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Check-up: Coming Energy Code Changes

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Learning Objectives

1. Gain understanding of the lighting and control requirements changes and updates across the main energy codes used in North America.
2. Recognize the impact of updated energy code requirements and credits with lighting and control designs.
3. Apply lighting design best practices for complying with new energy codes through construction documentation for administration and operational success.
4. Learn how to take part in and advocate for effective and efficient lighting designs within the energy code development organizations.

Disclaimer

This presentation provides an overview of lighting requirements for commercial buildings and is intended for informational purposes only. It should not serve as a substitute for your state or local jurisdiction's official energy code. Please consult your local building energy code or Authority Having Jurisdiction (AHJ) for accurate and specific requirements. Code compliance can only be assured by the AHJ.

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Diagnosing the Latest Lighting & Control Requirements

Michael Jouaneh, ASHRAE 90.1 & IECC

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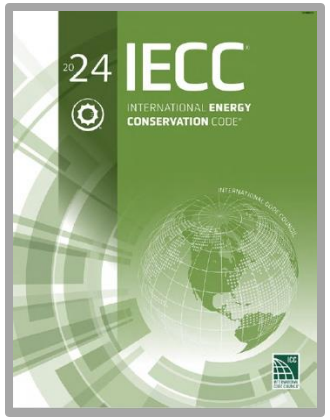
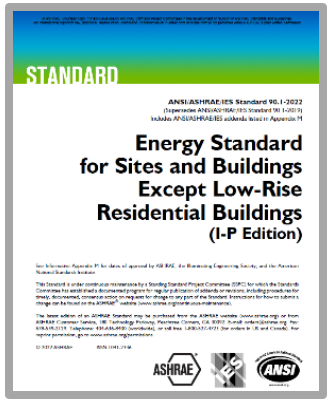
Code Check-up Time!

- Look at active and coming code changes
- ASHRAE 90.1 – 2022, preview 2025
- 2024 IECC
- Title 24 Part 6 – 2025
- What we know about NYS & NYC



Source: ICC/2024 IECC



Source: ANSI/ASHRAE/IES 90.1-2022 standard

Source: CEC Title 24 Part 6

Waiting release of 2025 version

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Increased Dimming Control

- **Manual control** requirement for **General Lighting**
- ASHRAE 90.1 – 2022, 2025
  - Bi-level changed to continuous dimming **Multi-level Control**
  - Applies to specific space types
- 2024 IECC
  - Light reduction control changed to **Dimming Controls**
  - Applies to Applies to specific space types and spaces not using occupancy sensor off controls
  - Exception where High-End Trim Controls provided
- Title 24 Part 6 – 2025
  - Required in spaces over 100SF (for many code cycles)
  - Multi-level and uniformity removed in lieu of dimming

Alterations Requirements Changing

- ASHRAE 90.1 – 2022, 2025
  - Interior lighting alterations
    - Wattage rather than %
    - Above 2000W all requirements apply
    - Below 2000W local control and shut-off requirements apply
  - Exterior lighting alterations
    - Greater than 10 luminaires, all requirements apply
    - Less than 10 luminaires, control off requirement applies

Alterations Requirements Changing

- 2024 IECC
  - Interior lighting control alterations, all requirements apply
    - Where full height partitions are added or relocated
    - Where lighting controls are altered
  - Exterior lighting control alterations
    - Where added or replaced luminaires is more than 400W, all requirements apply to that altered lighting
      - Exception: individual luminaires are less than 50W provided automatic shut off with daylight is verified
    - Where lighting controls are altered, altered lighting must comply with all lighting control requirements

Open Office Occupancy Sensor Zones

- Requirement
  - Occupancy sensor shut-off zones no larger than 600ft^2
  - Allows courtesy lighting up to 20% in adjacent zones
  - Full off when all lighting zones vacant

- ASHRAE 90.1 – 2022, 2025
- IECC since 2018 version
- Title 24 since 2022 version

Reduction in Daylight Responsive Control Threshold

- Requirement
  - Change from 150W to **75W** in daylight areas

- ASHRAE 90.1 – 2022, 2025
- 2024 IECC
- Title 24 2025

C406 – Additional Efficiency Requirements - **Energy Credits**

Provisions:

Achieve **energy credits** by:

- Building occupancy group (9)
- Climate zone (19)
- 32 efficiency options
- Design selects options
- Buildings > 2000ft^2
- Build-outs > 1000ft^2

TABLE C406.1.1(1)—ENERGY CREDIT REQUIREMENTS BY B

BUILDING OCCUPANCY GROUP	CLIMATE ZO									
	0A	0B	1A	1B	2A	2B	3A	3B	3C	4A
R-2, R-4 and I-1	65	66	67	77	80	86	80	81	90	86
I-2	43	42	38	37	36	38	32	32	30	36
R-1	63	62	66	65	70	71	77	80	84	81
B	62	62	64	66	66	65	64	64	68	70
A-2	70	70	72	72	75	75	70	73	82	69
M	80	79	83	79	81	84	67	74	87	80
E	56	57	55	58	58	57	59	62	59	61
S-1 and S-2	61	60	61	60	58	57	44	54	62	85
All other	31	31	31	32	32	33	30	32	36	35

Source: http://iccsafe.org, 2024 IECC

C406 – Additional Efficiency Requirements - **Energy Credits**

Business – offices, university, labs

Mercantile – retail

Education – K-12

TABLE C406.1.1(1)—ENERGY CREDIT REQUIREMENTS BY B											
BUILDING OCCUPANCY GROUP	CLIMATE ZO										
	0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	
R-2, R-4 and I-1	65	66	67	77	80	86	80	81	90	86	
I-2	43	42	38	37	36	38	32	32	30	36	
R-1	63	62	66	65	70	71	77	80	84	81	
B	62	62	64	66	66	65	64	64	68	70	
A-2	70	70	72	72	75	75	70	73	82	69	
M	80	79	83	79	81	84	67	74	87	80	
E	56	57	55	58	58	57	59	62	59	61	
S-1 and S-2	61	60	61	60	58	57	44	54	62	85	
All other	31	31	31	32	32	33	30	32	36	35	

Source: http://iccsafe.org, 2024 IECC

C406 – Additional Efficiency Requirements - **Energy Credits**

1A – very hot humid:

HI

South tip TX, FL

3B – warm dry:

Inland CA, West TX,

East NM

7 – very cold:

North ND, MN

South AK

TABLE C406.1.1(1)—ENERGY CREDIT REQUIREMENTS BY B

BUILDING OCCUPANCY GROUP	CLIMATE ZO									
	0A	0B	1A	1B	2A	2B	[illegible]	3B	3C	4A
R-2, R-4 and I-1	[illegible]	[illegible]	67	77	80	86	80	81	[illegible]	[illegible]
I-2	43	42	38	37	36	38	[illegible]	32	30	36
R-1	63	62	66	[illegible]	70	71	77	80	84	81
B	[illegible]	62	64	66	66	65	64	64	68	70
A-2	70	70	72	72	75	75	70	73	82	69
M	80	79	83	79	81	84	67	74	87	80
E	56	57	55	58	58	57	59	62	59	61
S-1 and S-2	61	60	61	60	58	57	44	54	62	85
All other	31	31	31	32	32	33	30	32	36	35

Source: http://iccsafe.org, 2024 IECC

C406 – Additional Efficiency Requirements - **Renewable & Load Management Credits**

Provisions:

Achieve **renewable & load management credits** by:

- Building occupancy group (9)
- Climate zone (19)
- 8 renewable & load management options
- Design selects options
- Buildings > 5000ft^2

TABLE C406.1.2—RENEWABLE AND LOAD MANAGEMENT CREDIT REQUIREME

BUILDING OCCUPANCY GROUP	CLIMATE ZONE										
	0A	0B	1A	1B	2A	2B	3A	3B	3C	4A	4B
R-2, R-4 and I-1	34	37	31	46	48	56	49	56	38	31	42
I-2	23	24	25	25	25	28	26	30	22	25	32
R-1	30	28	35	30	34	36	34	37	41	32	37
B	38	39	45	42	45	49	47	56	57	44	55
A-2	8	8	9	9	8	9	9	11	13	8	11
M	32	32	42	37	39	47	44	58	57	42	54
E	27	34	38	37	39	47	44	58	57	42	54
S-1 and S-2	89	90	90	90	90	90	90	90	90	90	90
All other	35	39	46	42	46	52	49	56	56	40	52

Source: http://iccsafe.org, 2024 IECC

C406.2.5 – Lighting "**Energy Credits**"

Credit	Measure Description	Requirements
L02	High-end trim lighting controls	• ≥50% project area • Authorized access to adjustment • Users cannot raise above trim • Initially set lighting to ≤85%

C406.2.5 – Lighting "**Energy Credits**" (continued)

Credit	Measure Description	Requirements
L02	High-end trim lighting controls	• ≥50% project area • Authorized access to adjustment • Users cannot raise above trim • Initially set lighting to ≤85%
L03	Increase occupancy sensor control	• Adds 23 spaces • 10 min time delay • Reduce ≤20% - warehouse, library stack, laboratory • Reduce ≤50% Elevator lobby

C406.2.5 – Lighting "**Energy Credits**"(continued)

Credit	Measure Description	Requirements
L02	High-end trim lighting controls	• ≥50% project area • Authorized access to adjustment • Users cannot raise above trim • Initially set lighting to ≤85%
L03	Increase occupancy sensor control	• Adds 23 spaces • 10 min time delay • Reduce ≤20% - warehouse, library stack, laboratory • Reduce ≤50% Elevator lobby
L04	Increased daylighting control area	• Increase DLA by ≥5%

C406.2.5 – Lighting "**Energy Credits**"(continued)

Credit	Measure Description	Requirements
L05	Residential light control (R-2)	• Occupancy sensor control for six common area spaces • One switched receptacle in living & sleeping rooms • Lights & switched receptacles in kitchens & bathrooms occupancy sensor controlled • Switch for control of all other lights and switched receptacles

C406.2.5 – Lighting "**Energy Credits**"(continued)

Credit	Measure Description	Requirements
L05	Residential light control (R-2)	• Occupancy sensor control for six common area spaces • One switched receptacle in living & sleeping rooms • Lights & switched receptacles in kitchens & bathrooms occupancy sensor controlled • Switch for control of all other lights and switched receptacles
L06	Reduced interior lighting power	• ≤95%, and no less than 80%

C406.2.5 – Lighting "**Load Management** "

Credit	Measure Description	Requirements
G01	Lighting load management demand responsive lighting	• ≥50 - ≤70% project area, reduce to ≤80% lighting power upon receiving a demand response signal

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Prescribing Solutions: Applying Code to Spaces

Julie Donovan, ASHRAE 90.1

Harold Jepsen, ASHRAE 90.1 & IECC

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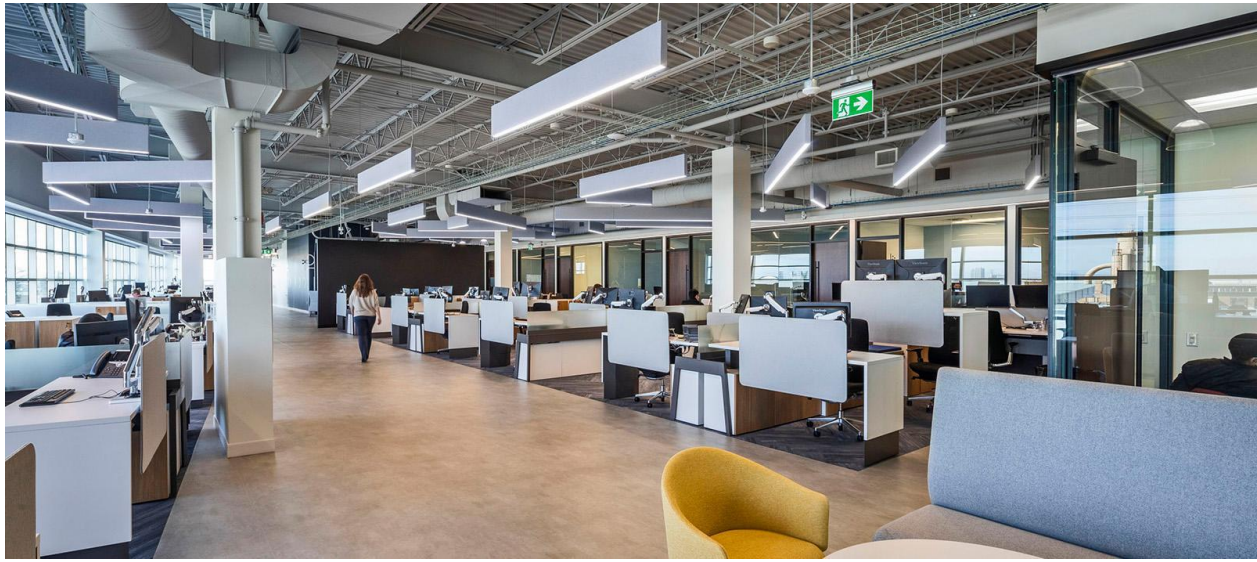
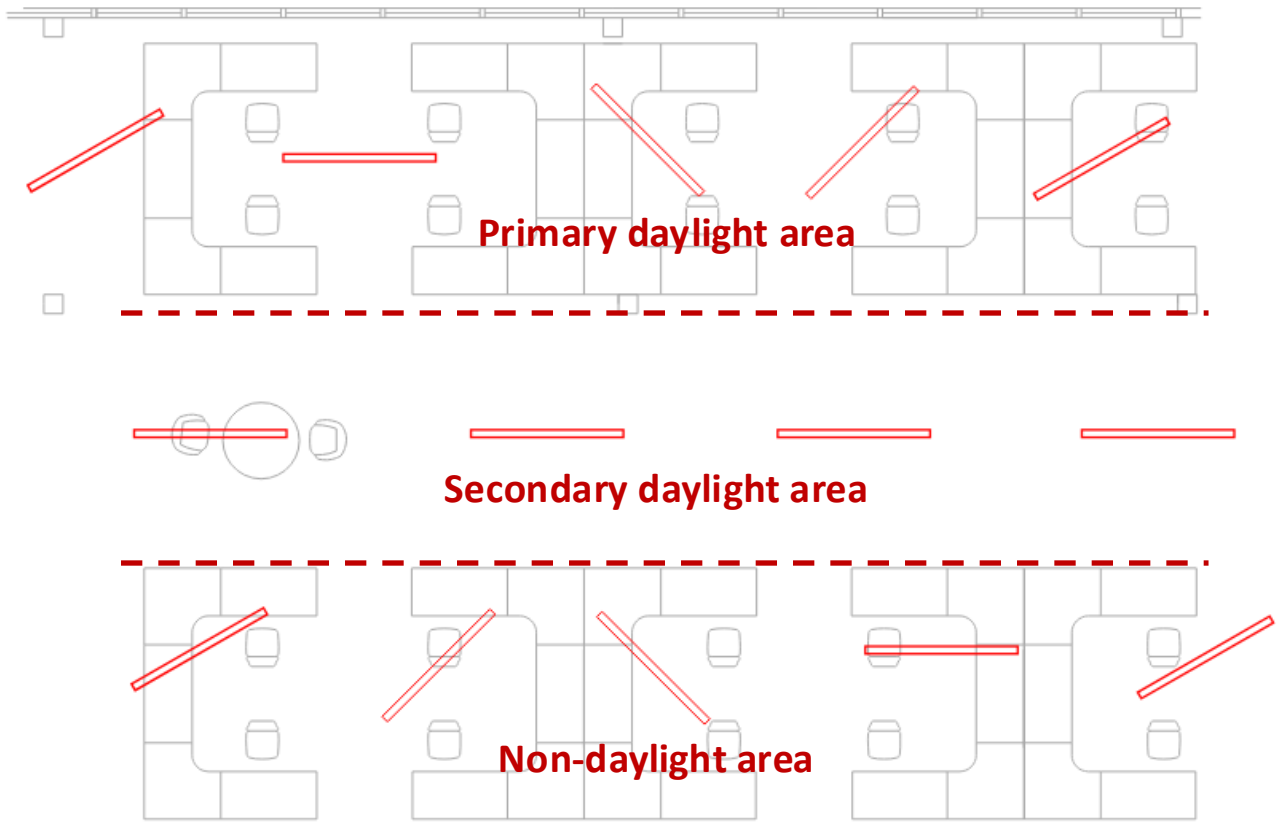
OPEN OFFICE DESIGN

Open Office - Design Diagnosis

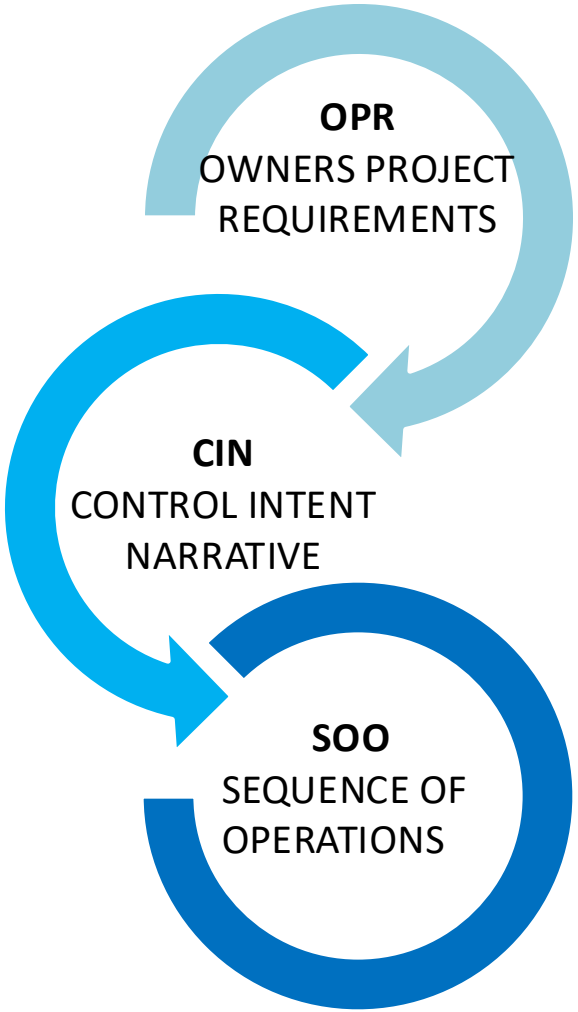
- Meet lighting power allowance
- 600SqFt control areas
- Should zone lighting turn off or go to 20% courtesy level?
- Primary, secondary daylight areas
- Manage corridor/circulation paths separately
- Control task/accent/decorative lighting separately



Open Office - Design Diagnosis



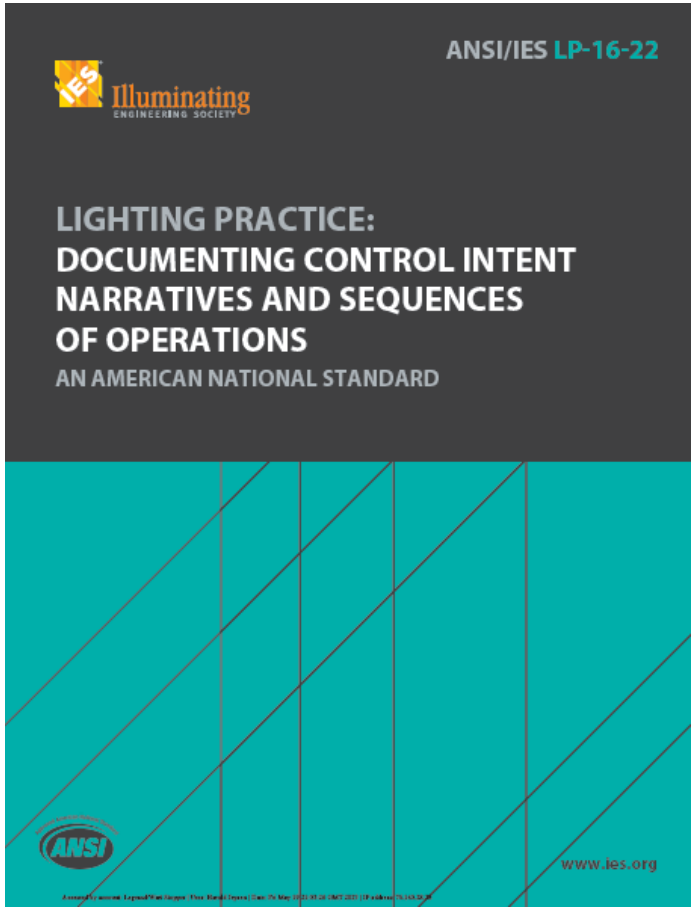
Lighting Control Operation- Origination



- *Owner's point of view*
- *Operational expectation by space*
- *Systems interactions*

- *Descriptive, guiding, narrative*
- *Broadly describes intent*
- *Requirements being followed*
- ***WHAT** controls are to do*

- *Contractually enforceable*
- *Specifies function, set points, timing*
- ***HOW** controls are to operate*



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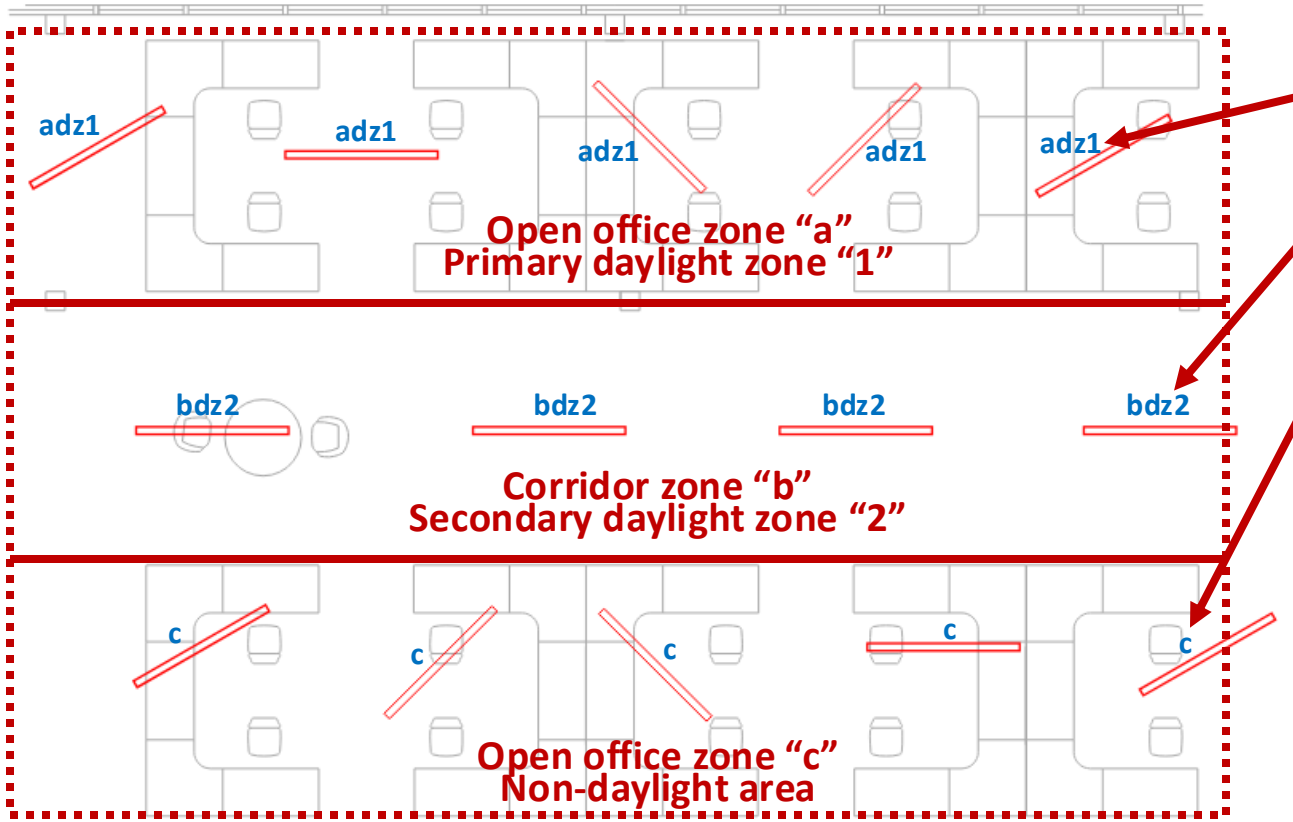
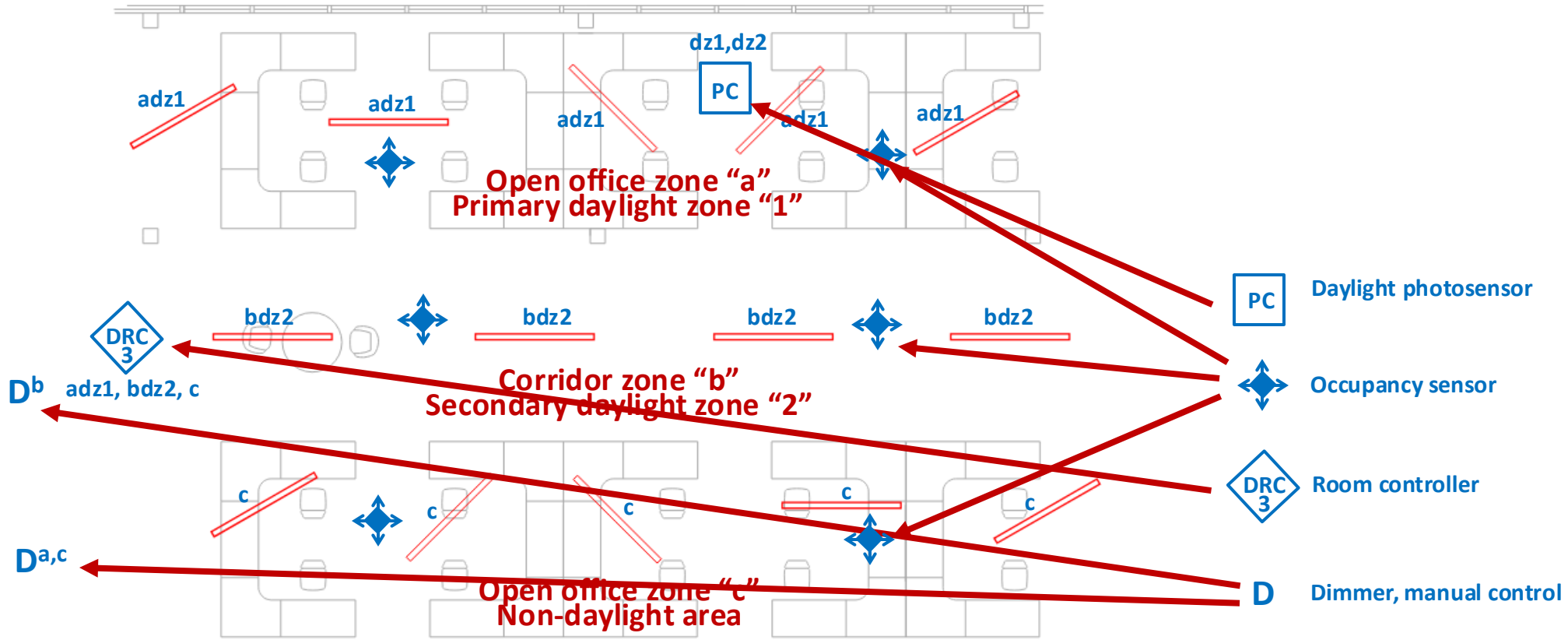
Open Office - Design Prescription



adz1 – control zone “a”, daylight zone 1
bdz2 – control zone “b”, daylight zone 2
c – control zone “c”

Open Office - Design Prescription



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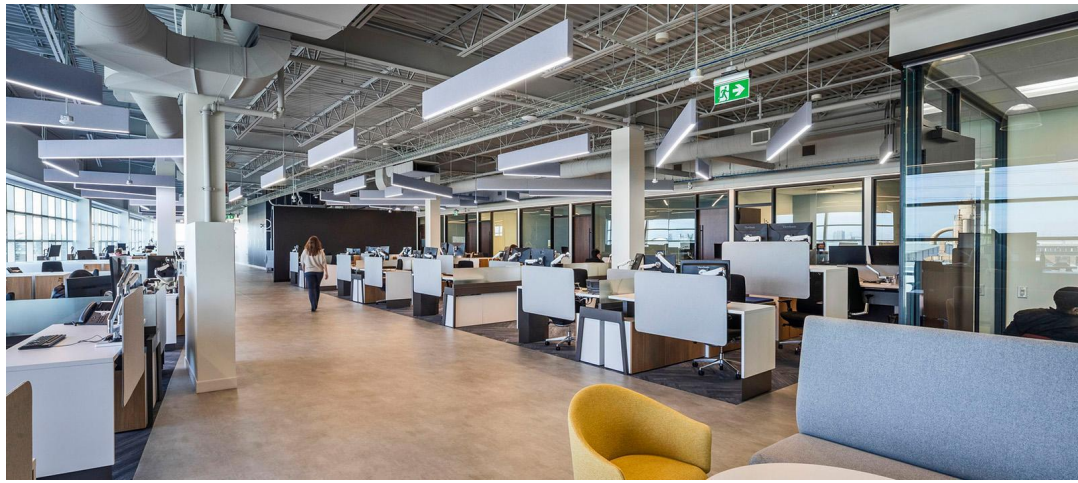
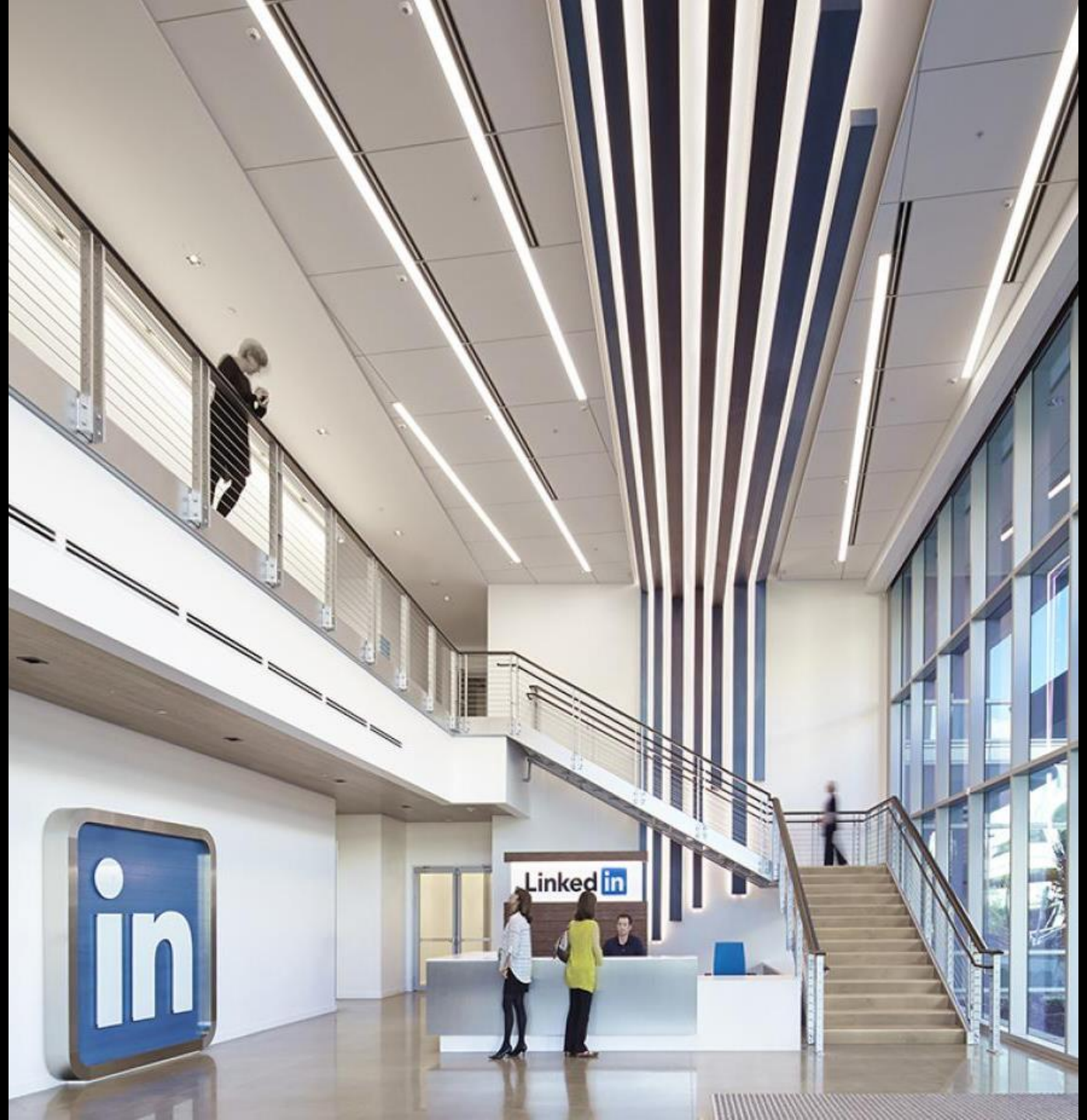
Open Office – Sequence of Operation

Lighting Sequence of Operation (IECC, 90.1, T24)

1. Set high end trim illuminance for 30fc(adj) at full on
2. Lighting in primary and secondary daylight areas shall continuously dim and turn off based on daylight contribution to maintain at least 30FC(adj) at task level
3. Manual on/off/dim lighting in all zones (a, c) uniformly with dimmer switch
4. In each ≤600 ft^2 zone (a, c), auto-on lighting to last level when occupancy detected. All other zones shall remain unaffected
5. Auto off lighting in each individual zone within 20min of occupants leaving

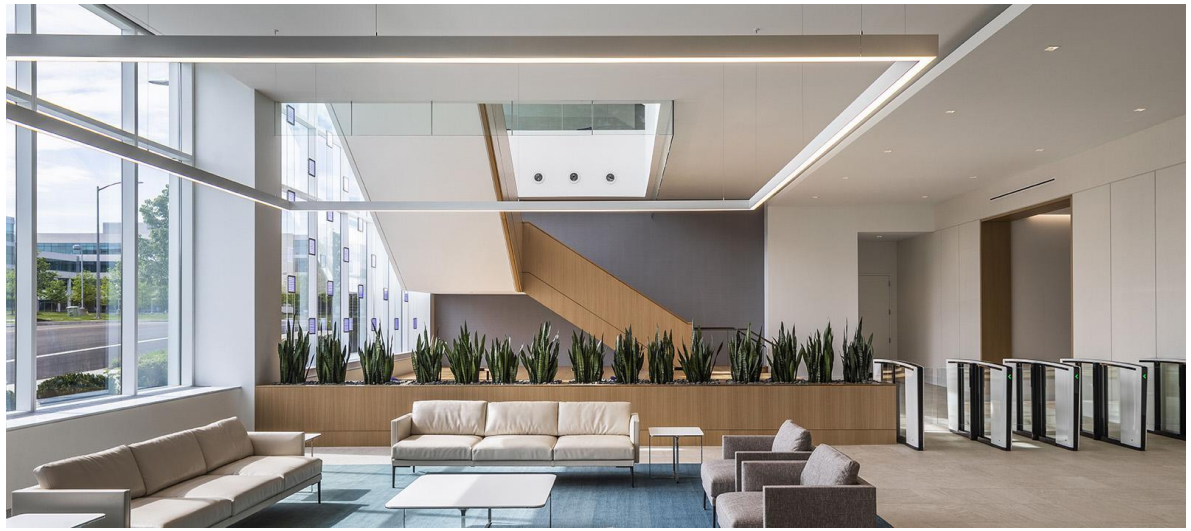


DAYLIGHT AREA DESIGN


Linked in

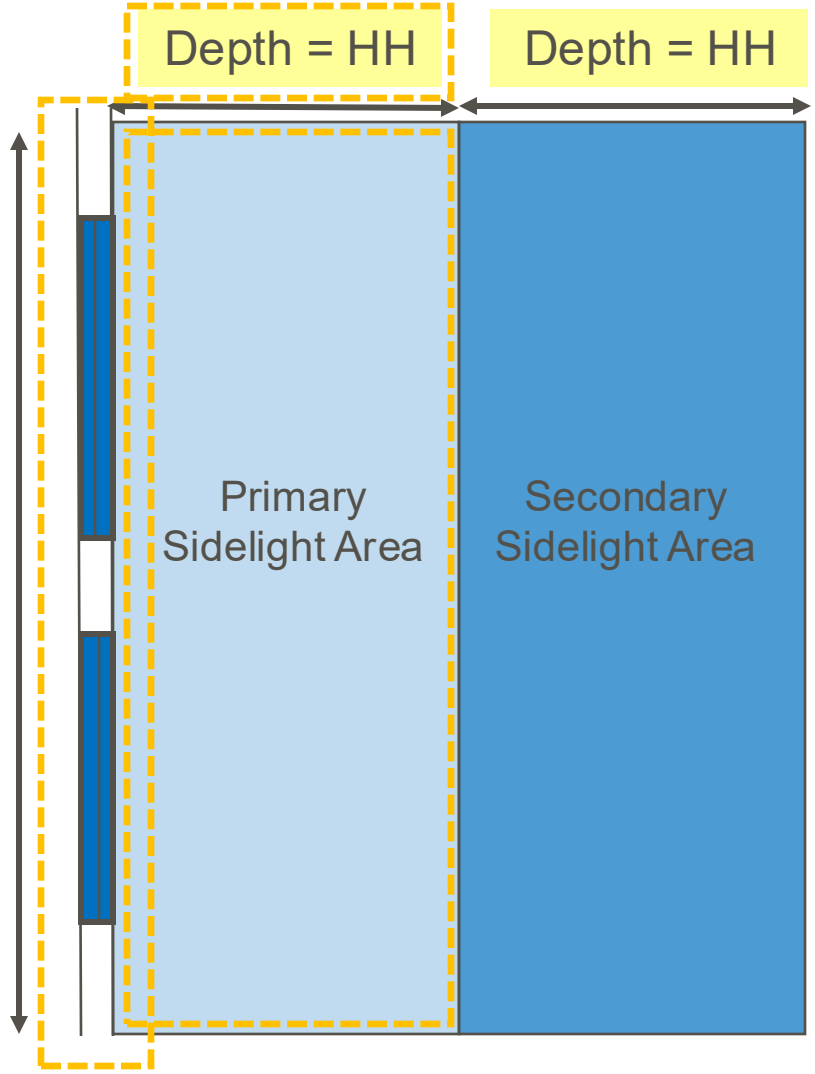
Daylight Responsive Control - Design Diagnosis

- Determining daylight area
- Triggering 75W threshold
- Primary, secondary daylight areas
- What fixtures are controlled?
- Photosensor control & placement
- Working within control zones
- Daylight projection factors



Primary and Secondary Sidelight Daylight Area

Width = ∑ three Dimensions

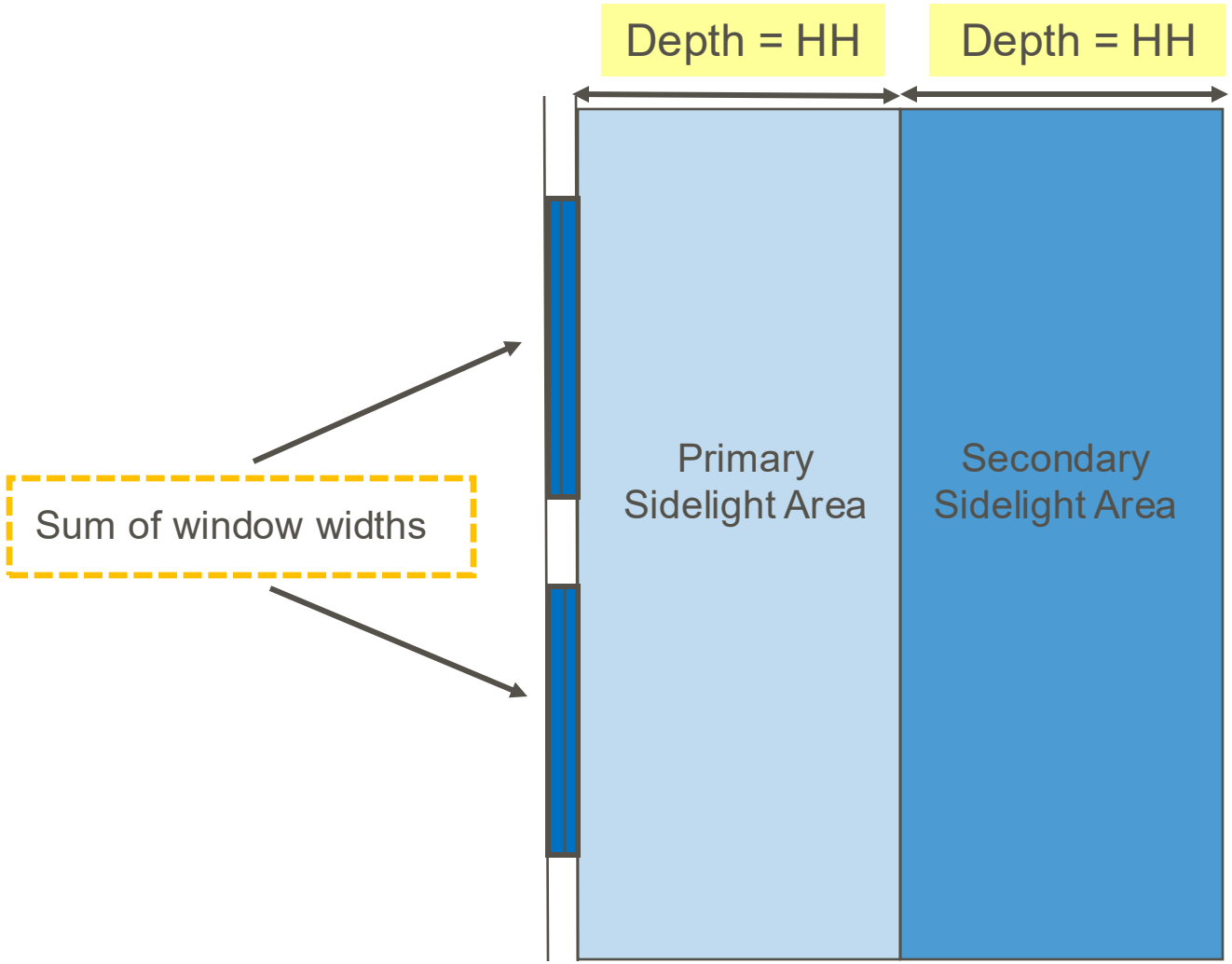


When general lighting power is:
≥75W in the primary sidelit zone
≥150W in the primary & secondary zone independent daylight responsive controls required for each zone

Sidelight Area Dimensions

- **Depth** of sidelight area is distance from floor to top of window (HH=head height)
  (unless it reaches obstruction 5' high)
- **Width** of sidelight area is window width + 0.5xHH on each side of window

Primary and Secondary Sidelight Daylight Area

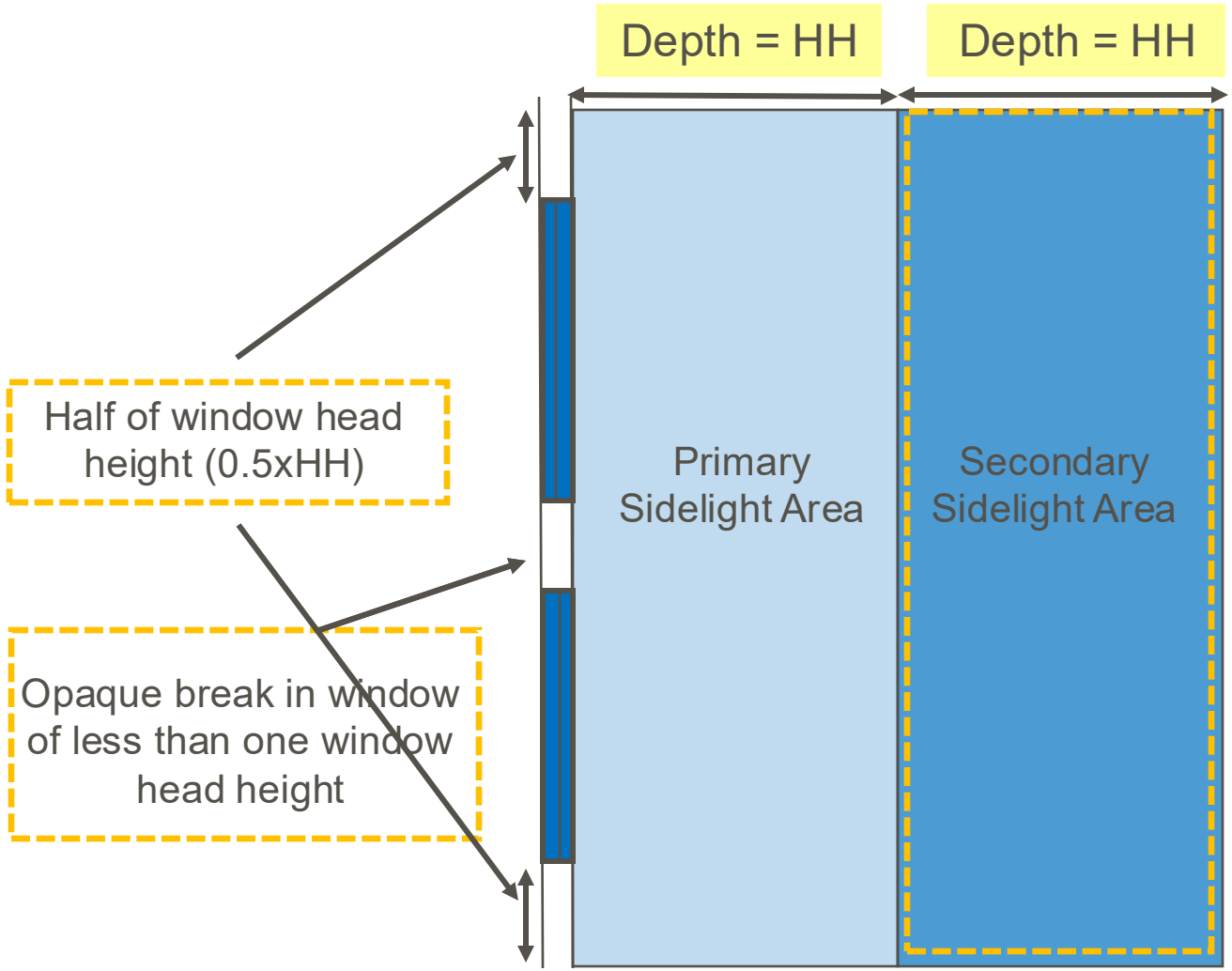


When general lighting power is:
≥75W in the primary sidelit zone
≥150W in the primary & secondary zone
independent daylight responsive controls required for each zone

Sidelight Area Dimensions

- **Depth** of sidelight area is distance from floor to top of window (HH=head height)
  (unless it reaches obstruction 5' high)
- **Width** of sidelight area is window width + 0.5xHH on each side of window

Primary and Secondary Sidelight Daylight Area

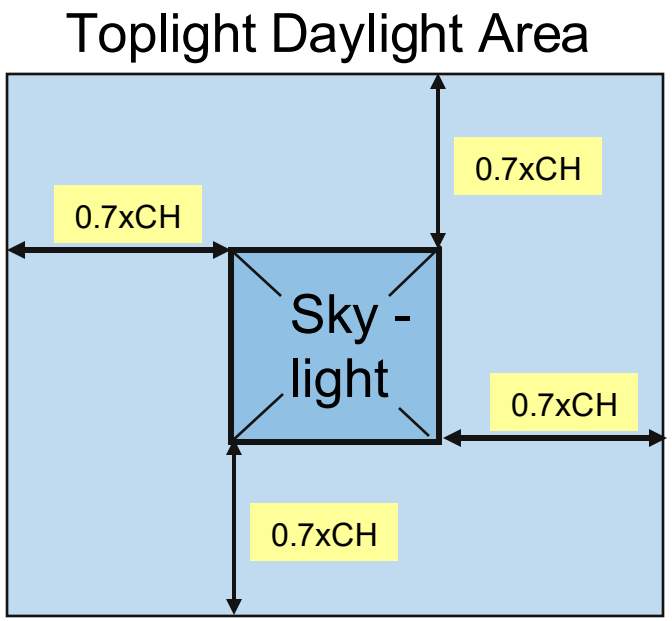


When general lighting power is:
≥75W in the primary sidelit zone
≥150W in the primary & secondary zone independent daylight responsive controls required for each zone

Sidelight Area Dimensions

- **Depth** of sidelight area is distance from floor to top of window (HH=head height)
  (unless it reaches obstruction 5' high)
- **Width** of sidelight area is window width + 0.5xHH on each side of window

Toplight Daylight Area

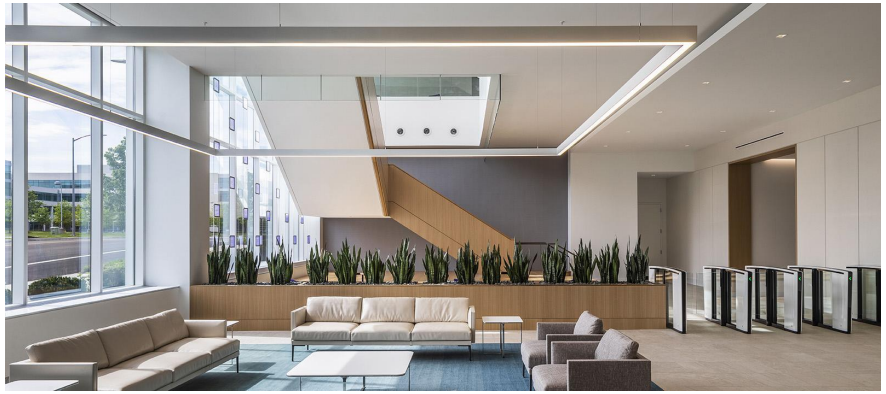


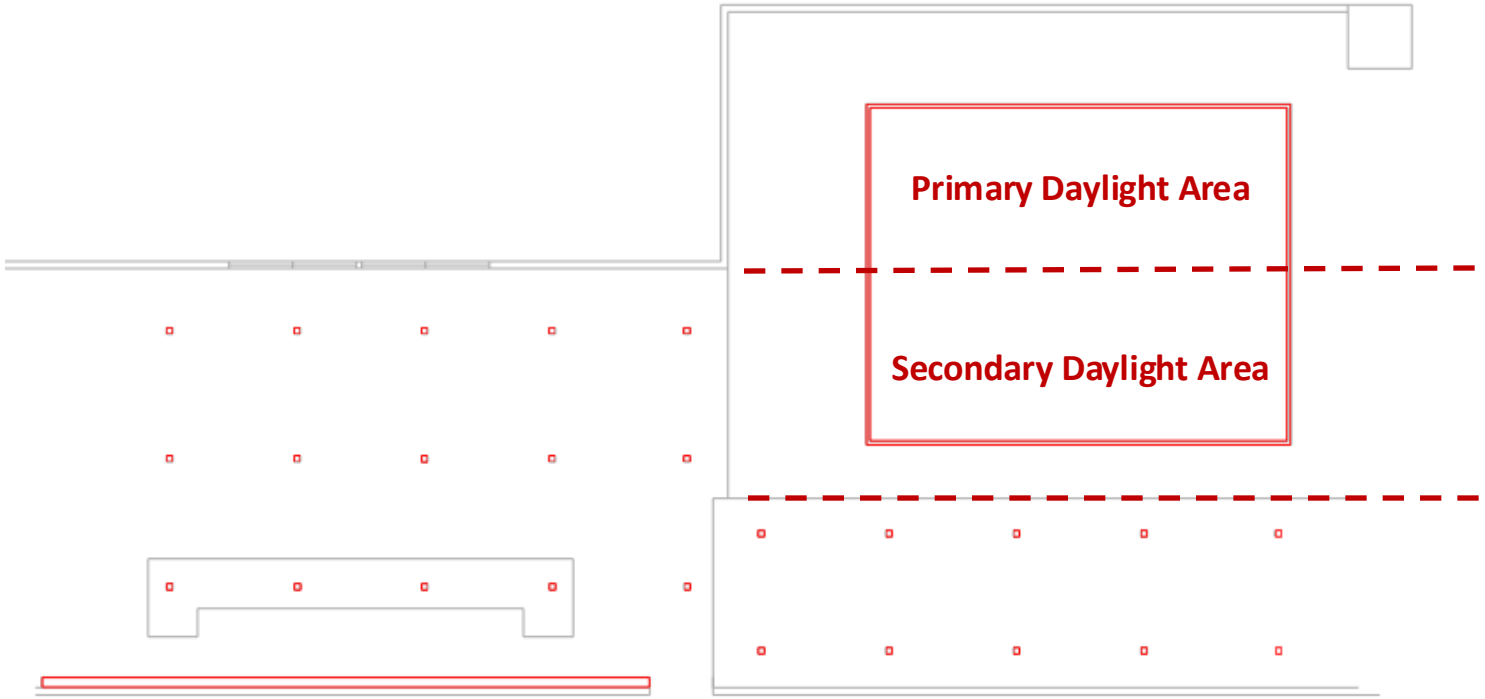
If the lighting power in the daylight area is ≥75W, the luminaires are required to be controlled by daylight responsive controls

Toplight Area Dimensions
Daylight area under a skylight is the opening beneath the skylight plus 70% of the ceiling height (CH) in each direction.

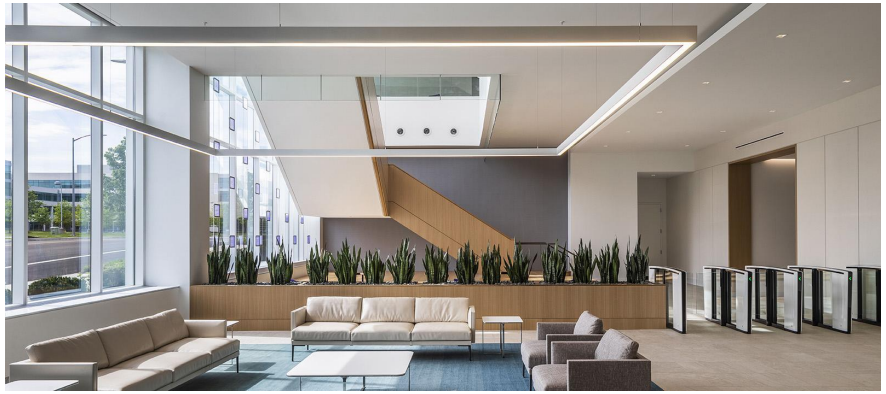
See standards for further requirements on modification to daylight area under skylights when obstructions are considered and for daylight area dimensions under roof monitors.

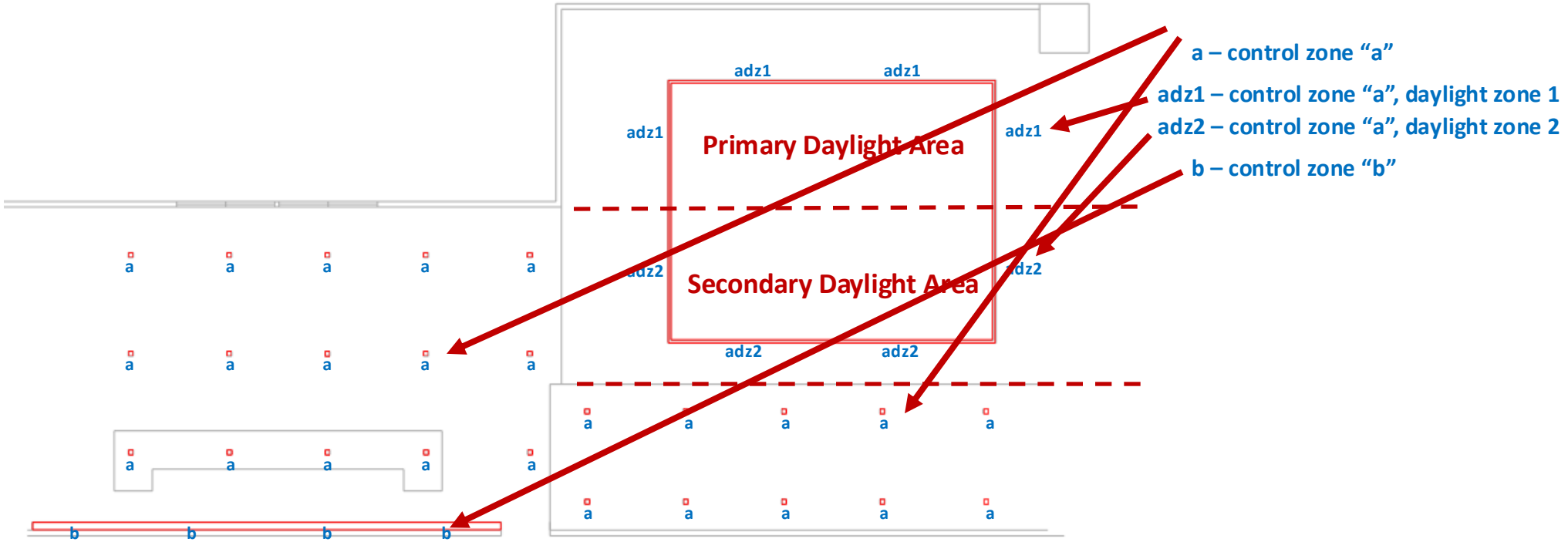
Design Diagnosis





Design Prescription





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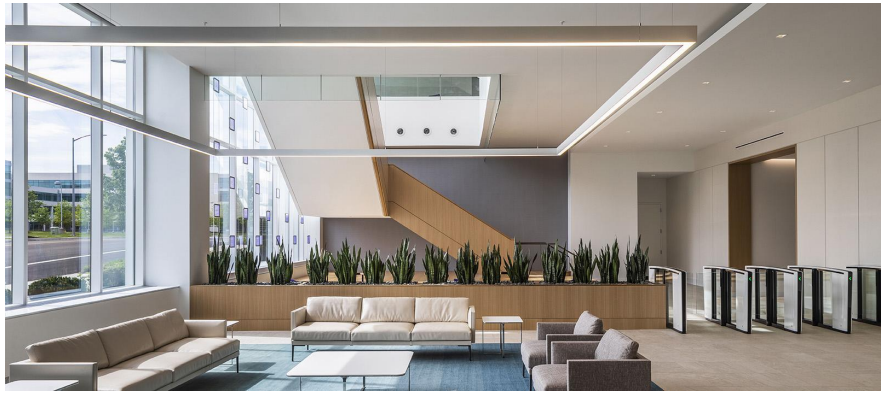
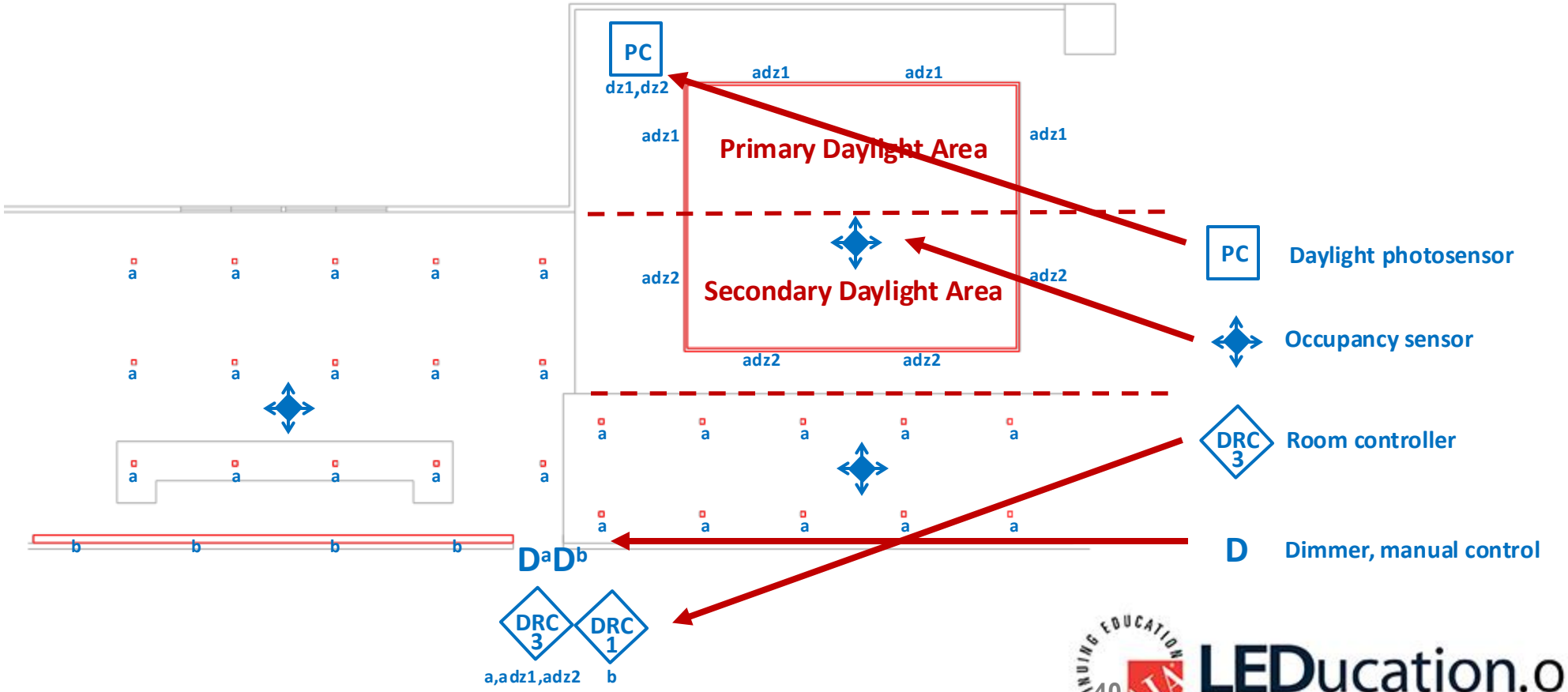
Design Prescription





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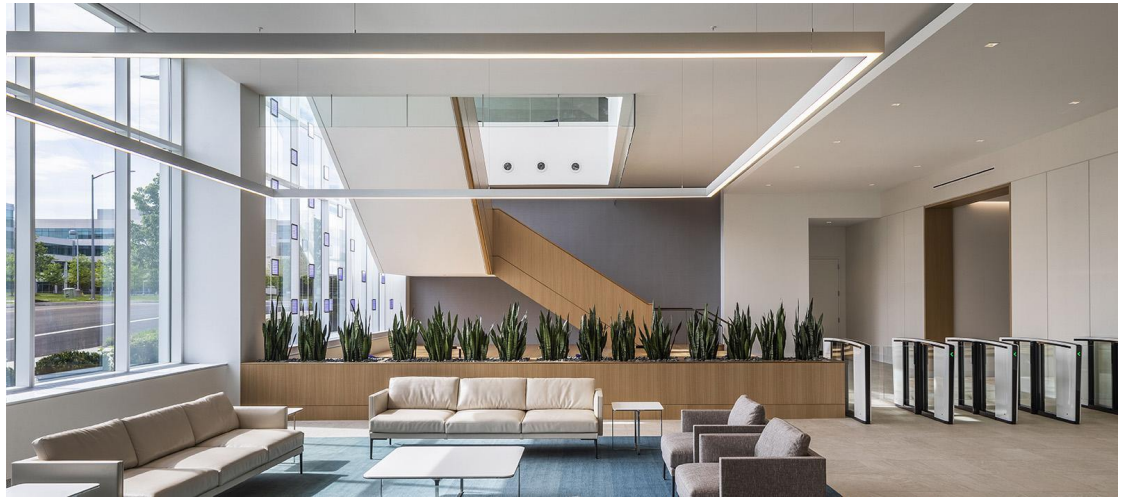
Sequence of Operations

Lighting Sequence of Operation (2024 IECC)

1. Set high end trim illuminance for 25fc(adj) at full on
2. Lighting in primary and secondary daylight areas (adz1, adz2) shall continuously dim and turn off based on daylight contribution to maintain at least 25FC(adj) at task level
3. Manual on/off/dim control general lighting (a)
4. Manual on/off control accent lighting (b)
5. General (a) & accent (b) lighting On to 100% Mon-Sat at 7:30am(adj), Sun scheduled off
6. General (a) & accent (b) lighting turns off Mon-Fri 6:00pm(adj), Sat 1:00pm(adj), Sun off
7. All lighting scheduled off during holidays
8. After scheduled hours, auto on lighting (a) when occupants enter the lobby, automatic off within 20min of occupants leaving the lobby



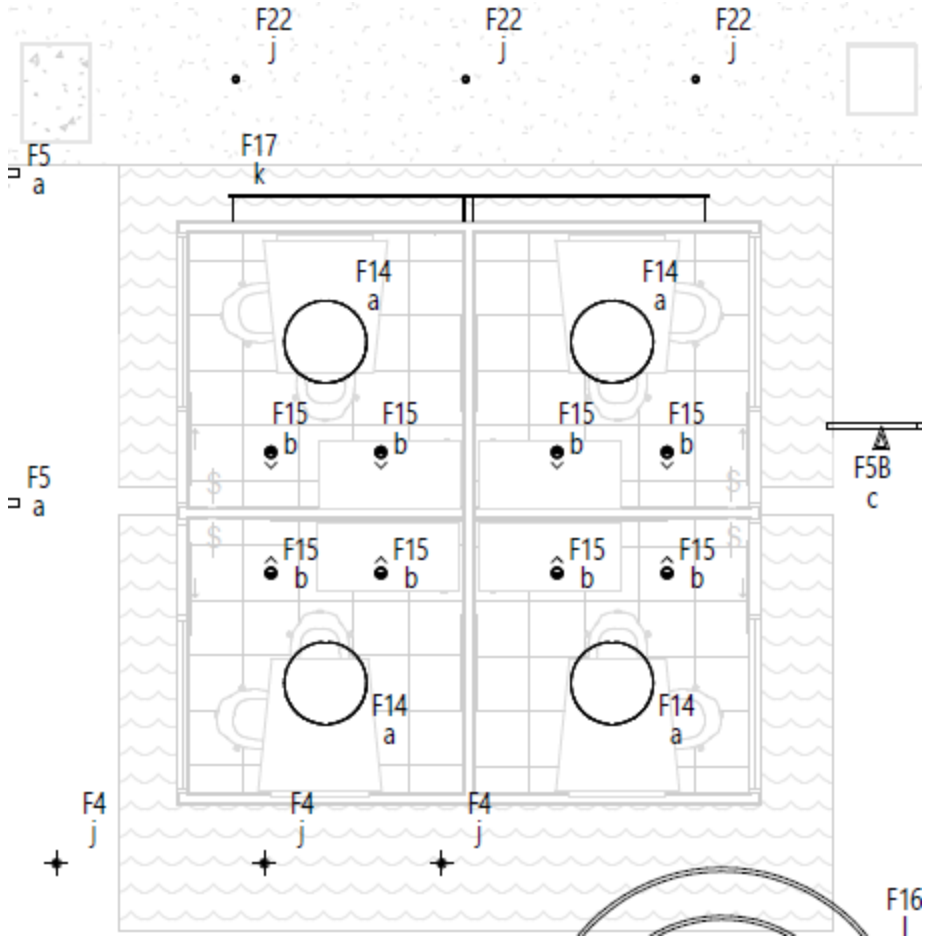
Additional requirement (ASHRAE 90.1-2022)

During operating hours, reduce lighting (a) power ≥50% lighting power within 20min of occupants leaving the lobby

Decorative Lighting

Decorative Lighting - Design Diagnosis

- Utilize decorative lighting power allowance
- Control task/accent/decorative lighting separately
- Not ***general lighting***
- Automatic shut off control



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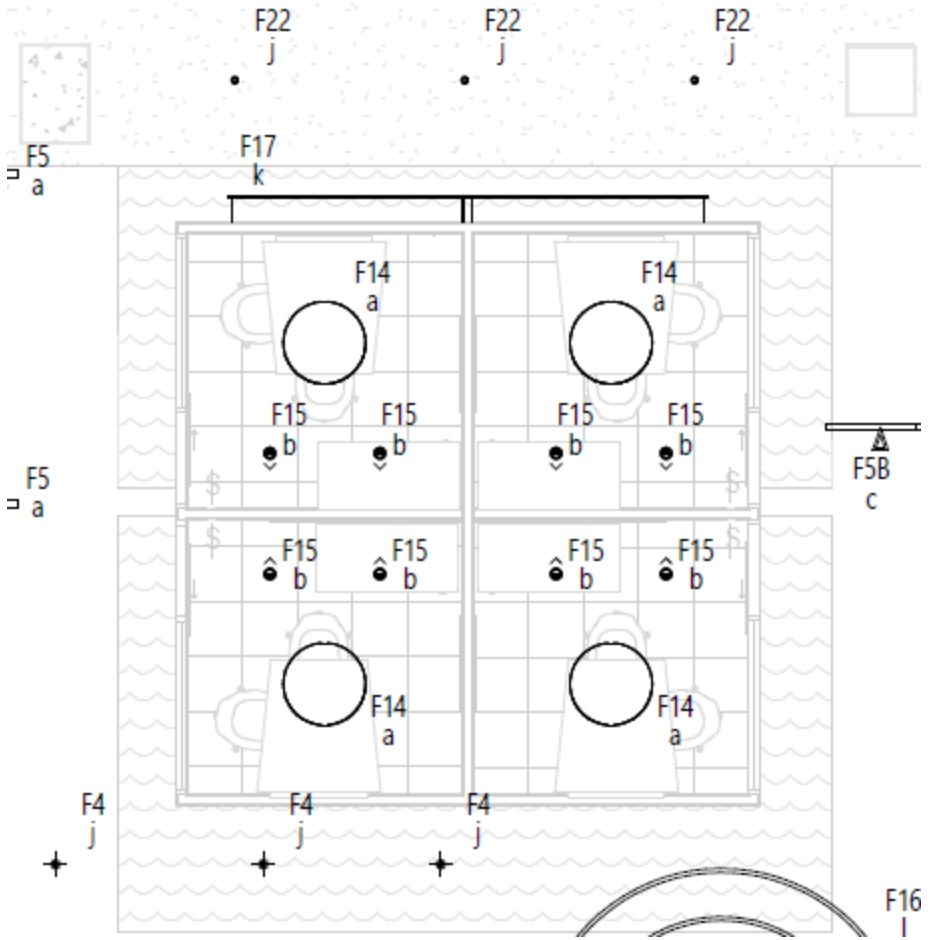
Decorative – Sequence of Operation

Lighting Sequence of Operation (IECC, 90.1, T24)

1. Manual on/off/dim general lighting (a fixtures) uniformly with dimmer switch
2. Manual on/off/dim white board lighting (b fixtures) uniformly with dimmer switch
3. Auto off all lighting within 20min of occupants leaving



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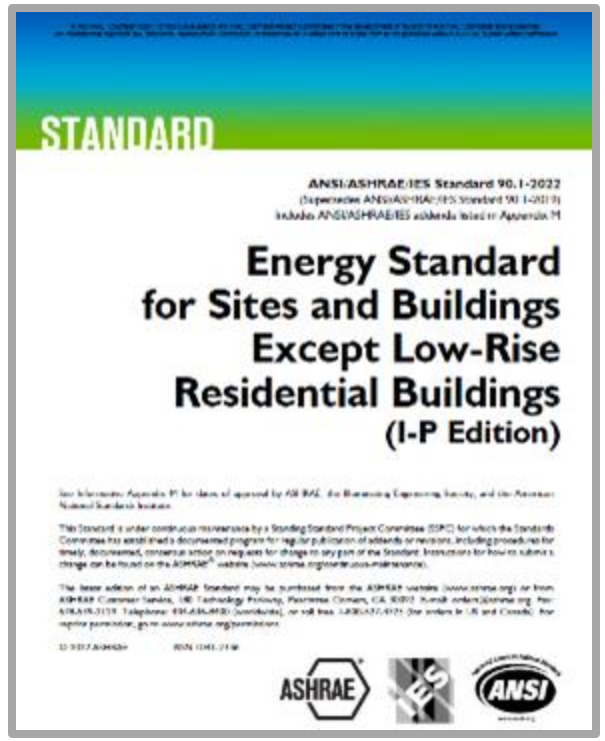
Prognosis: Predictions on coming code changes

Harold Jepsen, ASHRAE 90.1 & IECC

ASHRAE 90.1-2025 Proposed Updates

- Expected release end of 2025
- Occupancy sensor time delay 15 minutes
- Updated lighting power allowances
- Automatic reduction control added to some spaces
- Some healthcare spaces to reduce lighting during night operational hours supporting circadian entrainment.
- Open office control section added to clarify requirements
- Updates horticulture lighting efficacy



Source: ANSI/ASHRAE/IES 90.1-2022 standard

PROPOSED UPDATES

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ASHRAE 90.1 - Getting Involved

- Attend - meetings & process open to public
- Sign up for publication announcements
- Participate in addendum public comments
- Submit Continuous Maintenance Proposals (CMP)
- Apply: Lighting Power Sub-Committee and 90.1 main committee
- Join code review committee (IALD, NEMA, etc.)

90.1 NEWSLETTER

Winter 2025

Future Meetings

Special Web Meeting for Energy Credits
1/23/25 from 1-3 ET, WebEx

Orlando Winter '25 hybrid
Subcommittees 2/7 - 2/9
Full Committee 2/8 - 2/10
Schedule here

Atlanta Spring '25 hybrid
Wed 4/2; Thu 4/3;
1/2-Day Fri 4/4

Phoenix Summer '25
Subcommittees 6/20 - 6/22
Full Committee 6/21 - 6/23

If you are attending an upcoming ASHRAE conference, we highly recommend you use the 365 app - download here.

ADDENDA STATUS UPDATES

Public Review until Jan 12/13
Addendum ab (Exterior Lighting)
Addendum am (Fenestration)
Addendum ao (Simplified Bldg Method)
Addendum ba (WSHP Efficiency)
Addendum bp (TSPR no MPF)
Addendum bq (Room Air Conditioners)
Addendum br (Energy Monitor. Dash)
Public Review until Jan 27
Addendum bd (Interior Ltg Controls)
Addendum bf (Opaque Tables)
Addendum bi (App G Site Enrgy Metric)
Addendum bj (Simplified PRM)
Addendum bk (Heat Pump Primary)
Public Review until Feb 2
Addendum bv (Sect 12 Fan Power Eqs)
Public Review until Feb 17
Addendum ae (Tables 6.8.1-1 and -2)
Pending Publication (Feb 2025)
Addendum ar (ECB-App G Energy Cost)
Addendum at (Acceptance Criteria)
Addendum az (EV Charging Efficiency)
Recently Published
Addendum u (VAV Turndown)
Addendum y (Nontrans Dwelling ERV)
Addendum ah (EM Software Refs)
Addendum av (Envelope Alterations)

Source: ASHRAE/IES 90.1 Newsletter, Winter 2025

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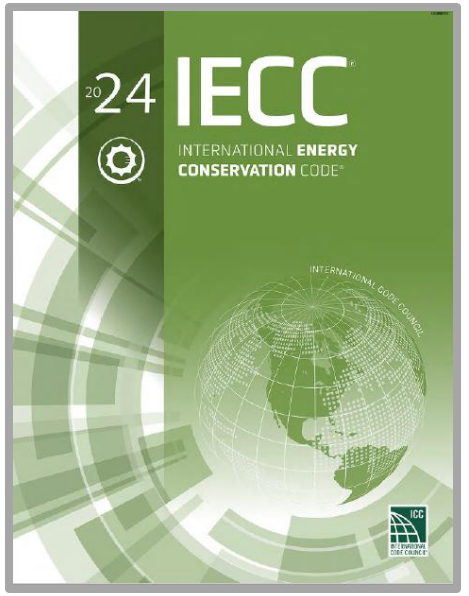
2027 IECC – Getting Involved

Status

- Expected 2027 release
- Initial public input proposals published Jan 2025
- Committees voting on proposals

How can I be involved?

- Attend – meetings & process open to public
- Participate in public comment periods
- Join code review committees (IALD, NEMA, etc.)



Source: ICC/2024 IECC

Title 24 Part 6 – 2025 Proposed Updates

- Expected release February 2025
- Effective Jan 1, 2026
- Automatic daylight response control threshold change to ≥75W primary & ≥150W primary & secondary zones
- Updated lighting power allowances
- Removed multi-level & uniformity table
- Removed control interaction section
- Updated Controlled Environment Horticulture efficacy

Waiting release of 2025 version

Source: CEC Title 24 Part 6

PROPOSED UPDATES

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Title 24 Part 6 – 2028 – Get Involved

- 2028 development started in January
- Attend – meetings & process open to public
- California Energy Commission (CEC)
  - Building Energy Efficiency Standards | California Energy Commission
- Investor-owned-utility CASE team via:
  - Title 24 Stakeholders | California Energy Codes & Standards
- Sign up for emails and announcements
- Docket comments during Express terms, 45-day, 15-day
- Join code review committees (IALD, NEMA, etc.)

Source: Building Energy Efficiency Standards | California Energy Commission

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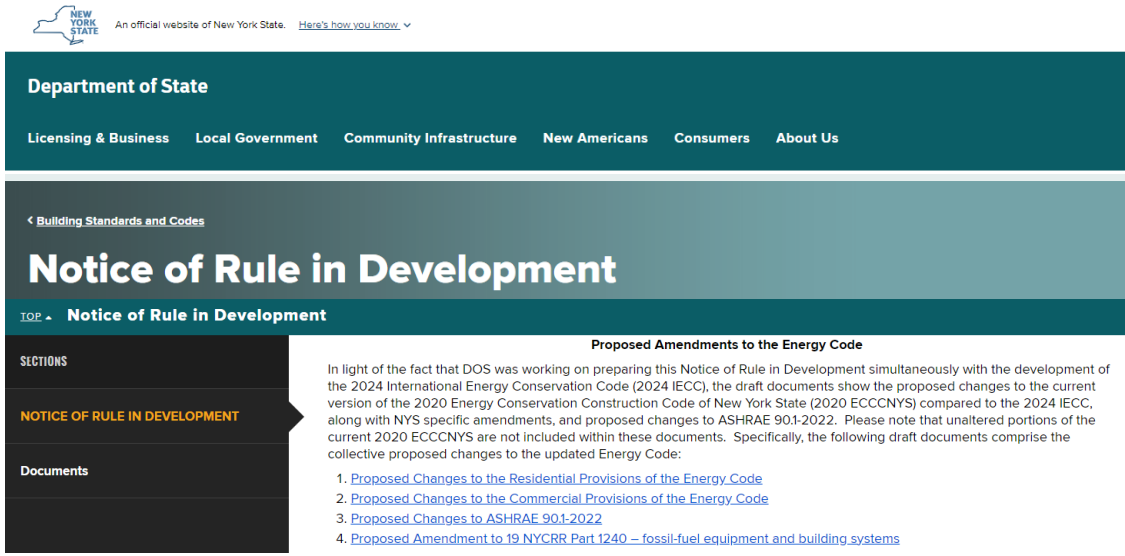
What's Up with NYS & NYC?

- NYS under review based on 2024 IECC
  - Published rulemaking notice July 2024
  - Possible late 2025 release?
- NYC in early review
  - Must be at least as stringent as NYS
  - Likely a few months after NYS is published
  - Before end of year?



Source: NYS Notice of Rule in Development | Department of State

LEDucation
Trade Show and Conference

This concludes The American Institute of Architects Continuing Education Systems Course

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Trade Show and Conference

Thank you

Questions?

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Trade Show and Conference

Thank you for attending!

Please scan the QR code to rate it and leave feedback.

Sutton North Room

LEDucation Presentation Committee

Wendy Kaplan, Kelvix | Craig Fox, ETC | Shaun Fillion, NYSID / RAB | Stacey Bello, KGM Lighting

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