



Daylight Zone Information Letter

December 19, 2011

The 2009 International Energy Conservation Code (IECC) contains a new provision referred to as Daylighting. This provision is exclusively for Commercial Buildings. It is the concept of making use of sunlight, when available, and allowing electrical consumption to be reduced by turning off lights. The code provision is based on the concept that unless separate switching is provided, the benefit of daylight cannot be recognized.

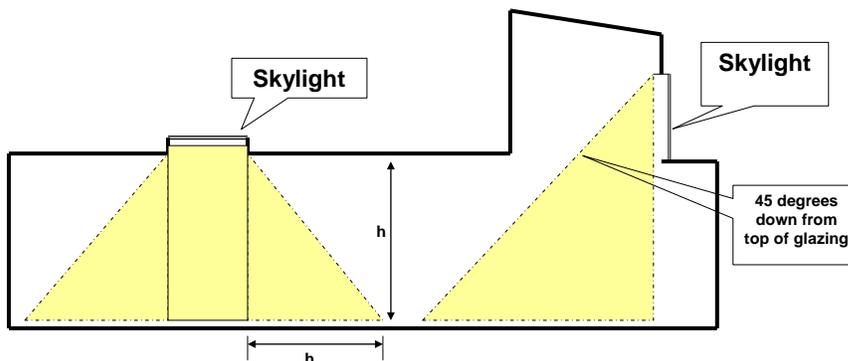
What are Daylight Zones?

Under Skylights: The area created by the width of the skylight, plus the area of a 45 degree triangle extending in all directions from the edge of the skylight extended to the floor below. If the angle is blocked by a wall, the area will be squared and end at that opaque wall.

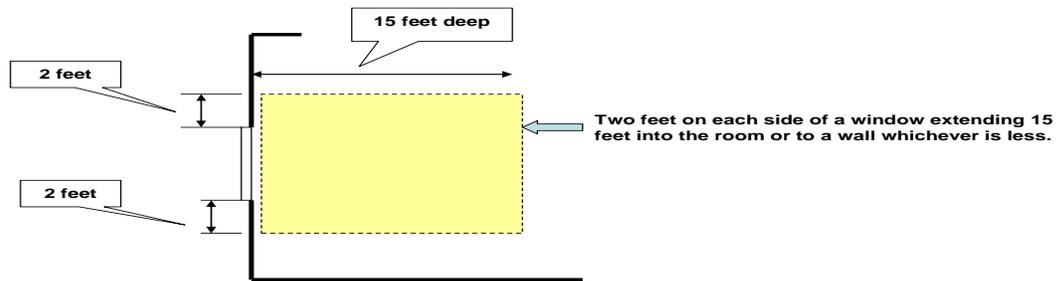
Daylight zones under skylights more than 15 feet (4572 mm) from the perimeter shall be controlled separately from daylight zones adjacent to vertical fenestration.

Daylight zones under skylights that overlap into adjacent vertical fenestration zones will be allowed to control both zones by a controller or switches as one zone. If the Daylight Zones do not overlap they shall be controlled separately.

The associated detail provides examples of skylights and their daylight zones.



Adjacent to Vertical Fenestration: The area created by the width of the fenestration (window) plus 2 feet on each side, extending to the nearest wall but not more than 15 feet into the room.



505.2.2.3 Daylight zone control.

Daylight zones, as defined by this code, shall be provided with individual controls that control the lights independent of general area lighting. The location of control devices for general lighting and daylight zones is not specified in the code, however switches or other controls shall be in the general vicinity of the fixtures being served.

Fixtures installed in daylight zones as defined by § 505.2.2.3 of the City of Fort Worth's amended International Energy Code are required to have separate controls from the general lighting within a room or space. Therefore, due to their independent switching requirements, it is not intended that they must comply with the general lighting control and bi-level control requirements of either § 505.2.1 or 505.2.2.1 of the Code.

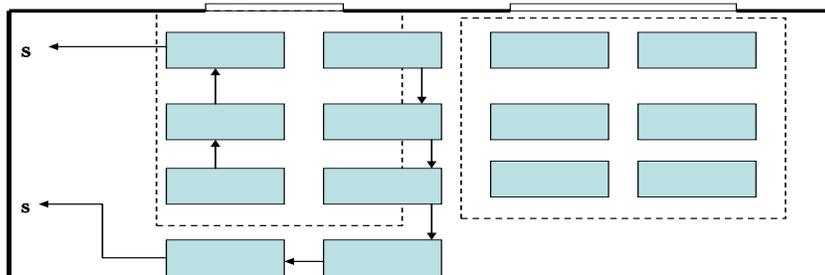
The word controls in IECC § 505.2.2.3 does not indicate that manual switching is mandatory when automatic controls are used except for on/off controls of the system, the word controls leaves the installer a variety of methods to control these zones that will meet the intent of this code.

Proposed enforcement of daylight zone controls according to the Department of Energy:

1. A single control or switch for daylight zones in each cardinal orientation.
2. A motion sensor with manual override could be installed for automatic control for daylight zones in buildings over 5000 square feet.
 - Other means of automatic control could be installed in buildings over 5000 square feet but manual control should be installed in the rooms with daylight zones areas for on/off control.
 - Rooms with daylight zones that use dimming devices should have a manual switch or motion detector with manual override for on/off control.

IECC 2009 addresses daylight controls as only requiring separate zone controls (via separate circuiting), but no specific method of control is mandated.

When a room contains both daylight zones and general lighting control areas, it is important to distinguish which fixtures are to be switched separately. When fixtures are located completely within a zone or area this is a relatively simple task. However, fixtures which straddle a line for a daylight zone must either be relocated entirely within the zone or shall be switched per the general lighting provisions of the code.

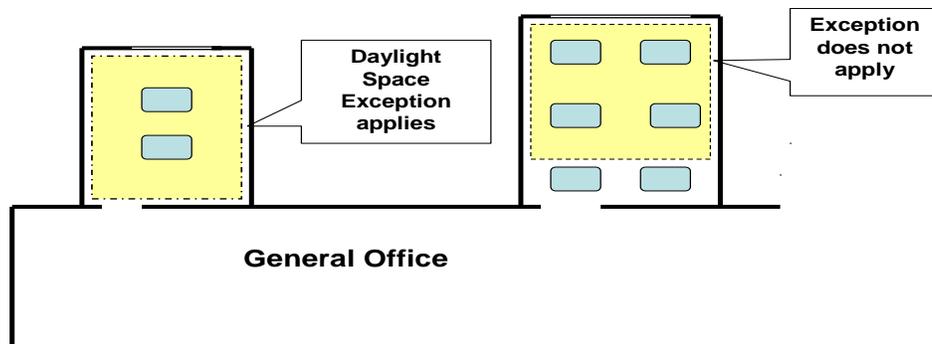


Separate switching for daylight zones and other fixtures which are part of the general lighting control area is not always required. There is an exception to the Code:

Daylight spaces enclosed by walls or ceiling height partitions containing two or fewer light fixtures are not required to have a separate switch for general area lighting.

Daylight Spaces

Daylight spaces enclosed by full height walls containing two or fewer fixtures meet the exception in §505.2.2.3 and do not have to comply with general lighting control requirements.



Where there are more than two fixtures within the daylight space (office on the right), the general lighting control requirements apply. So, even though the majority of the fixtures are within the Daylight Zone, at least half of the fixtures in that space must be separately controlled.

Recap of the Exception:

A room where the vertical fenestration daylight zones takes in the entire room with one or two lights - no general lighting is required.

A room where the vertical fenestration takes in more than two lights - bi-level switching for 50% reduction or automatic controls is required.

Even though the daylight zone may take in the entire room and the room has floor to ceiling partitions 50% reduction of the lighting shall be maintained per 505.2.2.1 if there are more than two light fixtures in the room.

505.2.1 Interior lighting controls.**Exceptions:****Lighting in stairways or corridors that are elements of the means of egress.**

These areas are exempt from bi-level switching or automatic controls.

IECC article **(505.2.2.2)** indicates that buildings larger than 5000 square feet shall be equipped with automatic lighting control devices.

Daylight zones in these buildings will require automatic controls to shut off the lighting in these areas.

Interpretation of Daylight Zones from the Department of Energy

Now we'd like to talk about one of the new provisions for 2009 which is daylight zone control. We need to start off with a couple of definitions, one for a daylight zone under a skylight. The simplest way to look at this is the dimensions of the skylight and in each of the four dimensions add to that the floor-to-ceiling height or the dimension to a ceiling height opaque partition that might be in the way, or one-half the distance to an adjacent skylight or other vertical fenestration, whichever is least. You add these to the skylight dimension in all four directions and that defines the area that is considered a daylight zone when you have skylights.

Let's look at similar definition for vertical fenestration when you have windows, and this is defined by a depth and a width. The daylight zone depth in this case is assumed to be 15 feet into the space away from the vertical fenestration or windows or to a nearest ceiling height opaque partition, which of course would block the light, whichever is less. The width is then going to be the width of the window plus two-feet on either side, or the width of the window plus the distance to again an opaque partition, or the width of the window plus half the distance to the next daylight area or with skylight or vertical fenestration, whichever is least. So that defines the two daylight zones, one for skylight/one for vertical fenestration.

Controls

The actual requirement for these daylight zones is that you must have individual control of the lights separate from the general lighting, and this allows occupants then to control that lighting and make use of the daylight. There's some special cases if you have contiguous daylight zones adjacent to vertical fenestration, in other words there are a row of windows. You can control larger areas with a single control if that zone or the areas in that zone do not encompass more than two adjacent orientations. So you could have a north and a east corner, for example, all in the same control, but areas on the north and the south could not be controlled with the same control for obvious reasons. If you have daylight zones that are under skylights and are greater than 15-feet from the perimeter, then these must have a separate control as well from the area that's daylight with windows on the side of the building, must be a separate control. There are of course some exceptions. If you have a daylight space that is enclosed by walls or ceiling height partitions and contains two or fewer light fixtures, then you're not required to have a separate switch, again from a practical standpoint that doesn't make a lot of sense. And one other note, these are - - these can be manual or automatic controls. There's no specific requirement as to what kind of control other than it has to be separate from the general lighting so occupants can affect them differently when there is daylight available.

Diagram of room below in building over 5000 square feet with motion detectors for automatic control of general lighting.

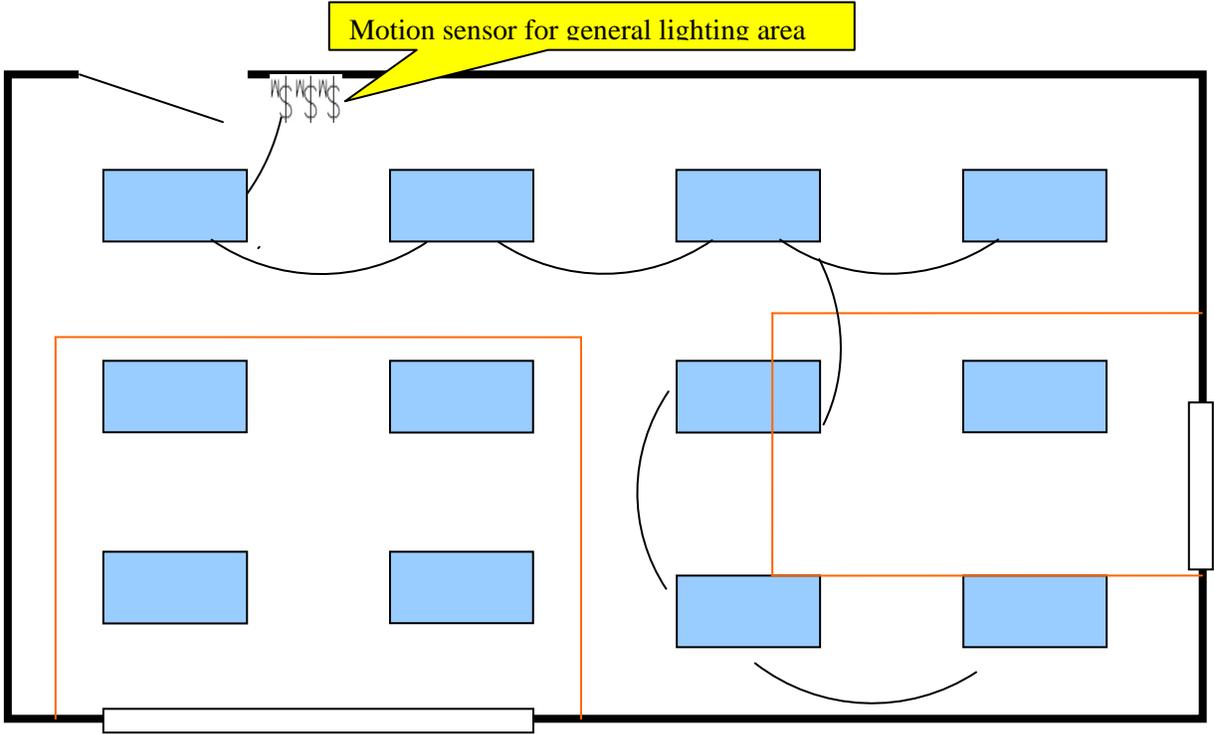
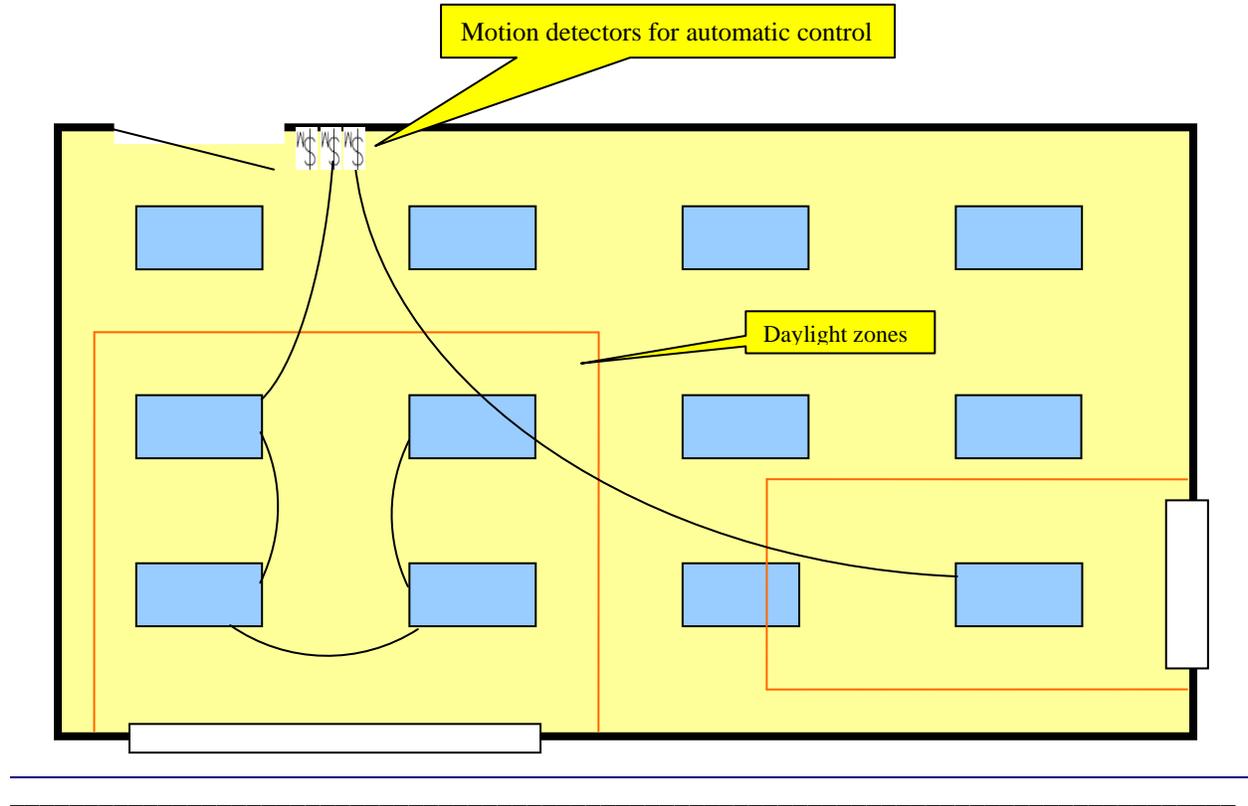
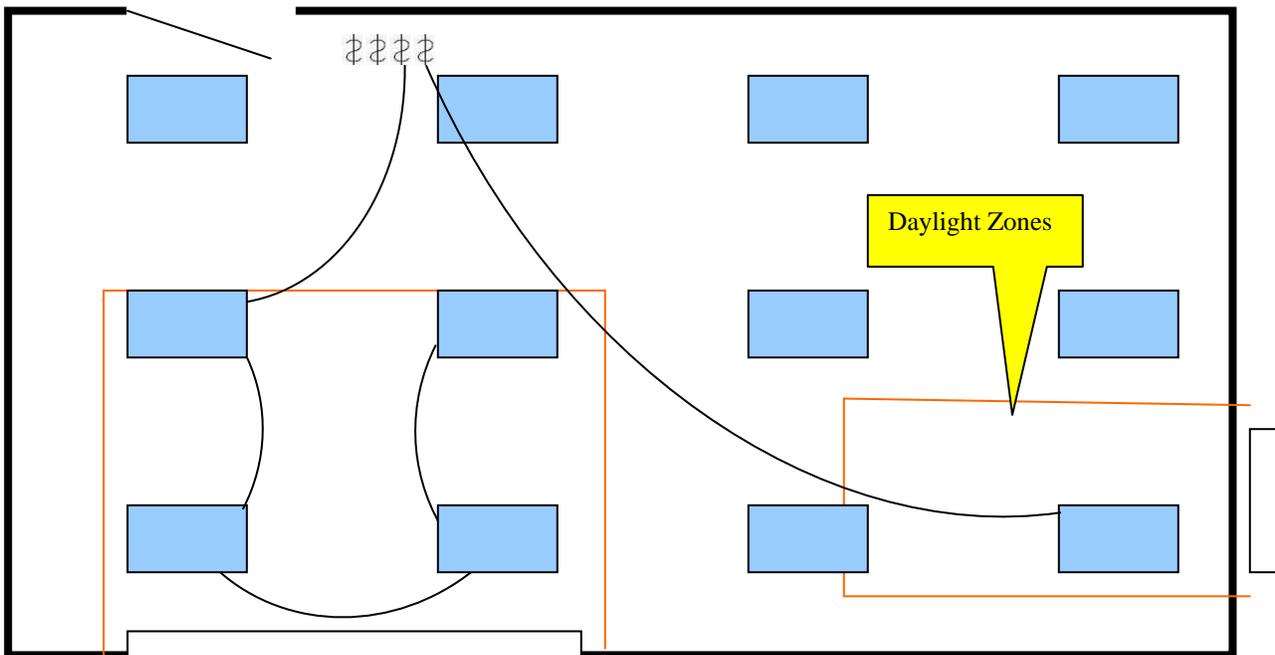


Diagram of room below in building over 5000 square feet with motion detectors for automatic control of Daylight Zones.

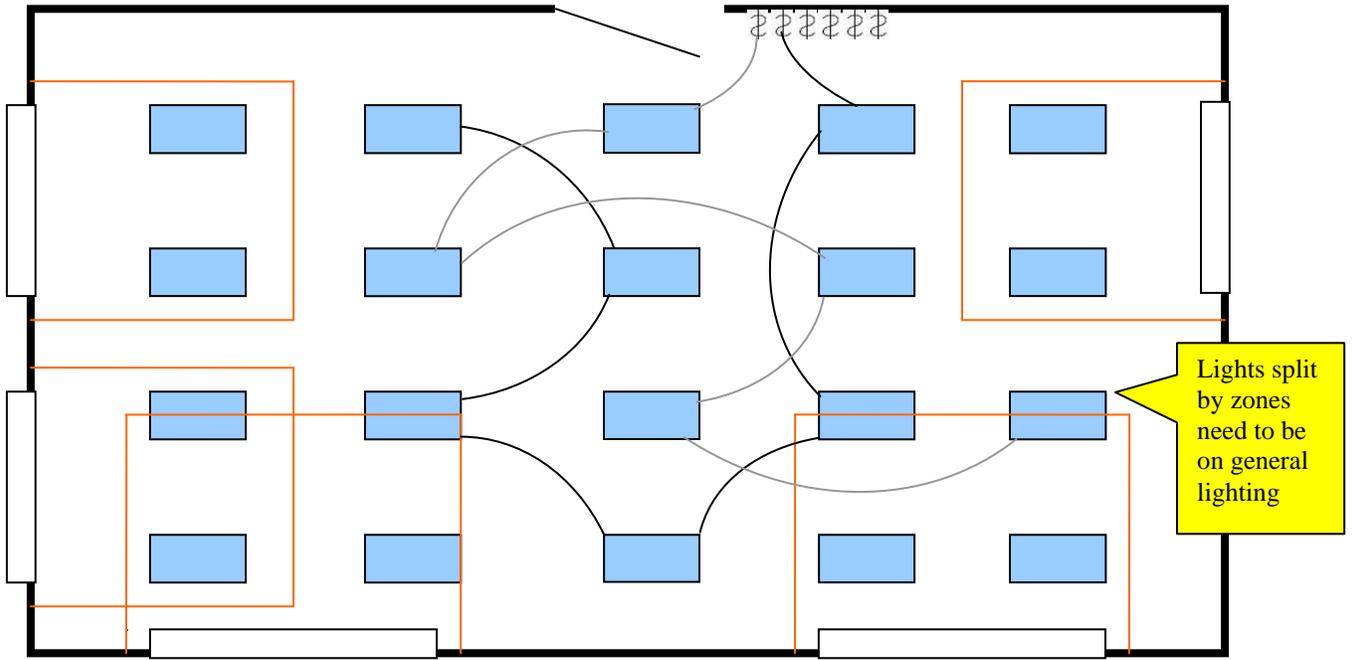


Daylight zones with manual lighting controls in buildings under 5000 sq. ft.



Bi-Level switching for general lighting in buildings under 5000 sq. ft. with daylight zones.

Manual switching of general lighting



Manual control for daylight zones with the switching controlling two adjacent cardinal orientations. Buildings under 5000 sq. ft.

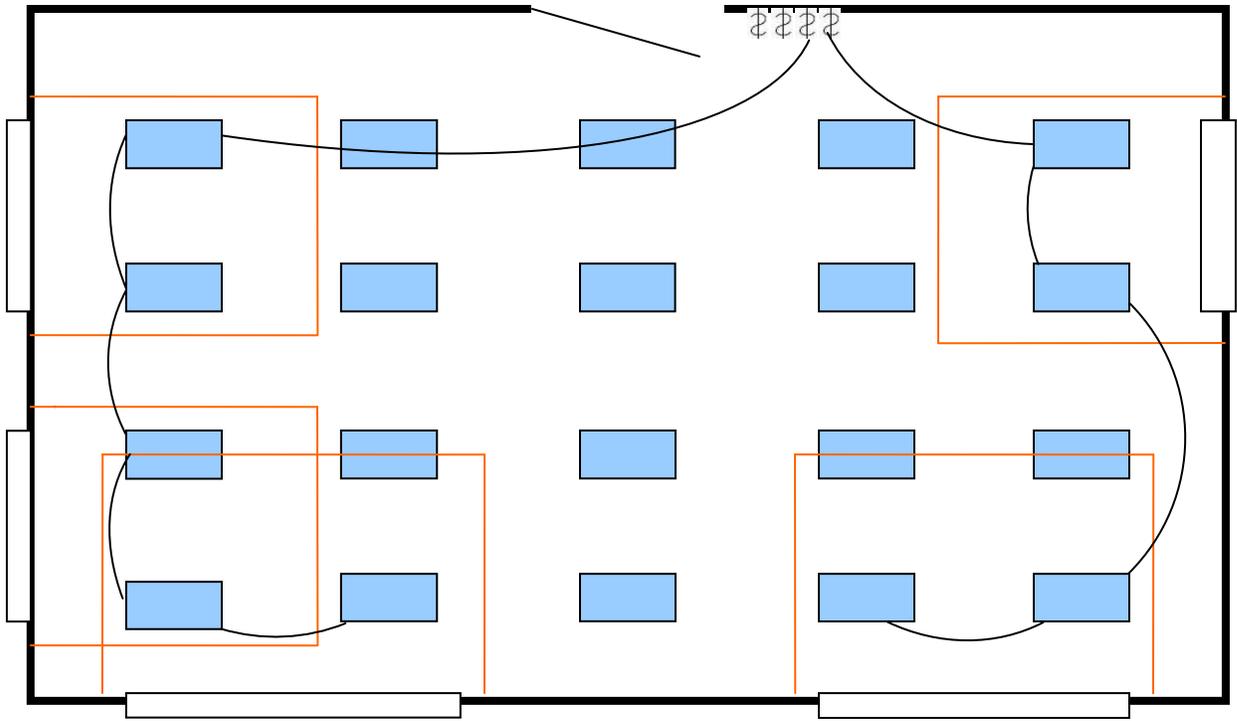
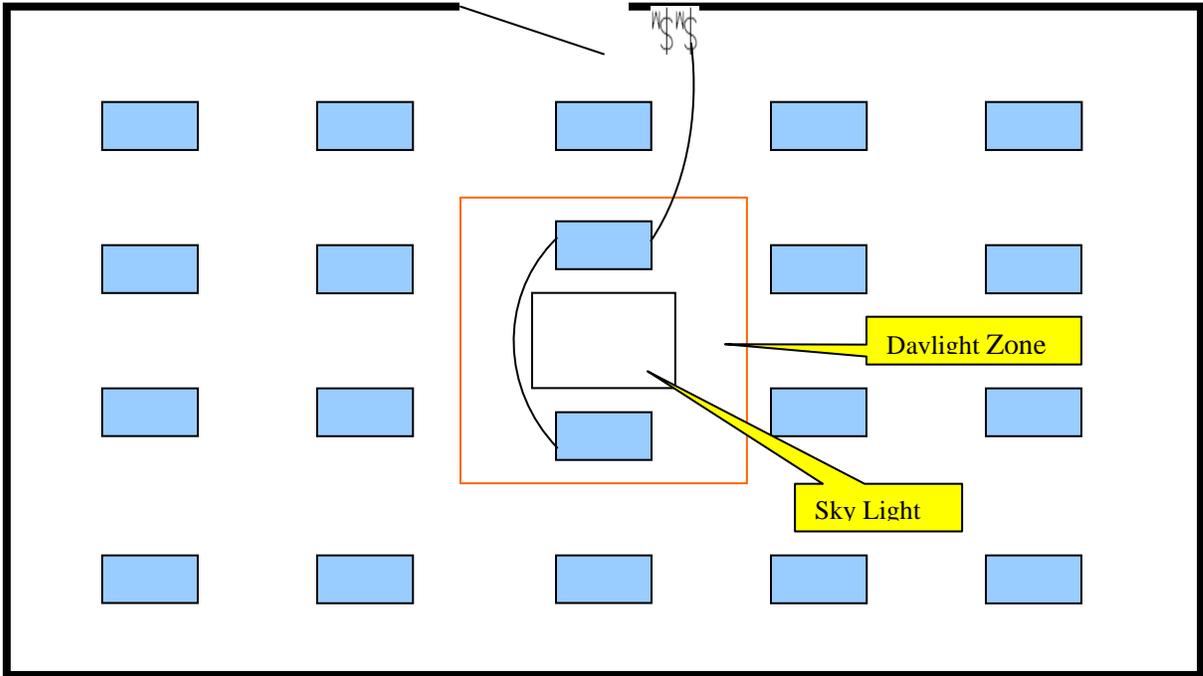


Diagram of room below in building over 5000 square feet with motion detectors for automatic control of Daylight Zone

Daylight Zone under sky light in building over 5000 sq. ft. with automatic on/off control



The illustrations above are not all inclusive but gives an idea of the different methods that could be used and the intent of 2009 IECC these controls.