

CONSTRUCTION REQUIREMENTS

Note: The buildings on the UCCS campus are divided into two categories: General Fund and Auxiliaries. General Fund Buildings include academic and administrative functions. Auxiliary buildings include residence halls, athletic, and dining facilities. In some cases, construction standards differ depending on the building category. Confirm building category with Facilities Services Project Manager.

- Network Lighting Controls

DIVISION TWENTY-SIX: NETWORK LIGHTING CONTROLS

A. System Design:

- Network lighting control system is not an off the shelf proprietary system; it is same system as the selected building automation system (BAS)
- Interior lighting such as all corridors, conference rooms, lecture halls, classrooms, instructional labs, open offices, service prep kitchens, cafes, workshops, maintenance areas, normal and emergency lighting shall be controlled by the network lighting control system that must have native BACnet hardware and be approved by the owner.
- EM lights come on when there is a full loss of power
- Exterior lighting shall be controlled by the network lighting control system.
- Local dimming, occupancy sensors, vacancy sensors, and switching for offices, restrooms, storage, custodial, practice rooms, etc should be locally controlled.
- Occupancy vs. Vacancy Sensors:
 1. Use of occupancy sensors shall be provided in non-office or interior spaces with no available daylight. Occupancy sensors are to be ceiling mounted. Wall sensors are not desired due to furniture placement.
 2. Vacancy sensors shall be used in offices or perimeter locations with available daylight. Vacancy sensors require the end user to turn the light on manually via a wall mounted switch. The vacancy sensor shall be ceiling mounted and monitor the space to turn the lights off if the space is vacant for a specified length of time. No wall mounted sensors.
 3. Dual technology occupancy sensors with integral dual level lighting control switches or integral dimming switches shall be used wherever practical.
 4. Wattstopper or approved equal.
- Switching of lights in spaces with A/V shall be setup to enhance visibility of the screen; i.e. lights near the screen can be turned off while maintaining lighting in the room.
- In larger spaces (ex. classrooms) with multi-tube fixtures, switching shall be setup to allow different numbers of tubes to be energized to vary lighting levels.
- Dimmers: Radiant 0-10V dimmer controls provided in one wall box control. Preference is for no separate power packs.
- Graphical interface should be provided with the following screens shown – main screen, interior control zones, exterior control zones, entire building control zone, etc.
- Panelboards: Refer to division 26 electrical standards.
- Photo cell – needs to be weather proof and rated for exterior application.


- All manual override lighting control switches shall be installed as close as possible to the entrances that serve the area.
- Locate lighting control switches at the ends of hallways rather than the middle.
- Corridor **night lighting** is desired with override switches located where applicable/path of travel. Occupant warning should provide a warning blink prior to each scheduled 'OFF' time.
 1. Egress lighting to be lowered to between 20% and 50% (per review with Engineer) when the space is unoccupied.
 2. Egress lighting to be 100% when the space is occupied.
- Daylight harvesting is to be used where applicable.
 1. A/E to perform daylight simulation to prepare plans for daylight zones.
 2. A/E to identify fixtures that are controlled on the drawings.
 3. Controls sequence narrative to be provided by A/E.
 4. Provide calibration requirement in project specifications.
- Wall plates: Preference is for modern, low profile screw less installation.
- Device finish color: Finishes to be determined by Architect.
- Device mounting heights: all devices should be ceiling mounted; no wall mounted devices.
- Device placement at ceilings should be aligned with other systems for an intentional approach.

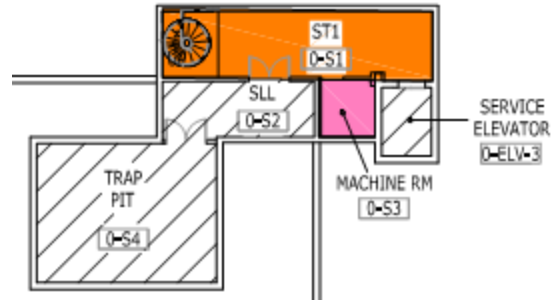
B. Submittals:

- Shop Drawings:
 1. Contractor shall manage the review process with the Project Team through at least three coordination meetings (in person) for new construction projects (30%, 60%, and 90% packages for review) prior to the design team's formal submittal. Preference is to perform reviews electronically.
 2. Shop drawings shall have campus base network diagrams included so that new project one-line's shows how it integrates with existing campus.
 3. Shop drawings should include a color control scheme diagram, such as example below:

Color Coded Control Scheme Key:

Type 1:	Stand Alone Line Voltage Switch by Others
Type 2A:	Full Scale Dimming by Occupant with Local Override and Vacancy Sensor
Type 2B:	Preset/Dual Dimming by Occupant with Local Override and Vacancy Sensor
Type 2C:	Full Scale Dimming by Occupant with Local Override and Occupancy Sensor
Type 3A:	Daylighting with Master Override, Preset 4 Scene Control, After Hours Occupancy Override
Type 3B:	50% Ambient, Dual Ballast, with Master Override & Nightlighting
Type 3C:	50% Ambient Dimming with Master Override & Nightlighting
Type 4A & 4B:	Local Override Button or Keyed Switch with Occupancy Sensor
Type 5A:	Scheduled Operation through BAS with Daylighting and Master Override
Type 5B:	Scheduled Operation through BAS with Photocell and Master Override
Type 6:	Master Override
Type 7:	Storage (not shown - see device floor plan for locations)

 : No Control by BAS required



4. Control schemes need to identify the sequences of operation for each type, such as example below:

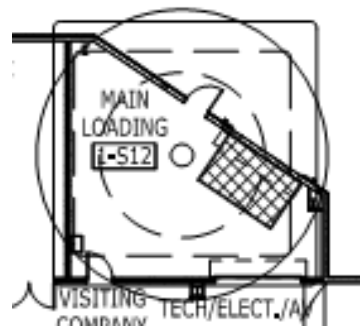
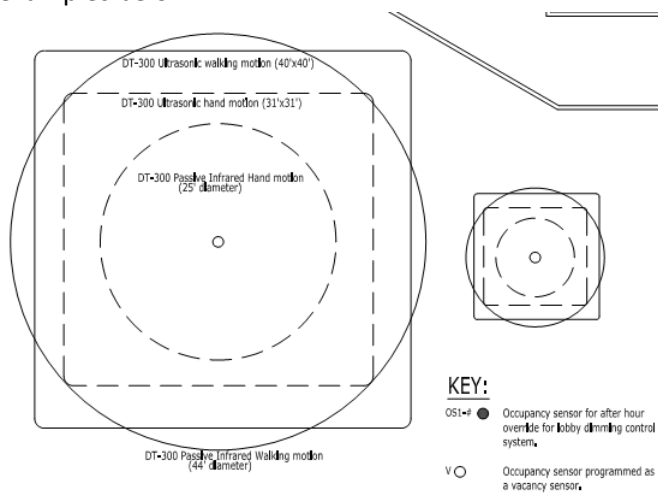
Typical Type 2A Full Scale Dimming Sequence of Operation:

Sequence of Operation:

1. The dimmable fixtures in this space shall be controlled by the BAS, 2 ceiling mounted vacancy sensors, wall mounted override buttons, and a wall mounted dimmer switch with the following features:
 - 1.1. momentary "ON/OFF" push buttons for override with an input to the BAS
 - 1.2. full scale dimmers
2. A time clock also controls this space. Time clock schedules shall be provided for each zone. The vacancy sensor will override the time clock schedule.
3. The wall dimmer will control the lighting output for each zone separately via a 0-10Vdc signal to each of the dimming drivers.

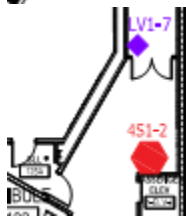
4. The BAS will monitor NO contacts on the ceiling mounted dual technology vacancy sensors.
5. If the fixtures in this space are left ON while the room is unoccupied, as indicated by a vacancy sensor, the BAS will shut the fixtures OFF.
6. The wall mounted "ON/OFF" push buttons shall override the vacancy sensors.
7. Vacancy sensors shall be provided with an auxiliary contact for the HVAC terminal unit sequence.
8. The BAS SWEEP will be accomplished thru an output from the BAS controllers.

5. Shop drawings should include geometry to show extent of coverage, such as examples below:



6. Shop drawings need to overlay the ceiling mounted devices on 'coordinated Reflected Ceiling Plans' for alignment with other ceiling devices.

- Product Data:
 1. Include a bill of material form that itemizes each product.
 2. Submit cut sheets of all product, hardware, software, etc. If finish samples are requested other than white, provide physical samples. PDF color charts are not acceptable.
 3. Devices are to be shown with color coded symbols at all locations, such as below example:



- Riser Diagram:
 1. Provide a one-line diagram showing the relative placement of all controls, contractor equipment and interconnection with equipment supplied by others.

C. Lighting Operation Sequences:

- Sequence of operation narratives shall be written by the A/E and included in the projects. Sequence of operations to be shown on shop drawings.

D. Installation Requirements:

- Install wiring per project specifications.
- Coordinate with other parties as necessary.
- Provide grounding kit for lighting control equipment.

E. Network Lighting Control System:

- **Network lighting control system is not an off the shelf proprietary system; it is same system as the selected building automation system (BAS); must have native BACnet hardware and be approved by the owner**
- New installations of HVAC Lighting Controls and BAS are limited to:
 - Setpoint Systems Corporation
 - Delta Controls: <https://www.deltacontrols.com/>
 - ICSI Colorado
 - Automated Logic: <http://www.automatedlogic.com/>