NYCLC is founded and managed by the New York City Section of the IES.

CODE UPDATE: LIGHTING

9 November 2016
6:30pm to 8:00pm

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Tonight's Panel of Experts

Lee Brandt, IALD, LC, LEED AP BD+C
Principal, HLB Lighting Design
Lee discovered lighting during her studies at Penn State University and received her Bachelor's and Master's of Architectural Engineering there. Lee leads the Energy Standards/LEED team within HLB's Daylighting & Sustainable Design Studio and serves on IALD Energy & Sustainability Committee. She has served on the NYC Energy Conservation Code Advisory Committee for the past two code cycles. She is also a practice leader in the design of hospitality projects and works on many other project types as well. In her principal duties, she runs the NYC office studios and leads the teamwork and talent side firm wide.

Marty Salzberg, IALD, IES
Marty Salzberg worked as an architectural lighting consultant for more than thirty years. Her work was honored with multiple industry awards for design and energy efficiency. As a member of the Illuminating Engineering Society, Marty has been a member of the Library Lighting Committee since 2003 and is currently the Chair. She is a Professional Member of the IALD, where she is an active member of the Energy & Sustainability Committee and serves as the IALD representative to the ASHRAE/IES 90.1 code committee. Marty was honored by the NYC section of the IES with a 2015 Brilliance Award for service to the industry.

Tonight's Program and Format

Learning Objectives:

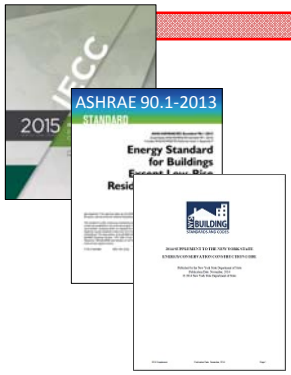
- What is the current energy code, and where to find it?
- What are the path options to comply with the code?
- DOB Documentation requirements

- A summary of the new NYC and ASHRAE requirements
  - Energy Efficiency requirements
  - Lighting Power Density
  - Controls
  - Daylighting Zone

SURVEY: Energy Codes on Lighting
We invite you to take a quick survey about the Energy Conservation Code and ask our panelists a question. Your answers will be anonymous and results will be presented during this Code Update: Lighting program. **Click Here To Access Survey**

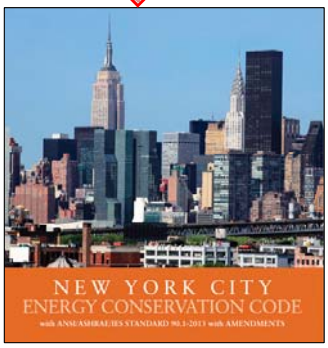
Components of NYC Energy Conservation Code 2016

NY State Adopts 2015 IECC and 90.1-2013 with Amendments:



LOCAL LAWS
OF
THE CITY OF NEW YORK
FOR THE YEAR 2016

No. 91



Local Law 91 of 2016:
-Adopts the NYCECC 2016
-Amendments to NY State Title 19 NYCRR Part 1240
-Amendments to IECC 2015
-Amendments to ASHRAE 90.1-2013

Other NYC Documents:

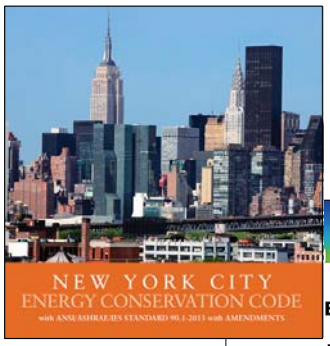
1 RCNY §5000-01
CHAPTER 5000

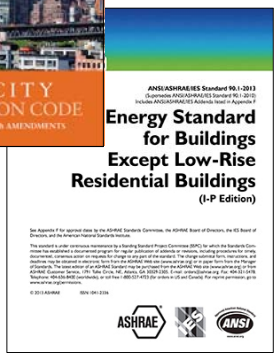
Energy Code Compliance Rule (describes compliance documentation, progress inspections, etc)

1 RCNY §101-07
CHAPTER 100

Approved Agencies Rule: Progress Inspectors

2016 NYC Energy Conservation Code (NYCECC)





2016 NYC Energy Conservation Code
creating a Residential and Commercial Code

alternate commercial compliance path….

ASHRAE 90.1-2013 As Amended by NYC

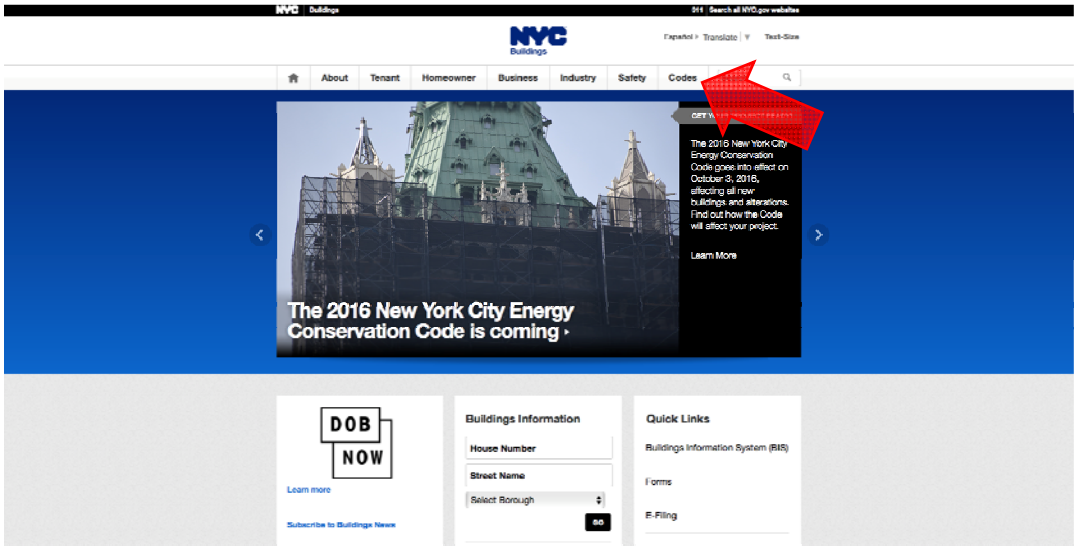
aka "Appendix CA of the 2016 NYCECC"

We need new acronym for this… is it?

ASHRAE-NYC
ASHRAE (NYC)
90.1-2013-NYC

Where to Find the Energy Code...**View it at**: NYC Dept of Building Website

www.**nyc**.gov/**buildings**



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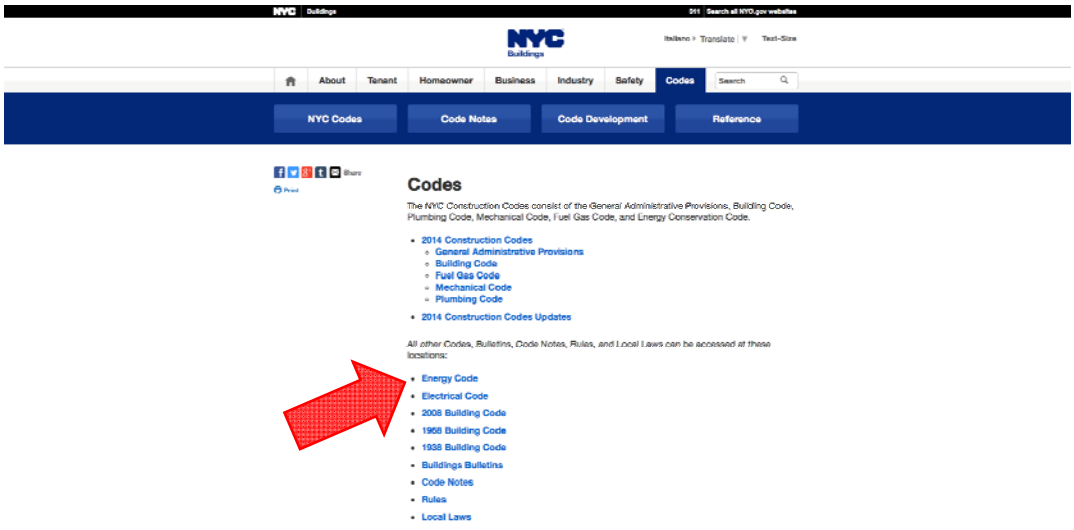

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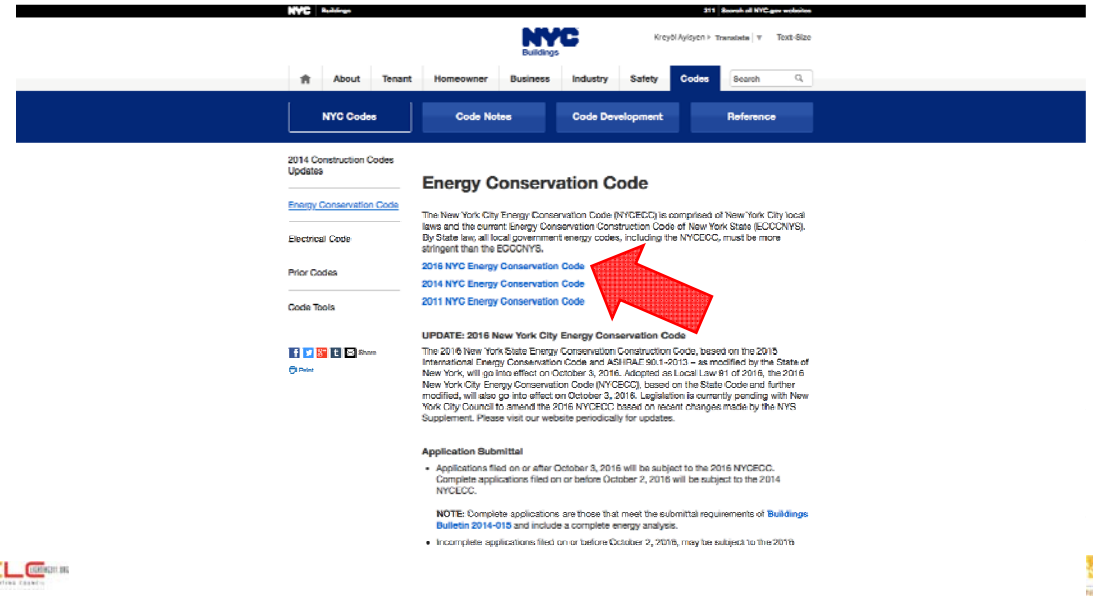

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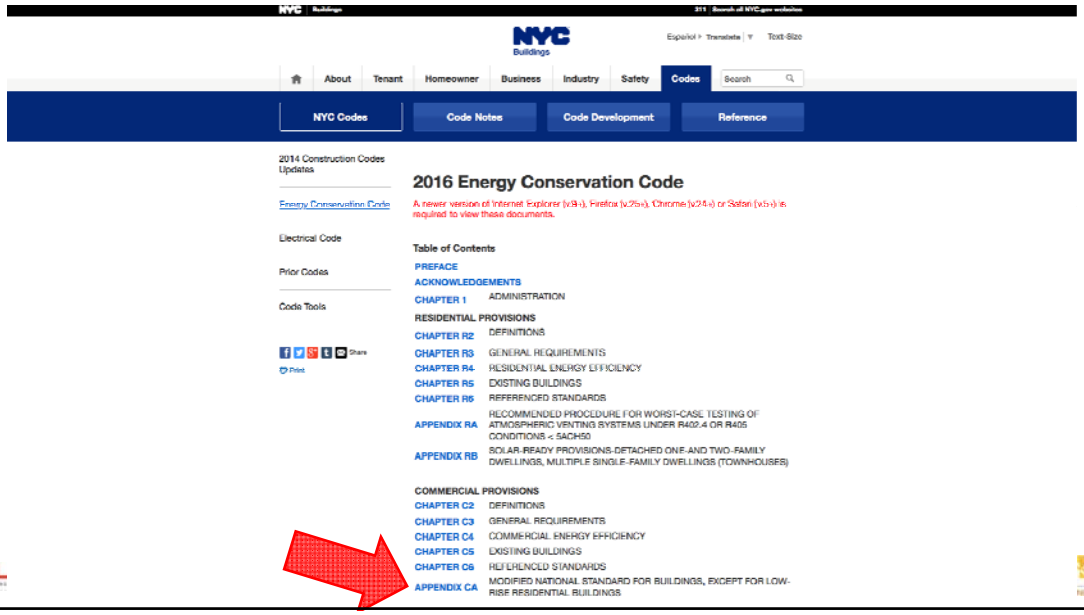
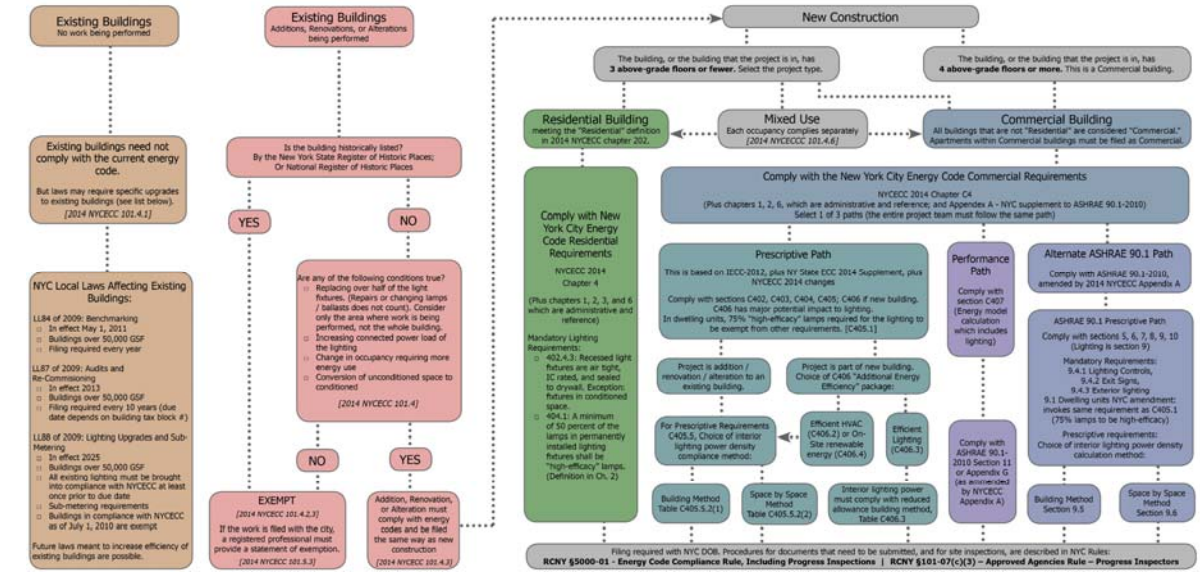


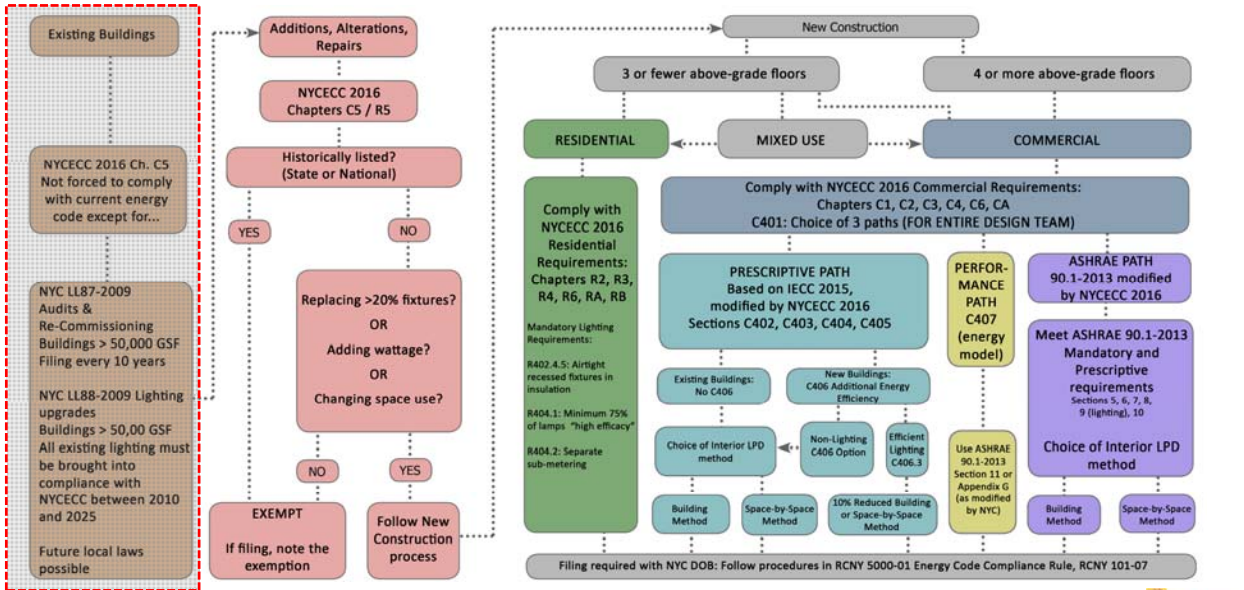
Where to Find the Energy Code: **Buy it at..** NYC City Store

www.a856-citystore.nyc.gov

2014 NYC Energy Code Paths (Outdated)

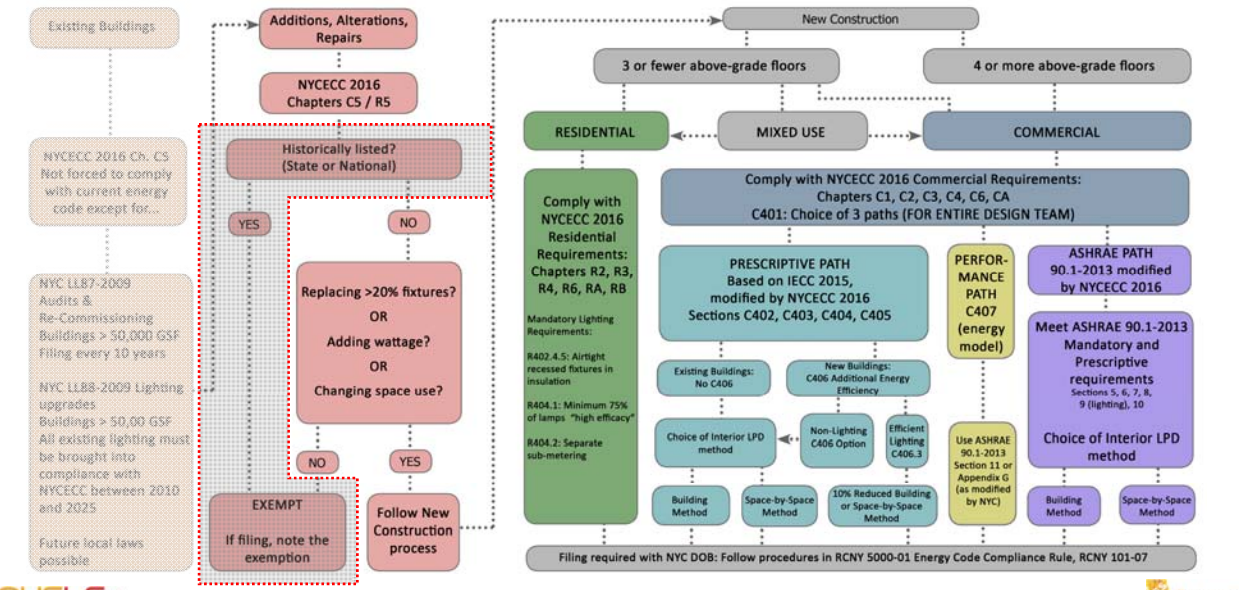


2016 NYC Energy Code Paths (Simplified)



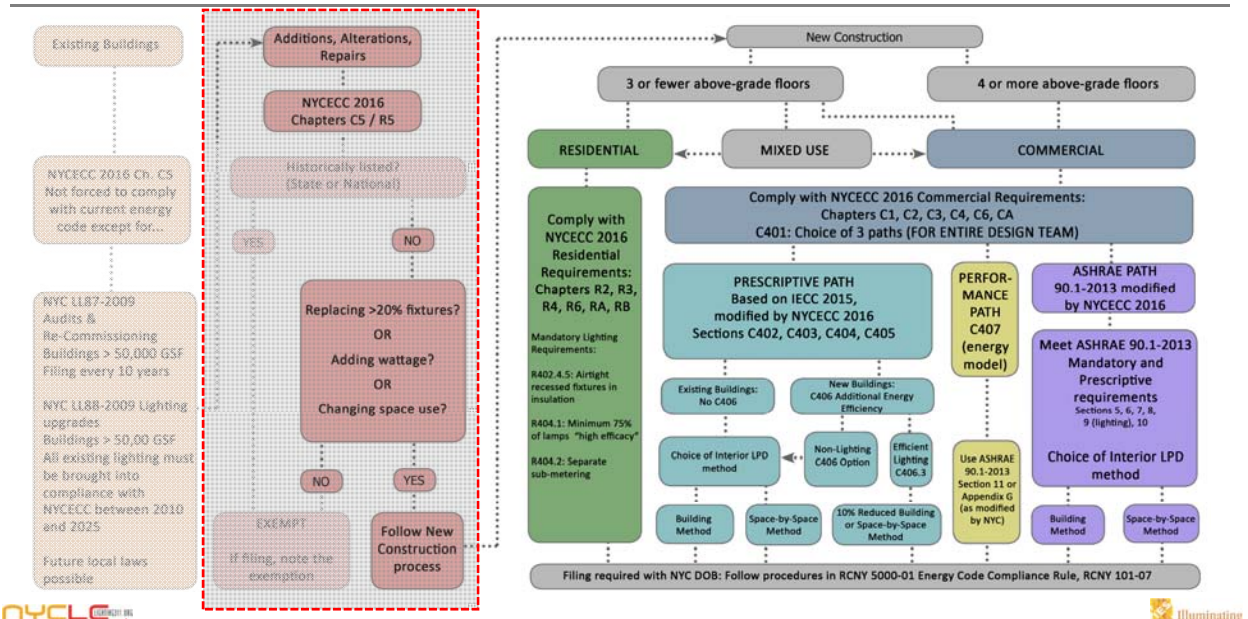
If we're hired, there is work being done

2016 NYC Energy Code Paths



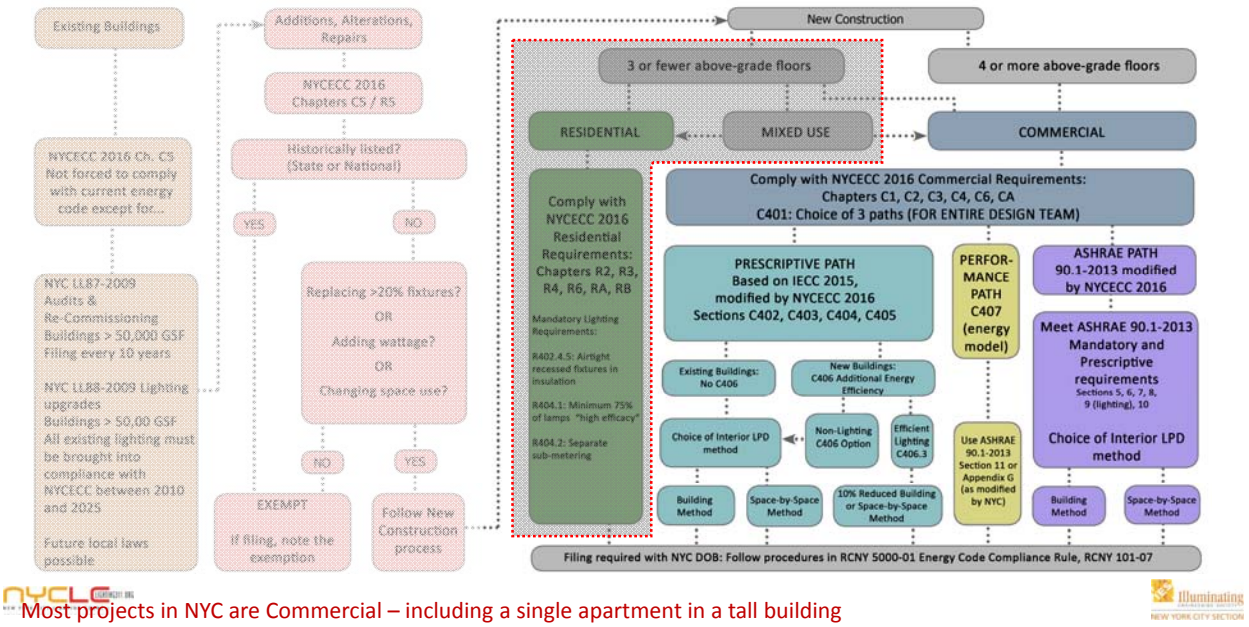
Historical exemption must be State or National – not NYC LPC

2016 NYC Energy Code Paths



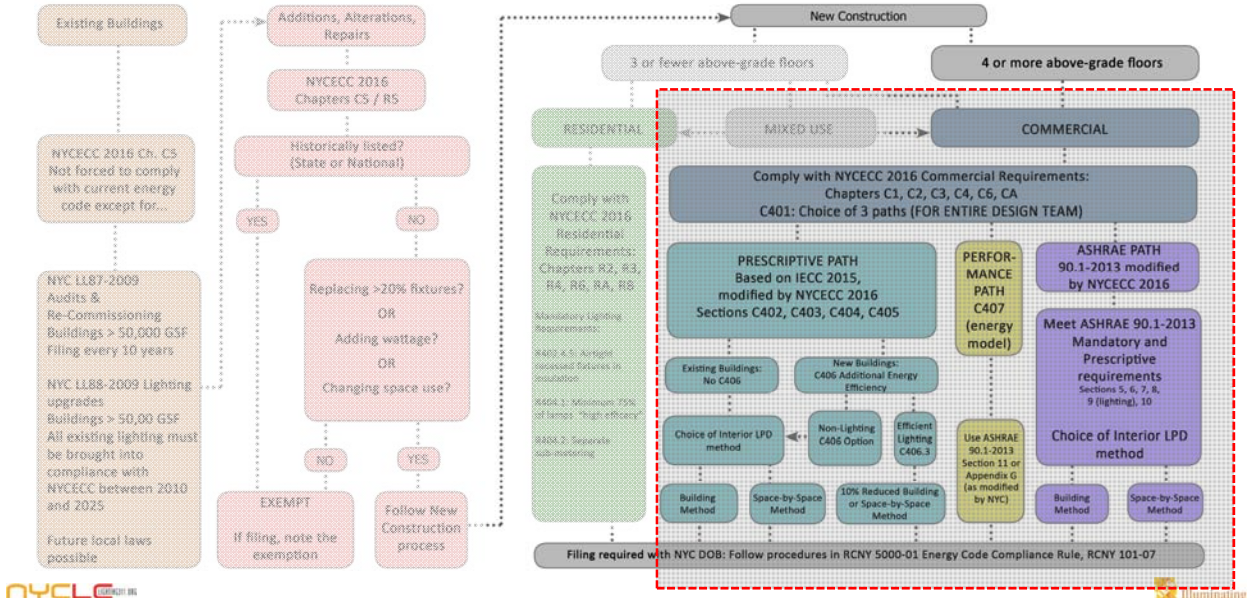
Additions / Alterations follow same path as New Construction

2016 NYC Energy Code Paths



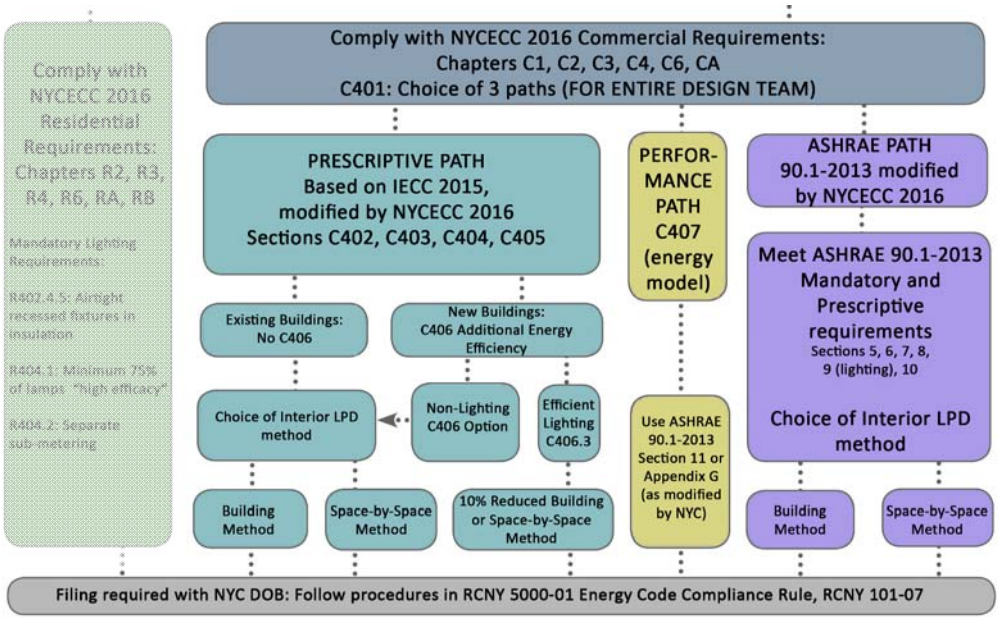
Most projects in NYC are Commercial – including a single apartment in a tall building

2016 NYC Energy Code Paths



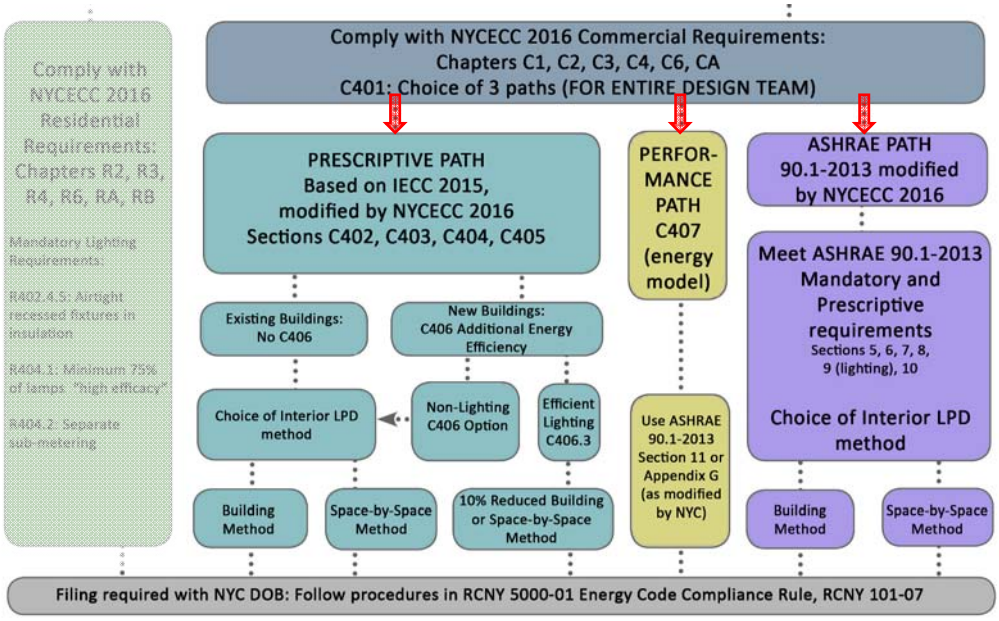
Commercial paths

2016 NYC Energy Code Paths



Commercial paths

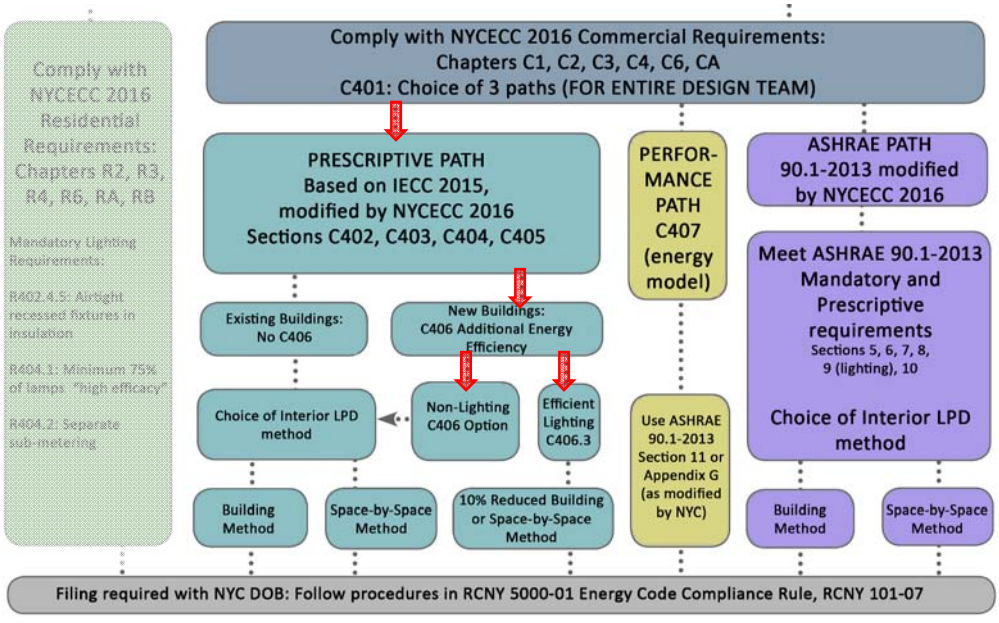
NYC Energy Code Paths - 2016



1. Which main energy code path is being used?

Entire project team must use same path

NYC Energy Code Paths - 2016

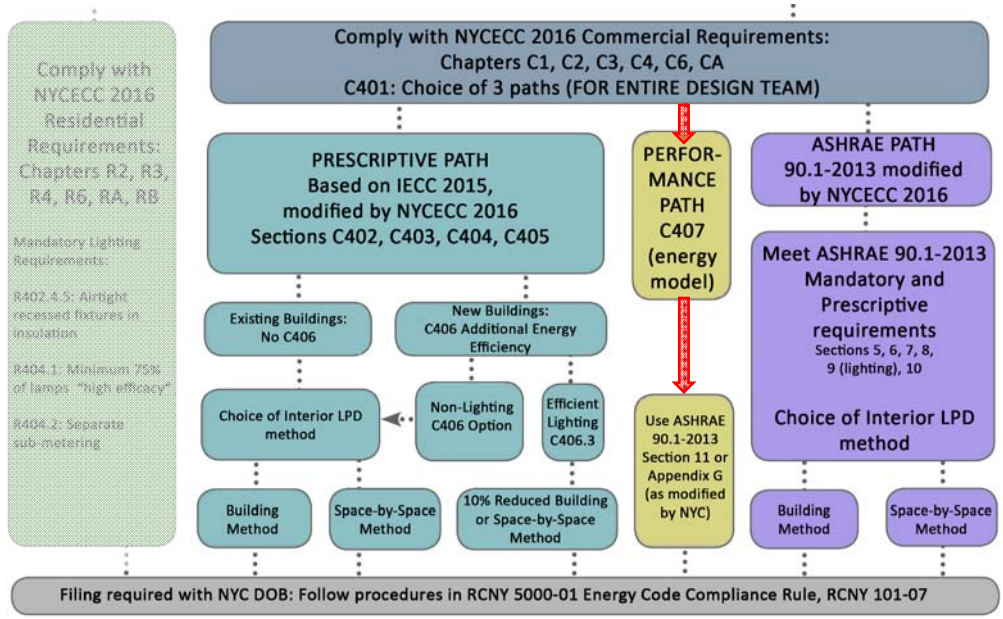


If using the Prescriptive Path based on IECC 2015, and it's a new building:

2. Which C406 Additional Efficiency Path?

Entire project team must use same path

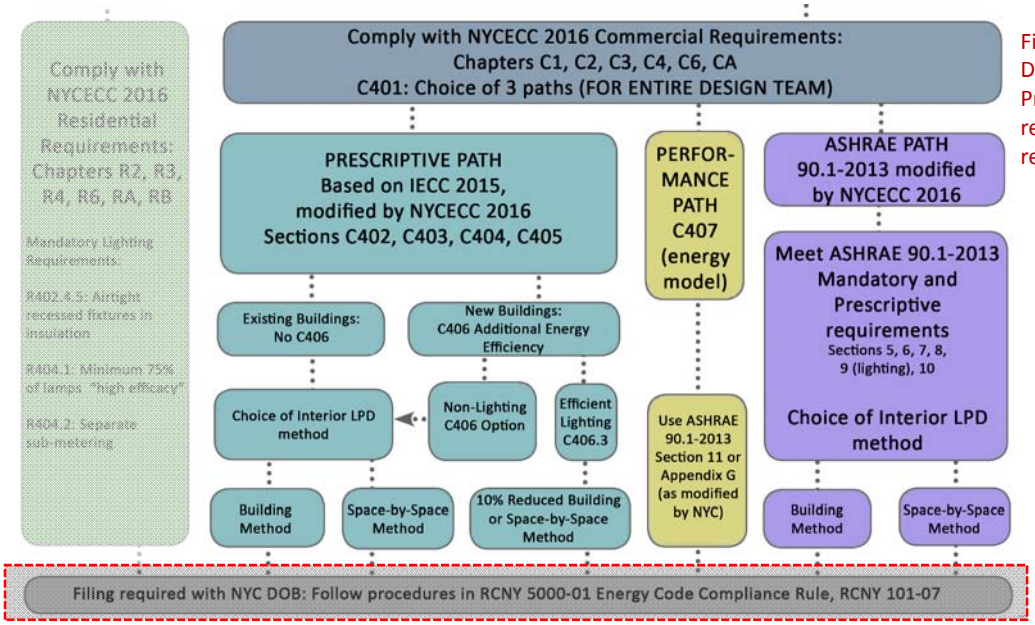
NYC Energy Code Paths - 2016



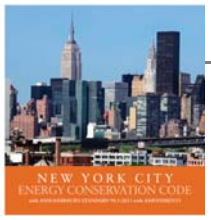
If Performance path is chosen, coordinate with team doing the energy modeling:

3. What lighting criteria are being modeled?

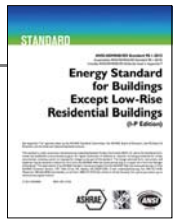
NYC Energy Code Paths - 2016



Filing, Documentation, Progress Inspection requirements regardless of path



Which Code Path is Preferred for Lighting?



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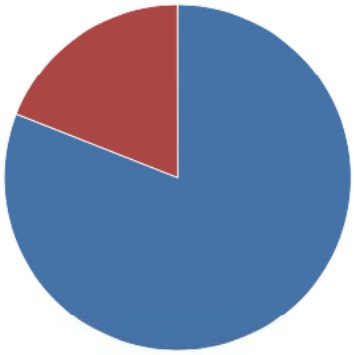
"Survey Says"..:

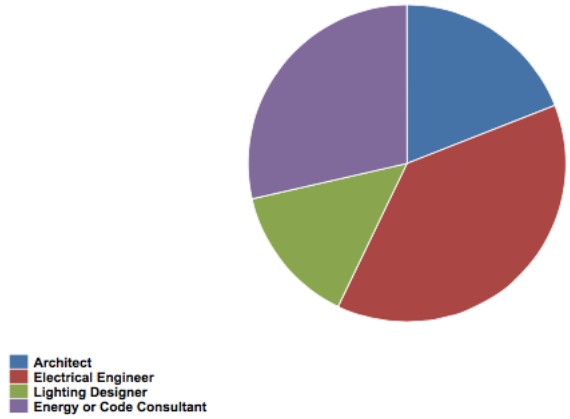
What is your Profession?



Lighting Designer
Lighting Manufacture or Representative

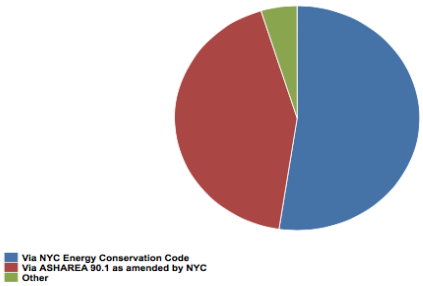
"Survey Says"..:

Who typically decides which energy code path the design team should follow?

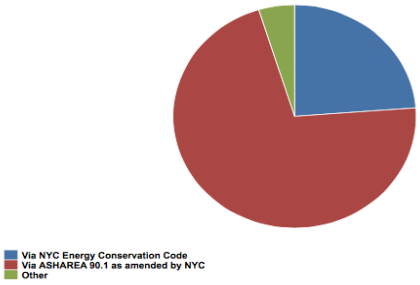


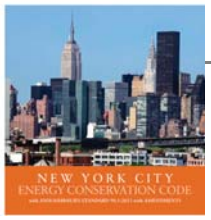
"Survey Says"..:

Which code path do you typically following when showing compliance for NYC commercial projects?

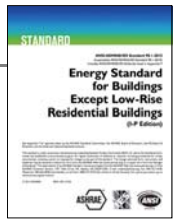


Which code path do you prefer when showing compliance for NYC commercial projects?





Which Code Path is Preferred for Lighting?



2016 NYCECC

ASHRAE 90.1-2013
As Amended by NYC

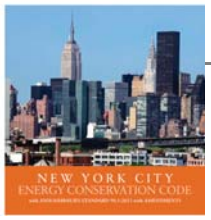
Both codes to Increase Efficiency by 20% above 2015 IECC and 90.1-2103

Both Require Dwelling Units to Comply with the 75% Efficacy Lamp/Source Rule Option

Both Exempt State and Federal Historic Buildings (NOT NYC Landmarked)

- Required separate electrical meter for each dwelling unit
- Has Additional ***Efficiency Package Options***
  - But with now more choices

- Voltage Drop provision is now National Electric Code Language – GOOD
- 50% Switched Receptacle requirement – STILL THERE
  - private offices, conference rooms
  - rooms for printing/copying, break rooms, classrooms and individual work stations
  - 25% of modular furniture circuits



Which Code Path is Preferred for Lighting?

Previous 2014 NYCECC version: C406 – 3 options

Exception: Covered tenant space for which the electrical consumption within such space is measured by a meter dedicated exclusively to that space.

SECTION ECC C406
ADDITIONAL EFFICIENCY PACKAGE OPTIONS

C406.1 Requirements.

Buildings shall comply with at least one of the following:

1. Efficient HVAC Performance in accordance with Section C406.2.
2. Efficient Lighting System in accordance with Section C406.3.
3. On-Site Supply of Renewable Energy in accordance with Section C406.4.

Individual tenant spaces shall comply with either Section C406.2 or Section C406.3 unless documentation can be provided that demonstrates compliance with Section C406.4 for the entire building.

C406.2 Efficient HVAC performance.

Equipment shall meet the minimum efficiency requirements of Tables C406.2.(1) through C406.2(7) in addition to the requirements in Section C403. This section shall only be used where the equipment efficiencies in Tables C406.2.(1) through C406.2(7) are greater than the equipment efficiencies listed in Table C403.2.3(1) through 403.2.3(7) for the equipment type.

Double effect – direct fired	1.0 (1.05)
Double effect – indirect fired	1.20

C406.3 Efficient lighting system.

Whole building lighting power density (Watts/sf) shall comply with the requirements of Section C406.3.1.

TABLE C406.3
REDUCED INTERIOR LIGHTING POWER

BUILDING AREA TYPE[a]	LPD (w/ft²)
Automotive facility	0.82
Convention center	1.08
Courthouse	1.05
Dining: bar lounge/leisure	0.99
Dining: cafeteria/fast food	0.90
Dining: family	0.89
Dormitory	0.61
Exercise center	0.88
Fire station	0.71
Gymnasium	1.0
Health care clinic	0.87
Hospital	1.10
Library	1.18
Manufacturing facility	1.11
Hotel/motel	0.88
Motion picture theater	0.83
Museum	1.06
Multifamily	0.60
Office	0.90/0.85[b]
Performing arts theater	1.39
Police station	0.96
Post office	0.87
Religious building	1.05
Retail	1.4/1.3[b]
School/university	0.99
Sports arena	0.78
Town hall	0.92
Transportation	0.77
Warehouse[c]	0.6
Workshop	1.2

For SI: 1 foot = 304.8 mm, 1 watt per square foot = W/0.0929 m².

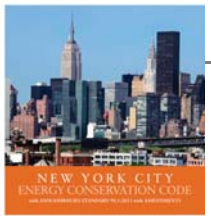
a. In cases where both a general building area type and a more specific building area type are listed, the more specific building area type shall apply.

b. First LPD value applies if no less than 50 percent of combined floor area is in daylight zones. Automatic daylighting controls shall be installed in daylight zones and shall meet the requirements of Section C405.2.2.3. In all other cases, second LPD value applies.

c. No less than 70 percent of the floor area shall be in the daylight zone. Automatic daylighting controls shall be installed in daylight zones and shall meet the requirements of Section C405.2.2.3.

C406.3.1 Reduced lighting power density.

The total interior lighting power (watts) of the building shall be determined by using the reduced whole building interior lighting power in Table C406.3 times the floor area for the building types.



Which Code Path is Preferred for Lighting?

New 2016 NYCECC version: C406 – 6 options

SECTION ECC C406
ADDITIONAL EFFICIENCY PACKAGE OPTIONS

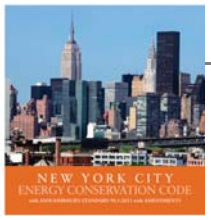
C406.1 Requirements. Buildings shall comply with at least one of the following:

1. More efficient HVAC performance in accordance with Section C406.2.
2. Reduced lighting power density system in accordance with Section C406.3.
3. Enhanced lighting controls in accordance with Section C406.4.
4. On-site supply of renewable energy in accordance with Section C406.5.
5. Provision of a dedicated outdoor air system for certain HVAC equipment in accordance with Section C406.6.
6. High-efficiency service water heating in accordance with Section C406.7.

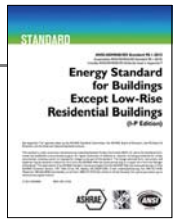
C406.3 Reduced lighting power density. The total interior lighting power (watts) of the building shall be determined by using 90 percent of the lighting power values specified in Table C405.4.2(1) times the floor area for the building types, or by using 90 percent of the interior lighting power allowance calculated by the Space-by-Space Method in Section C405.4.2.

C406.4 Enhanced digital lighting controls. Interior lighting in the building shall have the following enhanced lighting controls that shall be located, scheduled and operated in accordance with Section C405.2.2.

1. Luminaires shall be capable of continuous dimming.
2. Luminaires shall be capable of being addressed individually. Where individual addressability is not available for the luminaire class type, a controlled group of not more than four luminaries shall be allowed.
3. Not more than eight luminaires shall be controlled together in a daylight zone.
4. Fixtures shall be controlled through a digital control system that includes the following function:
   - 4.1. Control reconfiguration based on digital addressability.
   - 4.2. Load shedding.
   - 4.3. Individual user control of overhead general illumination in open offices.
   - 4.4. Occupancy sensors shall be capable of being reconfigured through the digital control system.
5. Construction documents shall include submittal of a Sequence of Operations, including a specification outlining each of the functions in Item 4 of this section.
6. Functional testing of lighting controls shall comply with Section C408.



Which Code Path is Preferred for Lighting?



2016 NYCECC

Advantages

- Slightly fewer control requirements for occ sensors and daylighting
- Simpler / shorter code, but less flexible than 90.1

More Difficult Requirements

- Section C406 "Additional Energy Efficiency" option for new construction – may result in extra control requirements or 10% reduced LPD allowance (though not as bad as the 2014 NYCECC requirements)
- No LPD allowances for room geometry (RCR) or extra controls (Control Factor)
- Potential daylight dimming requirement for Retail

ASHRAE 90.1-2013

As Amended by NYC

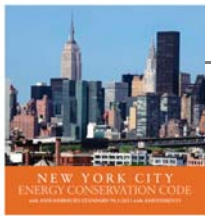
Overall: New codes have similar requirements
More similar than in the past

Advantages

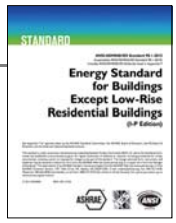
- Additional LPD allowances possible by demonstrating room geometry (RCR) or extra controls (Control Factor)
- Control requirements shown in table form (easier to understand than lists/paragraphs)
- No section C406 "Additional Energy Efficiency" requirement

More Difficult Requirements

- More requirements for occ sensors (parking garages, stairwells)
- More complex daylighting controls
- NYC version of 90.1-2013 not supported by COMcheck



Lighting Changes Compared to 2014 NYC Code



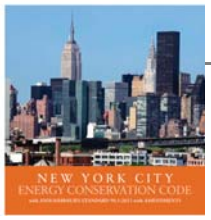
2016 NYCECC

- LPD w/sf allowances reduced
- LPD w/sf allowances for Space-by-Space method and Building Method now match ASHRAE 90.1
- **Decorative lighting of 1.0w/sf is now included**
- C406 "Additional efficiency" option for lighting is not as strict as the last code version
- Calculation for exterior façade lighting allowances is now based on total size of façade and not the area of illuminated facade
- Existing building alterations trigger LPD and controls requirements when replacing >20% of connected load (same as ASHRAE) (was previously 50%)
- Daylight controls must be automatic (not manual)

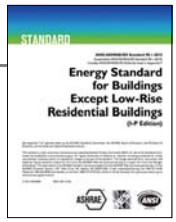
ASHRAE 90.1-2013
As Amended by NYC

Overall, reduction in LPD w/sf allowances, more control requirements, and the 2 codes are more similar to each other

- LPD w/sf allowances reduced
- 2 daylight control zones often required (Primary and Secondary)
- Control requirements are now shown in a table format instead of as lists/paragraphs
- More commissioning requirements



Significant NYC Lighting Changes



2016 NYCECC

- Alterations replacing over 20% of connected load need to be filed for energy compliance (instead of 50%)
- Occ sensor requirements added for Open Offices
- Manual on (vacancy sensor) requirements added for Classrooms, Conference/Meeting rooms, Lunch/Break rooms, Private Offices
- Motion sensor auto-off is 20 minutes (instead of 30 min)
- For building performance calculation method (C407 energy model), must use ASHRAE 90.1-2013 method
- Changes to Commissioning requirements (C408.2.5.4)

ASHRAE 90.1-2013
As Amended by NYC

- Alterations replacing over 20% of connected load need to be filed for energy compliance (instead of 10%)
- Various changes to control and occupancy sensor requirements (table of control requirements is revised)
- Motion sensor auto-off is 20 minutes (instead of 30)

Both Paths

- Administrative and definition changes
- LPD of some spaces are reduced:

-Open Office: 0.98 → 0.90 w/sf
-Enclosed office: 1.11 → 1.00 w/sf
-Retail sales area: 1.44 → 1.30 w/sf

"2016 New York City" in ComCheck

Software version (4.0.5.0) now includes the "2016 New York City" code option

COMcheck-Web™

Web ComCheck version now includes the "2016 New York City" code option

COMcheck Reports only can demonstrate compliance with 2016 NYCECC path!

– no ASHRAE 90.1-2013-NYC version

ASHRAE vs ASHRAE-NYC

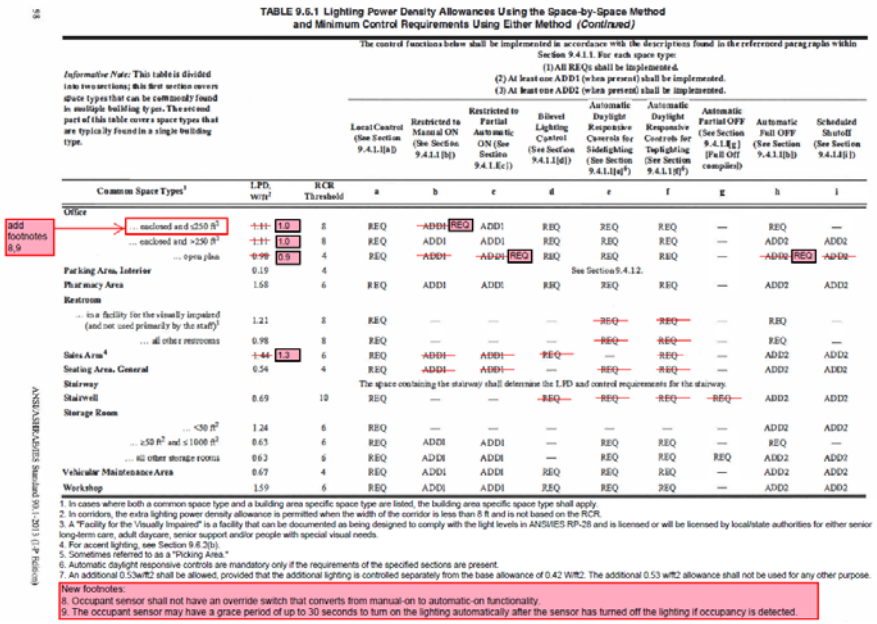


TABLE 9.6.1 Lighting Power Density Allowances Using the Space-by-Space Method and Minimum Control Requirements Using Either Method *(Continued)*

The control functions below shall be implemented in accordance with the descriptions found in the referenced paragraphs within Section 9.4.1.1. For each space type:
(1) All REQs shall be implemented.
(2) At least one ADD1 (when present) shall be implemented.
(3) At least one ADD2 (when present) shall be implemented.

Informative Note: This table is divided into two sections; this first section covers space types that can be commonly found in multiple building types. The second part of this table covers space types that are typically found in a single building type.

Common Space Types[1]	LPD, W/ft²	RCR Threshold	a Local Control (See Section 9.4.1.1[a])	b Restricted to Manual ON (See Section 9.4.1.1[b])	c Restricted to Partial Automatic ON (See Section 9.4.1.Ec])	d Bilevel Lighting Control (See Section 9.4.1.1[d])	e Automatic Daylight Responsive Controls for Sidelighting (See Section 9.4.1.1[q][4])	f Automatic Daylight Responsive Controls for Toplighting (See Section 9.4.1.1[q][5])	g Automatic Partial OFF (See Section 9.4.1.1[g] (Full OFF compiles])	h Automatic Full OFF (See Section 9.4.1.1[b])	i Scheduled Shutoff (See Section 9.4.1.1[i])
Office											
add footnotes 8,9 → … enclosed and ≤250 ft²	~~1.11~~ 1.0	8	REQ	~~ADDI~~ REQ	ADD1	REQ	REQ	REQ	—	REQ	—
… enclosed and >250 ft²	~~1.11~~ 1.0	8	REQ	ADDI	ADD1	REQ	REQ	REQ	—	ADD2	ADD2
… open plan	~~0.98~~ 0.9	4	REQ	~~ADDI~~	~~ADDI~~ REQ	REQ	REQ	REQ	—	~~ADDI~~ REQ	~~ADDI~~
Parking Area, Interior	0.19	4	See Section 9.4.1.2.								
Pharmacy Area	1.68	6	REQ	ADDI	ADDI	REQ	REQ	REQ	—	ADD2	ADD2
Restroom											
… in a facility for the visually impaired (and not used primarily by the staff)[3]	1.21	8	REQ	—	—	—	~~REQ~~	~~REQ~~	—	REQ	—
… all other restrooms	0.98	8	REQ	—	—	—	~~REQ~~	~~REQ~~	—	REQ	—
Sales Area[4]	~~1.44~~ 1.3	6	REQ	~~ADDI~~	~~ADDI~~	~~REQ~~	—	~~REQ~~	—	ADD2	ADD2
Seating Area, General	0.54	4	REQ	~~ADDI~~	~~ADDI~~	—	~~REQ~~	~~REQ~~	—	ADD2	ADD2
Stairway			The space containing the stairway shall determine the LPD and control requirements for the stairway.								
Stairwell	0.69	10	REQ	—	—	~~REQ~~	~~REQ~~	~~REQ~~	~~REQ~~	ADD2	ADD2
Storage Room											
… <50 ft²	1.24	6	REQ	—	—	—	—	—	—	ADD2	ADD2
… ≥50 ft² and ≤1000 ft²	0.63	6	REQ	ADDI	ADDI	—	REQ	REQ	—	REQ	—
… all other storage rooms	0.63	6	REQ	ADDI	ADDI	—	REQ	REQ	REQ	ADD2	ADD2
Vehicular Maintenance Area	0.67	4	REQ	ADDI	ADDI	REQ	REQ	REQ	—	ADD2	ADD2
Workshop	1.59	6	REQ	ADDI	ADDI	REQ	REQ	REQ	—	ADD2	ADD2

1. In cases where both a common space type and a building area specific space type are listed, the building area specific space type shall apply.
2. In corridors, the extra lighting power density allowance is permitted when the width of the corridor is less than 8 ft and is not based on the RCR.
3. A "Facility for the Visually Impaired" is a facility that can be documented as being designed to comply with the light levels in ANSI/IES RP-28 and is licensed or will be licensed by local/state authorities for either senior long-term care, adult daycare, senior support and/or people with special visual needs.
4. For accent lighting, see Section 9.4.2(b).
5. Sometimes referred to as a "Picking Area."
6. Automatic daylight responsive controls are mandatory only if the requirements of the specified sections are present.
7. An additional 0.53w/ft2 shall be allowed, provided that the additional lighting is controlled separately from the base allowance of 0.42 W/ft2. The additional 0.53 w/ft2 allowance shall not be used for any other purpose.

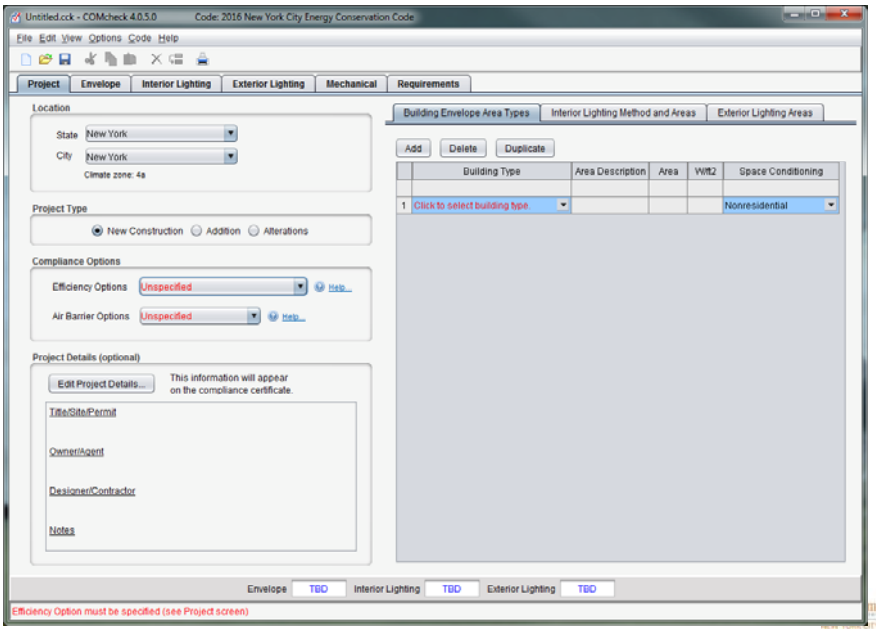
New footnotes:
8. Occupant sensor shall not have an override switch that converts from manual-on to automatic-on functionality.
9. The occupant sensor may have a grace period of up to 30 seconds to turn on the lighting automatically after the sensor has turned off the lighting if occupancy is detected.

NYC changes to ASHRAE 90.1-2013 are in red (example of 1 page)

Changes to LPD mean that calculating compliance for ASHRAE 90.1-2013 in COMcheck is not valid in NYC.

Tabular documentation method must be used when filing with DOB to show compliance with ASHRAE 90.1-2013-NYC.

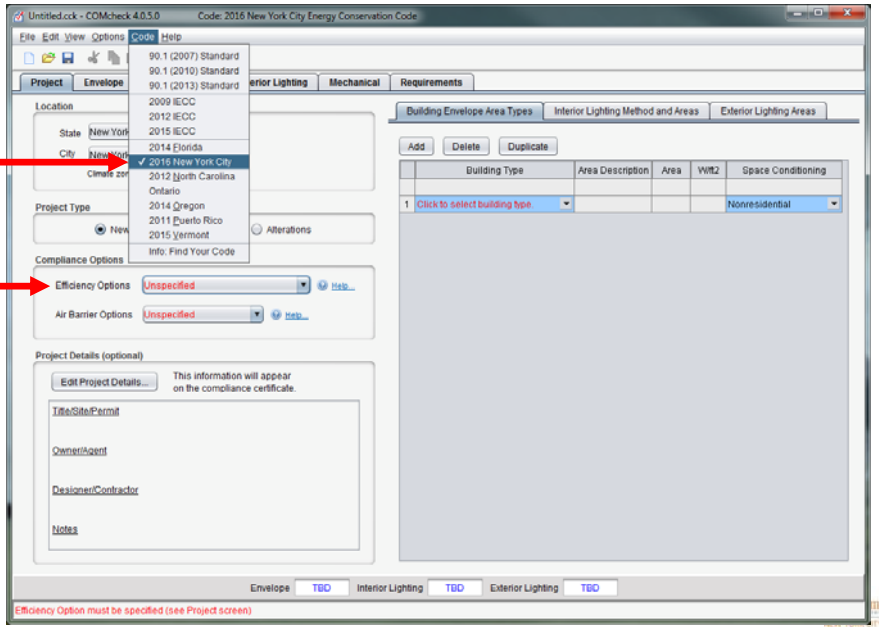
"2016 New York City" in ComCheck



"2016 New York City" in ComCheck

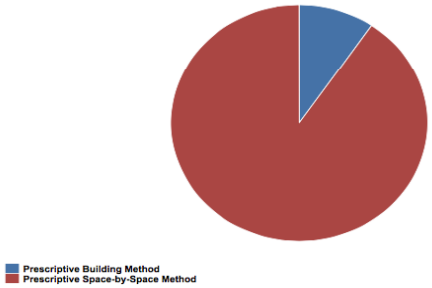
Choose 2016 New York City (this is the IECC 2015 based path, not ASHRAE)

For new buildings, choose the section C406 Additional Efficiency Option (which may be Lighting)
Do this first, since it limits calculation to Space-by-Space
(no Building Method)

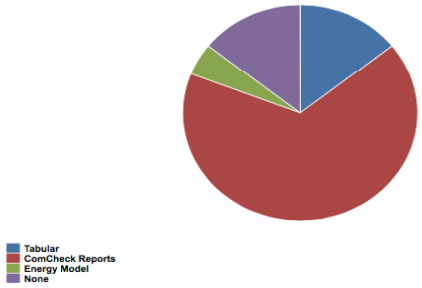


"Survey Says"..:

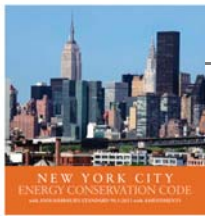
Which method do you typically use when determining energy usage for lighting in NYC commercial projects?



When documenting energy code compliance for lighting which method of documentation do you typically provide?



Controls: NYCECC



C405.2 Lighting controls (Mandatory). Lighting systems shall be provided with controls as specified in Sections C405.2.1, C405.2.2, C405.2.3, C405.2.4 and C405.2.5. Lighting controls shall be commissioned and completed in accordance with the requirements of Section C408.3.

Exceptions: Lighting controls are not required for the following:

1. Areas designated as security or emergency areas that are required to be continuously lighted.
2. Interior exit stairways, interior exit ramps and exit passageways.
3. Emergency egress lighting that is normally off.

C405.2.1 Occupant sensor controls. Occupant sensor controls shall be installed to control lights in the following space types:

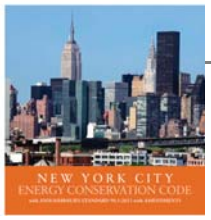
1. Classrooms/lecture/training rooms.
2. Conference/meeting/multipurpose rooms.
3. Copy/print rooms.
4. Lounges.
5. Employee lunch and break rooms.
6. Private offices.
7. Restrooms.
8. Storage rooms.
9. Janitorial closets.
10. Locker rooms.
11. Other spaces 300 square feet (28 m^2) or less th height partitions.
12. Warehouses.
13. Open Plan Offices.

C405.2.1.1 Occupant sensor control function. Occupant sensor controls in spaces other than warehouses specified in Section C405.2.1 shall comply with the following:

1. Automatically turn off lights within 20 minutes of all occupants leaving the space.
2. Be manual on or controlled to automatically turn the lighting on to not more than 50 percent power.

   Exceptions:

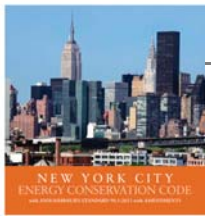
   1. Full automatic-on controls shall be permitted to control lighting in open plan offices, public corridors, stairways, restrooms, primary building entrance areas and lobbies, and areas where manual-on operation would endanger the safety or security of the room or building occupants.
   2. Manual on controls shall be required for classrooms (not including shop classrooms, laboratory classrooms, and preschool classrooms), conference/meeting rooms, employee lunch and break rooms, and offices smaller than 200 square feet (18.5 m^2) in area. Such sensors and controls shall not have an override switch that converts from manual-on to automatic-on functionality, and may have a grace period of up to 30 seconds to turn on the lighting automatically after the sensor has turned off the lighting if occupancy is detected.
3. Shall incorporate a manual control to allow occupants to turn lights off.



Controls: NYCECC

Lighting Controls (Mandatory)	Excempt	Occupant Sensor Control - Auto off after 20 min - Manual On or Auto On to 50% - with Manual Off	Occupant Sensor Control - Auto off after 20 min - Manual On or Auto On to 50% - with Manual Off - Auto On to 100% where manual-on operation would endanger the safety or security of the room or building occupant	Occupant Sensor Control - Auto off after 20 min - Manual On or Auto On to 50% - with Manual Off - with NO overide switch to switch from Manual to Auto, AND Auto On after 30 sec grace period	Occupant Sensor Control - Auto 50% Reduction after Unoccupied - Control lighting in each aisleway independently and shall not control lighting beyond the aisleway
Interior Areas:					
Areas designated as security or emergency areas that are required to be continuously lighted	X				
Interior exit stairways, interior exit ramps and exit passageways	X				
Public Corridors			X		
Stairways			X		
Emergency egress lighting that is normally off	X				
Classrooms / Lecture / Training Room				X*	
Conference / Meeting / Multipupose Rooms				X	
Copy / Print rooms		X			
Lounges		X			
Employee lunch and break rooms				X	
Private offices		X			
Offices smaller than 200 sqft				X	
Restrooms		X	X		
Storage rooms		X			
Janitorial closets		X			
Locker rooms		X			
Warehouses					
Aisleways and Open Areas					X
Open Plan Offices		X	X		
Primary Building Entrance Areas			X		
Lobbies			X		
Other spaces 300 square feet or less that are enclosed by floor-to-ceiling height partitions		X			

* not including shop classrooms, laboratory classrooms, and preschool classrooms



Controls: NYCECC

Lighting Controls (Mandatory)	Excempt	Occupant Sensor Control	Occupant Sensor Control	Occupant Sensor Control	Occupant Sensor Control
		- Auto off after 20 min - Manual On or Auto On to 50% - with Manual Off	- Auto off after 20 min - Manual On or Auto On to 50% - with Manual Off - Auto On to 100% where manual-on operation would endanger the safety or security of the room or building occupant	- Auto off after 20 min - Manual On or Auto On to 50% - with Manual Off - with NO overide switch to switch from Manual to Auto, AND Auto On after 30 sec grace period	- Auto 50% Reduction after Unoccupied - Control lighting in each aisle way independently and shall not control lighting beyond the aisle way

Controls: ASHRAE-NYC

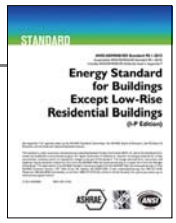


TABLE 9.6.1 Lighting Power Density Allowances Using the Space-by-Space Method and Minimum Control Requirements Using Either Method

Informative Note: This table is divided into two sections; this first section covers space types that can be commonly found in multiple building types. The second part of this table covers space types that are typically found in a single building type.

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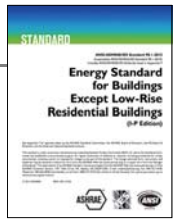
Common Space Types[1]	LPD W/ft²	RCR Threshold	a Local Control (See Section9.4.1.1(a))	b Restricted to Manual ON (See Section9.4.1.1(b))	c Restricted to Partial Automatic ON (See Section9.4.1.1(c))	d Bilevel Lighting Control(See Section9.4.1.1(d))	e AutomaticDaylight Responsive Controls for Sidelighting (See Section 9.4.1.1(e)[3])	f Automatic Daylight Responsive Controls for Toplighting (See Section 9.4.1.1(f)[3])	g Automatic Partial OFF (See Section 9.4.1.1(g) (Full Off complies))	h Automatic Full OFF (See Section 9.4.1.1(h))	i Scheduled Shutoff (See Section 9.4.1.1(i))
Atrium											
…that is < 20 ft in height	0.03/ft total height	NA	REQ	ADD1	ADD1	-	REQ	REQ	-	ADD2	ADD2
…that is ≥ 20 ft and ≤ 40 ft in height	0.03/ft total height	NA	REQ	ADD1	ADD1	REQ	REQ	REQ	-	ADD2	ADD2
…that is > 40 ft in height	0.40 + 0.02/ft total height	NA	REQ	ADD1	ADD1	REQ	REQ	REQ	-	ADD2	ADD2
Audience Seating Area											
…in an auditorium	0.63	6	REQ	ADD1	ADD1	REQ	REQ	REQ	-	ADD2	ADD2
…in a convention center	0.82	4	REQ	ADD1	ADD1	REQ	REQ	REQ	-	ADD2	ADD2
…in a gymnasium	0.65	6	REQ	ADD1	ADD1	REQ	REQ	REQ	-	ADD2	ADD2
…in a motion picture theater	1.14	4	REQ	ADD1	ADD1	REQ	REQ	REQ	-	ADD2	ADD2
…in a penitentiary	0.28	4	REQ	ADD1	ADD1	-	REQ	REQ	-	ADD2	ADD2
…in a performing arts theater	2.43	8	REQ	ADD1	ADD1	REQ	REQ	REQ	-	ADD2	ADD2
…in a religious building	1.53	4	REQ	ADD1	ADD1	REQ	REQ	REQ	-	ADD2	ADD2
…in a sports arena	0.43	4	REQ	ADD1	ADD1	-	REQ	REQ	-	ADD2	ADD2
…all other audience seating areas	0.43	4	REQ	ADD1	ADD1	-	REQ	REQ	-	ADD2	ADD2
Banking Activity Area	1.01	6	REQ	ADD1	ADD1	REQ	REQ	REQ	-	ADD2	ADD2
Breakroom (See Lounge/Breakroom)											
Classroom/Lecture hall/Training Room[4,5]											
…in a penitentiary	1.34	4	REQ	REQ	ADD1	REQ	REQ	REQ	-	REQ	-
…all other classrooms/lecture halls/training rooms	1.24	4	REQ	REQ	ADD1	REQ	REQ	REQ	-	REQ	-
Conference/Meeting,Multipurpose Room[4]	1.23	6	REQ	REQ	ADD1	REQ	REQ	REQ	-	REQ	-
Confinement Cells	0.81	6	REQ	ADD1	ADD1	REQ	REQ	REQ	-	ADD2	ADD2
Copy/Print Room	0.72	6	REQ	ADD1	ADD1	REQ	REQ	REQ	-	REQ	-
Corridor[2]											
…in a facility for the visually impaired (and not used primarily by the staff)[2]	0.92	width < 8 ft	REQ	-	-	-	REQ	REQ	REQ	ADD2	ADD2
…in a hospital	0.99	width < 8 ft	REQ	-	-	-	REQ	REQ	ADD2	ADD2	ADD2

Controls: ASHRAE-NYC



controls - reformatted

As amended by NYCECC 2016

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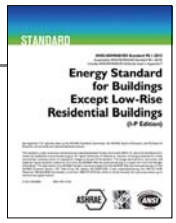
Common Space Types[1]	LPD W/ ft²	RCR Threshold	a Local Control (See Section9.4.1.1(a))	b Restricted to Manual ON (See Section9.4.1.1(b))	c Restricted to Partial Automatic ON (See Section9.4.1.1(c))	d Bilevel Lighting Control(See Section9.4.1.1(d))	e Automatic Daylight Responsive Controls for Sidelighting (See Section 9.4.1.1(e)[3])	f Automatic Daylight Responsive Controls for Toplighting (See Section 9.4.1.1(f)[3])	g Automatic Partial OFF (See Section 9.4.1.1(g) (Full Off complies))	h Automatic Full OFF (See Section 9.4.1.1(h))	i Scheduled Shutoff (See Section 9.4.1.1(i))
Office											
…enclosed and ≤ 250 ft²[20.9]	1.00	8	REQ	REQ	ADD1	REQ	REQ	REQ	---	REQ	---
…enclosed and > 250 ft²	1.00	8	REQ	ADD1	ADD1	REQ	REQ	REQ	---	ADD2	ADD2
…open plan	0.90	4	REQ	---	REQ	REQ	REQ	REQ	---	REQ	---

Controls: ASHRAE-NYC



control requirements

See Table 9.6.1 for applicable spaces

a – Local manual controls

Where space is ≤ 10,000 sf, manual control of ≤ 2,500 sf per device, otherwise no more than 10,000 sf

Readily accessible

Located so that the occupants can see the controlled lighting when using the control device, remote allowed with indicator

b - Restricted to manual ON

NOT automatically turned on

Exception for safety or security

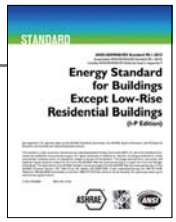
c – Restricted to partial automatic ON ≤ 50%

d – Bilevel control

At least one intermediate step between 30% and 70%

can be continuous dimming

Controls: ASHRAE-NYC



control requirements

Table 9.6.1 Example applicable spaces

Informative Note: This table is divided into two sections; this first section covers space types that can be commonly found in multiple building types. The second part of this table covers space types that are typically found in a single building type.

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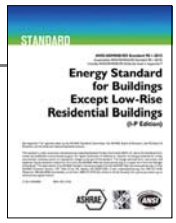
Common Space Types[1]	LPD W/ft²	RCR Threshold	Local Control (See Section9.4.1.1(a)) a	Restricted to Manual ON (See Section9.4.1.1(b)) b	Restricted to Partial Automatic ON (See Section9.4.1.1(c)) c	Bilevel Lighting Control (See Section9.4.1.1(d)) d
Lobby						
…in a facility for the visually impaired and not used primarily by staff)[3]	1.80	4	REQ	---	---	---
…for an elevator	0.64	6	REQ	---	---	---
…in a hotel	1.06	4	REQ	---	---	---
…in a motion picture theater	0.59	4	REQ	---	---	---
…in a performing arts theater	2.00	6	REQ	---	---	---
…all other lobbies	0.90	4	REQ	---	---	---
Locker Room	0.75	6	REQ	ADD1	ADD1	REQ
Lounge/Breakroom[3]						
…in a healthcare facility	0.92	6	REQ	REQ	ADD1	REQ
…all other lounges/breakrooms	0.73	4	REQ	REQ	ADD1	REQ
Office						
…enclosed and ≤ 250 ft²[2,3]	1.00	8	REQ	REQ	ADD1	REQ
…enclosed and > 250 ft²	1.00	8	REQ	ADD1	ADD1	REQ
…open plan	0.90	4	REQ	---	REQ	REQ
Parking Area, Interior	0.19	4	See Section 9.4.1.2			
Pharmacy Area	1.68	6	REQ	ADD1	ADD1	REQ
Restroom						
…in a facility for the visually impaired	1.21	8	REQ	---	---	---
…all other restrooms	0.98	8	REQ	---	---	---
Sales Area[4]	1.30	6	REQ	---	---	---

Controls: ASHRAE-NYC



control requirements

Table 9.6.1 Example applicable spaces

ASHRAE 90.1-2013 is similar to IECC 2015, with a few variations. The organization is different.

a. Manual controls

b. Restricted to manual ON

c. Restricted to partial automatic ON

d. Bilevel lighting control

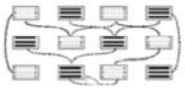
Each area with manual control shall have one control step between 30% and 70% in addition to off and full power.

Note: All of these solutions provide approximately 50% bi-level control. The solution that switches alternate lamps shows a three-lamp fixture. If the single lamp in each fixture was controlled separately from the other two lamps, a 33%/67% switching system would be achieved.

Bilevel controls diagrams

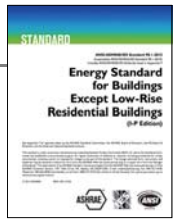
Dimming each luminaire

Switching alternate luminaires



Switching alternate lamps

Controls: ASHRAE-NYC



control requirements

See Table 9.6.1 for applicable spaces

e – Automatic daylight responsive controls for sidelighting

General lighting ≥ 150 watts in primary sidelighted zone

General lighting ≥ 300 watts in primary and secondary sidelighted zone – NOT in IECC

Readily accessible calibration

Primary and secondary areas controlled separately

Two control points + OFF, or continuous dimming

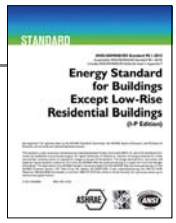
Exceptions – not same as IECC:

Obstructions – less height than IECC

Total glazing area < 20 sf

Retail spaces – ALL, not just first floor as in IECC 2015

Controls: ASHRAE-NYC



control requirements

See Table 9.6.1 for applicable spaces

f – Automatic daylight responsive controls for toplighting – roof monitors and skylights

General lighting ≥ 150 watts in toplighted zone

Readily accessible calibration

Two control points + OFF, or continuous dimming

General lighting overlapping from toplighting and sidelighting shall be controlled together - Not the same as IECC 2015

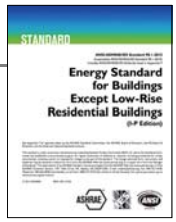
Exceptions – not same as IECC 2015 :

Obstructions

Skylight VT < 0.4

Spaces in Climate Zone 8 where general lighting is < 200 watts

Controls: ASHRAE-NYC



control requirements

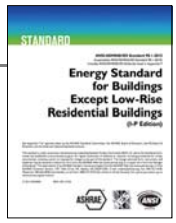
Table 9.6.1 example applicable spaces; daylight

Informative Note: This table is divided into two sections; this first section covers space types that can be commonly found in multiple building types. The second part of this table covers space types that are typically found in a single building type.

The control functions below shall be implemented in accordance with the descriptions found in the referenced paragraphs within Section 9.4.1.1. For each space type: (1) All REQs shall be implemented. (2) At least one ADD1 (when present) shall be implemented. (3) At least one ADD2 (when present) shall be implemented.

Common Space Types[1]	LPD W/ft²	RCR Threshold	Automatic Daylight Responsive Controls for Sidelighting (See Section 9.4.1.1(e)[2]) e	Automatic Daylight Responsive Controls for Toplighting (See Section 9.4.1.1(f)[2]) f
Lobby				
…in a facility for the visually impaired and not used primarily by staff)[3]	1.80	4	REQ	REQ
…for an elevator	0.64	6	REQ	REQ
…in a hotel	1.06	4	REQ	REQ
…in a motion picture theater	0.59	4	REQ	REQ
…in a performing arts theater	2.00	6	REQ	REQ
…all other lobbies	0.90	4	REQ	REQ
Locker Room	0.75	6	REQ	REQ
Lounge/Breakroom[8]				
…in a healthcare facility	0.92	6	REQ	REQ
…all other lounges/breakrooms	0.73	4	REQ	REQ
Office				
…enclosed and ≤ 250 ft²[8,9]	1.00	8	REQ	REQ
…enclosed and > 250 ft²	1.00	8	REQ	REQ
…open plan	0.90	4	REQ	REQ
Parking Area, Interior	0.19	4	See Section 9.4.1.2	
Pharmacy Area	1.68	6	REQ	REQ
Restroom				
…in a facility for the visually impaired	1.21	8	---	---
…all other restrooms	0.98	8	---	---
Sales Area[4]	1.30	6	---	---

Controls: ASHRAE-NYC



control requirements

See Table 9.6.1 for applicable spaces

g – Automatic partial OFF

Full OFF complies

Reduced by at least 50% within 20 minutes of all occupants leaving the space

One exception for spaces with LPD of ≤ 0.80 W/sf AND lighted by HID AND providing automatic partial OFF within 20 minutes

i- Scheduled shutoff:

Similar to IECC Time-switch

Automatically turn lights off at specific programmed times

Can be from signal from other automatic control device or alarm/security

Independent control sequences

Control ≤ 25,000 sf

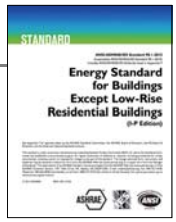
Control no more than one floor

Program includes weekends and holidays

Manual override ≤ 2 hrs, ≤ 5,000 sf

Exceptions for 24/7 operation, patient care spaces, endanger safety or security.
NOTE: Local or state codes may supersede, emergency lighting automatically off during normal building operation

Controls: ASHRAE-NYC



control requirements

See Table 9.6.1 for applicable spaces

h – Automatic full OFF - ASHRAE

Within 20 minutes of all occupants leaving the space

Controlling ≤ 5,000 sf

Exceptions:

For general and task lighting in shop and laboratory and classrooms

For general and task lighting where auto OFF would endanger safety or security – NYC same

Lighting required for 24/7 operation – NYC same

h – Automatic full OFF – As amended by NYCECC

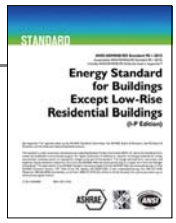
Provided that for open plan offices, a control device meeting this requirement shall control no more than 2,500 sf

Exceptions, same as ASHRAE, plus:

Preschool classrooms.

Lighting in offices smaller than 200 sf in area equipped with lighting controls activated by photosensor.

Controls: ASHRAE-NYC



control requirements

Table 9.6.1 Example applicable spaces

Informative Note: This table is divided into two sections; this first section covers space types that can be commonly found in multiple building types. The second part of this table covers space types that are typically found in a single building type.

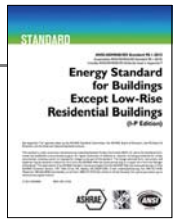
The control functions below shall be implemented in accordance with the descriptions found in the referenced paragraphs within Section 9.4.1.1. For each space type: (1) All REQs shall be implemented. (2) At least one ADD1 (when present) shall be implemented. (3) At least one ADD2 (when present) shall be implemented.

Common Space Types[1]	LPD W/ft²	RCR Threshold	Automatic Partial OFF (See Section 9.4.1.1(g) (Full Off complies)) g	Automatic Full OFF (See Section 9.4.1.1(h)) h	Scheduled Shutoff (See Section 9.4.1.1(i)) i
Lobby					
…in a facility for the visually impaired and not used primarily by staff)[2]	1.80	4	REQ	ADD2	ADD2
…for an elevator	0.64	6	REQ	ADD2	ADD2
…in a hotel	1.06	4	REQ	ADD2	ADD2
…in a motion picture theater	0.59	4	REQ	ADD2	ADD2
…in a performing arts theater	2.00	6	REQ	ADD2	ADD2
…all other lobbies	0.90	4	REQ	ADD2	ADD2
Locker Room	0.75	6	---	REQ	---
Lounge/Breakroom[8,9]					
…in a healthcare facility	0.92	6	---	REQ	---
…all other lounges/breakrooms	0.73	4	---	REQ	---
Office					
…enclosed and ≤ 250 ft²[2,8,9]	1.00	8	---	REQ	---
…enclosed and > 250 ft²	1.00	8	---	ADD2	ADD2
…open plan	0.90	4	---	REQ	---
Parking Area, Interior	0.19	4	See Section 9.4.1.2		
Pharmacy Area	1.68	6	---	ADD2	ADD2
Restroom					
…in a facility for the visually impaired	1.21	8	---	REQ	---
…all other restrooms	0.98	8	---	REQ	---
Sales Area[4]	1.30	6	---	ADD2	ADD2

NYCLC NEW YORK CITY LIGHTING COUNCIL

Illuminating Engineering Society NEW YORK CITY SECTION

Controls: ASHRAE-NYC



parking garages

ASHRAE 90.1-2013, not IECC 2015

—

Garage must have automatic shutoff controls

—

Occupancy sensor to decrease power of each luminaire by 30% within 20 minutes of no activity, < 3600 sf zone

—

Daylight transition zone, separate control - auto-on at daylight, automatically reduced by at least 50% from sunset to sunrise

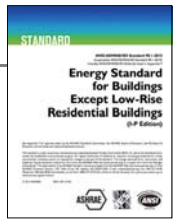
—

Daylight responsive lighting zone for fixtures within 20' of perimeter wall, where net opening-to-wall ratio ≥ 40% and no exterior obstructions within 20 ft

NYCLC NEW YORK CITY LIGHTING COUNCIL

Illuminating Engineering Society NEW YORK CITY SECTION

Controls: ASHRAE-NYC



exterior lighting controls

Automatic control required to keep lights off when sufficient daylight available

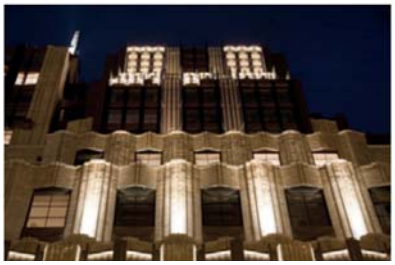
Facade and landscape lighting

Auto shut-off between midnight or business close and 6 am or business opening (more strict in IECC 2015)

All other exterior lighting (including signage) shall be controlled to reduce connected load by 30%

From midnight or business close and 6 am or business opening

Any period of inactivity > 15 min



Exceptions

Covered vehicle entrances/exits from building or parking structures

Lighting integral to signage installed by signage manufacturer

Exterior Lighting Changes since 2014 NYCECC

ASHRAE 90.1-2013-NYC

Wording has not changed since 90.1-2010

	LZ0	LZ1	LZ2	LZ3	LZ4
Nontradable Surfaces (*LPD* calculations for the following applications can be used only for the specific application and cannot be traded between surfaces or with other exterior lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table.)					
Building facades	No allowance	No allowance	0.1 W/ft^2 for each illuminated wall or surface or 2.5 W/linear foot for each illuminated wall or surface length	0.15 W/ft^2 for each illuminated wall or surface or 3.75 W/linear foot for each illuminated wall or surface length	0.2 W/ft^2 for each illuminated wall or surface or 5.0 W/linear foot for each illuminated wall or surface length

Note that official interpretation has clarified that all façade area that can be lit can be taken as façade lighting allowance, even if not illuminated

2016 NYCECC

New wording: Façade lighting allowance is based on total size of building

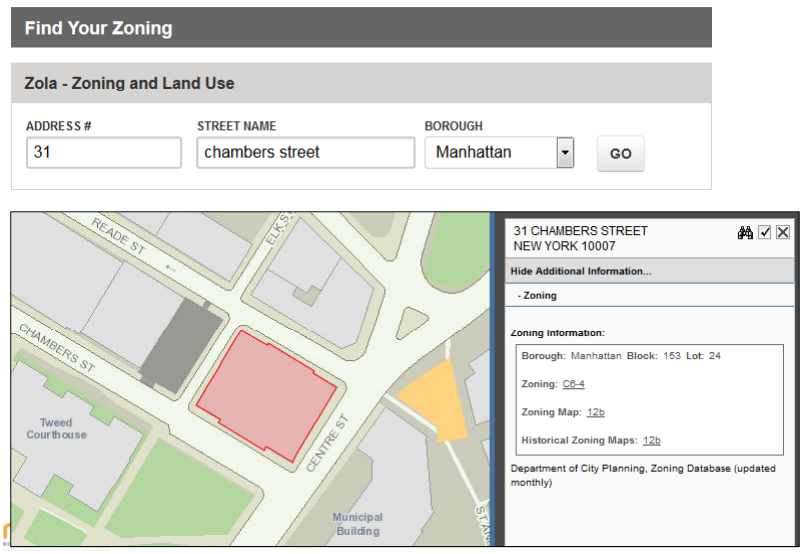
		LZ1	LZ2	LZ3	LZ4
Nontradable Surfaces (Lighting power density calculations for the following applications can be	Building facades	No allowance	0.075 W/ft^2 of gross above-grade wall area	0.113 W/ft^2 of gross above-grade wall area	0.15 W/ft^2 of gross above-grade wall area

Exterior Lighting Zone in NYC

Lighting Zone	Description	NYC zoning districts applicable
LZ0	2016 NYCECC path: LZ0 not a category ASHRAE 90.1-2013-NYC path: Undeveloped areas within national parks, state parks, forest land, rural areas, and other undeveloped areas as defined by the authority having jurisdiction	Not used
LZ1	Developed areas of national parks, state parks, forest land, and rural areas	Park land.
LZ2	Areas predominantly consisting of residential zoning, neighborhood business districts, light industrial with limited nighttime use and residential mixed-use areas	All R districts, R districts with C overlays and MX districts.
LZ3	All other areas not classified as lighting zone 1, 2 or 4	M districts, except MX; C districts, except C5, C6 and C overlays on R districts.
LZ4	High-activity commercial districts in major metropolitan areas as designated by the local land use planning authority	C5 and C6 districts.
Source of Info	ASHRAE 90.1-2013 table 9.4.2-1 NYC ECC 2016 table C405.5.2(1)	1 RCNY §5000-01 (g) (3) (ii)

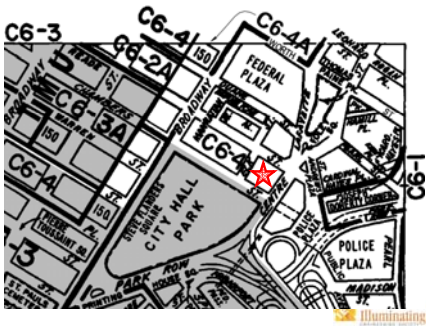
Exterior Lighting Zone in NYC

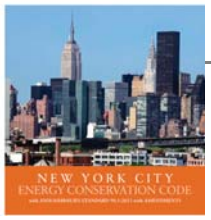
https://www1.nyc.gov/site/planning/zoning/index-map.page



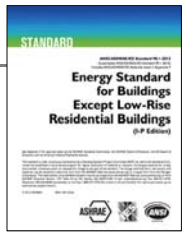
Zoning of this address is **C6-4**

1-RCNY-5000-01 lists this as
Lighting Zone 4
(the brightest allowed!)





Control Requirements: Apartment Building

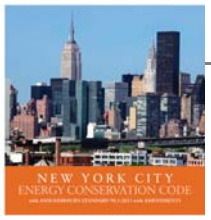


2016 NYCECC

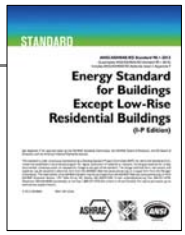
- Dwelling units: No control requirements if 75% of lamps are high efficacy
- Public lobbies and corridors:
  - Local control required
  - Automatic dimming of daylight zones required if more than 150w of lighting load
  - Can use exemption for 24/7 continuous use to avoid automatic or scheduled off requirements only if there is a manual control that provides "Light Reduction" ability of at least 50%

ASHRAE 90.1-2013
As Amended by NYC

- Dwelling units: No control requirements if 75% of lamps are high efficacy
- Public lobbies and corridors:
  - Local control required
  - Automatic dimming of daylight zones required:
    - Primary zones if >150w of general lighting
    - Secondary zones if >300w of general lighting
  - Automatic partial-off required: occ sensor must reduce output by at least 50%
  - Can use exemption for 24/7 continuous use to avoid full automatic or scheduled off requirements



Control Requirements: Hotel

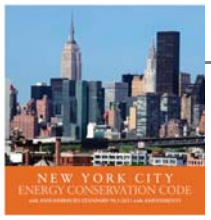


2016 NYCECC

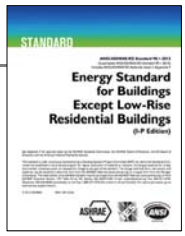
- Guest rooms:
  - Occ sensor OR captive card holder switch must turn off all lights and switched receptacles
- Public lobbies and corridors:
  - Local control required
  - Automatic dimming of daylight zones required if more than 150w of lighting load
  - Can use exemption for 24/7 continuous use to avoid automatic or scheduled off requirements only if there is a manual control that provides "Light Reduction" ability of at least 50%

ASHRAE 90.1-2013
As Amended by NYC

- Guest rooms:
  - Occ sensor OR captive card holder switch must turn off all lights and switched receptacles
  - Bathrooms must have separate occ sensor to turn off all lights except for up to 5w of night lights
- Public lobbies and corridors:
  - Local control required
  - Automatic dimming of daylight zones required:
    - Primary zones if >150w of general lighting
    - Secondary zones if >300w of general lighting
  - Automatic partial-off required: occ sensor must reduce output by at least 50%
  - Can use exemption for 24/7 continuous use to avoid full automatic or scheduled off requirements



Control Requirements: Office

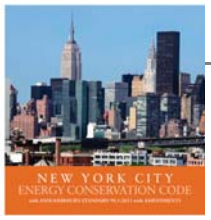


2016 NYCECC

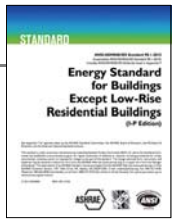
- Private Office:
  - Motion sensors required only if space is <300 SF, and must be Vacancy (manual on) if <200 SF
  - Timeclock auto-off can be used instead if space is >300 SF (and if manual "light reduction control" – such as dimming / bi-level switch, is provided)
- Open Office:
  - Occ sensors required (can turn lights on to full output)
- For both:
  - Local control required
  - Automatic dimming of daylight zones required if more than 150w of lighting load

ASHRAE 90.1-2013
As Amended by NYC

- Private Office:
  - Vacancy sensor (manual on) required
- Open Office:
  - Occ sensors required
    - Occ sensors must only turn on lights automatically to partial output
- For both:
  - Local control required (bi-level)
  - Automatic dimming of daylight zones required:
    - Primary zones if >150w of general lighting
    - Secondary zones if >300w of general lighting



Control Requirements: Retail Sales Area

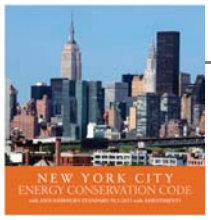


2016 NYCECC

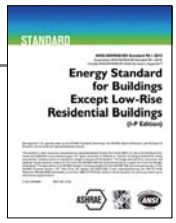
- Same requirements as ASHRAE, plus:
  - "light reduction control" is required if the automatic-off control is a timeclock. This a manual control that can reduce lighting load by at least 50%. (Multiple switching zones, a system with scene selector, local dimmer, etc).
  - Automatic daylight dimming is required when >150w of general lighting is in a daylight zone (retail display lighting does not need to be controlled by daylight sensor)

ASHRAE 90.1-2013
As Amended by NYC

- Local control required (on/off switch, timeclock ON-override, scene selector, etc)
- Automatic shut-off required - options:
  - Occupancy sensors (auto-on to full output), or
  - Timeclock with scheduled shut-off
- No daylighting requirements in Sales Areas **(ASHRAE 90.1-2013 has requirements, but NYC removed them)**
- Retail display lighting must be controlled separately from General or Decorative lighting
- Display windows enclosed by full-height walls is exempt from LPD count, but must be controlled separately from general lighting.



Daylighting: Changes from NYCECC 2014



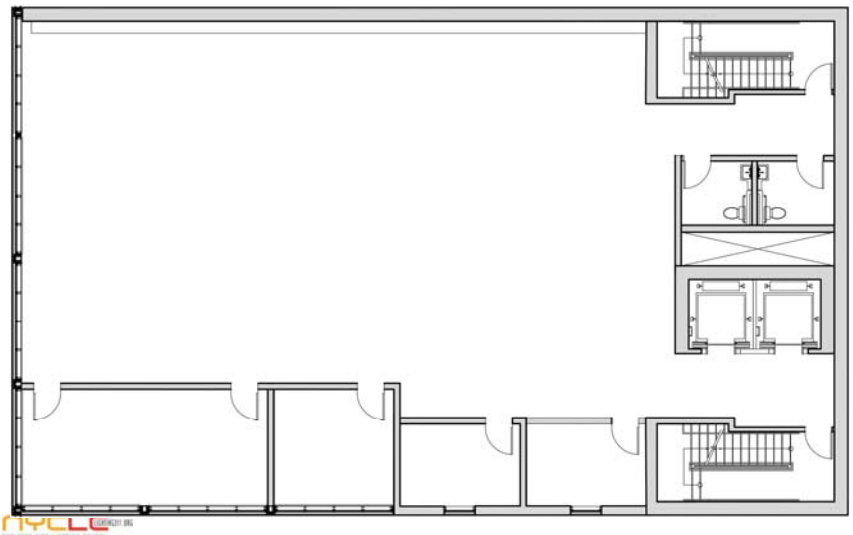
2016 NYCECC

- Mandatory skylights in some situations
- When daylighting controls are required, they must be automatic, not manual
- New definition of daylight areas (sidelight zone in 2014 code always extended 15ft into space)

ASHRAE 90.1-2013
As Amended by NYC

- Mandatory skylights in some situations
- Secondary sidelighting areas introduced
- New definitions of daylight areas and when automatic controls are required
- New way of showing which types of spaces require automatic daylight controls (table format)

Daylighting Requirements Example: Office

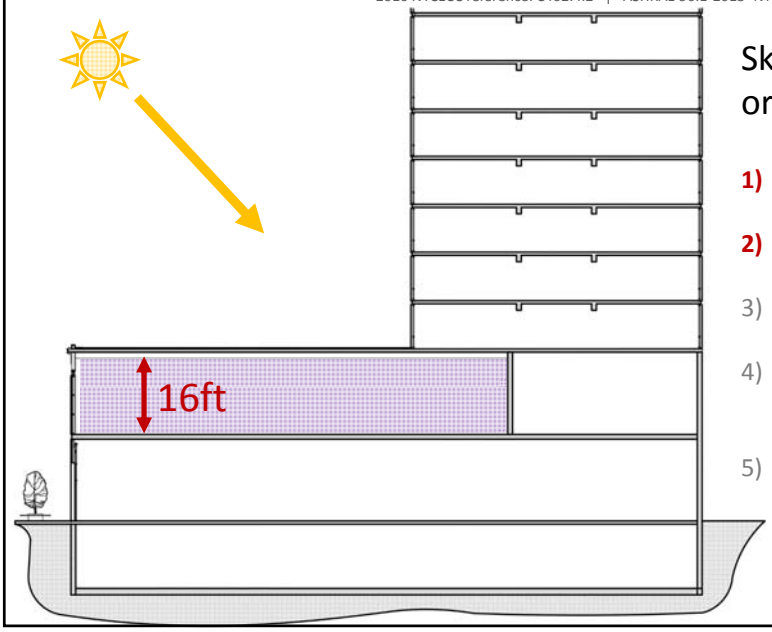


First:

Does the space **<u>require</u>** skylights?

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3

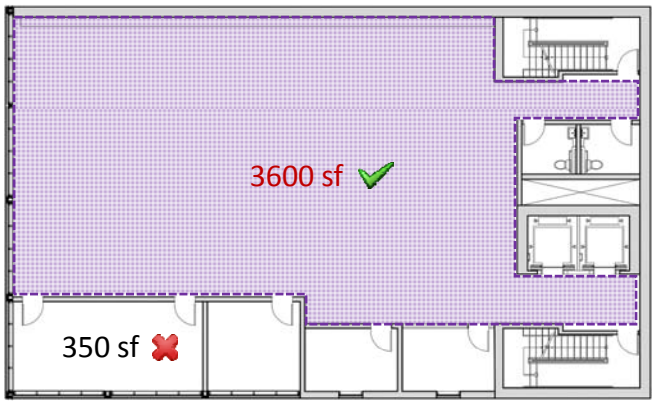


Skylights are required by NYCECC or ASHRAE code path when:

1) **Space is directly under a roof**
2) **Ceiling height over 15ft**
3) 2500 SF or greater enclosed area
4) A listed space type – including "Office" space for this example
5) Some exceptions

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3



Skylights are required by NYCECC or ASHRAE code path when:

✔ 1) Space is directly under a roof
✔ 2) Ceiling height over 15ft
3) 2500 SF or greater enclosed area
4) A listed space type – including "Office" space for this example
1) Some exception

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3

Skylights are required by NYCECC or ASHRAE code path when:

✔ 1) Space is directly under a roof

✔ 2) Ceiling height over 15ft

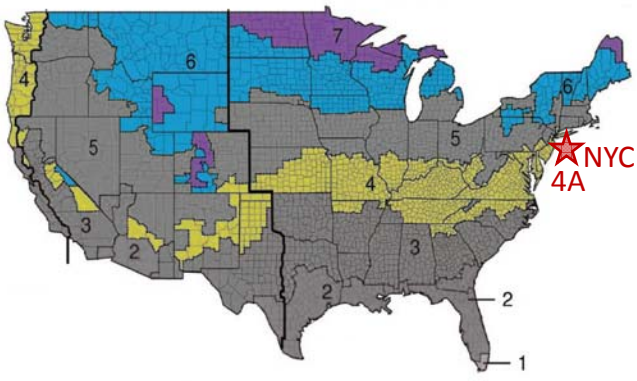
✔ 3) 2500 SF or greater enclosed area

4) A listed space type – including "Office" space for this example

5) Some exceptions

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3



Graphic: ASHRAE 90.1-2013 figure B-1

Exceptions to skylight requirements:

A. **Climate zones 6 to 8**
B. Obstructions from buildings or natural features
C. Sufficient daylight area achieved from Roof Monitors
D. If area under roof reduced to < 2500 sf by subtracting sidelight daylight area
E. LPD below 0.5w/sf (not for ASHRAE path)

All of NYC is Climate Zone 4A

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3

Exceptions to skylight requirements:

A. Climate zones 6 to 8
B. Obstructions from buildings or natural features
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All of NYC is Climate Zone 4A

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3

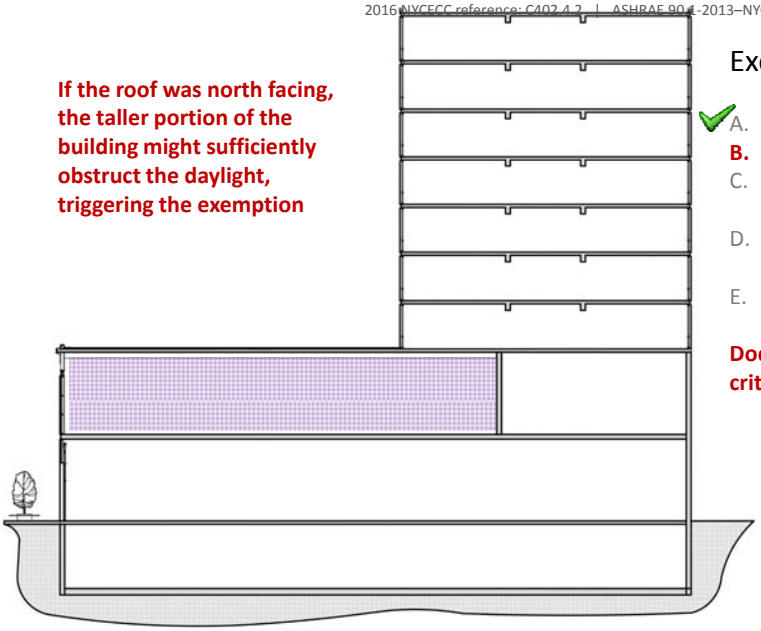
Exceptions to skylight requirements:

✔ A. Climate zones 6 to 8
B. Obstructions from buildings or natural features
C. Sufficient daylight area achieved from Roof Monitors
D. If area under roof reduced to < 2500 sf by subtracting sidelight daylight area
E. LPD below 0.5w/sf (not for ASHRAE path)

Documentation is needed: the code describes exact criteria to qualify an obstruction

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3



If the roof was north facing, the taller portion of the building might sufficiently obstruct the daylight, triggering the exemption

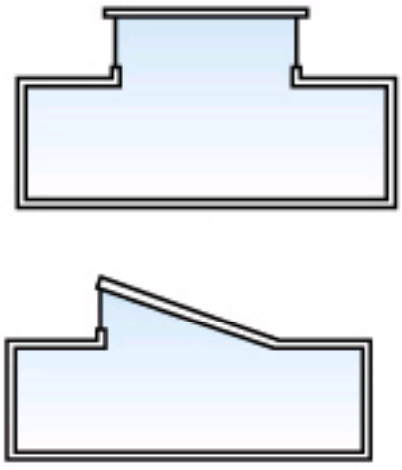
Exceptions to skylight requirements:

A. Climate zones 6 to 8
B. Obstructions from buildings or natural features
C. Sufficient daylight area achieved from Roof Monitors
D. If area under roof reduced to < 2500 sf by subtracting sidelight daylight area
E. LPD below 0.5w/sf (not for ASHRAE path)

Documentation is needed: the code describes exact criteria to qualify an obstruction

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3



Graphic: IESNA Handbook 9th Edition, Ch 8

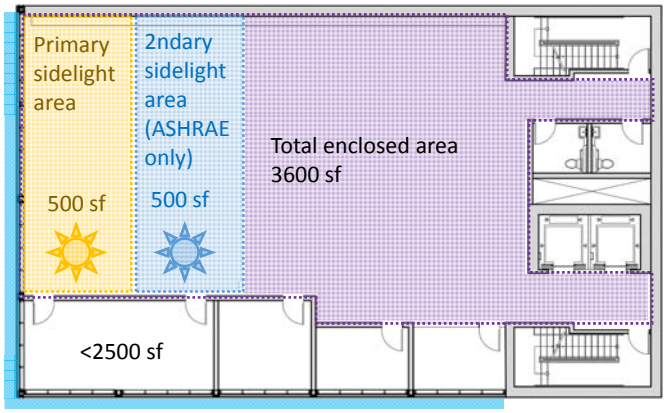
Exceptions to skylight requirements:

A. Climate zones 6 to 8
B. Obstructions from buildings or natural features
C. Sufficient daylight area achieved from Roof Monitors (>50% of enclosed space floor area)
D. If area under roof reduced to < 2500 sf by subtracting sidelight daylight area
E. LPD below 0.5w/sf (not for ASHRAE path)

***roof monitor:* that part of a building that projects above the plane of the roof and whose walls contain vertical fenestration for lighting the interior.**

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3



Exceptions to skylight requirements:

- ✓ A. Climate zones 6 to 8
- ✓ B. Obstructions from buildings or natural features
- ✓ C. If sufficient daylight area achieved from Roof Monitors
- D. If area under roof reduced to < 2500 sf by subtracting sidelight daylight area
- E. LPD below 0.5w/sf (not for ASHRAE path)

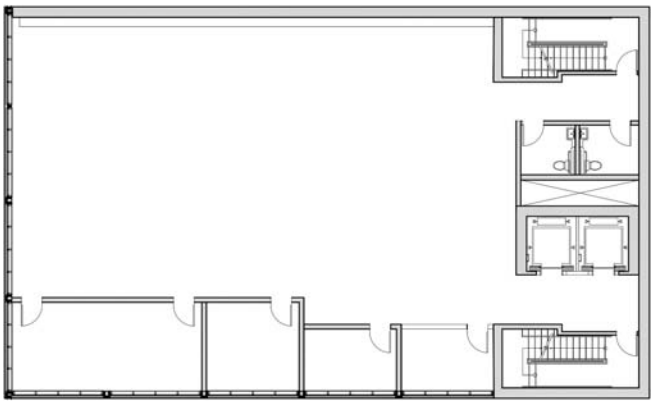
NYCECC:
3600 sf – 500 sf = **3100** sf

ASHRAE:
3600 sf – 1000 sf = **2600** sf

This example: Area is still over 2500 sf

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3



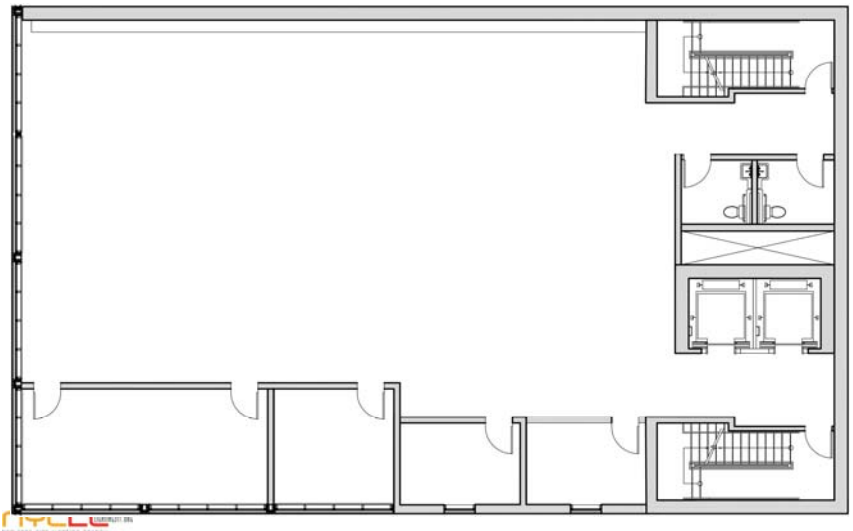
Exceptions to skylight requirements:

- ✓ A. Climate zones 6 to 8
- ✓ B. Obstructions from buildings or natural features
- ✓ C. If sufficient daylight area achieved from Roof Monitors
- ✓ D. If area under roof reduced to < 2500 sf by subtracting sidelight daylight area
- E. LPD below 0.5w/sf (not for ASHRAE path)

Probably can't meet light level requirements in an Office using below 0.5w/sf

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3

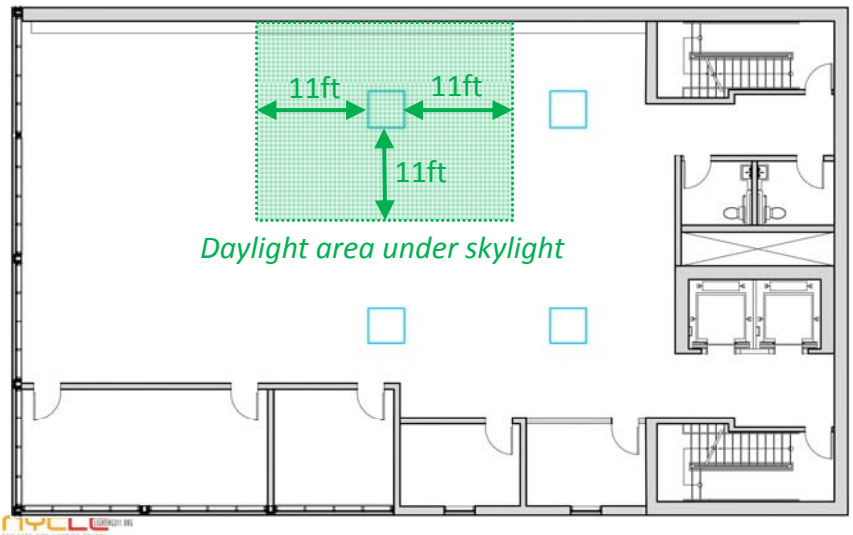


When skylights are required, half of floor area must be:

daylight area under skylight

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3



When skylights are required, half of floor area must be:

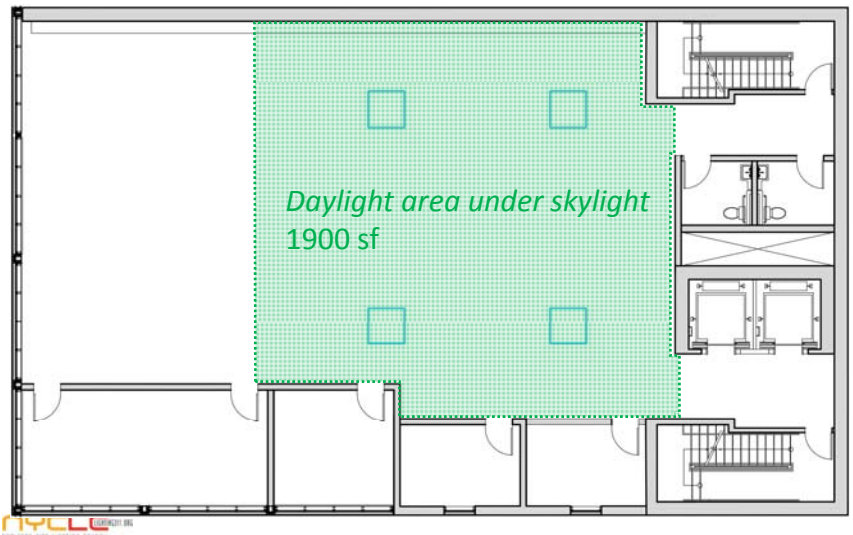
daylight area under skylight
(area extending from edge of skylight a distance of 70% ceiling height)

…in addition to other requirements about skylight, visual transmittance, effective aperture (see code!)

Ceiling height (CH) = 16ft
16ft x 0.7 = ~11ft

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3

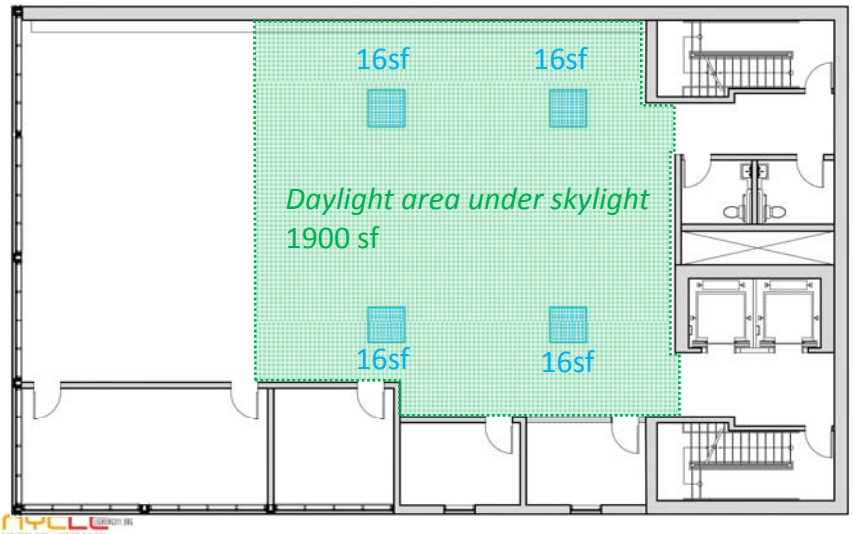


Daylight area under skylight
1900 sf is greater than 50% of total space area (3600 sf)

First requirement met

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3



Daylight area under skylight
1900 sf is greater than 50% of total space area (3600 sf)

Other requirements:
(example of 1 of 2 ASHRAE options)

Skylight area greater than 3% of daylight area (57 sf)
16sf each x 4 = 64 sf

40% minimum visual transmittance of skylight

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3

ASHRAE 90.1-2013-NYC

Common Space Types[1]	LPD W/ft²	RCR Threshold	a Local Control (See Section9.4.1.1(a))	b Restricted to Manual ON (See Section9.4.1.1(b))	c Restricted to Partial Automatic ON (See Section9.4.1.1(c))	d Bilevel Lighting Control(See Section9.4.1.1(d))	e AutomaticDaylight Responsive Controls for Sidelighting (See Section 9.4.1.1(e)[4])	f Automatic Daylight Responsive Controls for Toplighting (See Section 9.4.1.1(f)[4])	g Automatic Partial OFF (See Section 9.4.1.1(g) (Full Off complies))	h Automatic Full OFF (See Section 9.4.1.1(h))	i Scheduled Shutoff (See Section 9.4.1.1(i))
Locker Room	0.75	6	REQ	ADD1	ADD1	REQ	REQ	REQ	-	REQ	-
Lounge/Breakroom[2,3]											
...in a healthcare facility	0.92	6	REQ	REQ	ADD1	REQ	REQ	REQ	-	REQ	-
...all other lounge/breakrooms	0.73	4	REQ	REQ	ADD1	REQ	REQ	REQ	-	REQ	-
Office											
...enclosed and ≤ 250 ft²[2,3,5]	1.0	8	REQ	REQ	ADD1	REQ	REQ	REQ	-	REQ	-
...enclosed and > 250 ft²	1.0	8	REQ	ADD1	ADD1	REQ	REQ	REQ	-	ADD2	ADD2
...open plan	0.90	4	REQ	-	REQ	REQ	REQ	REQ	-	REQ	-

2016 NYCECC

All space types by default may require daylight controls, with a list of exceptions

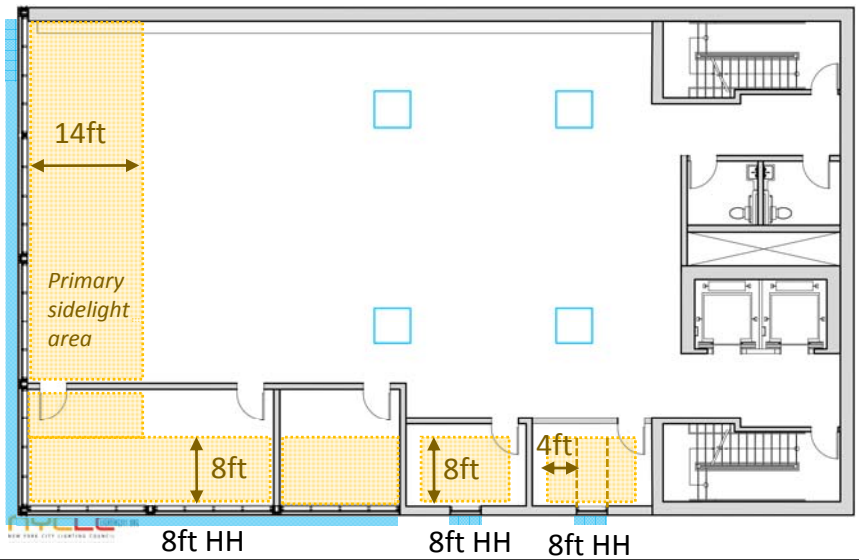
Exceptions: Daylight responsive controls are not required for the following:

1. Spaces in health care facilities where patient care is directly provided.
2. Dwelling units and sleeping units.
3. Lighting that is required to have specific application control in accordance with Section C405.2.4.
4. Sidelight daylight zones on the first floor above grade in Group A-2 and Group M occupancies.

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3

14ft HH



Primary sidelighted area:

-depth is the window head height, or to an obstruction
(If head height (HH) = 14ft, area extends 14ft into space)

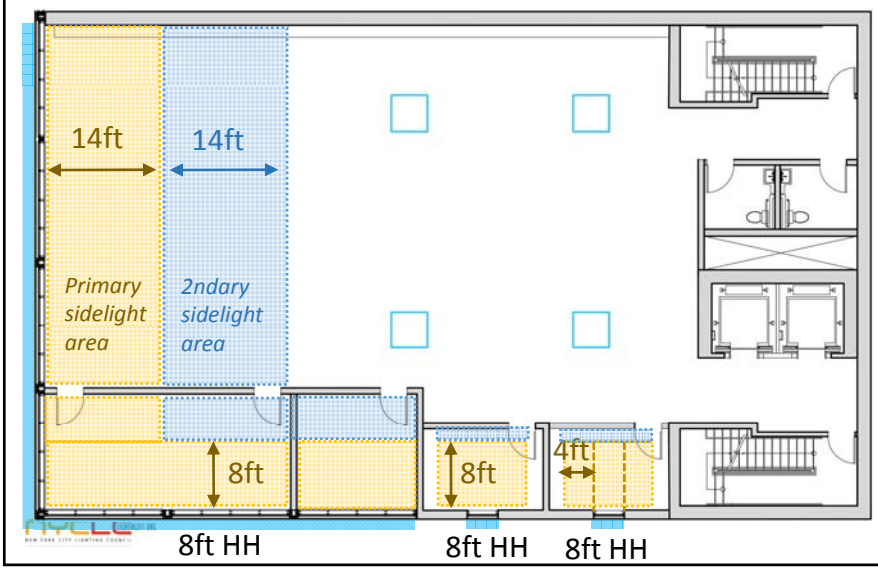
-width is half the head height, or to an obstruction
(If HH = 8ft, area extends 4ft to either side of window)…

Small Windows Exemption:
ASHRAE-NYC = 24 sqft
NYCECC = 20 sqft

Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3

14ft HH

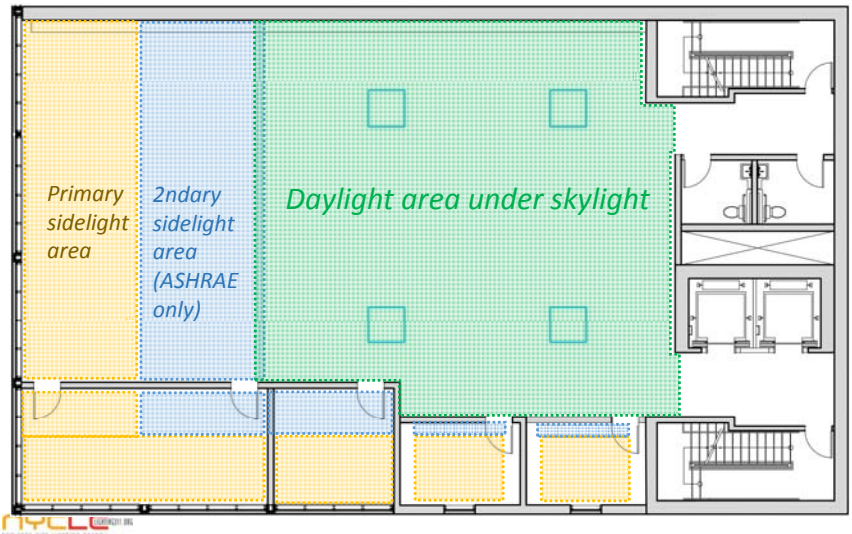


Secondary sidelighted area: (ASHRAE path only)

-depth is the window head height, or to an obstruction (If head height (HH) = 14ft, area extends 14ft into space past the primary area)

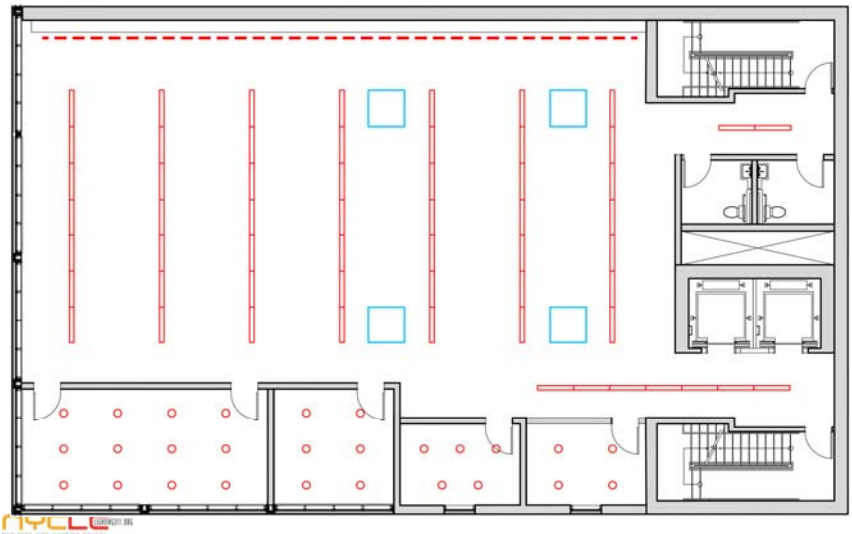
Daylighting Requirements Example: Office

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3



All of the daylight areas

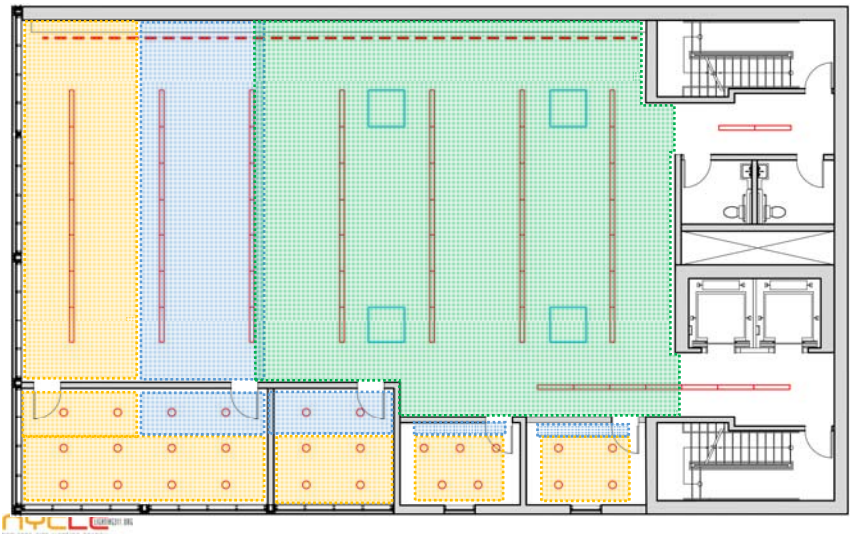
Daylighting Requirements Example: Office



Lighting layout

Daylighting Requirements Example: Office

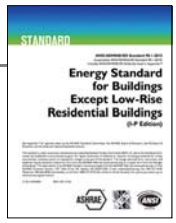
Primary *Secondary* *Daylight area under skylight (toplighting)*



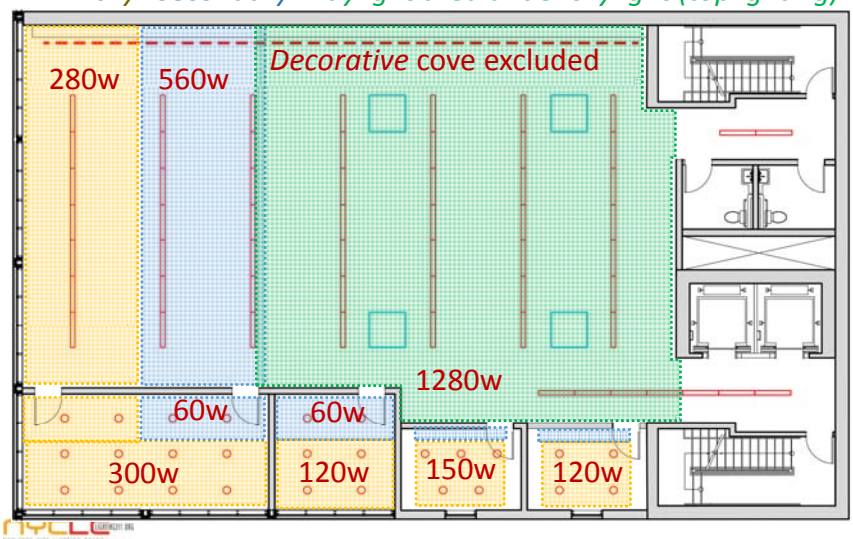
Lighting layout
and daylight zones

Daylighting Requirements Example: Office

ASHRAE 90.1-2013-NYC reference: 9.4.1.1 (e), (f)



Primary *Secondary* *Daylight area under skylight (toplighting)*



ASHRAE path

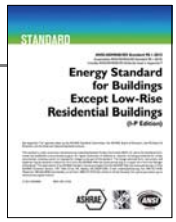
For each space, add *primary* and *secondary* area wattages:

150w or greater: *primary* area needs daylight responsive controls

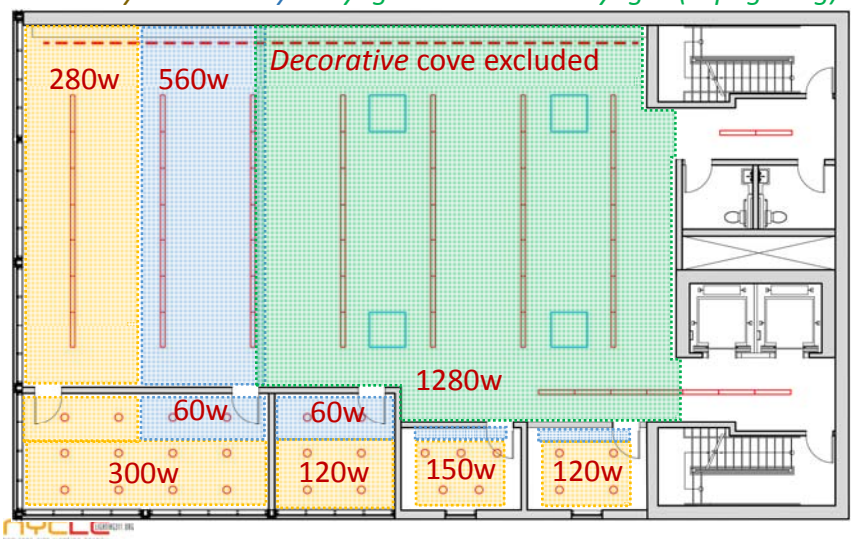
300w or greater: *primary* and *secondary* must be controlled separately

Daylighting Requirements Example: Office

ASHRAE 90.1-2013-NYC reference: 9.4.1.1 (e), (f)



Primary *Secondary* *Daylight area under skylight (toplighting)*



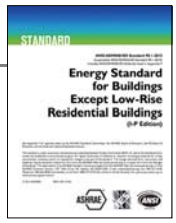
ASHRAE path

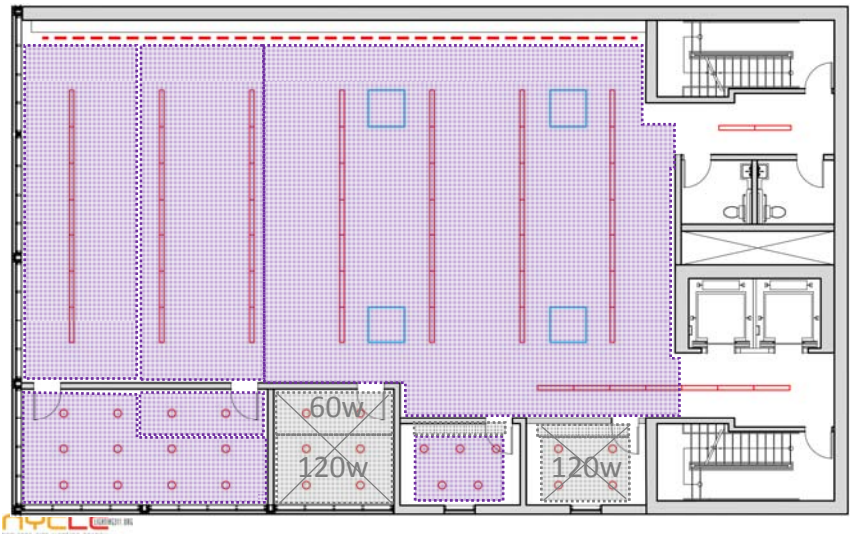
Toplighting: 150w or greater: daylight control required

Lighting in overlapping *toplighting* and *sidelighting* areas to be controlled together (NYCECC path says to control separately!)

Daylighting Requirements Example: Office

ASHRAE 90.1-2013-NYC reference: 9.4.1.1 (e), (f)



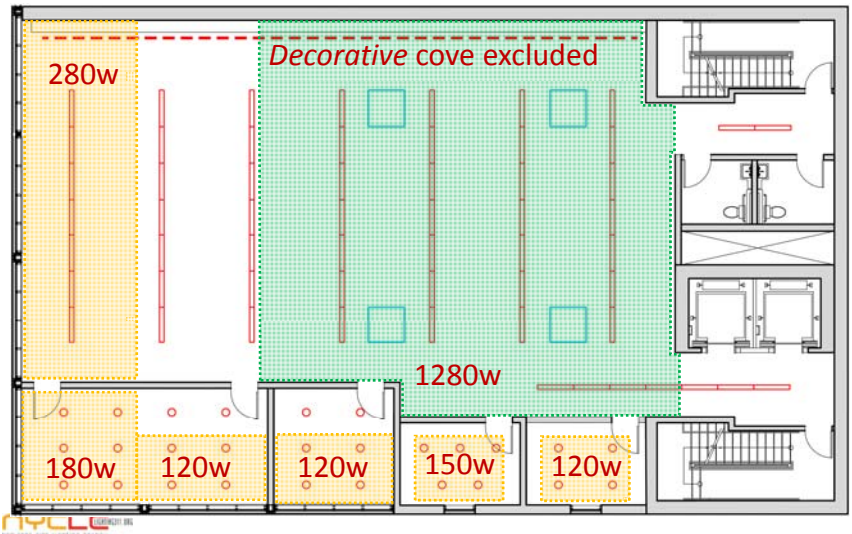


ASHRAE path

6 separate zones of automatic daylight control required

Daylighting Requirements Example: Office

Sidelight *Daylight area under skylight (toplighting)*

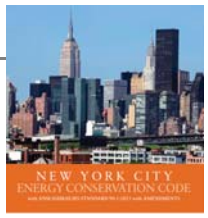


NYCECC path

For each *sidelight area* or *toplight area:* daylight control required when 150w or greater
Sidelight and *toplight* areas to be controlled separately

Lights in sidelight zones facing different cardinal directions to have separate control - exception for <150w

Daylighting Requirements Example: Office



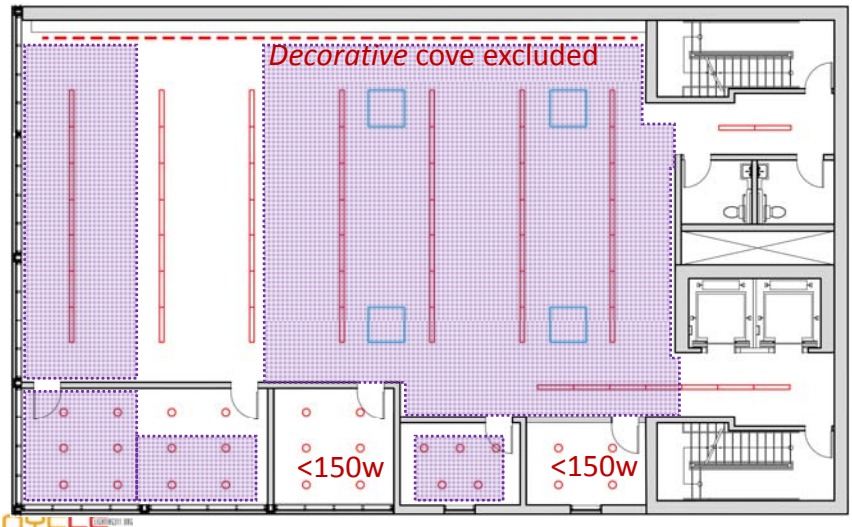
NYCECC path

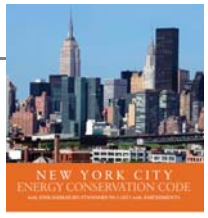
5 separate zones of automatic daylight control required

Daylighting Requirements Example: Office

2016 NYCCECC reference: C103.2.2

14ft HH





Include diagrams in filing drawings to DOB!

C103.2.2 Supporting Documentation on Construction Documents: Include:
…location of daylight zone on floor plans…

Daylight Responsive Control Requirements

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3

When daylight responsive controls are required… what does that mean?

For both code paths:

- Lights in daylight zones controlled separately from non-daylight zones
- Control must be automatic, not manual
- Complete shut-off capability required
- Specific application lighting (such as Decorative) not included
- Calibration must be readily accessible

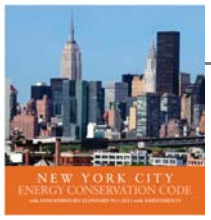
ASHRAE 90.1-2013-NYC:

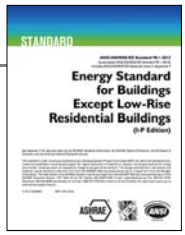
- Minimum 2 steps of output plus OFF, or continuous dimming to OFF
- Sidelighting zones (primary /secondary) controlled separately

2016 NYCECC:

- Continuous dimming down to 15% required only in: offices, classrooms, labs, library reading rooms
- Sidelighting zones facing cardinal directions (N/S/E/W) controlled separately

Daylighting: Control Functionality





2016 NYCECC

1st floor in Group M (Retail), A-2 (Assembly)

Dark windows in existing buildings (VT < 0.2)

Dark skylights (formula with VT)

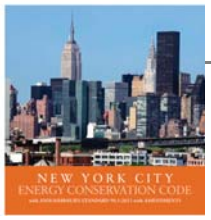
ASHRAE 90.1-2013

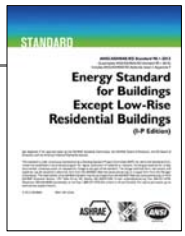
As Amended by NYC

Min. 2 steps of output plus OFF, or continuous dimming to OFF

Both paths: Obstructions of the daylight by buildings or natural features (the details vary in the 2 paths)

Daylighting: Control Exceptions

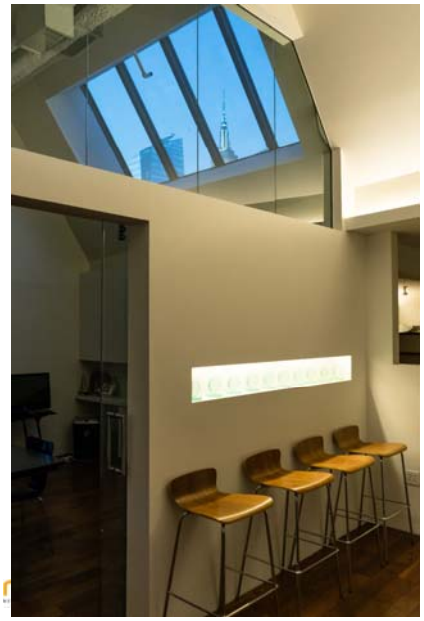




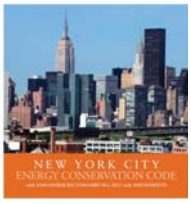
2016 NYCECC	ASHRAE 90.1-2013 As Amended by NYC
1st floor in Group M (Retail), A-2 (Assembly)	Toplighting in climate Zone 8 (COLD) when <200w in daylight zone
Dark windows in existing buildings (VT < 0.2)	Small windows (<20 sf fenestration)
Dark skylights (formula with VT)	Dark skylights (VT < 0.4)

Both paths: Obstructions of the daylight by buildings or natural features (the details vary in the 2 paths)

Daylighting: Obstructions



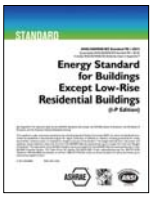
Is this an *obstruction* that ends the daylight area?
Depends on code path.
Look up formula that takes into account the geometry.



2106 NYCECC

Code doesn't specify *opaque* obstruction so this could end the daylight zone

ASHRAE 90.1-2013-NYC



Specifies *opaque* obstructions, so glass doesn't count.

2016 NYCECC reference: C402.4.2 | ASHRAE 90.1-2013–NYC reference: 5.5.4.2.3

Possible Energy Code Mistakes

Residential vs Commercial – An apartment in a residential tower over 3 floors is considered part of a commercial building

Remote power supplies – The maximum wattage of the power supplies should be added up, not the wattage of the connected LEDs

Plug loads – For decorative lighting or for plug-in vitrines or millwork units – These loads should be counted and controlled to ensure approval - the argument that they are "temporary" may not convince code reviewers.

Building method calculation – Multiple building occupancies can be used in the calculation similar to how space-by-space is used. For example, 1 floor of Retail plus 10 floors of Residential space type.

"Future" tenant spaces – Space category is whatever it is filed as with DOB. If providing only egress lighting for temporary fit-out, don't use extra tradable LPD allowance to make other areas of project comply with LPD requirements.

NYC Energy Code questions:

If you have any additional questions about the NYCECC, please email directly the Buildings Department at EnergyCode@buildings.nyc.gov

Links

NYC Rules 1-RCNY-5000-01: https://www1.nyc.gov/assets/buildings/rules/1_RCNY_5000-01.pdf
(Energy Code Compliance Rule, Including Progress Inspections, etc.)

NYC Zoning lookup: https://www1.nyc.gov/site/planning/zoning/index-map.page

Thank You

A PDF of this presentation will be emailed to those who attended tonight.

A video recording will be available to view on the IESNYC website
to members only.