

## ***School Design Guidelines***

A well designed control system requires the consideration of energy codes, the occupants' and building owner's control needs, building use patterns and the type of lighting that's used in each space. Listed below are some general lighting control best practice principles for space types in schools.

### **General Considerations**

- Mount occupancy sensors at least 6 to 8 ft away from HVAC ducts. Ultrasonic sensors should be mounted on vibration free, stable surfaces and should not be used in areas of heavy air flow, moving objects, or where the ceiling height is greater than 14 ft.
- If there is a concern that lighting could be turned off automatically or manually when people are still in a space, put in night lighting for safe egress.
- Use products that are durable and can resist abuse, such as stainless steel wall plates.
- Many lighting control devices have specific voltage and load rating requirements. Be sure to specify the device model that matches the correct voltage and load rating for the application.

### **Classrooms**

- Dual technology occupancy sensors are used for classrooms because of their optimal performance. Classrooms with hanging artwork that can move due to air flow, should utilize passive infrared sensors.
- Mount occupancy sensors so there is no detection outside the door. They should be mounted close to the teacher's desk, above the main level of activity, and below fixture mounting heights. They should not be placed where they could be covered by artwork, shelves or other furniture.
- Always include switches that provide manual override control of the lighting.
- If daylight is available, provide daylight responsive, continuous dimming control.

### **Public Spaces/Common Areas**

- Public spaces, such as hallways and restrooms, are best suited for automatic on/off control of lighting. If manual control is needed, use key operated switches or install switches in secured areas.
- If daylight is available, provide daylight responsive, stepped dimming control.

### **Gymnasiums/Multipurpose Rooms**

- For spaces with HID lighting requiring a restrike period, it is best to use a control panel with time based on/off control. A more energy efficient design can be accomplished by using bi-level control of HID fixtures with occupancy sensors and time based control for shut off after hours.

### **Restrooms**

- Ultrasonic sensors are the right choice for spaces such as restrooms with stalls even when there is no direct line of site of the occupant from the sensor.

### **Exterior**

- Using a lighting control panel with time clock and photocell, control exterior lighting to turn on at dusk and off at dawn. Program the clock to turn non-security lighting off early for energy savings.

## ***Influential Factors for Lighting Control***

### **Energy Code Requirements**

Energy code compliance varies from state to state. Many states are adopting the new ASHRAE 90.1-2001 standard, which requires automatic lighting shut-off in commercial buildings greater than 5000 square feet in individual spaces by using either time scheduling or occupancy sensors. Other states, such as California, have developed their own guidelines for lighting and other energy controls.

### **Safety and Security**

Providing lighting when and where needed is a key factor of safety and security. In a public setting such as a school, security is of the utmost importance. Proper design and use of lighting controls is an integral part of addressing these concerns. Location and accessibility to manual controls, adequate night lighting, timely exterior lighting control, reliable system operation as well as other lighting control elements, all play a part in ensuring safety and security in schools.

### **Energy Efficiency and Sustainable Building Designs**

With rising energy costs, making educational facilities operate as efficiently as possible is of increasing importance. Similarly, many new educational facilities are being designed using sustainable resource principles. These include architectural features, such as daylighting, and the use of building materials that are recyclable or environmentally benign.

### **Community Center Functions**

Another trend that influences lighting and lighting control design is the increasing use of educational facilities as community centers for adult education and after-school programs. Extended and varying operating schedules alter the space usage, and impose additional needs for flexibility in lighting control.



## Summary of Best Practices for Lighting Control in Schools

The table below summarizes the lighting control best practices for school spaces shown in this guide. These best practices address typical control needs in the most common space types. However, control needs will vary from project to project and with school type.

Although not described in this guide, many other areas in a school are ideal for lighting control including administrative offices, libraries, cafeterias, auditoriums, storage areas, field lighting, locker rooms, and more.

<i>Best Practice</i>	<i>Space</i>	<i>Best Practices Summary</i>
C1.0	Classroom	• occupancy sensing • manual override
C1.0.5	Classroom (hanging mobiles)	• occupancy sensing • manual override
C1.1	Classroom	• occupancy sensing • bi-level switching • manual override
C1.2	Classroom	• occupancy sensing • bi-level switching • manual override • daylighting (stepped dimming)
C2.0	Classroom (partitioned)	• occupancy sensing • manual override
C2.1	Classroom (partitioned)	• occupancy sensing • bi-level switching • manual override
C3.0	Classroom	• occupancy sensing • bi-level switching • manual override • daylighting (continuous dimming)
C3.1	Classroom (skylight)	• occupancy sensing • manual dimming • manual override • daylighting (continuous dimming)



<b>Best Practice</b>	<b>Space</b>	<b>Best Practices Summary</b>
G1.0	Gymnasium	• time scheduling • bi-level HID • night lighting • manual override
G1.1	Gymnasium	• time scheduling • bi-level HID • time switch • occupancy sensing • night lighting • manual override
G2.0	Gymnasium (partitioned)	• time scheduling • manual override
H1.0	Hallway, vestibule, lobby	• time scheduling • occupancy sensing
M1.0	Multipurpose room	• occupancy sensing • manual override • bi-level switching
R1.0	Large restroom	• occupancy sensing • manual override • fan control
R2.0	Small restroom	• occupancy sensing • manual override • fan control
R3.0	Faculty/individual restroom	• occupancy sensing • manual override • fan control
E1.0	Exterior lighting	• time scheduling • photocell • manual override