Lighting Control Technology

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Lighting control codes

- 2001 IECC
- ASHRAE/IES 90.1-1999 / 1989
- California Title 24
- Mass. - MA State Building Code
- Washington State Energy Code
- Others

Lighting control code elements

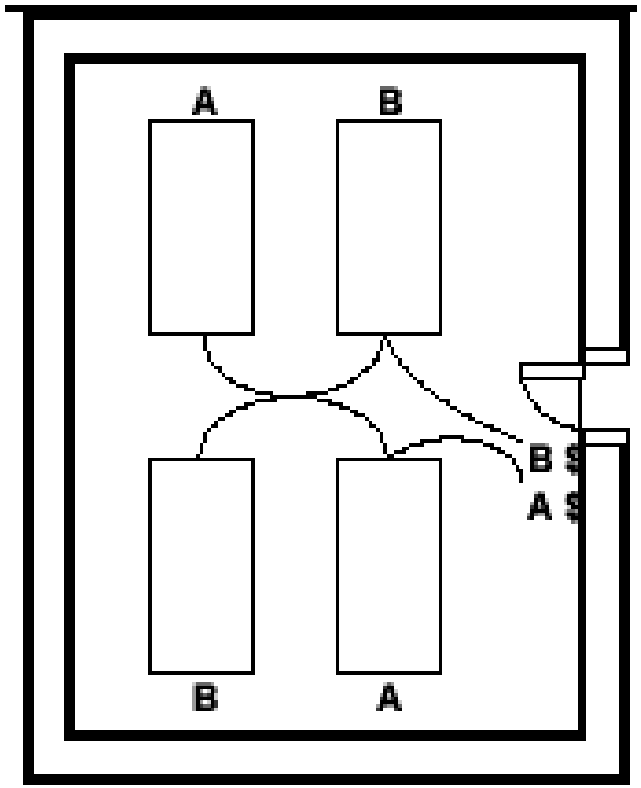
- Individual space
- Bi-level lighting
- Guest room lighting
- Automatic lighting shut-off
- Exterior lighting
- Daylighting
- Retail display lighting

Individual space control

- Independent control device in each enclosed space
  - Manually operated
  - Automatic by sensing
  - See lighting from control device
    - Identify lights and display status
  - Control maximum of 2500 ft^2 or 10,000 ft^2

Bi-level switching

- Reduce lighting by 50%
- Uniform reduction
- Exceptions
  - corridors, storerooms, restrooms, public lobbies, guestrooms
  - areas with one luminaire
  - where occupancy sensor used



Guest room lighting

- Master switch at main entry
  - controls all permanent lighting
  - controls all switched recepticles
    - except bathroom recepticles

Automatic lighting shut-off

- After hours shut lighting off
  - occupancy sensing
  - time schedule
  - time out
- Override limited to 2 or 4 hours
- 5000 ft^2 or 2500 ft^2 override area
- Building minimum size

Interior space control devices

- Toggle wall switch
- Occupancy sensor
- Dimmer
- Timer wall switch
- Telephone controlled switching
- Computer controlled
- Handheld remote

Occupancy sensor technology

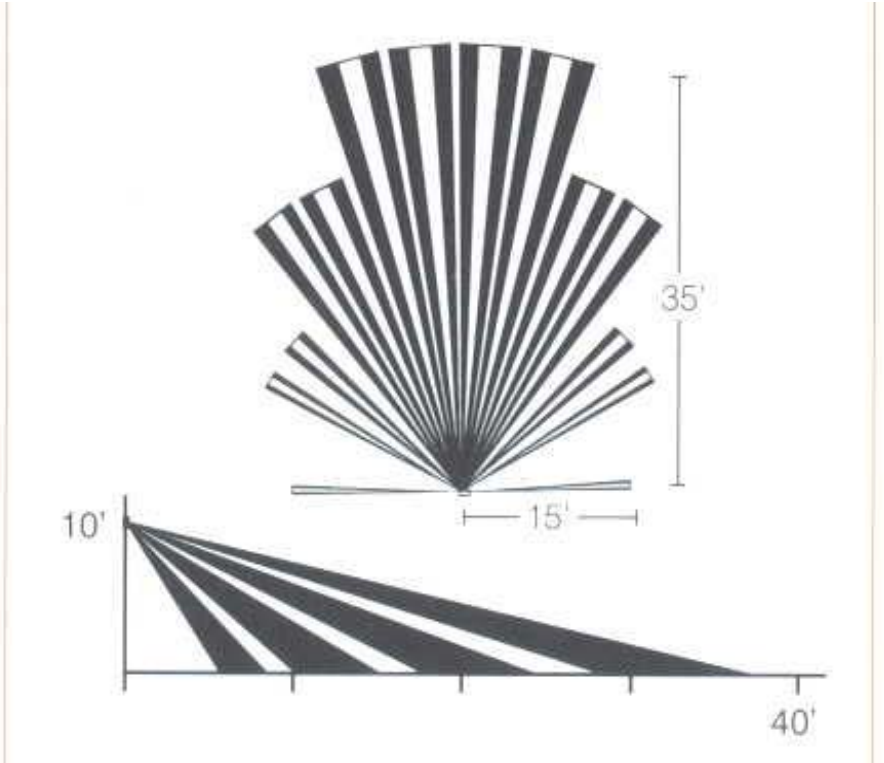
- Wall switch sensors

- Ceiling/wall mount sensors
  - Requires separate power pack

- Sensor technologies
  - Infrared sensing
  - Ultrasonic sensing
  - Dual technology sensing

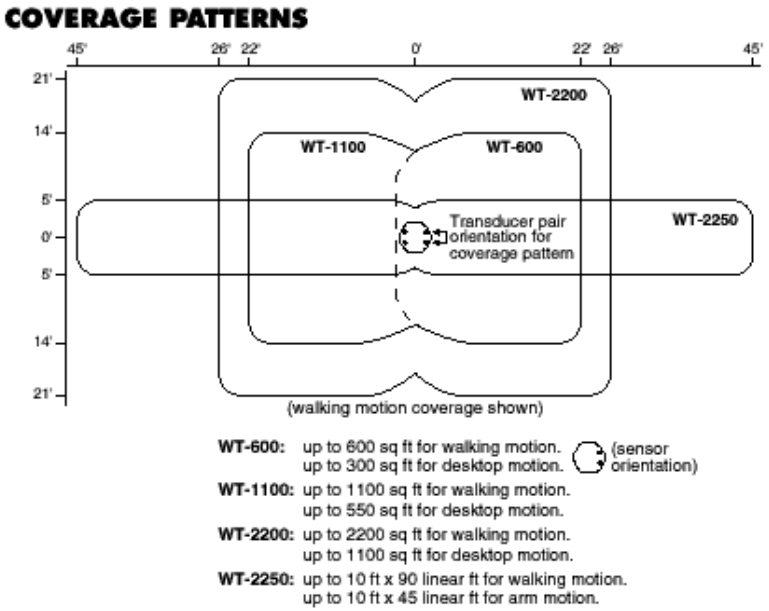
Sensor technology

- Infrared - line of sight
  - Detects body heat in motion



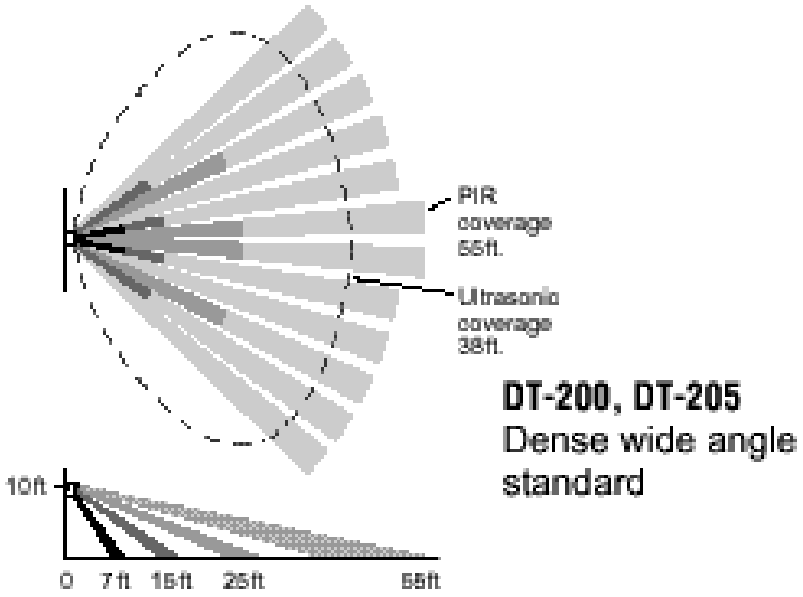
Sensor technology

- Ultrasonic - not line of sight
  - Detects movement through changes in ultrasonic sound waves



Sensor technology

- Multiple or dual tech
  - Use more than one technology
  - Set detection priority

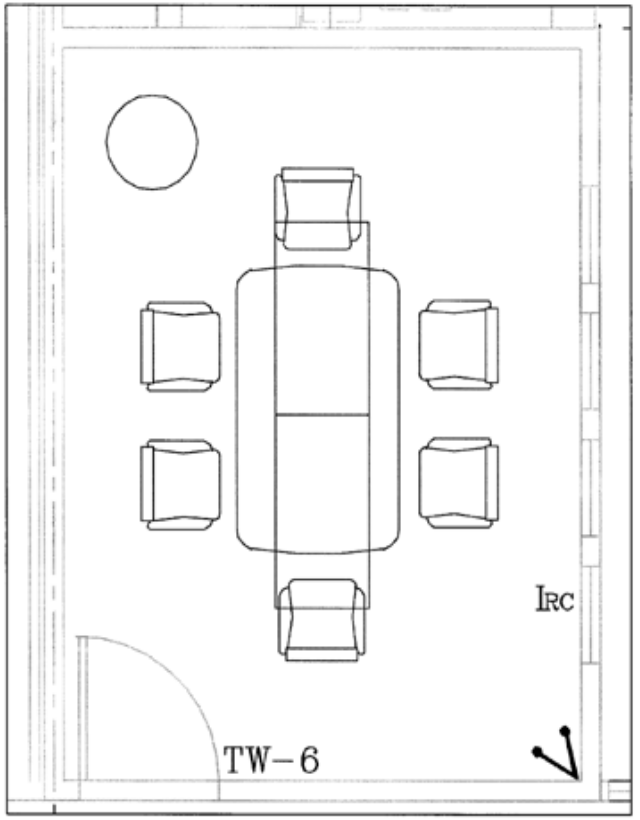


DT-200, DT-205
Dense wide angle
standard

Conference / training room control

- Occupancy sensor
- Wall switch
- Dimming controls
  - Vary lighting level
  - Remote control

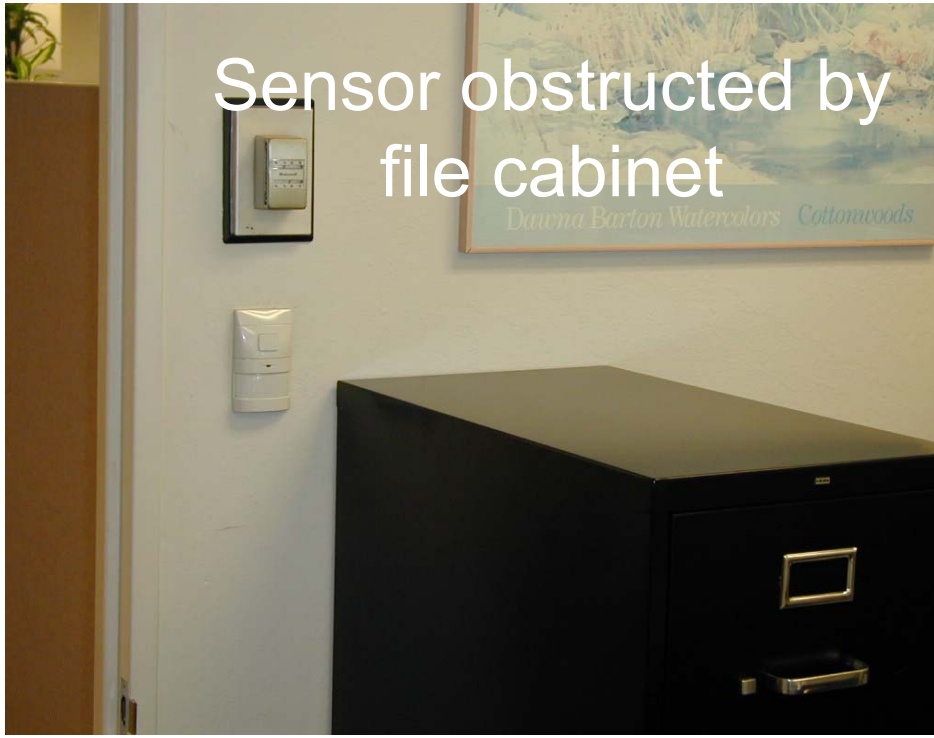
- Optimal applications



5B CONFERENCE ROOM

Sensor placement

Corner mounting of Dual technology sensor



Time scheduled control

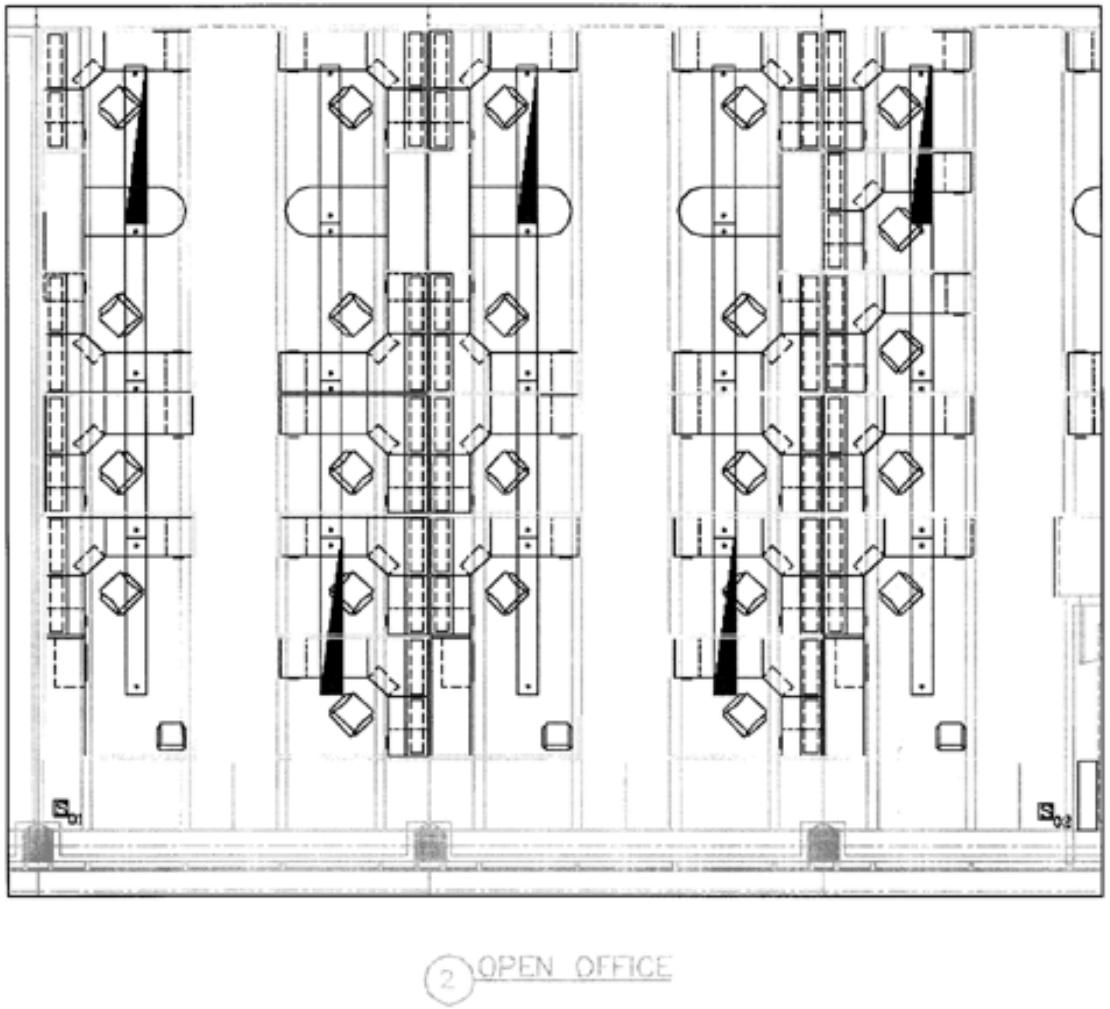
- Switches in the space
- Time scheduling system

- Control switches
- Lighting control panel
  - time clock

Open office space

- Time on/off
- Switch on/off
- Blink warning
- Timed shut-off

- Optimal applications

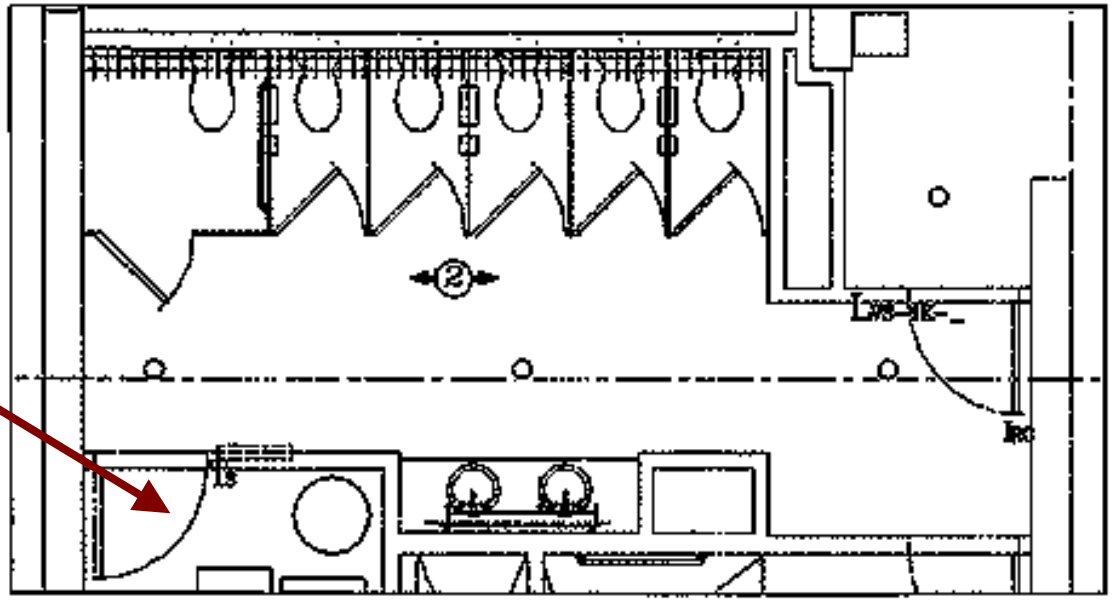


Time out control

- Manual on by switch
- Times out after preset time

Storage & mechanical rooms

- Optimum applications
  - storage rooms
  - mechanical rooms



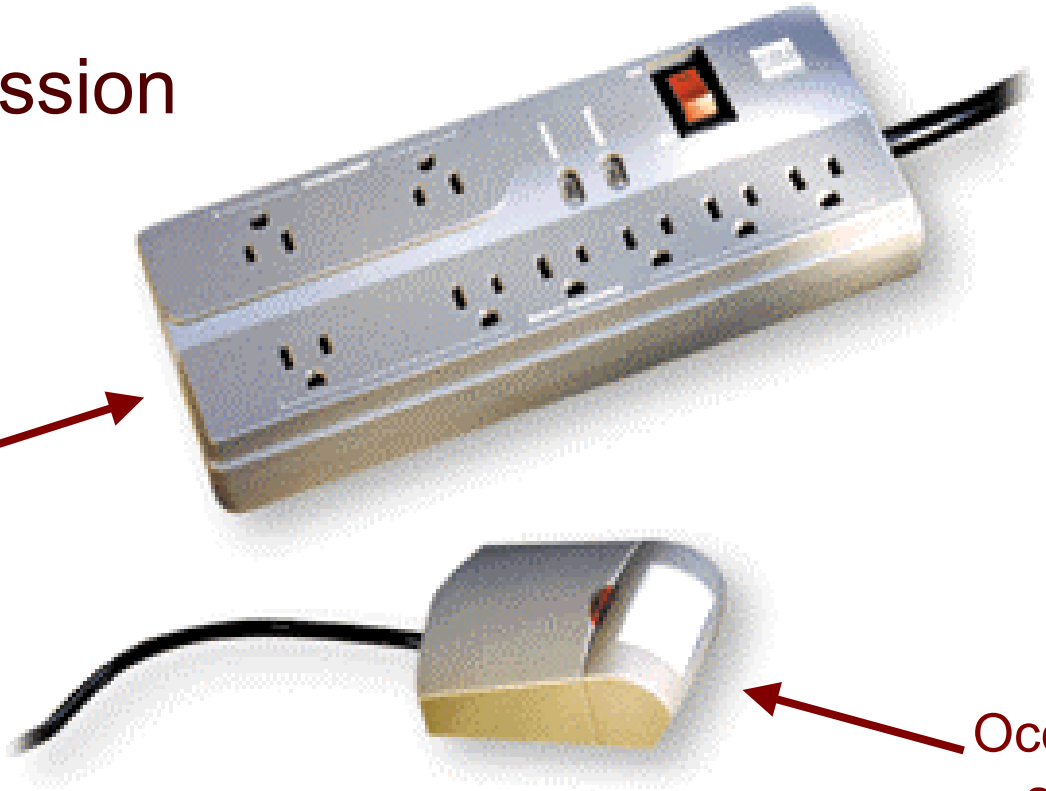
4 WOMEN'S RESTROOM

Task lighting & plug load control

- Don’t forget plug loads!
  - task lighting
  - fans
  - heaters
  - monitors
  - printers

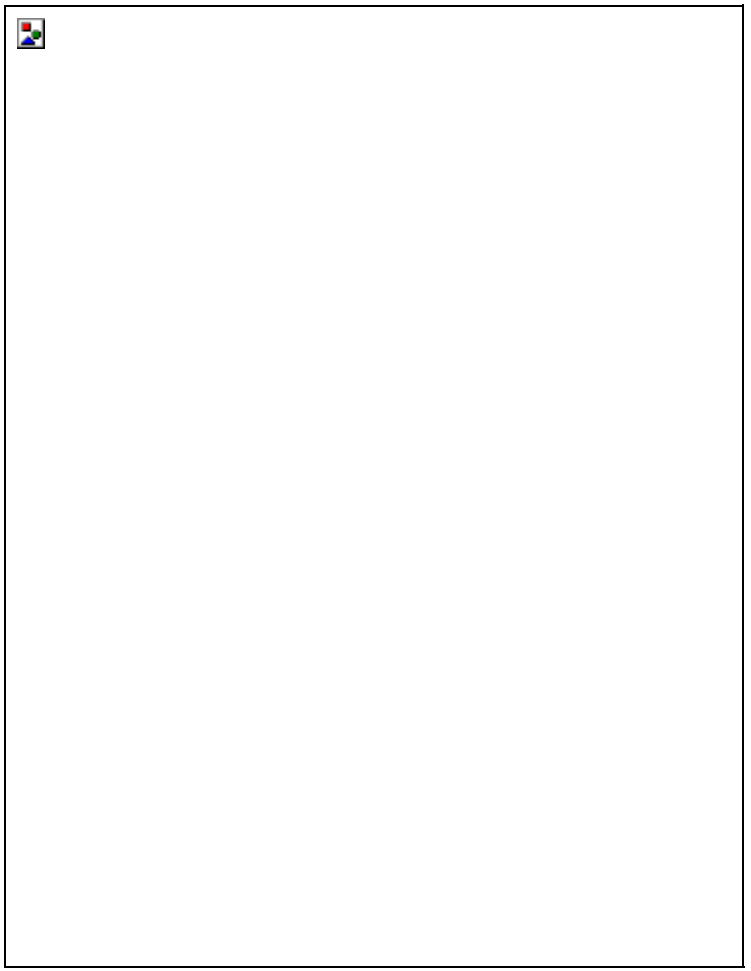
Plug load control devices

- Automatic shut-off
- Surge suppression



Exterior lighting control

- Off when not needed
- Photocell control
  - detects dusk/dawn
- Automatic time clock switching
  - seasonal adjustment (astronomic)
  - carryover, backup



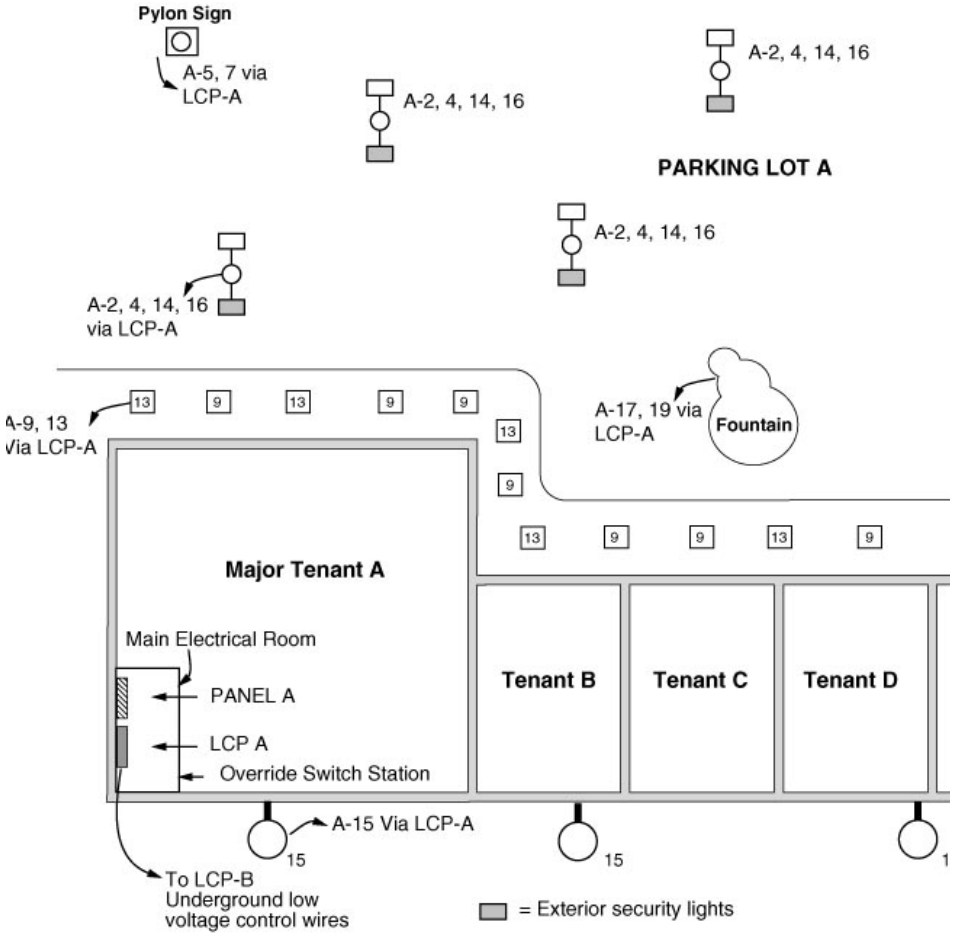
Exterior lighting control products

- Photocell
- Time switch / time clock
- Lighting control panel
  - with astronomic capability
- Photocell vs. Astronomic

Strip mall exterior lighting

- Dusk ON / Dawn OFF
- Dusk ON / Time OFF
- Time ON / Dawn OFF

- Optimal applications



Daylighting control

- Ability to reduce up to 50% of lighting in day light areas
  - manually - wall switch
  - automatically - daylighting controller
- Daylighting studies
  - productivity
  - energy savings

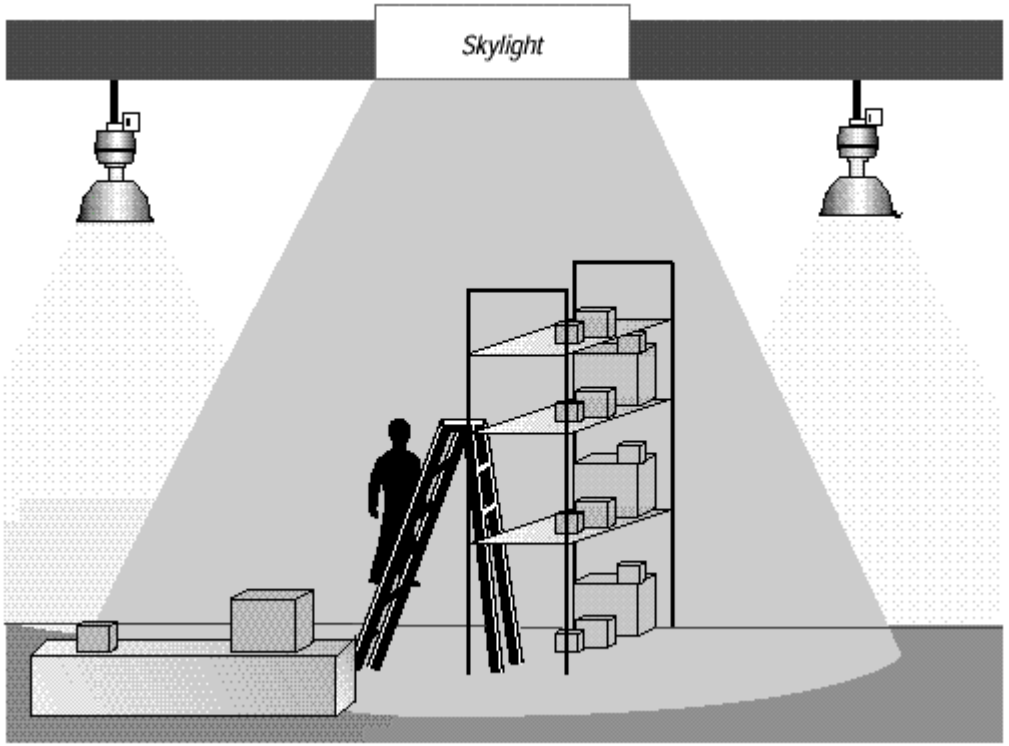
Daylighting control technologies

- Daylighting control methods
  - continuous dimming
  - on/off, step dimming

- Wall switches
- Daylighting controller
- Photocell sensor

Warehouse daylighting

- Reduce or turn off electric lighting
- Reducing load during peak times



- Optimal applications

Retail display lighting

- Case, accent, display, track, demonstration, lighting
- Control device separate from other lighting
- Encourage to turn off separately

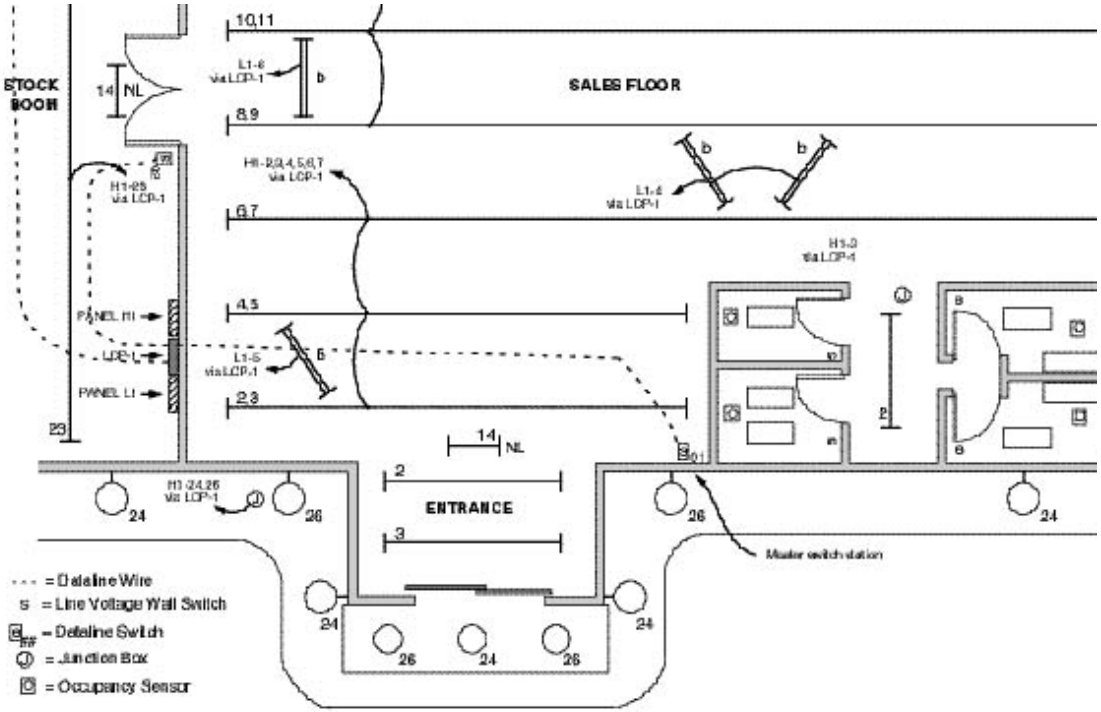
Switch & time scheduled control

- Manually by switches
- Automatically by time
  - satisfy shut-off requirements

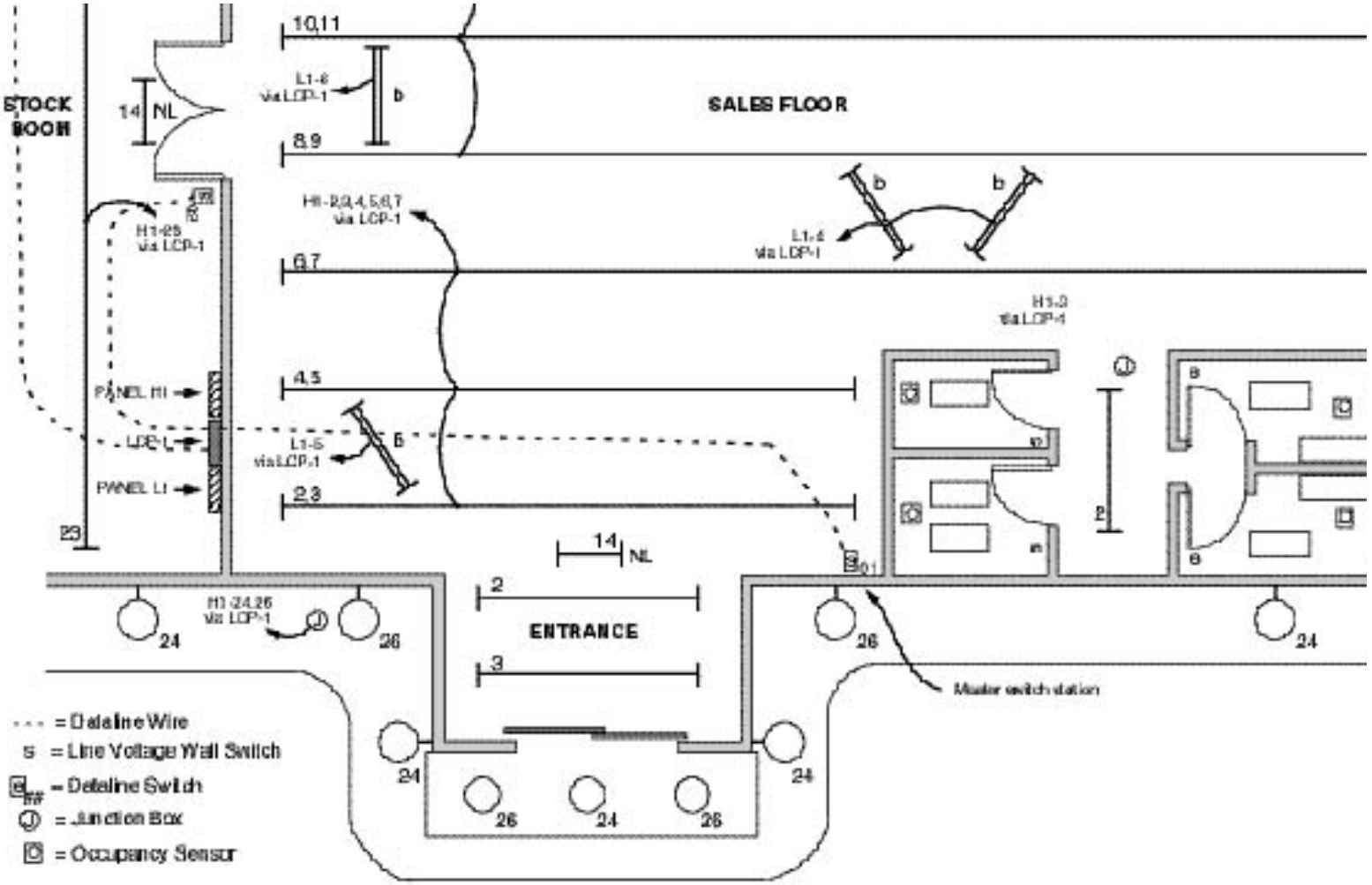
- Control switches
- Lighting control panel
  - time clock

Retail store application

- Time schedule sales floor
- Occupancy sensing backrooms
- Exterior lights & signage

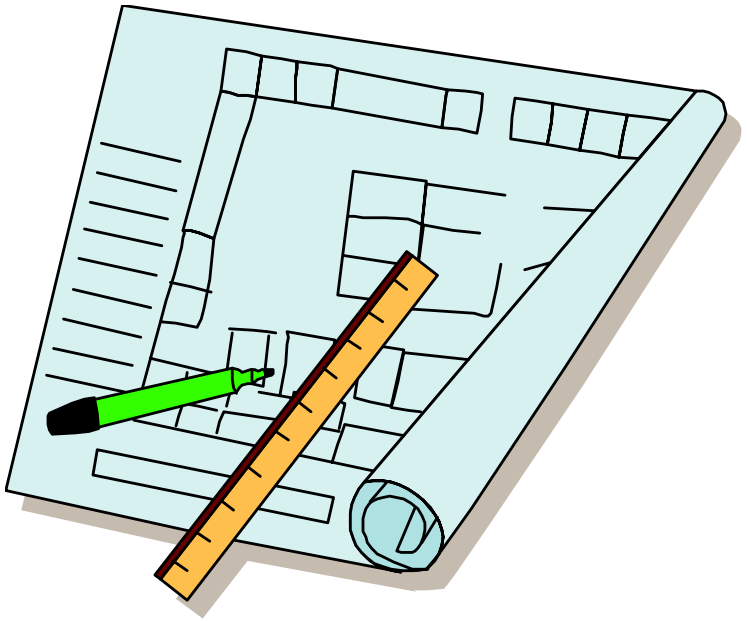


Retail store application



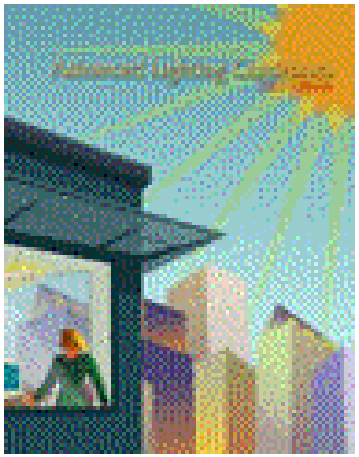
Commissioning lighting controls

- Commissioning is critical to energy efficient lighting controls
- Must be a requirement
  - Manufacturer
  - Contractor
  - Engineer / lighting designer
  - Owner / facility manager



Lighting control resources

- Advanced Lighting Guidelines
  - www.newbuildings.org
- LRC - Lighting Research Center
  - www.lrc.rpi.edu
- IESNA
  - www.iesna.org
- Local utility programs



The future of lighting codes

- More lighting controls required
- Move toward automated control
  - daylighting
- Occupancy sensors in personal spaces
- Control of task loads

The future of lighting controls

- Integrated lighting system
  - ballast, controls, fixtures, wiring methods
- More intelligence in the controls
- Increase occupant satisfaction
  - personal level of control
  - more control of space

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