

SECTION 26 09 26
LIGHTING CONTROLS
Design Standard

PART 1 GENERAL

1.1 PURPOSE

This design standard has the purpose of creating learning and working environments that maximize occupant comfort and controllability. The consistent application of lighting controls for the San Mateo County Community College District therefore achieving a standard of operation, reliability and quality throughout all renovation and new building projects.

1.2 SYSTEM REQUIREMENTS

- A. Dimmable lighting controls shall be provided throughout.
- B. The Lighting Controls System must be integrated with the Facility Management System (FMS) through BACnet IP.
- C. The Lighting Controls Systems at a minimum must include switch level controls. If proprietary software is used, it must be capable of being disabled.

PART 2 PRODUCTS

2.1 Lighting control systems include but are not limited to the following:

- A. Lighting control panels/devices, switches, sensors and all related hardware, software and operational interfaces.
- B. Individual sensors designed to control individual lighting fixtures for maximum control. Sensors to include occupancy sensing and daylight sensing (photocell) where deemed appropriate.
- C. Lighting controls to be UL listed and carry factory warranty for minimum 5-year duration.
- D. All building technology product selections and deployments shall conform to this Basis of Design to include approved architecture and product criteria. .
- E. Hard wired solutions shall be Lutron Quantum Products
 1. Specify control panel for load size and control characters required for the space.
 2. Specify control units, wall stations, switches, sensors and other devices based on the functional requirement of the space.
 3. Connect though BACnet to the SMCCCD Facility Management System (FMS) for the purposes of monitoring, control and fault detection as well as SOO enabling/disabling.
 4. Integration with shading devices, HVAC systems and other devices may be required. Control panel and system selection should be made with future integration needs and capabilities in mind.
 5. All product, system, and integration specification require written approval from SMCCCD Project Manager in consultation with SMCCCD's commissioning agent and Energy Manager (at minimum).
- F. Wireless Solutions shall be Lutron Vive Products

1. Include the BACnet-enabled Vive Hub HJS-2-SM (Surface Mount) or HJS-2-FM (Flush Mount). The selection of the Vive Hub model is directly related to the installation location. To ensure RF coverage is sufficient, no projects will use existing Vive Hubs without express approval of the designated project representative at San Mateo County Community College District.
2. It is at the installing contractors' discretion whether to use 8A RMJS-8T or RMJS-8TN 0-10v dimming PowPaks. The -8T uses Class 2 0-10v terminals and the -8TN uses Class 1 0-10v whips through the electrical box knockout.
 - a. Fixtures using the IEC 60929 or ANSI C82.11 0-10v protocol with 10-year warranty are the campus standard (e.g. Finelite or Philips architectural fixtures or retrofit kits). Refer to District Design Standard 26 50 00 – Lighting for further detail on fixture selection.
3. For switching relay loads, the RMJS-16R will be the standard switching PowPak on the SMCCCD Campus. This PowPak will be used for all interior and exterior switching loads.
4. The Lutron Vive family of interior occupancy sensor will be used as the primary means of shutoff controls for campus lighting and will follow the building schedule prescribed on the Schneider Electric FMS. All sensors will be left at their factory default maximum sensitivity and 15-minute time out unless specified below.
 - a. LRF2-OCR2B-P-WH is the standard ceiling sensor for ceilings up to 10 feet. For higher ceilings, please drop occupancy sensor down on a rod to 10 foot height.
 - b. LRF2-OWLB-P-WH is the standard wall mount sensor for large spaces. It can detect minor motion out to 50 feet and should be placed every 30 feet on center.
 - c. LRF2-OKLB-P-WH is the corner mount sensor for private offices and conference rooms. It can detect minor motion out to 35 feet.
 - d. LRF2-OHLB-P-WH is the hallway sensor that can detect motion out to 150 feet.
 - e. Lutron WLCU will be used as the RF interface gateway for all Lutron low voltage wired occupancy sensors for complex environments including dual-tech, high bay, IP66-rated humidity or exterior locations, etc.
 - f. The PJ-3BRL-GWH-L01 is the standard dimming PICO for all spaces except open classrooms. There will be one PJ-3BRL-GWH-L01 for each 0-10v dimming zone.
 - g. The PJ-2B-GWH-L01 is the standard dimming PICO for open offices. There will be one PJ-3BRL-GWH-L01 for each 0-10v dimming zone.
 - h. The PJ-2B-GWH-L01 is the standard switching relay PICO. There will be one PJ-2B-GWH-L01 for each relay.
 - i. The PJ-4B-GWH-L01 is the standard scene PICO for classrooms, conference, and meeting rooms. The PJ-4B-GWH-L01 will be used to set custom A/V light levels if there are multiple PowPaks in a space. All integration with A/V systems will be via BACnet/IP.
 - j. UL924/1008 devices will be utilized to comply with the fire code as needed for compliance with local/national ordinances unless otherwise specified by SMCCD. The RMJS-8T-DV-B-EM will be used standalone or in conjunction with a LUT-ATS-D to satisfy NFPA101 7.8.1.2.2 and UL924 requirements. LVS Controls devices are also acceptable to satisfy the uniformity requirements of Title 24 Section 130.1(b).
 - k. Deviation from these specifications may be granted with proof of equivalency or superiority

2.2 APPROVED MANUFACTURERS

- A. Exterior Lighting Controls: Enlighted
- B. Interior Lighting Controls: Lutron

PART 3 EXECUTION

3.1 CONTROL INTEGRATION INTENT

- A. Provide all necessary programming and interfacing requirements needs to control common areas in any building from the FMS.
- B. Design and specify all lighting controls to meet the following Code requirements and industry standard of care
- C. Continuous Dimming Lighting Controller:
 - 1. Provide dimming control of interior lights in response to light level data, compatible with 0 to 10VDC dimming ballasts/controllers. Control system to be open loop, and will provide three output control zones consisting of a 0 to 10VDC signal compatible with fluorescent dimmable ballasts and LED controllers.

3.2 INSTALLATION

- A. Control Integration
 - 1. Each Vive Hub will have an individual Cat-6 LAN drop run to the IDF closet or other location specified by the designated SMCCD representative. Hubs will not be connected via splitters or otherwise daisy-chained. Once a Hub is fully programmed and living on the campus IT network, the designated SMCCD representative will enable or disable the Hub's wi-fi access at their discretion for security.
- B. Programming
 - 1. All wireless lighting controllers will be programmed in the Vive Application with the correct load wattage during start-up. This load wattage is the sum of all connected fixtures to the respective PowPak.
 - 2. All daylight sensors must be manually calibrated per the installation standards and direction. Default out of box calibration is not permitted. Target Brightness Levels will be set for individual space types using the foot-candle ranges suggested by the Illuminating Engineering Society of North America's (IESNA) Lighting Handbook recommended light levels for '15' in each zone.
 - 3. For all dimming loads, a high end trim will be set based on the maximum value for the IESNA suggested range for that space. When manually turned on, all dimming loads should turn on to an illuminance level within IESNA suggested range for that space type with the option for occupants to toggle dimming as needed.
 - 4. Sensors will be left at factory default settings of auto-on, maximum sensitivity, and 15-minute time out. If the sensors are located in an area to be tested for NRCA-MCH-19-A compliance, the time out will be set for 5-minutes. Once testing is complete, the sensor will be restored to 15-minute time-out.
 - 5. Project quotes will include a factory-certified technician to verify installation and submit project documentation to Lutron for 5 year warranty activation and Lutron Factory As-Built Drawings. Provide factory representative to participate in commissioning. Make all adjustments required for correct operation of entire lighting system. Complete all commissioning and local authority paperwork required for occupancy.

C. Orientation and Training

1. Provide minimum four (4) hours of training to SMCCCD facility personnel in operation and maintenance of the control system. Include hands-on software training to allow facility personnel to make field changes to the system.

D. Programming SMCCCD Sequence of Operation (SOO)

Interior Lighting - Sequence of Operations - Basis of Design		
Classroom (CLS)	Manual On (IESNA suggested illuminance)/Auto Off	15min Delay
Multipurpose Room (MPR)	Manual On (IESNA suggested illuminance)/Auto Off	15min Delay
Private Office (OFF)	Manual On (IESNA suggested illuminance)/Auto Off	15min Delay
Open Office (OFD)	Manual On/Auto Off	15min Delay
Open Area (COM)	Manual On/Auto Off	15min Delay
Break areas (BKR)	Manual On/Auto Off	15min Delay
Elevator Lobby (LOB)	Manual On/Auto Off	15min Delay
Conference Room (CRF)	Manual On (IESNA suggested illuminance)/Auto Off	15min Delay
Storage (STOR)	Manual On/Auto Off	15min Delay
Lab (LAB)	Auto On/Auto Off	15min Delay
Flex Offices (FWS)	Manual On/Auto Off	15min Delay
Mail/Copy Room (MFD)	Manual On/Auto Off	15min Delay
Huddle Room (HUR)	Manual On/Auto Off	15min Delay
* Auto settings controlled by Occupancy Sensor or Time-clock. Spaces permitted for timeclock shut-off by Title 24 such as a Lobby, may be controlled by Time-clock during normal hours and have sensors disabled. * Please check with SMCCCD Facility Operations for site requirements.		

3.3 CONTROLS INTEGRATION

- A. Schneider Electric will perform the integration to the Lutron and/or Enlighted systems. SMCCCD approval of all product Submittals, Bill of Materials, and preliminary space layout is required prior to requesting a quote from Schneider Electric.
- B. Schneider Electric provides and installs hardware and software components to interface to the lighting control system status and occupancy sensors and to display that information in the existing FMS deployment as needed.

- a. Schneider Electric leverages the SMCCCD approved Control System that is typically furnished/installed by the electrician and commissioned by a manufacturer-certified technician in collaboration with the SMCCCD Energy Manager and the designated commissioning agent for the project using BACnet/IP. The technician installing the system must provide all occupancy sensor point information to Schneider Electric throughout the project in order to integrate lighting controls effectively.
- C. The system status information will be overlaid on new system graphics and will include the standard lighting control system reporting and calculations defined below.
1. Provide floor plans with Lighting and Occupancy Zone Overlays and points adhering to SMCCD space type and labeling guidelines
 2. Provide detailed Occupancy Metrics for each zone (classrooms, common areas, private offices, conference rooms, and open office floor plans)
 3. Provide Aggregate Occupancy Metrics for whole Floor
 4. Trending and Alarming Setup
 5. Quality Assurance Testing and Commissioning feedback to Electrical trade for end to end commissioning support
 6. Update Help Menu & Documentation
 7. Schneider Electric FMS Training
 8. If required for system expansion, provide new server hardware as needed for the lighting control interface. If needed, electrical installation should be by project electrician.

Lighting Control System Integration Point List (standard)				
Item	Point Description	Point Type	Units/Facets	Area
1	Occupancy Status	Multi-State-Value	Occupied/Unoccupied/Unknown	Per Space
2	Total Calculated Power	Analog	W	Per Space
3	Light Level	Analog Value	%	Per Space
4	Lighting State	Binary Value	ON/OFF	Per Space
5	Master Load Shed Enabled	Binary Value	Enable/Disabled	Per Vive Hub

Lutron Vive BACnet PICS statement is available at the following Dropbox link:
<https://www.dropbox.com/s/iu7wa4mjvhrf6y4/VIVE%20BACNET%20IMPLEMENTATION.pdf?dl=0>

Any exceptions to this table or to the integration requirements at SMCCD should be approved in writing by the designated SMCCD representative prior to project kickoff.

3.4 TITLE 24 (PART 6) 2019 CODE UPDATES

SMCCD standard is 100% DCV integration with local lighting occupancy sensors. A list of exceptions must be approved by the designated SMCCD representative prior

to project kick-off. At a minimum, Occupancy Sensors values will be shared with local mechanical controls for Demand Control Ventilation purposes per §120.2(e)3 and §120.2(d)5 for Table 120.1-A note F of the Title 24 (Part 6) Energy Code for 2019 in all the optional and mandatory spaces:

Primary Function Area		Allowed Lighting Power Density for General Lighting (W/ft²) 2019
Auditorium Area		0.7
Audience Seating Area		0.6
Civic Meeting Place Area		1
Classroom, Lecture, Training, Vocational Area		0.7
Convention, Conference, Multipurpose and Meeting Area		0.85
Corridor Area		0.6
Hotel Function Area		0.85
Museum Area	Exhibition/Display	0.6
Financial Transaction Area		0.8
Main Entry Lobby		0.85
Office Area	> 250 square feet	0.65
	≤ 250 square feet	0.7
	Open plan office	0.6
Retail Sales Area		1.05
Meditation Area		0.95

After January 1st, 2020, the NRCA-MCH-19-A-Occupancy Sensor Controls Acceptance Testing will be performed for all new construction and renovations projects where new mechanical equipment is installed per the requirements in the Title 24 (Part 6) Energy Code for 2019. A copy of the completed NRCA-MCH-19-A will be provided to the SMCCD Facilities Team. Sensors in NRCA test locations will initially be set to 5 minutes for testing purposes during installation in accordance with NRCA-MCH-19-A guidelines and then reset to 15 minutes by the Electrical Contractor after testing is complete. This is acceptable by the CEC and verified by ALR. **This additional reprogramming costs should be covered in the electrical subcontractor’s initial project bid.**

Further information on these requirements is consolidated here:

<https://www.dropbox.com/s/7d631868h2i7ib9/T24%202019%20Mechanical%20Issues%20Forecast.pdf?dl=0>

3.5 SUBSTITUTES ALLOWED?

Yes, if performance and quality equivalency can be evidenced.

3.6 ASSOCIATED DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS

- A. 25 55 00 - FACILITY MANAGEMENT SYSTEMS (FMS)
- B. 26 00 00 Basic Electrical Requirements
- C. 26 50 00 – Lighting Design Standard

END OF SECTION