relay status feedback and pilot light indication.

O. Power supply shall be a multi-voltage transformer assembly with rated power to supply all electronics, occupancy sensors, switches, pilot lights, and photocells as necessary to meet the project requirements. Power supply to have internal over-current protection with automatic reset and metal oxide varistor protection.

P. Where indicated, lighting control panels designated for control of emergency lighting shall be provided with factory installed provision for automatic by pass of relays controlling emergency circuits upon loss of normal power. Panels shall be properly listed and labeled for use on emergency lighting circuits and shall meet the requirements of UL924 and NFPA 70 - Article 700.

Q. Integral system clock shall provide scheduling capabilities for panel-only projects without DLM segment networks or BAS control.

1. Each panel shall include digital clock capability able to issue system wide automation commands to up to 11 other panels for a total of 12 networked lighting control panels. Clock shall provide capability for up to 254 independent schedule events per panel for each of the ninety-nine system wide channel groups.

2. Clock capability of each panel shall support the time-based energy saving requirements of applicable local energy codes.

3. Clock module shall provide astronomic capabilities, time delays, blink warning, daylight savings, and holiday functions and will include a battery backup for clock function and program retention in non-volatile FLASH memory. Clocks that require multiple events to meet local code lighting shut off requirements shall not be allowed.

4. Clock capability of each panel shall operate on a basis of ON/OFF or Normal Hours/After Hours messages to automation groups that implement pre-configured control scenarios. Scenarios shall include:

a. Scheduled ON / OFF

b. Manual ON / Scheduled OFF

c. Astro ON / OFF (or Photo ON / OFF)

d. Astro and Schedule ON / OFF (or Photo and Schedule ON / OFF)

5. User interface shall be a portable IR handheld remote control capable of programming any panel in the system (LMCT-100)

6. Clock capability of each panel shall employ non-volatile memory and shall retain user programming and time for a minimum of 10 years.

7. Schedules programmed into the clock of any one panel shall be capable of executing panel local schedule or Dark/Light (photocell or Astro) events for that panel in the event that global network communication is lost. Lighting control panels that are not capable of executing events independently of the global network shall not be acceptable.

R. Lighting control panel can operate as a stand-alone system, or can support schedule, group, and photocell control functions, as configured in a Segment Manager controller, via a segment network connection.

S. Lighting control panel shall support digital communications to facilitate the extension of control to include interoperation with building automation systems and other intelligent field devices. Digital communications shall be RS485 MS/TP-based using the BACnet protocol.

T. Panel shall have provision for an individual BACnet device ID and shall support the full 222 range (0 – 4,193,304). The device ID description property shall be writable via the network to allow unique identification of the lighting control panel on the network.

U. Panel shall support MS/TP MAC addresses in the range of 0 − 127 and baud rates of 9600k, 38400k, 76800k, and 115.2k bits per second.

V. Lighting control relays shall be controllable as binary output objects in the instance range of 1 − 64. The state of each relay shall be readable and writable by the BAS via the object present value property.

W. Lighting control relays shall report their true on/off state as binary input objects in the instance range of 1 − 64.

X. The 99 group Normal Hours/After Hours control objects associated with the panel shall be represented by binary value objects in the instance range of 201 − 299. The occupancy state of

each channel group shall be readable and writable by the BAS via the object present value property. Commanding 1 to a channel group will put all relays associated with the channel into the normal hour's mode. Commanding 0 or NULL shall put the relays into the after-hours mode.

Y. Setup and commissioning of panel shall not require manufacturer-specific software or a computer. All configuration of the lighting control panel shall be performed using standard BACnet objects or via the handheld IR programming remote. Provide BACnet objects for panel setup and control as follows:

1. Binary output objects in the instance range of 1 − 64 (one per relay) for on/off control of relays.

2. Binary value objects in the instance range of 1 − 99 (one per channel) for normal hours/after-hours schedule control.

3. Binary input objects in the instance range of 1 − 64 (one per relay) for reading true on/off state of the relays.

4. Analog value objects in the instance range of 101 − 199 (one per channel group) shall assign a blink warn time value to each channel. A value of 5 shall activate the blink warn feature for the channel and set a 5-minute grace-time period. A value of 250 shall activate the sweep feature for the channel and enable the use of sweep type automatic wall switches.

Z. Description property for all objects shall be writable via the network and shall be saved in non-volatile memory within the panel.

AA. Programming of panel location information shall be accomplished by the handheld IR remote and include at a minimum LAT, LON, DST zone, and an approximate city/state location.

BB. Wattstopper Product Number: LMCT-100

2.5 LIGHTING CONTROL PROFILES

A. Changes to the operation of the system shall be capable of being made in real-time or scheduled via lighting control profiles. These profiles are outlines of settings that direct how a collection of devices function for a defined time period.

B. Lighting control profiles shall be capable of being created and applied to a single device, zone of devices, or customized group of zones.

C. All relays and dimming outputs shall be capable of being scheduled to track or ignore information regarding occupancy, daylight, and local user switches via lighting control profiles.

D. Every device parameter (e.g. sensor time delay and photocell set-point) shall be configurable via a lighting control profile.

E. All lighting control profiles shall be stored on the network control gateway device and on the software's host server.

F. Lighting control profiles shall be capable of being scheduled to run according to the following calendar options: start date/hour/minute, end date/hour/minute, and sunrise/sunset +/- timed offsets.

G. Sunrise/sunset times shall be automatically derived from location information using an astronomical clock.

H. Daylight savings time adjustments shall be capable of being performed automatically, if desired.

I. Lighting control profile schedules shall be capable of being given the following recurrence settings: daily, weekday, weekend, weekly, monthly, and yearly.

J. Software shall provide a graphical tool for easily viewing scheduled lighting control profiles.

2.6 MANAGEMENT SOFTWARE

A. Every device parameter (e.g. sensor time delay and photocell set-point) shall be available and configurable remotely from the software

B. The following status monitoring information shall be made available from the software for all devices for which it is applicable: current occupancy status, current PIR Status, current Microphonics Status, remaining occupancy time delay(s), current photocell reading, current photocell inhibiting state, photocell transitions time remaining, current dim level, device temperature, and device relay state(s).

C. The following device identification information shall be made available from the software: model number, model description, serial number, manufacturing date code, custom label(s), and parent network device.

D. A printable network inventory report shall be available via the software.

E. A printable report detailing all system profiles shall be available via the software.

F. Software shall require all users to login with a User Name and Password.

G. Software shall provide at least three permission levels for users.

H. All sensitive stored information and privileged communication by the software shall be encrypted.

I. All device firmware and system software updates must be available for automatic download and installation via the internet.

J. Software shall be capable of managing systems interconnected via a WAN (wide area network)

2.7 LIGHTING CONTROL APPLICATIONS

A. Unless relevant provisions of the applicable local Energy Codes are more stringent, provide a minimum application of lighting controls as follows:

1. Space Control Requirements – Provide occupancy/vacancy sensors with Manual- or Partial-ON functionality in all spaces except toilet rooms, storerooms, library stacks, or other applications where hands-free operation is desirable and Automatic-ON occupancy sensors are more appropriate. Provide Manual-ON occupancy/vacancy sensors for any enclosed office, conference room and meeting rooms. For spaces with multiple occupants, or where line-of-sight may be obscured, provide ceiling- or corner-mounted sensors and Manual-ON switches.

2. Daylit Areas – Provide daylight-responsive automatic control in all spaces (conditioned or unconditioned) where daylight contribution is available as defined by relevant local building energy code:

a. All luminaires within code-defined daylight zones shall be controlled separately from luminaires outside of daylit zones.

b. Daytime setpoints for total ambient illumination (combined daylight and electric light) levels that initiate dimming shall be programmed in compliance with relevant local building energy codes.

c. Multiple-leveled switched daylight harvesting controls may be utilized for areas marked on drawings.

d. Provide smooth and continuous daylight dimming for areas marked on drawings. Daylighting control system may be designed to turn off electric lighting when daylight is at or above required lighting levels, only if system functions to turn lamps back on at dimmed level, rather than turning full-on prior to dimming.

PART 3 - EXECUTION

3.1 PRE-INSTALLATION MEETING

A. A factory authorized manufacturer's representative shall provide the electrical contractor a functional overview of the lighting control system prior to installation. The contractor shall schedule the pre-installation site visit after receipt of approved submittals to review the following:

1. Confirm the location and mounting of all digital devices, with special attention to placement of occupancy and daylighting sensors.

2. Review the specifications for low voltage control wiring and termination.

3. Discuss the functionality and configuration of all products, including sequences of operation, per design requirements.

4. Discuss requirements for integration with other trades.

B. Calibrate all sensor time delays and sensitivity to guarantee proper detection of occupants and energy savings.

1. Adjust time delay so that controlled area remains lighted while occupied.

C. Provide written or computer-generated documentation on the configuration of the system including room by room description including:

1. Sensor parameters, time delays, sensitivities, and daylighting setpoints.

2. Sequence of operation, (e.g. manual ON, Auto OFF. etc.)

3. Load Parameters (e.g. blink warning, etc.)

D. Post start-up tuning – After 30 days from occupancy contractor shall adjust sensor time delays and sensitivities to meet the Owner's requirements. Provide a detailed report to the Architect / Owner of post start-up activity.

3.2 COMMISSIONING SUPPORT SERVICES

A. On this project, a commissioning agent will be hired to verify the installation and programming of all building systems, which includes the lighting control system. Manufacturer should include an extra day of technician's time to review the functionality and settings of the lighting control hardware with the commissioning agent, including reviewing submittal drawings and ensuring that instructions on how to configure each device are readily available. Manufacturer is NOT responsible for helping the commissioning agent inspect the individual devices. It will be the commissioning agent's responsibility to create and complete any forms required for the commissioning process, although the manufacturer or contractor may offer spreadsheets and/or printouts to assist the agent with this task.

B. The commissioning agent shall work with the electrical contractor during installation of the lighting control hardware to become familiar with the specific products. The agent may also accompany the manufacturer's technicians during their start-up work to better understand the process of testing, calibration and configuration of the products. However, the contractor and manufacturer shall ensure that interfacing with the agent does not prevent them from completing the requirements outlined in the contract documents.

3.3 EQUIPMENT INSTALLATION AND DOCUMENTATION

A. Installation: The control system shall be installed and fully wired as shown on the plans by the installing Contractor. The Contractor shall complete all electrical connections to all control circuits and override wiring.

B. Documentation: The Contractor shall provide accurate "as-built" drawings to the Owner for correct programming and proper maintenance of the control system. The "as-builts" shall indicate the load controlled by each relay and the relay panel number.

C. Operation and Service Manuals: The factory shall supply all operation and service manuals as related to the design of the control system.

3.4 CABLING

A. All low voltage cabling shall be plenum rated, blue outer jacket with white tape every two (2) feet to identify it as lighting control cabling.

3.5 PRODUCT SUPPORT AND SERVICE

A. Factory Support: Factory telephone support shall be available at no cost to the Owner. Factory assistance shall consist of solving programming or application questions concerning the control equipment. The factory shall maintain toll-free numbers for technical support for their customers.

3.6 START-UP & SUPPORT FEATURES

A. Upon completion of the installation, the manufacturer's factory authorized representative shall start up and verify a complete fully functional system.

B. The electrical contractor shall provide both the manufacturer and the electrical engineer with three weeks written notice of the system start up and adjustment date.

C. Upon completion of the system start up, the factory-authorized technician shall provide the proper training to the owner's personnel on the adjustment and maintenance of the system.

D. To facilitate start-up, all devices daisy-chained together (using CAT-5) shall automatically be grouped together into a functional lighting control zone.

E. All lighting control zones shall be able to function according to default settings once adequate power is applied and before any system software is installed.

F. Once software is installed, system shall be able to auto-discover all system devices without requiring any commissioning.

G. All system devices shall be capable of being given user defined names.

H. All devices within the network shall be able to have their firmware reprogrammed remotely and without being physically uninstalled for purposes of upgrading functionality at a later date.

I. All sensor devices shall have the ability to detect improper communication wiring and blink it’s LED in a specific cadence as to alert installation/startup personnel.

3.7 SYSTEM ACCEPTANCE

A. The Contractor is responsible for complete installation of the system according to strict factory standards and requirements. The following items shall be included requirements:

1. All system equipment shall operate in accordance with specification and industrial standard procedures.

2. An operational user program shall exist in the control system. The program shall execute and perform all functions required to effectively operate the site according to the requirements.

3. Demonstration of program integrity during normal operation and pursuant to a power outage.

4. Contractor shall provide a minimum of three hours training on the operation and use of the control system. Additional support services shall be negotiated between the Contractor and the building Owner or manager.

END OF SECTION 260923