

LIGHTING & POWER OVERVIEW: 2016 NYC Energy Conservation Code

Effective October 3, 2016

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NYC
Buildings

presented by
Bill de Blasio, Mayor
Melanie La Rocca, Commissioner

ACKNOWLEDGEMENTS

One City: Built to Last

We wish to acknowledge Mayor Bill de Blasio for his commitment to 80% reduction of Greenhouse Gas Emissions by 2050, over 2005 levels.

- A sweeping plan to retrofit public and private buildings to reduce the City's contributions to climate change.
- This makes New York the largest city to commit to the 80% reduction by 2050.
- It charts a long-term path for investment in renewable sources of energy and a total transition from fossil fuels.



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INTRODUCTION

Welcome to the New York City Department of Buildings Energy Code Training Modules!

This **LIGHTING** Module addresses:

- Technical issues and strategies related to the 2016 NYCECC;
- Applicability of the 2016 NYCECC;
- NYC DOB Energy Code Submission Requirements; and
- NYC DOB Progress Inspection Requirements.

This module addresses lighting criteria related to all **Commercial** building types. Information about ASHRAE 90.1-2013 alternative compliance is also included.



OVERVIEW: TRAINING MODULE ORGANIZATION

- The **LIGHTING** Module has been divided into a number of smaller sub-topics. These can be accessed either in-sequence or out-of-sequence through links in the Main Menu slide.
- Each sub-topic begins with a brief overview of the issues to be reviewed, and many end with a set of summary questions.
- Many of the sub-topics are organized in a Q & A format. Code-related questions are posed at the top of a slide, with answers provided below, or in the following sequence of slides.



OVERVIEW: SLIDE NAVIGATION GUIDE

Look for the following icons:



The **NYC Buildings** logo takes you to the [2016 NYCECC Training Modules](#) home page.



The **Menu** icon takes you to the main menu page within each module.



The **Attention** icon brings up Callouts with key points and additional information.



The **Links** icon takes you to related DOB web pages or other resources.



OVERVIEW: SLIDE NAVIGATION GUIDE

Look for the following icons:



The **Documentation** icon addresses DOB documentation issues and requirements.



The **Inspection** icon addresses DOB Progress Inspection issues and requirements.



The **Code Reference** icon refers to relevant Code sections.

The slides are enhanced with special icons that will help to focus on key points, or serve as links to external resources. The Attention icon brings up Callouts (like this one) with key points and additional information.



LIGHTING OVERVIEW: MODULE MENU

1. KEY UPDATES & CODE APPLICABILITY	Key Updates • Local Laws, Rules and Buildings Bulletins • Code Applicability • Residential Compliance • ASHRAE 90.1 Alternate Compliance	11
2. Required Documentation	Supporting Documentation (Drawings, Schedules, Narratives) • Energy Analysis	22
3. Mandatory Provisions	Mandatory Controls • Additional Controls • Exit Signs	44
4. Interior Lighting	Calculating Connected Power • Additional Allowances • Compliance Paths	71



LIGHTING OVERVIEW: MODULE MENU

5. Exterior Lighting

Applicability • Exceptions • ASHRAE • Base
• Tradable • Non-tradable

108

6. Resources

Summary List of Progress Inspections •
References & Links • DOB Assistance

136



1. UPDATES & APPLICABILITY: LIGHTING

Slides 11 to 21



1. UPDATES & APPLICABILITY: OVERVIEW

In this section you will learn about:

- Key changes and additions to the [2016 NYCECC](#) related to lighting and power;
- Current Local Laws, Rules, & Bulletins affecting lighting and power compliance;
- Code applicability specific to lighting; and
- ASHRAE 90.1 Alternative Compliance.



1. UPDATES & APPLICABILITY: KEY UPDATES 1

What are the Most Pertinent Lighting Changes in the NYCECC?

- Mandatory requirements for Daylight Responsive Controls
- Occupancy sensors required in more spaces, including open plan offices
- Reduced lighting power densities in many spaces
- Interior lighting power allowances now align with ASHRAE 90.1-2013 for Building Area Method and Space-by-Space Method
- Commissioning required on Lighting controls

This slide summarizes key lighting updates in the 2016 NYCECC, as compared to the previous 2014 version. These changes are addressed in more detail throughout the module.



1. UPDATES & APPLICABILITY: KEY UPDATES 2

What other changes to the NYCECC should be given consideration?

Additions

- Must comply with

Per NYCECC C503.1, when less than 20% of the luminaires are replaced, spaces do not need to meet current NYCECC requirements; **however, the replacements cannot increase the installed interior lighting power compared to existing conditions.**

Alterations

- When 20% or more of the luminaires within the area of the entire scope of work are being replaced, the whole scope of work must comply
- In spaces where 20% or more of the luminaires are being replaced, the whole space must comply

Replacements (lamps and/or ballasts)

- High-efficacy lamps and/or high-efficiency ballasts must be used unless not available for the specific fixture
- Where high-efficacy replacements are not available, applicants must still show no increase in the installed lighting power compared to existing conditions



1. UPDATES & APPLICABILITY: LOCAL LAWS, RULES & BULLETINS

What NYCECC-related local laws, rules, or bulletins affect lighting?

Local Laws

- [LL91 of 2016](#) – Established the current [2016 NYCECC](#) 
- [LL48 of 2010](#) – Requirements for shut-off only occupancy sensors 

Rules

- [1 RCNY §5000-01](#) 
 - Defines energy code submission procedures & progress inspection requirements
- [1 RCNY §101-07](#) 
 - Defines qualification requirements for individuals performing progress inspections



1. UPDATES & APPLICABILITY: CODE APPLICABILITY

What exemptions exist under the NYCECC?



Existing Buildings

- Code is not retroactive for “lawfully constructed buildings”

Historic Buildings

- Only National or State-Registered (or eligible) buildings or contributing buildings in historic districts are exempt



1. UPDATES & APPLICABILITY: COMMERCIAL HIGH-RISE RESIDENTIAL

What is required for dwelling units now that they must comply?

Commercial buildings chapter applies to common/general spaces for mid- or high-rise residential projects (4 stories or higher)

- Dwelling units may comply by either:
 - Meeting the Table C405.4.2(1) Interior Lighting Power allowance for a multi-family building (0.51 W/sf);
OR
 - Providing a minimum of 75% of the permanently installed light fixtures with high-efficacy lamps.

- Separate metering for individual dwelling and tenant units is required



1. UPDATES & APPLICABILITY: DWELLING UNIT COMPLIANCE

What must be provided for dwelling units to comply?



EPA EISA 2007 Efficacy Requirements

Rated Lumen Ranges	Maximum Rate Wattage	Minimum Rate Lifetime	Effective Date
1118-1950	72	1,000 hours	1/1/2012
788-1117	53	1,000 hours	1/1/2013
563-787	43	1,000 hours	1/1/2014
232-562	29	1,000 hours	1/1/2014

The federal Energy Independence and Security Act of 2007 (EISA) established lamp efficacy standards that have informed the current Energy Code. These standards may continue to change in the future, and could result in new provisions in the next version of the NYCECC.

High-efficacy Lamps Requirement

- A minimum of 75% of the lamps in permanently installed lighting fixtures or a minimum of 75% of the permanently installed lighting fixtures shall contain only high-efficacy lamps

What is considered a high-efficacy lamp?

- Compact fluorescent lamps
- Light-emitting diode (LED)
- T8, T5, T2 fluorescent lamps
 - Fluorescent lamps with 1" diameter or less
- Lamps with minimum efficacies:
 - 60 lumens per watt for lamps > 40 watts
 - 50 lumens per watt for lamps > 15 watts and ≤ 40 watts
 - 40 lumens per watt for lamps ≥ 15 watts



1. UPDATES & APPLICABILITY: METERING

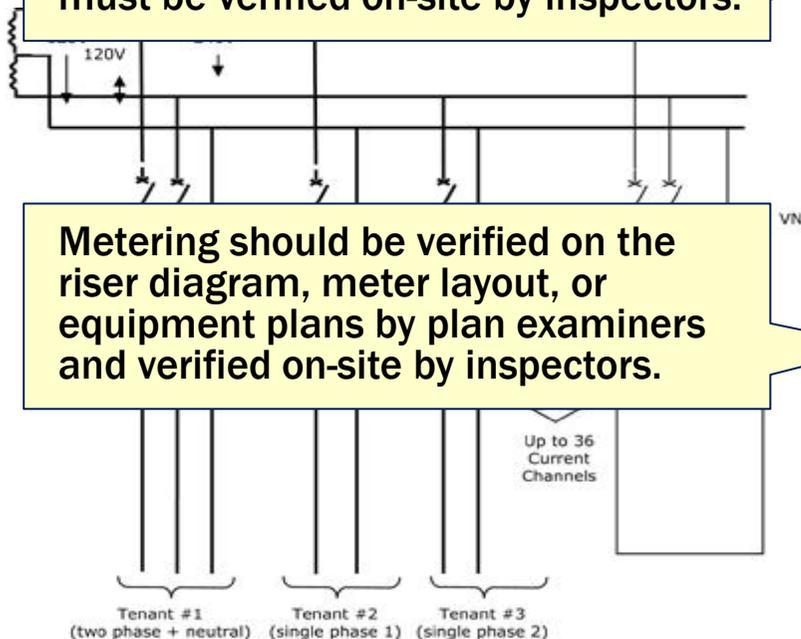
What must be provided to comply with NYCECC?

All tenants must have the ability to monitor their own energy use in all dwelling units, including high-rise buildings. Metering and sub-metering must be verified on-site by inspectors.

Metering

- Separate metering (e.g. utility meters or submeters) is required for dwelling units in multi-family buildings
- Meters can be provided at the base building panel or near individual dwelling units
- Provision for meters may be shown on Electrical drawings, on Energy drawings, or on drawings of another discipline
- Data from submeters should be accessible to the owner and the tenant

Metering should be verified on the riser diagram, meter layout, or equipment plans by plan examiners and verified on-site by inspectors.



1. UPDATES & APPLICABILITY: ASHRAE 90.1 ALTERNATIVE COMPLIANCE - 1

Can projects still opt to use ASHRAE 90.1 as an alternative?

- All disciplines of a project team must use either Chapter C4 of the NYCECC or ASHRAE Standard 90.1, and the documentation must indicate same (NEW requirement)
- Compliance via ASHRAE 90.1 offers more flexibility for lighting
 - Prescriptive Path:
 - Space-by-Space method of prescriptive compliance is available
 - Retrospective Chart Review (RCR) method
 - Performance Path:
 - Allows trade-off between disciplines
 - Typically used for demonstration of LEED compliance
 - Provides credit for automatic lighting systems and automatic daylight controls not required by prescriptive method
- Some differences in approaches between NYCECC & ASHRAE 90.1
 - To be reviewed throughout this module

Building area method is also identified in ASHRAE 90.1 and is similar to the NYCECC prescriptive path method.

ASHRAE 90.1 Appendix G Table G3.1 provides simple percent reductions for use of automatic controls.



1. UPDATES & APPLICABILITY: ASHRAE 90.1 ALTERNATIVE COMPLIANCE - 2

What are the differences in using ASHRAE 90.1 vs. the NYCECC?

Prescriptive/Mandatory Provisions

- **Power, Section 8.4, has maximum voltage drop of 5% for feeders and branch circuits combined, except those that are dedicated to emergency services**
- **Electrical Energy Monitoring, Section 8.4.3 requires end use metering for electrical systems**
- **Whole building energy monitoring, Section 10.4.5 requires measurement devices for energy supplied by a utility**

It is important to realize that pursuing compliance via ASHRAE 90.1 may have other repercussions that affect the applicant's design.



2. REQUIRED DOCUMENTATION

Slides 22 to 43

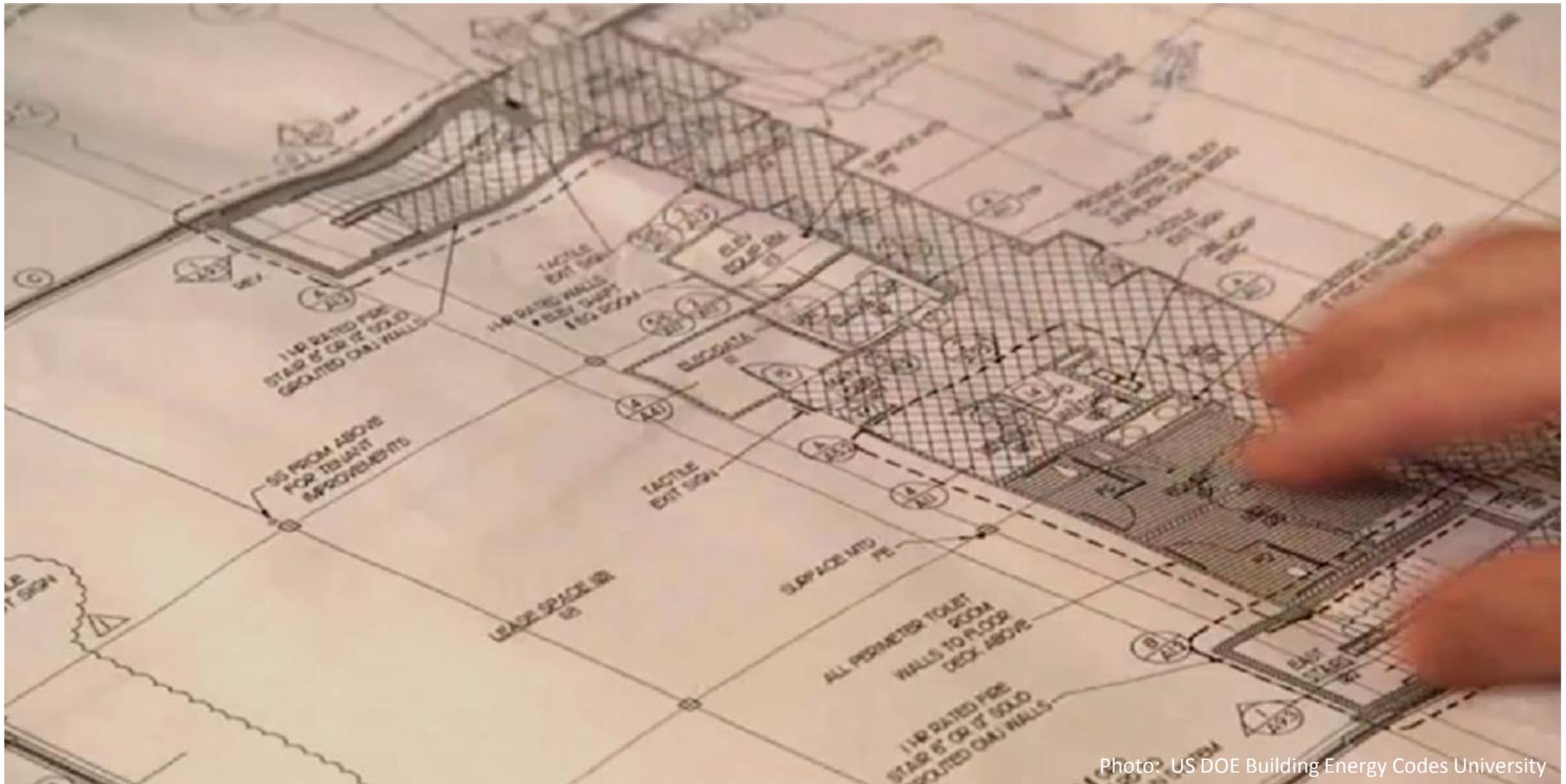


Photo: US DOE Building Energy Codes University

2. REQUIRED DOCUMENTATION: OVERVIEW

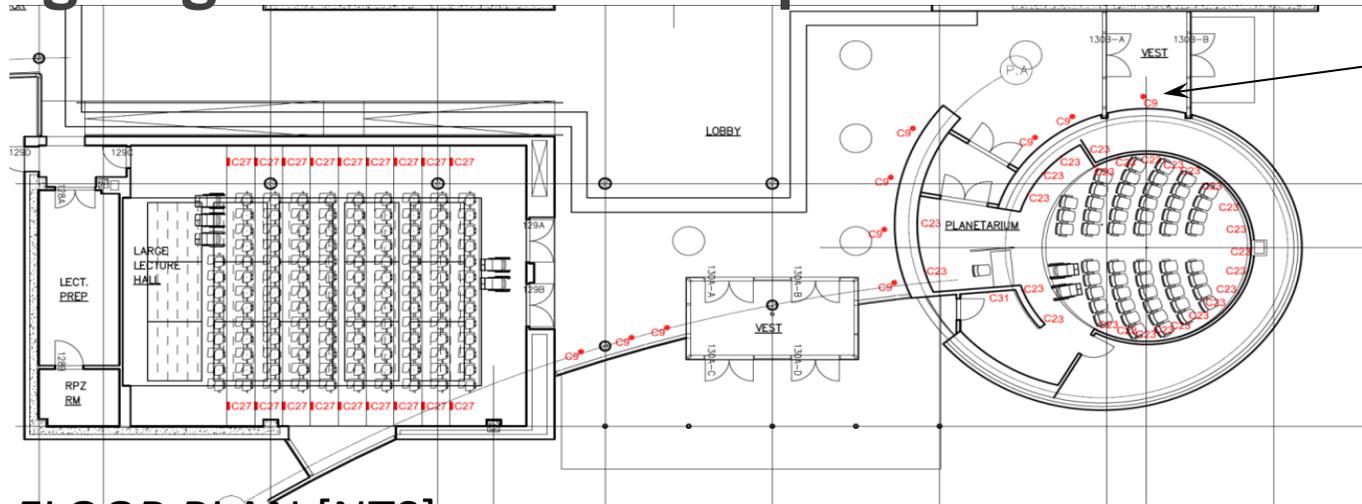
In this section you will learn about:

- **Documentation Requirements of 1RCNY §5000-01**
 - **Supporting Documentation must show**
 - Interior Lighting
 - Exterior Lighting
 - Lighting Legend
 - Lighting Controls
 - Controls Narrative
 - Dwelling Unit Meters
 - Commissioning Statement
 - **Energy Analysis**
 - Tabular Analysis
 - COMcheck
 - EN1 (Performance Method)



2. REQUIRED DOCUMENTATION: FLOOR PLANS & ELEVATIONS

Is lighting ever shown on floor plans or elevations?

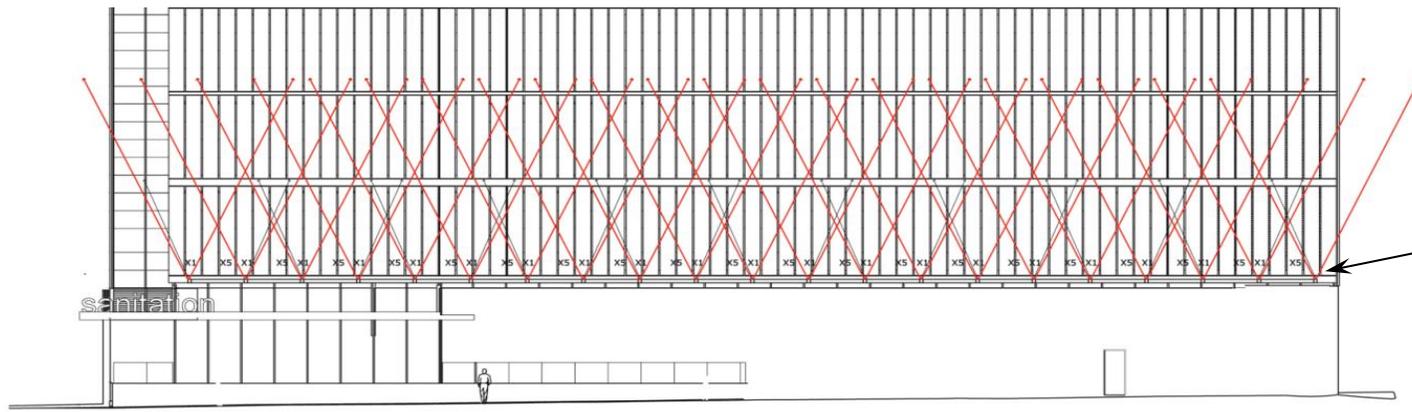


FLOOR PLAN [NTS]

If fixtures are described in the legend as in-grade, floor mounted or wall-mounted, they should be located on the floor plans.



Supporting documentation may need to include floor plans and elevations for some lighting conditions, as well as reflected ceiling plans.



ELEVATION [NTS]

Exterior fixtures may be shown on elevations, particularly if they are located at varying heights along the façade.



2. REQUIRED DOCUMENTATION: EXTERIOR SITE PLAN WITH LIGHTING

Where should exterior lighting be shown?

Fixtures intended to be mounted on the façade of a building could also be located on the site plan.

All exterior fixtures should be shown on the exterior site plan and keyed back to the legend and Energy Analysis.



SITE PLAN [NTS]



2. REQUIRED DOCUMENTATION: LIGHTING LEGEND

What information is included in a completed legend?

- Fixture type
- Fixture description
- Lamp type
- Lamp wattage
- Quantity of lamps per fixture
- Ballast/transformer/driver
 - Especially for ballast/transformer/driver types being specified
- System wattage
 - Lamp/ballast/transformer/driver



Specific information must be included. Ballast/transformer/driver types must be known to understand system watts (this is often missing in Legends).

Example: A 32W lamp may have a total draw of less than 32W based on the ballast factor.

All fixture descriptions and types should correspond to information provided in the Energy Analysis.



2. REQUIRED DOCUMENTATION: LIGHTING SCHEDULE

Can all required information be included in a single schedule?

All relevant lighting information must be provided on the submitted construction drawings, no separate specification books.



LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	PHOTOMETRY	SYSTEM WATTS	VOLT	CONTROL INTENT	MANUFACTURER
H1	ARM-MOUNTED COSMO OR LED NYCDOT LIGHTPOLE 25'-0" A.F.G. WITH DAVIT ARM AND OCTAGONAL POLE (1) CPO-TW 140W/728 [2800°K] [14,020 LUMENS] [PHILIPS]	NOTE: POLAR CURVE REFLECTS 170W MH.	185 watts		PHOTOCELL ON/ TIMECLOCK OFF	LUMINAIRE: HOLOPHANE #15DHP-12-F-F-AS-R POLE: NYCDOT WEST HOUSTON BASE: GCT/ FLATBUSH AVE TRANSFORMER TYPE OR APPROVED EQUAL BY TBD.
H2	POST-TOP MOUNTED 1-LAMP LENSED PEDESTRIAN LUMINAIRE MOUNTED TO POLE AT 12'-0" A.F.G. (1) CPO-TW 90W/728 [2800°K] [8800 LUMENS] [PHILIPS]	NOTE: POLAR CURVE REFLECTS 170W MH.			PHOTOCELL ON/ TIMECLOCK OFF	LUMINAIRE: RIVERSIDE #SLR-90CPO-120V-V-PH POLE: NYCDOT TYPE-B BASE: NYCDOT LANDSCAPE BASE OR APPROVED EQUAL BY SPRING CITY, LUMEC.

Controls information must be clearly identified if included in schedule.



2. REQUIRED DOCUMENTATION: LIGHTING SCHEDULE

Are the manufacturer's and model numbers required?

Fixture Type	Fixture Description	Location	Manf.	Model Number	Specification
A1	2' x4' x4-5/16"	Sales	LSI	PGN18-3-32-FD-SS010-LM841-UE	High Efficiency T8 Parabolic
A2	2' x4' x4-5/16"	Food Prep	LSI	PGN18-3-32-FD-SS010-LM841-UE	High Efficiency T8 Parabolic with Guards

 **Answer: No.** A catalog or model number is not required by the Energy Code nor is it sufficient to determine system watts.

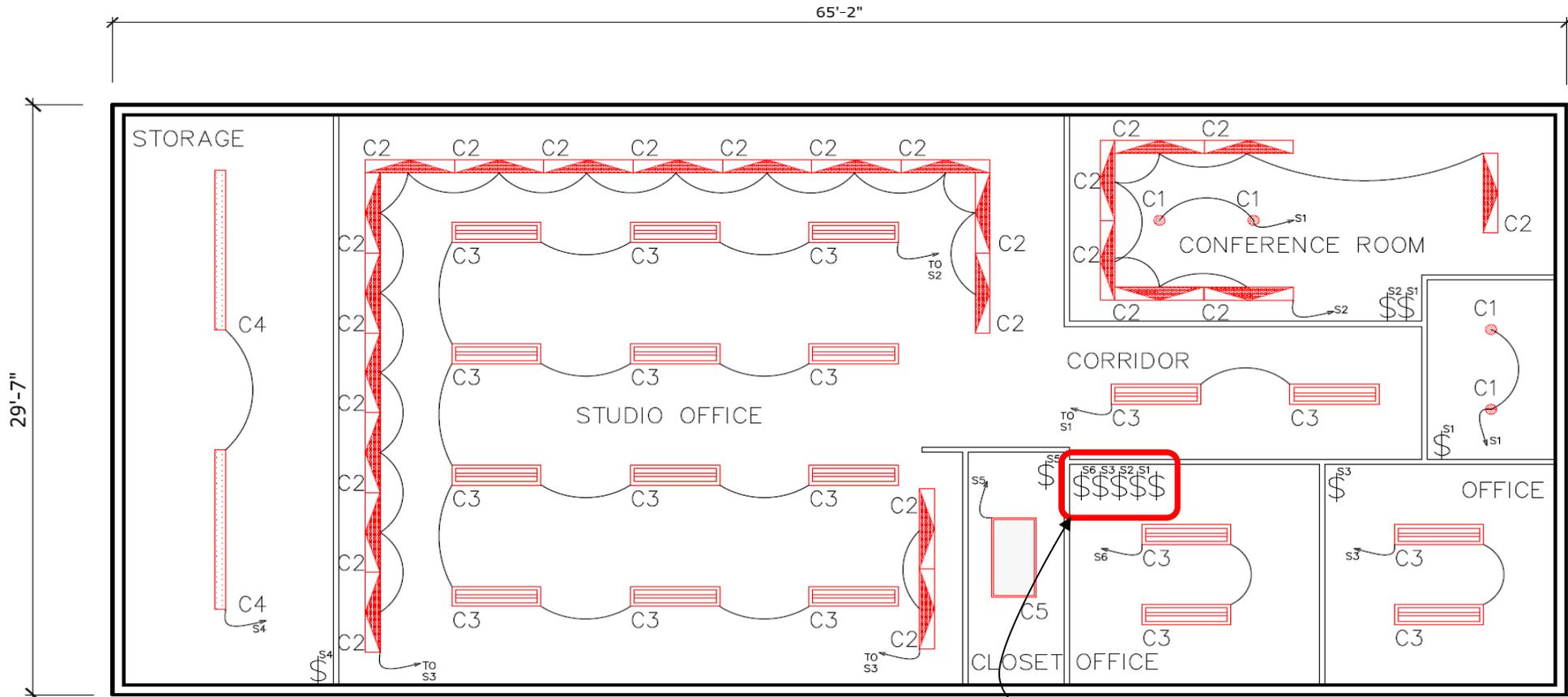
 If a luminaire schedule is provided then all of the same information that is required in a legend must be included in a luminaire schedule, including system watts.

TOTAL	TYPE	DESCRIPTION	MANUFACTURER	FIXTURE CATALOG NUMBER	ACCESSORIES / CATALOG NUMBER	TRIM/HOUSING COLOR	REFLECTOR FINISH	VOLTAGE	LISTING	MOUNTING SYSTEM	LAMP SPECIFICATION	FIXTURE LOAD IN WATTS	TOTAL WATTS
50	D1700.2	RECESSED 20W T4.5 MH DOWNLIGHT WITH 4" APERTURE [20W]	CUSTOM	LED	CUSTOM	CUSTOM	N/A	277V	UL DAMP LOCATION	RECESSED MTD	PHILLIPS, Catalog #: CDM65TC/S30, QTY: TBD	26	1300
22	L1700.1	SURFACE MOUNTED 28W T5 (4'-0") SINGLE-LAMP STAGGERED STRIP MOUNTED IN ARCHITECTURAL COVE [7.2W/LF]	METALUX	SM-228T5	Metalux4-SM-128T5-277-EBT1	WHITE	N/A	277V	UL DAMP LOCATION	SURFACE MTD	SYLVANIA, Catalog #: FP28/830/ECO, QTY: (1)	7.2	158.4
3	L1700.2	SURFACE MOUNTED 14WATT T5 (2'-0") SINGLE-LAMP STAGGERED STRIP MOUNTED IN ARCHITECTURE COVE [8.5W/LF]	METALUX	SM-228T5	Metalux4-SM-121T5-277-EBT1	WHITE	N/A	277V	UL DAMP LOCATION	SURFACE MTD	SYLVANIA, Catalog #: FP14/830/ECO, QTY: (1)	8.5	25.5
11	L1700.3	SURFACE MOUNTED CURVABLE 13W CFL MOUNTED IN ARCHITECTURAL COVE, [13W]	BELFER	2801-FXQ/13-227V-H	2801-FXQ-13-2	WHITE	N/A	277V	UL DAMP LOCATION	SURFACE MTD	SYLVANIA, Catalog #: CFT13W-GX23d QTY: (TBD)	13	143
496	L1700.4	4W/LF SURFACE MOUNTED LINEAR WHITE LED STRIP WITH DIFFUSE ACRYLIC LENS [4W/LF]	ILIGHT	PN24W1-65 (1.5" CLIP)	PN24W1-35	MW	N/A	277V	UL DAMP LOCATION	COVE TRIM	LED	4	1984
12	L1700.5	SURFACE MOUNTED 28WTS LINEAR FL TASKLIGHT [30W]	KENALL	AUCDL-S-MW-48-EB-277V	AUCDL-J-MW-37-EB-277	MW	N/A	277V	UL DAMP LOCATION	UNDERCABINET MTD	SYLVANIA, Catalog #: FP28/830/ECO, QTY: (1)	30	360
86	L1700.6	SURFACE MOUNTED LINEAR RGB LED STRIP, FIELD CURVABLE [6W/LF]		LED	LED-4 WIRE	N/A	N/A	277V	UL DAMP LOCATION	FLOOR MTD AND CEILING MTD	LED	6	516
13	R1700.1	RECESSED 28WTS LINEAR FL 6'X4'-0" WITH ACRYLIC LENS [30W]	NEORAY	67-24-SR-2TS-SR-1EB-DU	7-648-R-2-TS-SR-2-28W	MW	MW	277V	UL DAMP LOCATION	RECESSED MTD	SYLVANIA, Catalog #: FP28/830/ECO, QTY: (1)	30	390



2. REQUIRED DOCUMENTATION: LIGHTING CONTROLS

What is required to be shown for circuiting?



Circuit numbers should be shown at light switches.



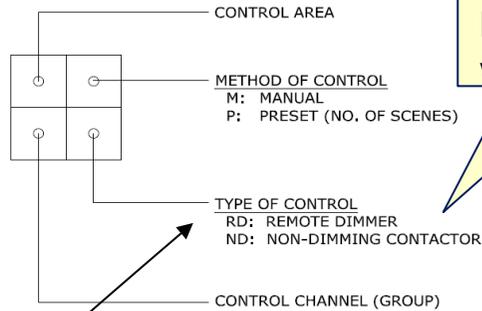
2. REQUIRED DOCUMENTATION: LIGHTING CONTROLS

How are control zones (groups) to be identified?



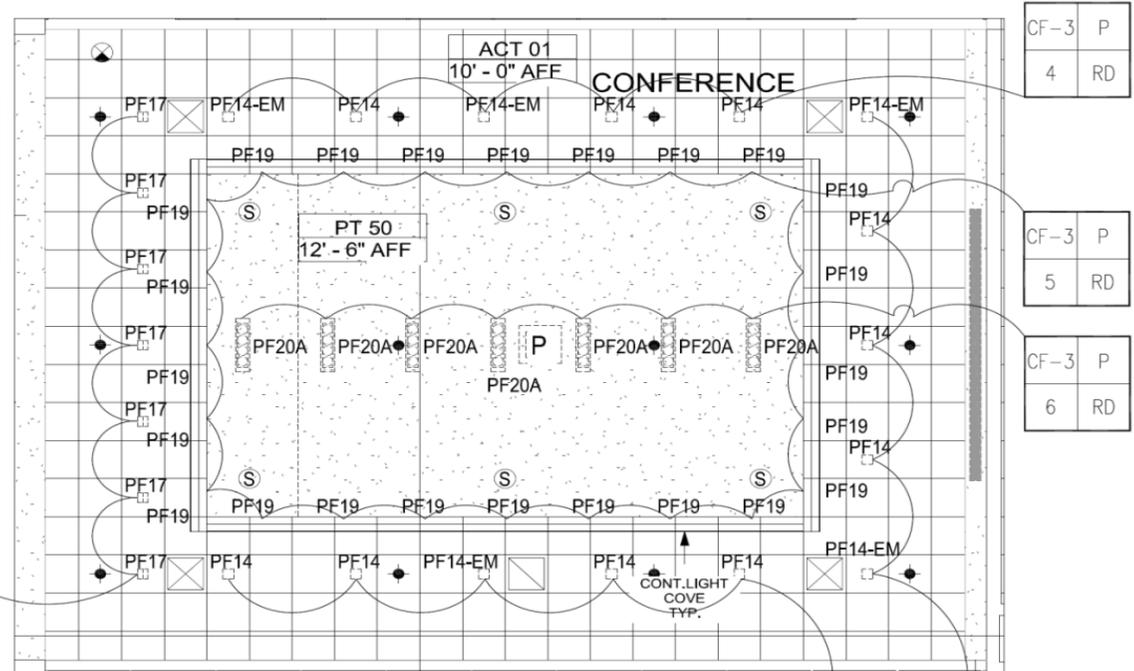
Sample Documentation:

CONTROL LEGEND



Drawings should describe what is being dimmed vs. switched.

- Lighting controls should be clearly described, particularly for a dimmed device or multi-scene preset.



3RD FL CONFERENCE ROOM

Control Zones (groups) should be clearly identified on documents.

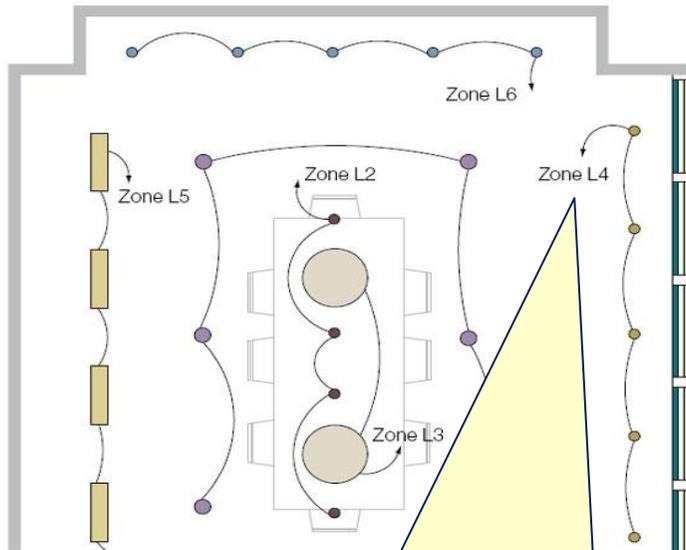


2. REQUIRED DOCUMENTATION: LIGHTING CONTROLS

Does the lighting control pad clearly identify the zones?



Sample Field Condition:



Circuiting alone can also provide controls information. Progress Inspectors are required to determine if controls operate as documented.



Zones should be clearly shown on installed equipment and should coordinate with drawings.



2. REQUIRED DOCUMENTATION: CONTROLS NARRATIVE

What is required in the controls narrative?

- Description of controls for individual spaces identifying their function and operation
- Including:
 - **Devices** such as occupancy sensors, photosensors, timeclock, etc.
 - **Location of devices** and/or limitations of devices
 - **Daylight control zones** including location of photosensor
 - **Intent of control** such as fixtures on zones, hours of operation, expected override
 - **Holiday scheduling** as required
- Documentation could include:
 - Graphical diagram
 - Written notes
 - Column in lighting schedule

Narratives may be either graphical and/or text. Which will be provided will vary depending upon control project and is often based on complexity of the controls.

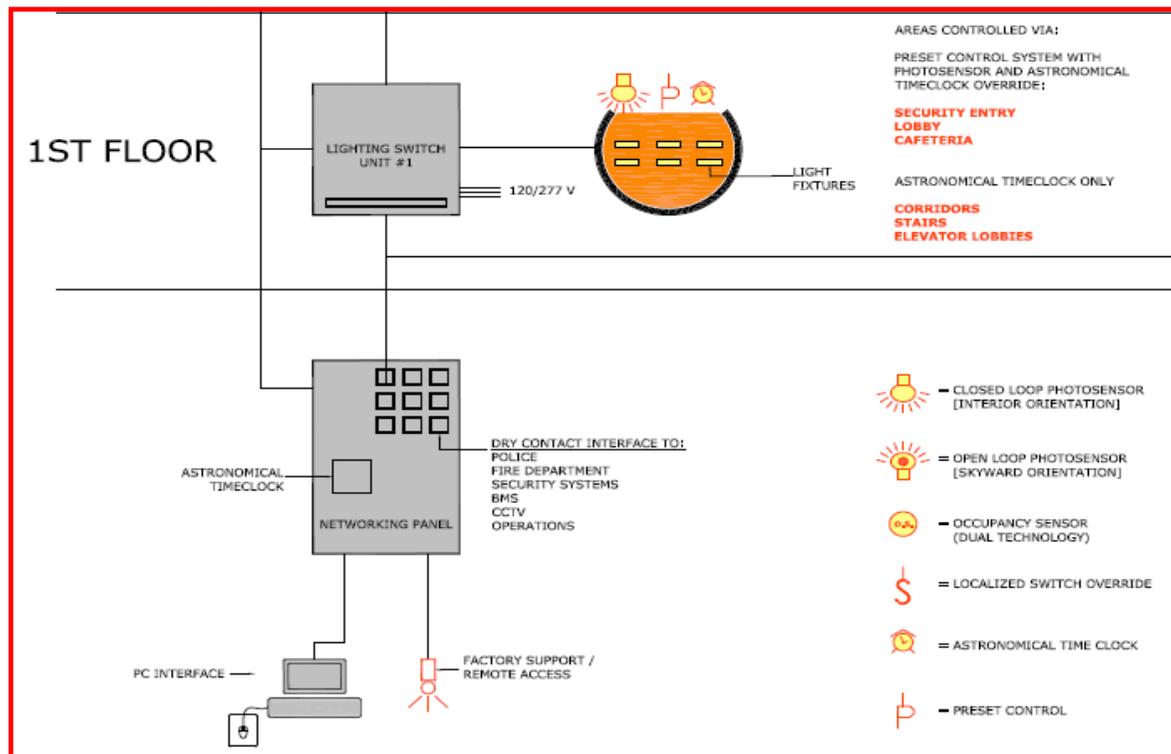
Basics must include intent, type, location, exceptions, and holiday scheduling requirements.



2. REQUIRED DOCUMENTATION: CONTROLS NARRATIVE

What might a graphical controls narrative look like?

- Graphical Diagram Example includes:
 - Location by floor and area type
 - Types of devices (i.e. preset control system with photosensor)



2. REQUIRED DOCUMENTATION: CONTROLS NARRATIVE

What might a written controls narrative look like?

■ Written Example Includes:

- Location by drawing number and room type
- Types of devices (i.e. astronomical timeclock)
- Intent of control (i.e. local switches with dual technology occupancy sensor – manual on, automatic off for 75% of fixtures, with astronomical timeclock)



CONTROL INTENT ONLY

A-402-00

Room Number/Type Control Strategy Recommendation

Corridors/Elev. Lobbies Automatic on/off of 75% of fixtures. 25% of fixtures to remain energized at all times (i.e. emergency fixtures to remain on).

Restrooms Astronomical timeclock with occupancy sensor. Automatic on/off of 75% of fixtures. 25% of fixtures to remain energized at all times (i.e. emergency fixtures to remain on).

Locker Rooms Astronomical timeclock with occupancy sensor. Automatic on/off of 75% of fixtures. 25% of fixtures to remain energized at all times (i.e. emergency fixtures to remain on).

Stairs Astronomical timeclock with occupancy sensor to de-energize 50% of fixtures. 50% of fixtures to remain energized at all times.

Elec./Mechanical Rooms Local switches with dual technology occupancy sensor (manual on, automatic off 75% of fixtures) and astronomical timeclock sweep. 25% of fixtures to remain energized at all times (i.e. emergency fixtures to remain on).

A-402-00

Room Number/Type **Control Strategy Recommendation**

Corridors/Elev. Lobbies	Automatic on/off of 75% of fixtures. 25% of fixtures to remain energized at all times (i.e. emergency fixtures to remain on).
Restrooms	Astronomical timeclock with occupancy sensor. Automatic on/off of 75% of fixtures. 25% of fixtures to remain energized at all times (i.e. emergency fixtures to remain on).
Locker Rooms	Astronomical timeclock with occupancy sensor. Automatic on/off of 75% of fixtures. 25% of fixtures to remain energized at all times (i.e. emergency fixtures to remain on).
Stairs	Astronomical timeclock with occupancy sensor to de-energize 50% of fixtures. 50% of fixtures to remain energized at all times.
Elec./Mechanical Rooms	Local switches with dual technology occupancy sensor (manual on, automatic off 75% of fixtures) and astronomical timeclock sweep. 25% of fixtures to remain energized at all times (i.e. emergency fixtures to remain on).

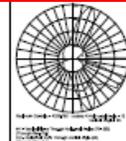


2. REQUIRED DOCUMENTATION: CONTROLS NARRATIVE

How should a controls narrative be included in a lighting schedule?

- A separate column provided in the Lighting Schedule:
 - Type of device
 - Location of device
 - Intent of control
- This is only appropriate if the control is consistent for the fixture type throughout the project

TYPE	DESCRIPTION	WATTS	VOLT	CONTROL INTENT
H1	<p>Description: ARM-MOUNTED COSMO OR LED NYCDOT LIGHTPOLE 25'-0" A,F,G, WITH DAVIT ARM AND OCTAGONAL POLE</p> <p>Lamp: (1) CPO-TW 140W/728 [2800°K] [14,020 LUMENS] [PHILIPS]</p> <p>Optics: LUMINAIRE SHALL CONSIST OF A THERMAL RESISTANT FLAT GLASS LENS. LENS SHALL BE HOUSED IN A CAST ALUMINUM ALLOY BODY. OPTICAL ASSEMBLY TO BE AN ANODIZED FULL-CUTOFF ASYMMETRIC TYPE</p> <p>Location/Remarks: [ROADWAYS] LUMINAIRE HOUSING SHALL BE COMPRISED OF A DOOR FRAME AND CANOPY WHICH HOUSES INTEGRAL CONTROL GEAR, THE DOOR SHALL BE SECURED BY A CORROSION RESISTANT ALUMINUM ACCESS FOR MAINTENANCE, THE CANOPY AND DOOR SHALL BE SEALED BY A SILICONE GASKET. FIXTURE SHALL HAVE UNIVERSAL MOUNTING SYSTEM TO BE SECURED ON A 1.28" TO 2.38" O.D, X MINIMUM 2" LON LUMINAIRE EFFICIENCY SHALL BE MINIMUM 75%. ENTIRE ASSEMBLY SHALL BE UL LISTED, SUITABLE FOR WET LOCATION.</p> <p>Ballast: ICW140TLS [PHILIPS] [BALLAST TEMPERATURE RANGE -20°C/+50°C] BALLAST SHALL BE ASSEMBLED ON A UNITIZED REMOVABLE TRAY WITH QUICK DISCONNECT PLUG.</p> <p>Pole: POLE SHALL BE NYCDOT STANDARD ALUMINUM DAVIT (8'-0" ARM) SET IN NYCDOT STANDARD OCTAGONAL STEEL POLE (TRANSITION AT NOMINAL 19'-0" AFG); TOTAL HEIGHT NOMINAL 25'-0" AFG. POLE TO ACCOM BOLT CIRCLE. POLE SHALL BE CAPABLE OF WITHSTANDING 100MPH WINDS WITH 1.3 GUST FACTOR, PROVIDE WITH WEATHER-RESISTANT GFCI RECEPTACLE AT 14'-0" AFG.</p>	watts	120 V	<p>CONTROL INTENT</p> <p>PHOTOCELL ON/ TIMECLOCK OFF</p> <p>PHOTOCELL TO BE LOCATED ON EACH INDIVIDUAL FIXTURE AS PER DOT SPEC.</p>
H2	<p>Description: POST-TOP MOUNTED 1-LAMP LENSED PEDESTRIAN LUMINAIRE MOUNTED TO POLE AT 12'-0" A,F,G.</p> <p>Lamp: (1) CPO-TW 90W/728 [2800°K] [8800 LUMENS] [PHILIPS]</p> <p>Optics: FULL CUTOFF, TYPE V DISTRIBUTION. LENS SHALL BE FLAT, CLEAR TEMPERED GLASS MECHANICALLY ASSEMBLED TO THE FIXTURE FRAME.</p> <p>Location/Remarks: [PATHWAYS] LUMINAIRE HOUSING SHALL BE CONSTRUCTED OF DIE CAST ALUMINUM AND MECHANICALLY ASSEMBLED TO THE POLE. ENTIRE ASSEMBLY SHALL HAVE POLYESTER POWDER COAT FINISH; COLOR: NYCDOT BLACK, TOTAL LUMINAIRE EFFICIENCY SHALL BE MINIMUM 71%. ENTIRE ASSEMBLY SHALL BE UL LISTED, SUITABLE FOR WET LOCATION.</p> <p>Ballast: ICW60NLS [PHILIPS] [BALLAST TEMPERATURE RANGE -20°C/+50°C] BALLAST SHALL BE ASSEMBLED ON A UNITIZED REMOVABLE TRAY WITH QUICK DISCONNECT PLUG.</p> <p>Pole: POLE SHALL BE NYCDOT STANDARD DUCTILE IRON TYPE-B, THICK WALLED ASTM A48, CLASS 30 CAST IRON. PROVIDE HAND HOLES AS REQUIRED BY NYCDOT. POLE TO ACCOMMODATE STANDARD NYCDOT BOLT CIRCLE. PROVIDE WITH CONCEALED WEATHER RESISTANT GFCI RECEPTACLE. POLE SHALL BE CAPABLE OF WITHSTANDING 100MPH WINDS WITH A 1.3 GUST FACTOR.</p>	99 watts	120 V	<p>PHOTOCELL ON/ TIMECLOCK OFF</p> <p>PHOTOCELL TO BE LOCATED ON EACH INDIVIDUAL FIXTURE AS PER DOT SPEC.</p>



2. REQUIRED DOCUMENTATION: ENERGY ANALYSIS

In what formats should the energy analysis be submitted?

Tabular Analysis (Prescriptive Compliance)

- Identifies energy compliance
- Table must include at least 4 columns: Item description, proposed design value, code-prescribed value citation, and where in the drawing set the information is to be found

COMcheck (Prescriptive Compliance)

- Software calculates interior and exterior lighting **power allowances** based on building area, building use, and code-prescribed values
- Software calculates proposed **energy usage** based on proposed design (interior and exterior)
- Identifies compliance
- **Supporting documentation index** stating where in the drawing set the fixture schedule and count is found as per 1 RCNY §5000-01

EN1 Form (Total Building Performance, i.e., Energy Modeling)

- Identify compliance via ASHRAE 90.1-2013 Section 11 or Appendix G



2. REQUIRED DOCUMENTATION: TABULAR ANALYSIS

What information is to be included in a tabular analysis?

Tabular Analysis

- Table must compare the proposed values of the Lighting Power Density (LPD) with the prescriptive values from the applicable LPD table in the Building Area Lighting Power Allowance identified in the NYCECC
- Table must include all Code-related items, organized by discipline

Documents indicate where to find supporting information to facilitate plan examination and Progress Inspections (spot-checking) in the field.

ITEM DESCRIPTION	PROPOSED DESIGN VALUE	CODE PRESCRIPTIVE VALUE AND CITATION	SUPPORTING DOCUMENTATION
Interior Lighting			
Total connected load of proposed interior lighting for office building type	0.77 w/sq.ft.	0.82 w/sq.ft. for office	Series A-400 drawings (Reflected Ceiling Plans for all floors) Series E-600 drawings (Reflected Ceiling Plans for all floors) E-900 - 907 (Fixture schedule, control narrative, and details)
Exterior Lighting			
Total connected load of proposed exterior lighting for lighting zone 3	27.66 kW	364 kW	Series A-400 drawings (Reflected Ceiling Plans for all floors) Series E-600 drawings (Reflected Ceiling Plans for all floors) E-900 - 907 (Fixture schedule, control narrative, and details)



2. REQUIRED DOCUMENTATION: TABULAR ANALYSIS

When might a space-by-space analysis be used?

Tabular Analysis

- Keep the tabular analysis simple unless Space-by-Space is used
- Space-by-Space analysis might be used when:
 - When the retail allowances apply
 - Large projects with complex occupancies

This table represents the degree of analysis that could be required for compliance.

ITEM DESCRIPTION	AREA (SQ. FT.)	PROPOSED DESIGN VALUE		CODE PRESCRIPTIVE VALUE AND CITATION		REFERENCE DRAWINGS
		Design Wattage (Watts)	Design LPD (W/SF)	ASHRAE 90.1-2013 LPA (W/SF)	Wattage Allowance	
Space Type	Area (sq.ft.)	Design Wattage (Watts)	Design LPD (W/SF)	ASHRAE 90.1-2013 LPA (W/SF)	Wattage Allowance	Drawing Numbers
Auditorium	8633	5611	0.65	0.63	5439	A - 401, E-601
Corridors	9183	6428	0.70	0.66	6061	A-401 - 409, E-601-609
Lobby	4836	4401	0.91	0.90	4352	A - 401, E-601
Cafeteria/Kitchen	8777	5705	0.65	0.65	5705	A - 401, E-601
Bathrooms	1641	1313	0.80	0.98	1608	A-401 - 409, E-601-609
Stairs	802	561	0.70	0.69	553	A-401 - 409, E-601-609
Mechanical/Electrical	2428	2064	0.85	0.42	1020	A-401 - 409, E-601-609
Lounge/Quiet Room	1494	1046	0.70	0.73	1091	A - 401, E-601
Offices (open plan)	24675	19740	0.80	0.90	22208	A-401 - 409, E-601-609
Conference Rooms	1054	1159	1.10	1.23	1296	A-401 - 409, E-601-609
TOTALS FOR OFFICE BUILDING	63523	48029	0.79	1.00	49333 W	



2. REQUIRED DOCUMENTATION: COMCHECK INT LTG

What information must be completed on a COMcheck form for interior lighting?

- COMcheck Analysis must reflect appropriate standard:

- Either 2016 NYCECC
- Or 2013 ASHRAE 90.1

- COMcheck Analysis requirements:

- Fixture watts should be equal to system watts (lamp/ballast)
- Fixture types and lamp description should tie back to submitted drawings
- Quantity of fixtures should be equivalent to fixtures shown on submitted plans
- Confirmation of compliance should be identified by a "Passes"

When using ASHRAE 90.1-2013 COMcheck, the values do not reflect the edits made in Appendix CA of 2016 NYCECC.

COMcheck Software Version 4.0.7.2 Review
Interior Lighting Compliance Certificate

Project Information
Energy Code: 2016 New York City Energy Conservation Code
Project Title: Natural Foods
Project Type: New Construction
Permit Date: 1/30/18
Permit No.: XXX12345

Construction Site: 123 Main Avenue, New York, NY 10007
Owner/Agent: Alan Frank, ABC Foods, 111 Broadway, New York, NY 10007, 123-456-7890, AFrank@abcfoods.com
Designer/Contractor: Kenneth Ramos, Functional Design, 321 Riverwalk Road, New York, NY 10007, 111-234-5678, KRamos@funcdesign.com

Additional Efficiency Package
On-site Renewable Energy

Area Category	Floor Area (ft ²)	Allowed Watts / ft ²	Allowed Watts (B X C)
1-Common Space Types:Office - Open Plan	32456	0.90	29160
		Total Allowed Watts =	29160

Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	Lamps/ Fixture	# of Fixtures	Fixture Watt (C X D)
LED 1: LED MR 4W:	5	70	2800
Halogen 1: Halogen 90W:	4	50	1500
Halogen 2: Halogen 80W:	2	30	900
Halogen 3: Halogen 120W:	4	60	3600
LED 2: LED PAR 20W:	7	50	4000
LED 3: LED Linear 2xw:	6	100	7000
LED 4: LED Panel 70W:	6	35	2450
LED 5: LED PAR 18W:	7	50	3000
		Total Proposed Watts =	25250

Interior Lighting PASSES: Design 13% better than code

Interior Lighting Compliance Statement
Compliance Statement: The proposed interior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed interior lighting systems have been designed to meet the 2016 New York City Energy Conservation Code requirements in COMcheck Version 4.0.7.2 Review and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Project Title: Natural Foods
Data filename: U:\Sustainability\280 Broadway COMcheck.cck
Report date: 03/28/18
Page 3 of 31

Signature _____ Date _____
Stamp

Report date: 03/28/18
Page 4 of 31



2. REQUIRED DOCUMENTATION: COMCHECK EXT LTG

What information must be completed on a COMcheck form for exterior lighting?

- COMcheck Analysis must reflect appropriate standard:
 - Either 2016 NYCECC
 - Or 2013 ASHRAE 90.1
- COMcheck Analysis requirements:
 - Base Site Allowance should match the appropriate NYCECC Exterior Lighting Zone based on 1 RCNY § 5000-01
 - If applicable, tradable and non-tradable lighting should be identified
 - Checklist should be completed
 - Confirmation of compliance should be identified by a "Passes"

When using ASHRAE 90.1-2013 COMcheck, the values do not reflect the edits made in Appendix CA of 2016 NYCECC.

Signature _____ Date _____

COMcheck Software Version 4.0.7.2 Review
Exterior Lighting Compliance Certificate

Project Information

Energy Code: 2016 New York City Energy Conservation Code
 Project Title: Natural Foods
 Project Type: New Construction
 Permit Date: 1/30/18
 Permit No.: XXX12345
 Exterior Lighting Zone: 4 (High activity metropolitan commercial district)

Construction Site: 123 Main Avenue, New York, NY 10007 Owner/Agent: Alan Frank, ABC Foods, 111 Broadway, New York, NY 10007, 112-456-7890, AFrank@abcfoods.com Designer/Contractor: Kenneth Ramos, Functional Design, 321 Riverwalk Road, New York, NY 10007, 111-234-5678, KRamos@funcdesign.com

A Area/Surface Category	B Quantity	C Allowed Watts / Unit	D Tradable Wattage	E Allowed Watts (B X C)
Illuminated area of facade wall or surface	60 ft ²	0.2	No	12
Guarded facility, entrance/inspection area	70 ft ²	0.75	No	52
			Total Tradable Watts (a) =	0
			Total Allowed Watts =	64
			Total Allowed Supplemental Watts (b) =	1300

(a) Wattage tradeoffs are only allowed between tradable areas/surfaces.
(b) A supplemental allowance equal to 1300 watts may be applied toward compliance of both non-tradable and tradable areas/surfaces.

Proposed Exterior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Illuminated area of facade wall or surface (60 ft²): Non-tradable Wattage				
LED 1: LED A Lamp 25W:	6	10	40	400
LED 2: LED Panel 80W:	8	10	30	300
Halogen 1: Halogen 70W:	4	12	20	240
Guarded facility, entrance/inspection area (70 ft²): Non-tradable Wattage				
LED 3: LED A Lamp 70W:	5	20	10	200
			Total Tradable Proposed Watts =	0

Exterior Lighting PASSES: Design 0.0% better than code

Exterior Lighting Compliance Statement
 Compliance Statement: The proposed exterior lighting design represented in this document is consistent with the building plans, specifications, and other calculations submitted with this permit application. The proposed exterior lighting systems have been designed to meet the 2016 New York City Energy Conservation Code requirements in COMcheck Version 4.0.7.2 Review and to comply with any applicable mandatory requirements listed in the Inspection Checklist.

Project Title: Natural Foods Report date: 03/28/18
 Date filename: U:\Sustainability\280 Broadway COMcheck.cck Page 5 of 21



3. MANDATORY PROVISIONS

Slides 44 to 70

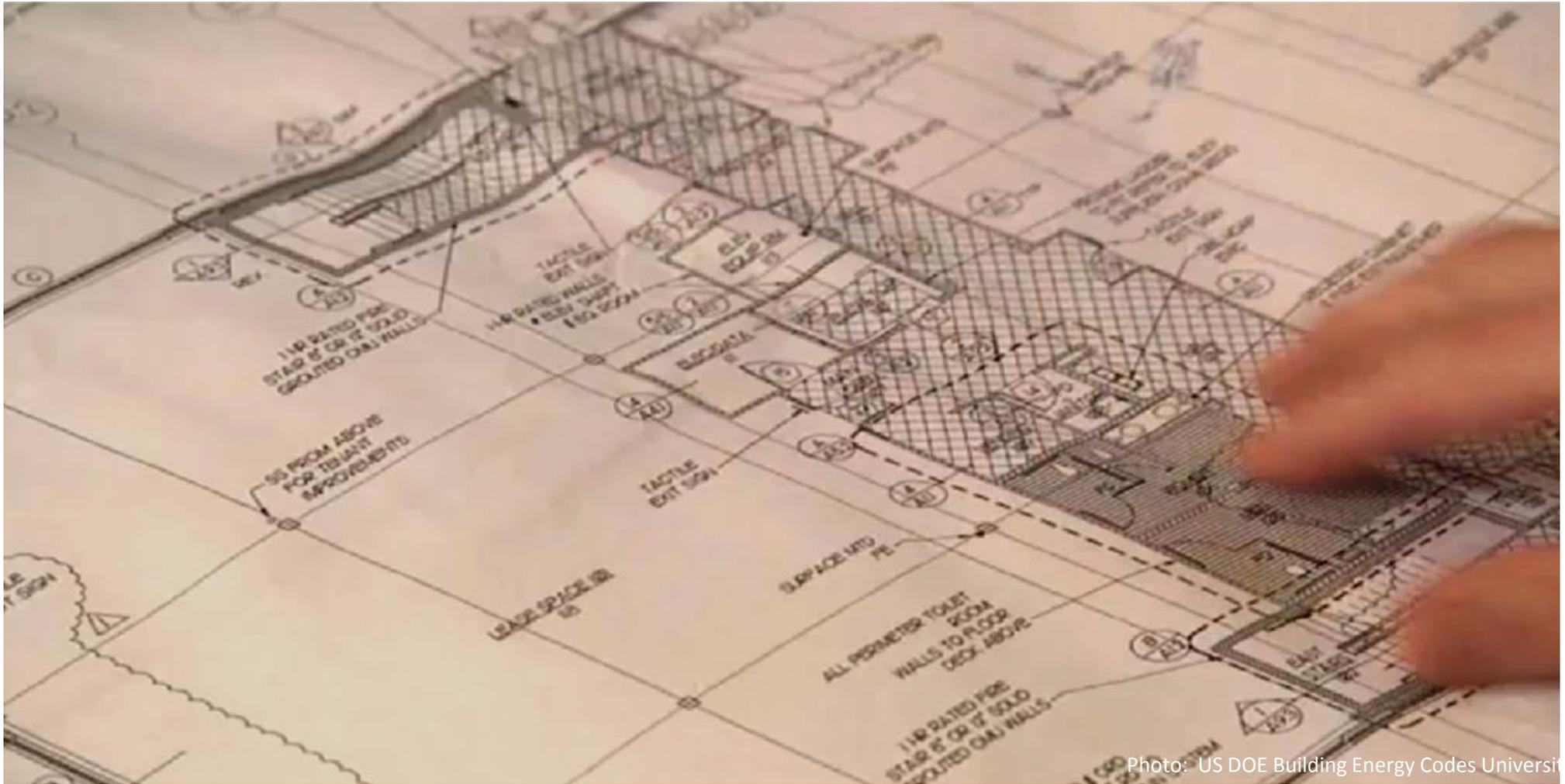


Photo: US DOE Building Energy Codes University

3. MANDATORY PROVISIONS: OVERVIEW

In this section you will learn about:

- Lighting controls;
- Additional controls;
- ASHRAE 90.1 alternative compliance controls;
- Exit signs;
- Metering requirements.



3. MANDATORY PROVISIONS: LIGHTING CONTROLS

What are the minimum controls required?



Sample Field Condition



Lighting systems shall be provided with controls as specified, including:

- Occupant sensor controls
- Time switch controls
- Daylighting-responsive controls
- Specific application controls
- Exterior lighting controls



3. MANDATORY PROVISIONS: LIGHTING CONTROLS (C405.2)

What are the minimum controls required?

Lighting reduction controls

- Occupant sensor controls
- Occupant sensor controls in warehouses
- Time-switch controls
- Daylight-responsive controls

Lighting Reduction Controls are required to reduce the connected lighting load by 50%. These may be identified in the controls narrative and/or notes. Don't forget to check the fixture specification since it could be identified as (2) circuits. For small projects it may be two separate switches identified on the wall with circuiting shown.

Occupant sensor controls are required to automatically turn off lights within 20 minutes of all occupants leaving the space, except in warehouses.

Occupant sensors in warehouses to reduce lighting not less than 50% in aiseways and open areas.

Time-switch controls are required for areas that are not provided with occupant sensor controls and areas should also be provided with a manual control for light reduction.

Daylight-responsive control is a mandatory requirement to control the electric lighting within daylight zones and must be capable of completely shutting off all controlled lights within the zone.



3. MANDATORY PROVISIONS: LIGHTING CONTROLS

What are the minimum controls required?

- Occupant sensor controls are required to:
 - Automatically turn off lights within 20 minutes of all occupants leaving the space.
 - Be manual on or controlled to automatically turn the lighting on to not more than 50 percent power.

- Full Automatic on controls are required in all corridors, stairways, restrooms, lobbies, and areas where manual security of occupants

- Manual-on controls are not required

Occupant Sensor Controls are required in:

- Classrooms/lecture/training rooms**
- Conference/meeting/multipurpose rooms**
- Copy/print rooms
- Lounges
- Employee lunch and break rooms**
- Private offices
- Restrooms
- Storage rooms
- Janitorial closets
- Locker rooms
- Spaces 300 sq.ft. or less, enclosed by floor to ceiling partitions
- Warehouses
- Open plan offices

** designates spaces where manual-on controls are not required

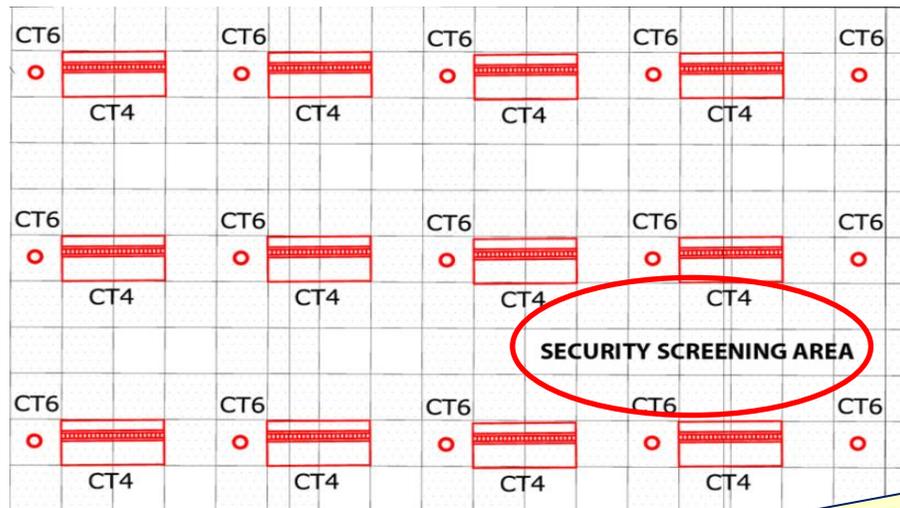


3. MANDATORY PROVISIONS: LIGHTING CONTROLS

Are there any areas which do not require lighting controls?



Sample Documentation



An exit passageway is defined in the NYC Building Code Section 1023.5, and is a space that does not contain an elevator.

- Any area designated as security or emergency that must be **continuously illuminated**
- Possible spaces could include:
 - Airport Security Checkpoint
 - Subway Station
 - Police Precinct
- Lighting of stairs, interior exit ramps and exit passageways designed as **means of egress**
- Emergency egress lighting in areas that is normally off



3. MANDATORY PROVISIONS: ADDITIONAL CONTROLS

How can the lighting load be reduced by at least 50%?

Reduce connected lighting load in a uniform illumination pattern by at least 50%.



Sample Documentation

CIR #1: PROVIDE WITH (1) ONE INTEGRAL 1-LAMP PROGRAM RAPID START SOLID STATE, 265 mA 20kHz ELECTRONIC BALLAST. BALLAST SHALL BE TYPE A SOUND RATED, CLASS P, AND SUITABLE FOR OPERATION AT 277 VOLTS. MIN. BALLAST FACTOR: 0.88.

CIR #2: PROVIDE WITH (1) ONE INTEGRAL 2-LAMP PROGRAM RAPID START SOLID STATE, 265 mA 20kHz ELECTRONIC BALLAST. BALLAST SHALL BE TYPE A SOUND RATED, CLASS P, AND SUITABLE FOR OPERATION AT 277 VOLTS. MIN. BALLAST FACTOR: 0.88.

CIR #3: PROVIDE WITH (1) ONE INTEGRAL LED DRIVER COMPATIBLE FOR LED NIGHT LIGHT.

■ Possible methods include:

- Designating multiple lamps in same fixture on separate circuits
- Placing fixtures on alternate circuits providing a uniform distribution of light
- Specifying dimming system with appropriate zoning and commissioning of scene controls

■ Where to look:

- Electrical circuiting diagrams
- Legend or specification on drawings
- Controls narrative
- Lighting control zone diagrams and load schedule



3. MANDATORY PROVISIONS: ADDITIONAL CONTROLS

How can the lighting load be reduced by at least 50%?

Reduce connected lighting load in a uniform illumination pattern by at least 50%.



Sample Field Condition



Circuit #1

Circuit #2

■ Possible methods include:

- Designating multiple lamps in same fixture on separate circuits
- Placing fixtures on alternate circuits

During Progress Inspections should identify circuit and test switches to confirm that 50% (or more) reduction is achieved.

distribution of light
system with appropriate
timing of scene controls

■ Where to look:

- Electrical circuiting diagrams
- Legend or specification on drawings
- Controls narrative
- Lighting control zone diagrams and load schedule



3. MANDATORY PROVISIONS: ADDITIONAL CONTROLS

When are time-switch shut-off controls required?

Buildings > 5,000 sf. shall be equipped with a time-switch control device to shut off lighting.



Sample Field Condition



- Possible methods include
 - Automatic timeclock
 - Astronomical timeclock
 - Occupant sensor
 - Signal from another control or alarm system which indicates the area is unoccupied
- Control shall allow for **manual on** and **manual off** with **automatic off** after a **maximum of 20 minutes**
 - No override switch for automatic on



3. MANDATORY PROVISIONS: ADDITIONAL CONTROLS

When are time-switch shut-off controls required?

Manual on controls are required in

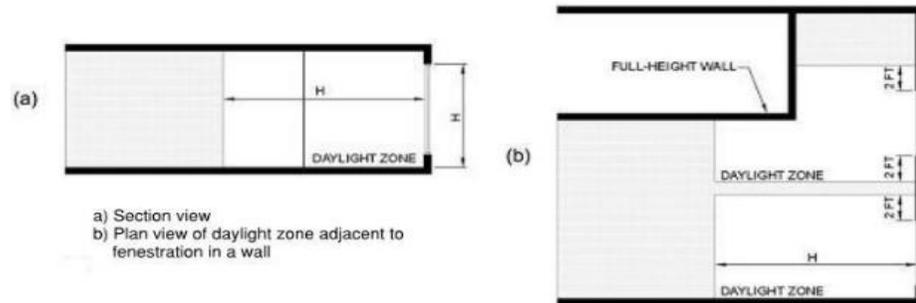
- **Classrooms**
 - Not including shop classrooms, laboratory classrooms, and preschool classrooms
- **Conference/Meeting rooms**
- **Employee lunch and break rooms**
- **Offices smaller than 200 sq.ft.**

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.



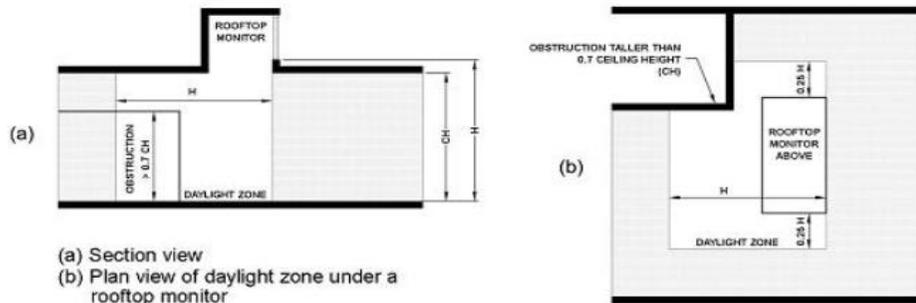
3. MANDATORY PROVISIONS: DAYLIGHT ZONES

What are the different types of Daylight Zones?



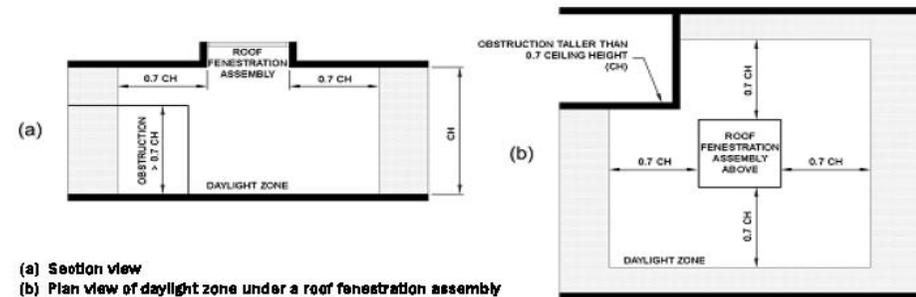
Sidelight Daylight Zone

- Must be identified on drawings in the floor area adjacent to vertical fenestration



Daylight Zone under Rooftop Monitor

- Must be identified on drawings in the floor area under a rooftop monitor



Daylight Zone under Roof Fenestration Assembly

- Must be identified on drawings in the floor area underneath a roof fenestration assembly



3. MANDATORY PROVISIONS: DAYLIGHT ZONES

How should a controls narrative be included in a lighting schedule?

- For spaces having electric lights > 150 watts within daylight zones, independent controls for the lights within daylight zones must be specified
- For this purpose, light fixture layout plans must clearly delineate the boundary of each daylight zone, and indicate separate circuiting and switch control for each zone boundary
- Daylight-responsive controls must be designed to be capable of a complete shutoff of lights within each daylight zone, and must be installed such that authorized professionals can readily access the controls for calibration



3. MANDATORY PROVISIONS: DAYLIGHT ZONES

What are the requirements for Open Plan Offices?

- **Occupant sensor controls shall be installed in Open Plan Offices**
 - Should automatically turn off lights within 20 minutes of all occupants leaving the space
 - Full automatic-on controls permitted
 - Shall incorporate a manual control to allow occupants to turn lights off
 - The maximum area controlled by one (1) occupant sensing device is 2,500 sf (as compared to the maximum area of 5,000 sf per device for other occupant-sensor-required areas)

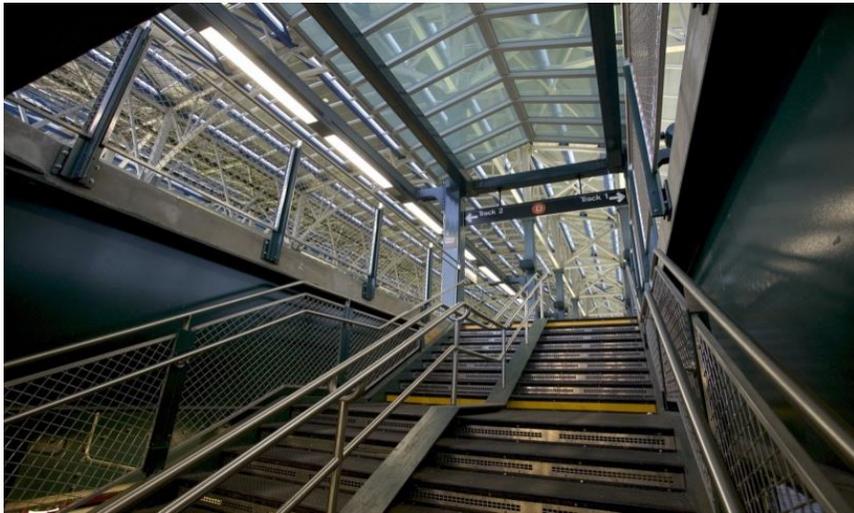


3. MANDATORY PROVISIONS: ADDITIONAL CONTROLS – ASHRAE 90.1

What are the differences between NYCECC and ASHRAE 90.1?



Sample Field Condition



- **Exceptions for Automatic Shut-off in ASHRAE 90.1**
 - General lighting and task lighting in shop, laboratory, and preschool classrooms
 - General lighting and task lighting in spaces where automatic shutoff would endanger the safety or security of room or building occupants
 - Lighting required for 24/7 operation
 - Lighting in offices smaller than 200 square feet in area equipped with lighting controls activated by photosensor



3. MANDATORY PROVISIONS: ADDITIONAL CONTROLS – ASHRAE 90.1

What are the differences between NYCECC and ASHRAE 90.1? (*continued*)

These additional provisions exist in ASHRAE

- Receptacles should be automatically controlled (8.4.2):
 - At least 50% of all 125-volt 15- and 20-amp receptacles in all private offices, conference rooms, rooms used primarily for printing and/or copying functions, break rooms, classrooms, and individual workstations
 - At least 25% of branch circuit feeders installed for modular furniture not shown on the construction documents
- Mandatory parking garage lighting controls are required (9.4.1.2)
- All supplemental task lighting shall be controlled by a control integral to the luminaires or by a readily accessible wall-mounted control device (9.4.1.3(c))
- RCR (Room Cavity Ratio) may be implemented to calculate Room Geometry Adjustment when using the Space-by-Space Method (9.6.4)



3. MANDATORY PROVISIONS: ADDITIONAL CONTROLS

Where automatic shutoff is required what other control requirements apply?

Occupant override is required when Time-switch controls are required and never in spaces with occupancy sensors

 Sample Field Condition



- **Override shall be**
 - Readily accessible to occupant
 - Located for user to see the device and the lights in the controlled area
 - Manually operated
 - Programmed for maximum 2-hour override.
 - Designed to control maximum area of 5,000 sf
- **Provision for automatic shutoff should be in the specification schedule on the drawings and/or lighting narrative**



3. MANDATORY PROVISIONS: ADDITIONAL CONTROLS

What control is required for holiday scheduling?

Incorporate an automatic Holiday Scheduling feature



This provision is included in both the NYCECC and ASHRAE 90.1

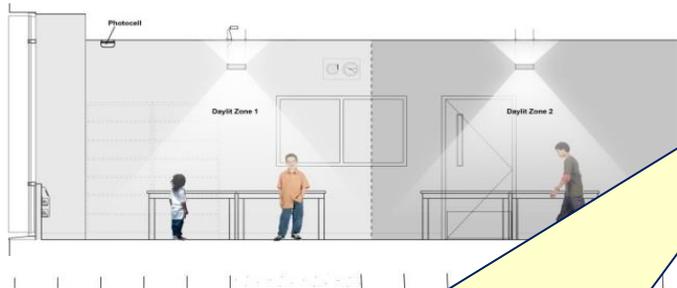
- Automatic time switch shall turn lights off for at least 24 hours, then resume normally scheduled operations
- Not required for retail stores, malls, restaurants, grocery stores, theaters, and religious facilities
- Shown in the fixture schedule and/or controls narrative



3. MANDATORY PROVISIONS: ADDITIONAL CONTROLS

What provisions are required for daylighting controls near windows?

A Daylight control zone shall be provided with individual controls to control lights independent of general area lighting

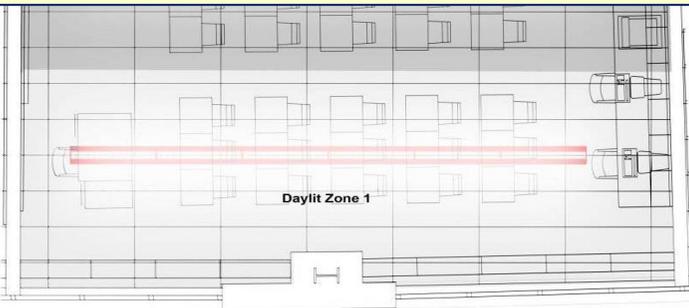


■ Daylight Zone for Vertical Fenestration

- Area adjacent to window (or other vertical fenestration) extending **15 feet** into the space, or
- Area adjacent to window extending to the nearest ceiling height opaque partition

This is NEW and only requires that the control ZONE be created AND lighting is controlled with automatic daylight control.

Lighting fixtures **adjacent to windows** may be controlled by a single device if they are not facing more than two directions



■ Daylight zones should be clearly identified

- Zoning diagrams or circuiting should identify each lighting circuit (or zone)
- Fixture schedule and/or narrative should identify method of daylight control (e.g. photosensor with daylight dimming or switching)



3. MANDATORY PROVISIONS: ADDITIONAL CONTROLS

What provisions are required for daylight responsive controls?

A Daylight control zone shall be provided with individual controls to control lights independent of general area lighting

 Sample Field Condition



- **Daylight Zone**
 - That portion of a building's interior floor area that is illuminated by natural light
- **For Sidelight Daylight Zone, the zone extends:**
 - Laterally to the nearest full height wall, or up to 1- times the height from the floor to the top of the fenestration, and
 - Longitudinally from the edge of the fenestration to the nearest full-height wall or up to 2ft, whichever is less
- **Daylight zones should be clearly identified**
 - Zoning diagrams or circuiting should identify each lighting circuit (or zone)
 - Fixture schedule and/or narrative should identify method of daylight control (e.g. photosensor with daylight dimming or switching)



3. MANDATORY PROVISIONS: ADDITIONAL CONTROLS

What provisions are required for lighting controls in daylight zones under roof fenestration?

These zones are called **Toplight Daylight Zones**

- **Daylight Zone for roof fenestration**
 - Extends laterally and longitudinally beyond the edge of the roof skylight
 - To the nearest obstruction that is taller than 0.7-times the ceiling height, or
 - Up to 0.7-times the ceiling height, whichever is less
- **Lighting fixtures under skylights must be controlled separately**
- **Daylight zones should be clearly identified**
 - Zoning diagrams or circuiting should identify each lighting circuit (or zone)
 - Fixture schedule and/or narrative should identify method of daylight control (e.g. photosensor with daylight dimming or switching)



Sample Field Condition



3. MANDATORY PROVISIONS: ADDITIONAL CONTROLS

What controls are required for hotel rooms?

Sleeping Units shall have at least one master switch at the main entry

 Sample Field Condition



- **Master switch should control:**
 - All permanently wired luminaires
 - All switched outlets
 - Capable of automatically switching off luminaires and outlets within 20 minutes after all occupants leave the room
- **Master switch is not required to control bathroom luminaires or outlets**
- **Control strategy should be documented in controls narrative and on construction drawings**



3. MANDATORY PROVISIONS: ADDITIONAL CONTROLS

Are there additional controls required for ASHRAE 90.1?

These additional provisions exist in ASHRAE:

- Receptacles should be automatically controlled (8.4.2):
 - At least 50% of all 125-volt 15- and 20-amp receptacles in all private offices, conference rooms, rooms used primarily for printing and/or copying functions, break rooms, classrooms, and individual workstations
 - At least 25% of branch circuit feeders installed for modular furniture not shown on the construction documents
- Mandatory parking garage lighting controls are required (9.4.1.2)
- All supplemental task lighting shall be controlled by a control integral to the luminaires or by a readily accessible wall-mounted control device (9.4.1.3(c))
- RCR (Room Cavity Ratio) may be implemented to calculate Room Geometry Adjustment when using the Space-by-Space Method (9.6.4)

Only ASHRAE regulates controls for task lighting.
The NYCECC has no similar requirement.

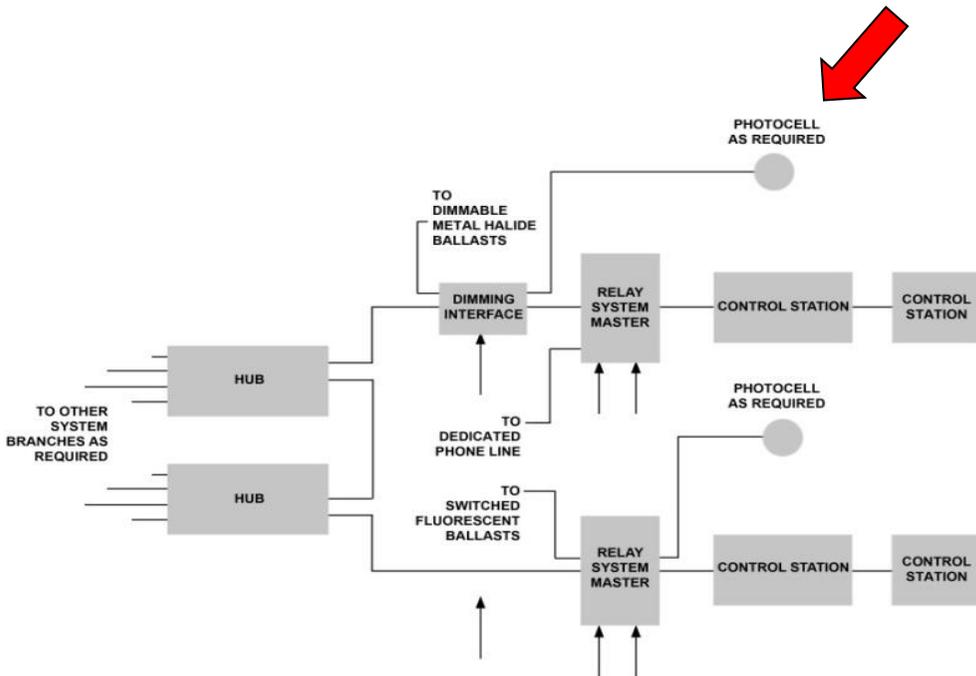


3. MANDATORY PROVISIONS: EXTERIOR CONTROLS

What mandatory controls are required for exterior lighting?



Sample Documentation



- Lighting must be controlled via photosensor and/or automatic timeclock
- If designed for use during daylight hours (dawn-to-dusk) the lighting shall be controlled by a combination of photosensor and time switch or an astronomical time switch
- Light reduction controls for exterior lighting are required as per C405.2.5



3. MANDATORY PROVISIONS: EXTERIOR CONTROLS

What mandatory controls are required for exterior lighting?



Sample Documentation



- Lighting must be controlled via **photosensor and/or automatic timeclock**
- If designed for use during daylight hours (dawn-to-dusk) the lighting shall be controlled by a combination of photosensor and time switch or an astronomical time switch
- Light reduction controls for exterior lighting are required as per C405.2.5



3. MANDATORY PROVISIONS: EXIT SIGNS

What is required for exit signs?



Sample Field Condition



- Internally illuminated exit signs shall not exceed 5 watts per face



3. MANDATORY PROVISIONS: METERING REQUIREMENTS

What is required for metering in ASHRAE?

- **Electrical Energy Monitoring** requires that the electric load in the total building and each individual tenant space, have a submeter on the following electric loads:
 - Total electrical energy
 - HVAC systems
 - Interior lighting
 - Exterior lighting
 - Receptacle circuits
- **Whole building energy monitoring** requires that each fuel use (i.e. natural gas, fuel oil, chilled water, purchased steam) is monitored at the building
- Each tenant space greater than 10,000 square feet in a new building that is greater than 50,000 square feet shall be equipped with a separate meter or sub-meter to measure the electrical consumption



4. INTERIOR LIGHTING

Slides 71 to 107



4. INTERIOR LIGHTING: OVERVIEW

In this section you will learn about:

- Calculating connected lighting power;
- Determining power for track;
- Determining power for low-voltage lighting;
- Interior lighting power densities (LPD);
- Additional lighting power allowances (LPS);
- Exceptions;
- Compliance paths; and
- Differences between the NYCECC and ASHRAE 90.1.



4. INTERIOR LIGHTING: POWER

How is interior lighting power calculated for the energy analysis?

- The installed interior lighting power for the Energy Analysis shall include all power used by the luminaire, including lamps, ballast or transformer, and control devices
 - Document the system wattage, including lamp and ballast (or transformer), of permanently installed luminaires
 - For Line-voltage track lighting use either:
 - the specified wattage of the luminaires shown on the track, but 30W/linear ft. minimum;
 - the wattage limit of a current-limiting device; or
 - the limit of the circuit breaker.
 - Use the specified voltage of the transformer supplying the luminaires for low-voltage systems with a remote transformer
 - Use the wattage identified on manufacturer's data or the maximum wattage labeled on the fixture for all other lighting



4. INTERIOR LIGHTING: CONNECTED LIGHTING POWER

How are system watts determined?

- System watts per fixture includes the lamp and the ballast draw
 - If you have a 2'- 0" x 4'- 0" recessed fixture with (2) 32W T8 linear fluorescent lamps, what are the total fixture watts?



Sample Documentation

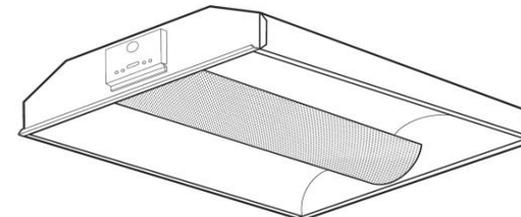
2AV 2'x2'

ORDERING INFORMATION For shortest lead times, configure product using **standard options (shown in bold)**.
Example: 2AV G 2 17 MDR MVOLT GEB10IS

2AV Series 2AV 2' wide	17 Lamp type 17 17W T8 (24")	MVOLT² 347 Others available.	Options
Trim type G Grid trim ST Screw slot	Number of lamps 1 2 3 Not included.	Diffuser	GEB10IS Electronic ballast, ≤ 10% THD, instant start ALG Acrylic litter guard ¹ EL14 Emergency battery pack (nominal 1400 lumens) GLR Internal fast-blow fuse ³ LP Lamped. Specify lamp type and color PWS1836 6' prewire, 3/8" dia., 18-gauge, 3 wires NY3 New York City approved CP Chicago Plenum approved APB Air pattern control blades (air only) ¹ Reflector option ASR Aluminum stepped reflector
Air function (blank) Static (no air function) A Air return/supply	Accessories Order as separate catalog number. DGA22 Drywall ceiling adapter, unit installation. Use G trim plus DGA accessory for fixture trim flange and fixture support in plaster or plasterboard ceilings.	MDR Metal diffuser, round holes SBL Straight blade louver, round holes MDM Metal diffuser, mini slots ADP Acrylic diffuser, linear prismatic lens MDC Metal diffuser, round holes with large center slots ¹ Others available.	

NOTES:
1 Refer to options and accessories section for more detailed information.
2 MVOLT (120 - 277 volt).
3 Must specify voltage, 120 or 277.

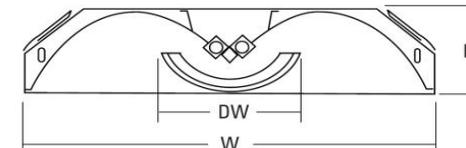
Fluorescent Sheet #: 2AV 2X2 T8 ARCH-230



Linear Fluorescent
T8
1, 2 or 3 lamps

Specifications

Length: 24" (602)
Width: 24" (602)
Diffuser Width: 8" (203)
Depth: 5-1/2" (140)



All dimensions are inches (millimeters).



4. INTERIOR LIGHTING: CONNECTED LIGHTING POWER

Where is the information for the ballast draw found?

F32T8

• Low Profile Designs Featured

• Instant & Programmed Rapid Starting Options

• 2 Lamp Applications

TRIAD® ELECTRONIC BALLASTS

FOR (2) F32T8 LAMPS

Lamp Qty.	Starting Method	Line Volts	Catalog Number	Certification	Line Current (Amps)	Input Power (Watts)	Power Factor (PF)	Ballast Factor (BF)	Ballast Efficacy Factor (BEF)	THD %	Min. FC Start Temp	Wiring Diag.	Dim.	
Fluorescent-Electronic														
120	B2321120L-A	•	•	•	0.44	51	> 95	0.78	1.53	< 20	0-18	3	-A	
277	B2321277L-A	•	•	•	0.19	51	> 95	0.78	1.53	< 20	0-18	3	-A	
347	B2321347L-A	•	•	•	0.15	51	> 98	0.78	1.53	< 20	0-18	3	-A	
120	B2321120RES-A*	•	•	•	0.80	56	> 50	0.88	1.57	< 120	0-18	3	-A	
120	B2321120RES-G*	•	•	•	0.80	56	> 50	0.88	1.57	< 150	0-18	3	-G	
120	B2321120RH-A	•	•	•	0.49	58	> 98	0.88	1.52	< 20	0-18	3	-A	
277	B2321277RH-A	•	•	•	0.22	58	> 98	0.88	1.52	< 20	0-18	3	-A	
347	B2321347RH-A	•	•	•	0.17	58	> 99	0.88	1.52	< 20	0-18	3	-A	
120	B2321120RHH-A	•	•	•	0.66	77	> 98	1.18	1.53	< 20	0-18	3	-A	
277	B2321277RHH-A	•	•	•	0.29	77	> 98	1.18	1.53	< 20	0-18	3	-A	
347	B2321347HPL	•	•	•	0.14	50	> 99	0.78	1.56	< 10	0-18	3	ST	
2	PAR-IS	120	B2321UNVHP-B	•	•	0.47	56	> 99	0.88	1.57	< 10	0-18	3	-B
277	B2321277HP-A	•	•	•	0.19	55	> 99	0.88	1.60	< 10	0-18	3	-A	
347	B2321347HP-A	•	•	•	0.17	58	> 99	0.88	1.52	< 10	0-18	3	-A	
120	B2321UNV-C	•	•	•	0.48	58	> 98	0.88	1.52	< 10	0-18	3	ST	
277	B2321277V-C	•	•	•	0.20	56	> 98	0.88	1.57	< 10	0-18	21	-C	
120	B2321UNVEL-A	•	•	•	0.40	48	> 95	0.77	1.60	< 10	0-18	3	-A	
277	B2321277EL	•	•	•	0.17	47	> 98	0.77	1.64	< 10	0-18	3	ST	
120	B2321120EL	•	•	•	0.40	47	> 98	0.77	1.64	< 10	0-18	3	ST	
277	B2321277EL	•	•	•	0.18	47	> 98	0.77	1.64	< 10	0-18	3	ST	
120	B2321UNVHE-A	•	•	•	0.45	55	> 95	0.87	1.58	< 10	0-18	3	-A	
277	B2321277HE	•	•	•	0.20	54	> 95	0.87	1.61	< 10	0-18	3	-A	
120	B2321UNVHEH-A	•	•	•	0.62	74	> 95	1.18	1.62	< 10	0-18	3	-A	
277	B2321277HEH-A	•	•	•	0.26	73	> 95	1.18	1.62	< 10	0-18	3	-A	
120	B2321120HE	•	•	•	0.45	54	> 98	0.87	1.61	< 10	0-18	3	ST	
277	B2321277HE	•	•	•	0.20	53	> 98	0.87	1.64	< 10	0-18	3	ST	
347	B2321347HE	•	•	•	0.22	76	> 97	1.22	1.61	< 10	0-18	46	-E	
480	B3321HRVHB-E	•	•	•	0.17	76	> 90	1.22	1.61	< 10	0-18	46	-E	
2	SER-IS	120	ES1608A	•	•	0.48	57	> 97	0.87	1.53	< 10	0-18	39	ESA
277	B3321277L-A	•	•	•	0.21	56	> 97	0.87	1.55	< 10	0-18	6	-A	
120	B3321120L-A	•	•	•	0.51	58	> 95	0.92	1.59	< 25	0-18	6	-A	
277	B3321277L-A	•	•	•	0.21	61	> 98	0.92	1.51	< 20	0-18	6	-A	
347	B3321347L-A	•	•	•	0.16	56	> 99	0.87	1.55	< 20	0-18	6	ST	
120	B3321120RH-A	•	•	•	0.59	69	> 95	1.03	1.49	< 25	0-18	6	-A	
277	B3321277RH-A	•	•	•	0.26	69	> 95	1.04	1.51	< 25	0-18	6	-A	
347	B3321347RH	•	•	•	0.19	65	> 95	0.99	1.52	< 20	0-18	6	ST	
347	B3321347HPL	•	•	•	0.16	56	> 99	0.87	1.55	< 10	0-18	6	ST	
120	B3321UNVHP-A	•	•	•	0.53	63	> 99	0.99	1.57	< 10	0-18	6	-A	
277	B3321277HP-A	•	•	•	0.24	58	> 95	0.99	1.50	< 10	0-18	6	ST	
120	B3321UNVEL-A	•	•	•	0.48	57	> 99	0.89	1.56	< 10	0-18	6	-A	
277	B3321277V-C	•	•	•	0.21	56	> 97	0.89	1.59	< 10	0-18	6	-A	
120	B3321120EL	•	•	•	0.45	53	> 98	0.86	1.62	< 10	0-18	6	ST	
277	B3321277EL	•	•	•	0.20	55	> 98	0.87	1.58	< 10	0-18	6	ST	
120	B3321UNVHE-A	•	•	•	0.53	64	> 99	0.99	1.55	< 10	0-18	6	-A	
277	B3321277HE	•	•	•	0.23	63	> 98	0.99	1.57	< 10	0-18	6	-A	
120	B3321120HE	•	•	•	0.50	60	> 98	0.96	1.60	< 10	0-18	6	ST	
277	B3321277HE	•	•	•	0.23	61	> 98	1.01	1.66	< 10	0-18	6	ST	
120	B3321UNVHEH-A1	•	•	•	0.69	83	> 95	1.27	1.53	< 10	0-18	6	-A	
277	B3321277HEH-A1	•	•	•	0.30	81	> 95	1.27	1.57	< 10	0-18	6	-A	
120	B2321UNVVEL-A	•	•	•	0.40	47	> 90	0.71	1.51	< 10	0-18	30	-A	
277	B2321277V-C	•	•	•	0.17	46	> 90	0.71	1.54	< 10	0-18	30	-A	
120	B2321UNVHE-A	•	•	•	0.47	56	> 90	0.88	1.57	< 10	0-18	30	-A	
277	B2321277V-C	•	•	•	0.20	55	> 90	0.88	1.60	< 10	0-18	30	-A	
120	B2321UNVHP-A	•	•	•	0.52	62	> 99	0.99	1.42	< 10	0-18	30	-A	
277	B2321277V-C	•	•	•	0.22	60	> 98	0.88	1.47	< 10	0-18	30	-A	

* For Residential Use Only
1 Consult lamp manufacturers

See page 2-23 for Dimensions and Wiring Diagrams

- System watts per fixture includes the lamp and the ballast draw
- Example:
 - If you have a 2'- 0" x 4'- 0" recessed fixture with (2) 32W T8 linear fluorescent lamps, what are the total fixture watts?
 - Identify quantity of lamps
 - Identify voltage
 - Identify desired ballast factor
 - Identify system watts using ballast manufacturers (also referred to as input wattage or operating wattage depending on manufacturer charts)



4. INTERIOR LIGHTING: CONNECTED LIGHTING POWER

Where is the information for the ballast draw found?

277	B232I277RHH-A	•	•	0.29	77	> .98	1.18	1.53	< 20	0/-18	3	-A
347	B232I347HPL	•	•	0.14	50	> .99	0.78	1.56	< 10	0/-18	3	ST
2	PAR-IS											
120	B232IUNVHP-B	•	•	0.47	56	> .99	0.88	1.57	< 10	0/-18	3	-B
277	B232I347HP-A	•	•	0.19	55	> .99	0.88	1.60	< 10	0/-18	3	-A
347	B232I347HP-A	•	•	0.17	58	> .99	0.88	1.52	< 10	0/-18	3	-A
120	B232IUNV-C	•	•	0.48	58	> .98	0.88	1.52	< 10	0/-18	21	-C
277	B232IUNV-C	•	•	0.20	56	> .98	0.88	1.57	< 10	0/-18	21	-C

- 1. Quantity of lamps = 2
- 2. Voltage = 120v
- 3. Ballast Factor = 0.88
- 4. System Watts = 58W

Note: For a two lamp fixture the draw could be as high as 77W for a 1.18 ballast factor and low as 56W for a 0.88 ballast factor ballast. It can be important to note the ballast factor on the ballast description.

Identify the number of lamps, ballast factor, and voltage. The input wattage is 58W in this case, not 64W as might be intuited – this can be significant for large buildings with repeating fixture types. Designers use ballast factors to fine-tune illuminance vs. power usage balance.



4. INTERIOR LIGHTING: CONNECTED LIGHTING POWER

How are system watts on site verified?

Sample Documentation:

CT5 — RECESSED CONTINUOUS TWO LAMP 32 WATT T8 FLUORESCENT WALL WASHER LUMINAIRE (58w) (.88BF)

Sample Field Condition:

- Calculate
 - Voltage x Current (see ballast) x Power Factor (see ballast) = Input Watts
- Measure
 - Use a watt meter

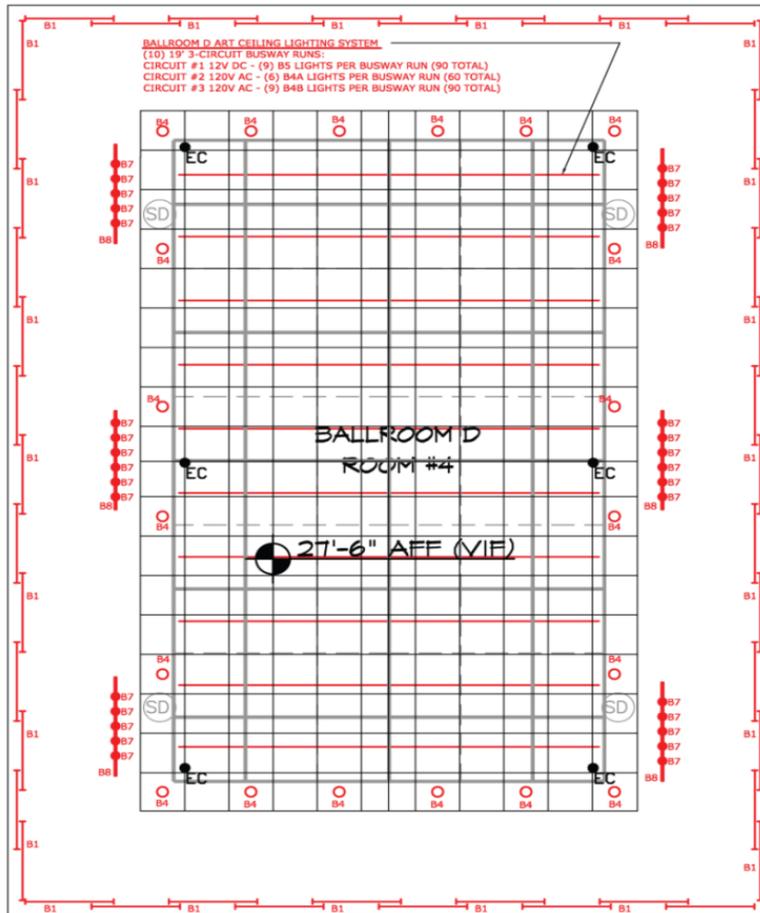


4. INTERIOR LIGHTING: DETERMINING POWER FOR TRACK

How many ways can the power for the installed track be determined?



Sample Documentation:



- **Wattage of circuit breaker**
 - Check the electrical panel schedules
- **Wattage of track limiting device**
 - Check lighting fixture schedule for inclusion of track limiting device
- **Wattage of luminaires on track**
 - Check drawing for length of track, quantity of fixtures and specification or legend for wattage
 - Minimum 30w/lin. ft. regardless of number of luminaires shown on track

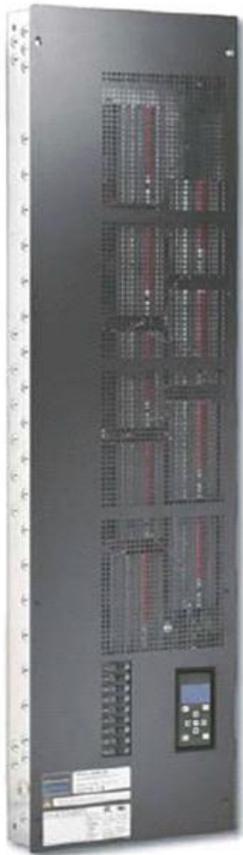


4. INTERIOR LIGHTING: DETERMINING POWER FOR TRACK

How many ways can the power for the installed track be determined?



Sample Field Condition:



- **Wattage of circuit breaker**
 - Check circuit breaker at panel
- **Wattage of track limiting device**
 - Check lighting fixture schedule for inclusion of track limiting device
- **Wattage of luminaires on track**
 - Check drawing for length of track, quantity of fixtures and specification or legend for wattage
■ Maximum 30w/lin. ft. regardless of number of fixtures shown on track

For Progress Inspectors: Check at panel, look at end of track or count fixtures.



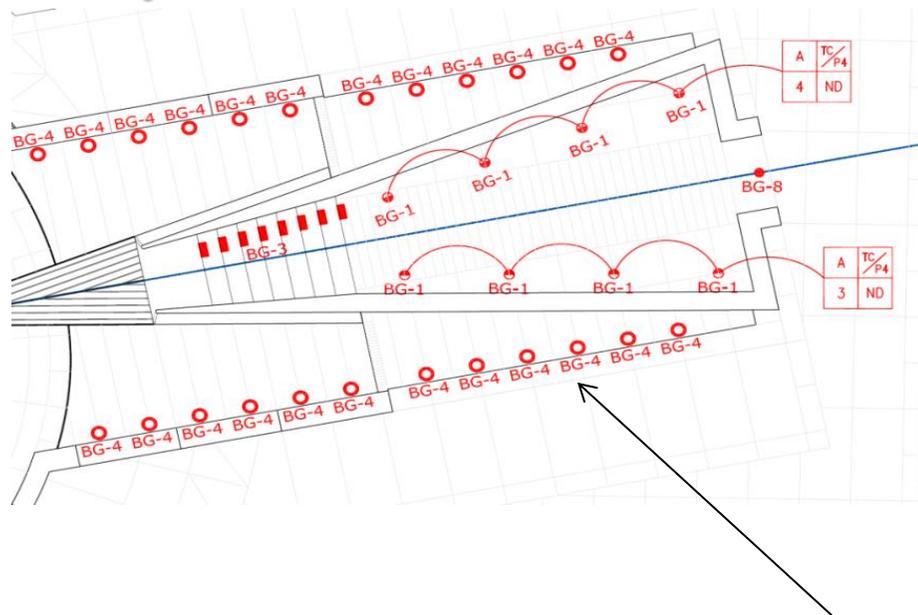
4. INTERIOR LIGHTING: DETERMINING POWER FOR LOW-VOLTAGE LIGHTING

How is the power for low-voltage lighting determined?

Power for low-voltage lighting is determined by the wattage of the transformer.



Sample Documentation:



BG-4 ○

UNDERWATER NICHE MOUNTED 50 WATT MR16 LOW VOLTAGE TUNGSTEN HALOGEN ADJUSTABLE ACCENT LIGHT [REMOTE 120/12V TRANSFORMER] [60VA]

- **Integral transformer**
 - Single transformer for single-fixture
 - Typical of recessed downlights and some track fixtures
- **Remote transformer**
 - Remote transformers may feed a single fixture or multiple fixtures
 - Maximum wattage is listed on the transformer or on the transformer cut-sheet
 - May be used for fountain lighting, in-grade lighting or wall mounted lighting, track lighting, etc.



4. INTERIOR LIGHTING: DETERMINING POWER FOR LOW-VOLTAGE LIGHTING

How is the power for low-voltage lighting determined?

The connected load for low-voltage lighting is determined by the wattage of the transformer.



Sample Documentation:

Integral



Remote



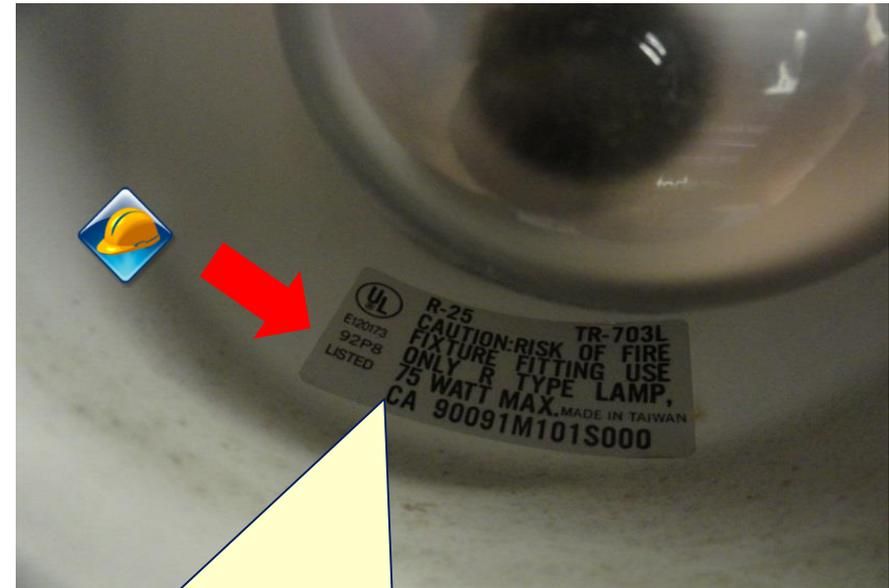
- **Integral transformer**
 - Single transformer for single-fixture
 - Typical of recessed downlights and some track fixtures
- **Remote transformer**
 - Remote transformers may feed a single fixture or multiple fixtures
 - Maximum wattage is listed on the transformer or on the transformer cut-sheet
 - May be used for fountain lighting, in-grade lighting or wall mounted lighting, track lighting, etc.



4. INTERIOR LIGHTING: DETERMINING POWER FOR OTHER FIXTURES

How is the power for all other fixtures determined?

Determined either by manufacturer's data or maximum wattage labeled on fixture.



“Other fixtures” will generally be screw-based luminaires (compact fluorescent, tungsten/halogen, or incandescent). For LEDs, total draw can be deceptive – assume the maximum wattage listed on the luminaire.



4. INTERIOR LIGHTING: LIGHTING POWER ALLOWANCES (LPA)

With all of this information, how do you confirm LPA?

Sample COMcheck:

Compare the
Allowed Watts
with the
Proposed Watts

Allowed Interior Lighting Power

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B X C)
1-Common Space Types:Office - Open Plan	32400	0.90	29160
Total Allowed Watts =			29160

Proposed Interior Lighting Power

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
1-Common Space Types:Office - Open Plan				
LED 1: LED MR 4W:	5	70	40	2800
Halogen 1: Halogen 90W:	4	50	30	1500
Halogen 2: Halogen 80W:	8	30	30	900
Halogen 3: Halogen 120W:	4	60	60	3600
LED 2: LED PAR 20W:	7	80	50	4000
LED 3: LED Linear 22W:	6	100	70	7000
LED 4: LED Panel 70W:	6	35	70	2450
LED 5: LED PAR 18W:	7	50	60	3000
Total Proposed Watts =				25250



Progress Inspectors:
Check areas and
compare against the
submitted schedule for
a minimum of 15%.



4. INTERIOR LIGHTING: ADDITIONAL LPAs

What happens to all of the additional wattage allowances?

Allowances only for lighting equipment installed specifically for merchandising, circuited separately from general lighting.

Additional power allowances are allowed for only one space type – Retail.

Additional allowances are allowed on top of base allowances – retail area(s) must be known in order to calculate for compliance, AND sales area must be considered separately from other space types.



500W +

- **+ Retail Area 4**
 - Jewelry, Crystal, China
 - (Area x 2.5w/sq.ft.)
- **+ Retail Area 3**
 - Furniture, Clothing, Cosmetics, Artwork
 - (Area x 1.4 w/sq.ft.)
- **+ Retail Area 2**
 - Vehicles, Sporting Goods, Small Electronics
 - (Area x 0.6 w/sq.ft.)
- **+ Retail Area 1**
 - All other products not identified above
 - (Area x 0.6 w/sq.ft.)

Note: The w/sq.ft. allowances are cumulative if the building has mixed merchandise but the 500W is only counted once per building.



4. INTERIOR LIGHTING: EXCEPTIONS TO LPAs

Are there spaces that do not need to be included in the total load?

- Professional sports arenas and playing field lighting
- Sleeping unit in hotels, motels, boarding house, or similar
- Emergency lighting automatically off during normal building operation
- Spaces designed for people with special needs, including visual impairment, age-related, or other medical issues
- Registered interior historic landmarks
- Casino gaming areas
- Mirror lighting in dressing rooms
- Task lighting for medical & dental purposes (additional to general lighting)
- Display lighting for exhibits in galleries, museums, and monuments, that is in addition to general lighting
- Theatrical including performance, stage, film production, and video production



4. INTERIOR LIGHTING: EXCEPTIONS TO LPAs

Additional spaces that can be excluded.

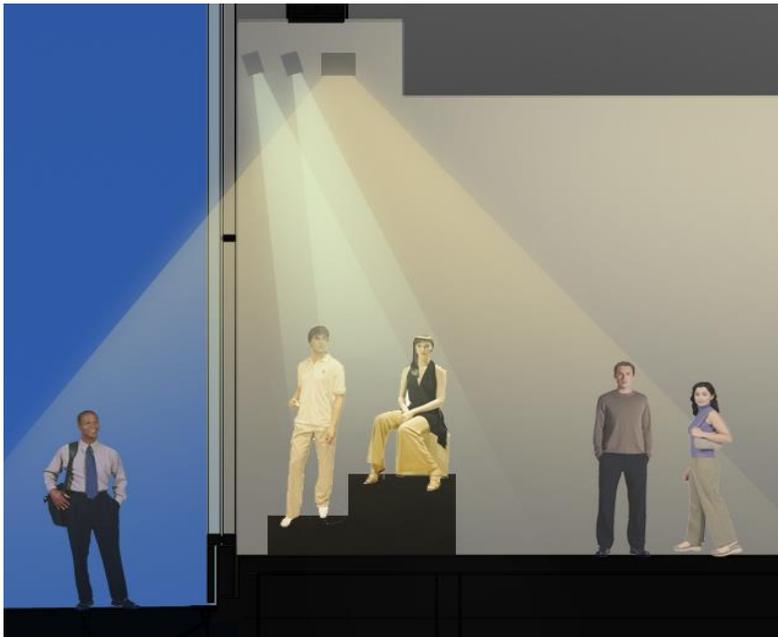
- Photographic processes
- Integral equipment lighting installed by the manufacturer (i.e. vending machine)
- Task lighting for plant growth or maintenance
- Advertising signage or direction signage
- Food warming lighting or lighting integral to food preparation equipment
- Lighting that is for sale
- Lighting for educational demonstrations
- Lighting approved because of safety or emergency considerations
- Integral freezer or refrigerator case lighting
- Retail window displays enclosed by a full height partition
- Furniture mounted supplemental task light that has automatic shut-off
- Exit signs



4. INTERIOR LIGHTING: EXCEPTIONS IN ASHRAE 90.1

How do NYCECC and ASHRAE 90.1 compare on interior power?

Interior lighting power calculations are similar, but not identical, between NYCECC & ASHRAE 90.1



- **ASHRAE 90.1 Exception:**
 - For two or more lighting systems capable of being controlled to prevent simultaneous use, the lighting power can be based on the lighting system with the highest wattage (the lower wattage system is excluded from the calculation)



4. INTERIOR LIGHTING: CALCULATING TOTAL LOAD DENSITY EXERCISE

Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

- Steps:**
1. Determine areas
 2. Determine total interior connected load
 3. Determine lighting power allowance
 4. Determine compliance

Interior Lighting Power Allowance Worksheet

Area Description	Area or Linear Feet	Power Allowance (from C405.4.2(1))	Additional Interior Power Allowances (i.e. Retail)	Total Power Allowance ((area x LPA) + additional)
Retail – entire store				
Building Totals		sq. ft.		W

Additional Power Allowances:

- | | | |
|---------------|---------------------|--|
| Retail Area 1 | 500 W + 0.6 W/sq.ft | Floor area for all products not listed in Retail Area 2, 3 or 4. |
| Retail Area 2 | 500 W + 0.6 W/sq.ft | Floor area used for the sales of vehicles, sporting goods and small electronics. |
| Retail Area 3 | 500 W + 1.4 W/sq.ft | Floor area used for the sale of furniture, clothing, cosmetics and artwork. |
| Retail Area 4 | 500 W + 2.5 W/sq.ft | Floor area used for the sale of jewelry, crystal, and china. |



4. INTERIOR LIGHTING: CALCULATING TOTAL LOAD DENSITY EXERCISE

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Interior Lighting Power Allowance Worksheet

Area Description	Area or Linear Feet	Power Allowance (from C405.4.2(1))	Additional Interior Power Allowances (i.e. Retail)	Total Power Allowance ((area x LPA) + additional)
Retail – entire store	1936			
Building Totals	sq. ft.			W

Additional Power Allowances:

- | | | |
|---------------|---------------------|--|
| Retail Area 1 | 500 W + 0.6 W/sq.ft | Floor area for all products not listed in Retail Area 2, 3 or 4. |
| Retail Area 2 | 500 W + 0.6 W/sq.ft | Floor area used for the sales of vehicles, sporting goods and small electronics. |
| Retail Area 3 | 500 W + 1.4 W/sq.ft | Floor area used for the sale of furniture, clothing, cosmetics and artwork. |
| Retail Area 4 | 500 W + 2.5 W/sq.ft | Floor area used for the sale of jewelry, crystal, and china. |



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Retail facilities	
In a dressing/fitting room	0.71
In a mall concourse	1.1
Sports arena- playing area	
For a Class I facility	3.68

Table C405.4.2(2)
Interior Lighting Power Allowances:
Space-By-Space Method

Common Space Types	LPD (W/ft ²)
Atrium	
Less than 40 feet in height	0.03 per foot In total height
Greater than 40 feet in height	0.40 + 0.02 per foot In total height
Audience seating area	
In an auditorium	0.63
In a convention center	0.82
In a gymnasium	0.65
In a motion picture theater	1.14
In a penitentiary	0.28
In a performing arts theater	2.43
In a religious building	1.53
In a sports arena	0.43
Otherwise	0.43
Banking activity area	1.01
Breakroom (See Lounge/Breakroom)	
Classroom/lecture hall/training room	
In a penitentiary	1.34
Otherwise	1.24
Conference/meeting/multipurpose room	1.23
Copy/print room	0.72
Corridor	
In a facility for the visually impaired (and not used primarily by the staff)	0.92
In a hospital	0.79
In a manufacturing facility	0.41
Otherwise	0.66
Courtroom	1.72
Computer room	1.71
Dining area	
In a penitentiary	0.96
In a facility for the visually impaired (and not used primarily by the staff)	1.9
In bar/lounge or leisure dining	1.07
In cafeteria or fast food dining	0.65
In family dining	0.89
Otherwise	0.65



4. INTERIOR LIGHTING: CALCULATING TOTAL LOAD DENSITY EXERCISE

Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

- Steps:**
1. Determine areas
 2. Determine total interior connected load
 3. Determine lighting power allowance
 4. Determine compliance

Interior Lighting Power Allowance Worksheet

Area Description	Area or Linear Feet	Power Allowance (from C405.4.2(1))	Additional Interior Power Allowances (i.e. Retail)	Total Power Allowance ((area x LPA) + additional)
Retail – entire store	1936	1.1		
Building Totals	sq. ft.			W

Additional Power Allowances:

- | | | |
|---------------|---------------------|--|
| Retail Area 1 | 500 W + 0.6 W/sq.ft | Floor area for all products not listed in Retail Area 2, 3 or 4. |
| Retail Area 2 | 500 W + 0.6 W/sq.ft | Floor area used for the sales of vehicles, sporting goods and small electronics. |
| Retail Area 3 | 500 W + 1.4 W/sq.ft | Floor area used for the sale of furniture, clothing, cosmetics and artwork. |
| Retail Area 4 | 500 W + 2.5 W/sq.ft | Floor area used for the sale of jewelry, crystal, and china. |



4. INTERIOR LIGHTING: CALCULATING TOTAL LOAD DENSITY EXERCISE

Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

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1. Determine areas
 2. Determine total interior connected load
 3. Determine lighting power allowance
 4. Determine compliance

Interior Lighting Power Allowance Worksheet

Area Description	Area or Linear Feet	Power Allowance (from C405.4.2(1))	Additional Interior Power Allowances (i.e. Retail)	Total Power Allowance ((area x LPA) + additional)
Retail – entire store	1936	1.1		2129.6
Building Totals	sq. ft.			W

Additional Power Allowances:

- | | | |
|---------------|---------------------|--|
| Retail Area 1 | 500 W + 0.6 W/sq.ft | Floor area for all products not listed in Retail Area 2, 3 or 4. |
| Retail Area 2 | 500 W + 0.6 W/sq.ft | Floor area used for the sales of vehicles, sporting goods and small electronics. |
| Retail Area 3 | 500 W + 1.4 W/sq.ft | Floor area used for the sale of furniture, clothing, cosmetics and artwork. |
| Retail Area 4 | 500 W + 2.5 W/sq.ft | Floor area used for the sale of jewelry, crystal, and china. |



4. INTERIOR LIGHTING: CALCULATING TOTAL LOAD DENSITY EXERCISE

Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

- Steps:**
1. Determine areas
 2. Determine total interior connected load
 3. Determine lighting power allowance
 4. Determine compliance

Interior Lighting Power Allowance Worksheet

Area Description	Area or Linear Feet	Power Allowance (from C405.4.2(1))	Additional Interior Power Allowances (i.e. Retail)	Total Power Allowance ((area x LPA) + additional)
Retail – entire store	1936	1.1		2129.6
Floor area used for retail			500W	
Building Totals	sq. ft.			W

Additional Power Allowances:

- Retail Area 1 500 W + 0.6 W/sq.ft Floor area for all products not listed in Retail Area 2, 3 or 4.
- Retail Area 2 500 W + 0.6 W/sq.ft Floor area used for the sales of vehicles, sporting goods and small electronics.
- Retail Area 3 500 W + 1.4 W/sq.ft Floor area used for the sale of furniture, clothing, cosmetics and artwork.
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Area Description	Area or Linear Feet	Power Allowance (from C405.4.2(1))	Additional Interior Power Allowances (i.e. Retail)	Total Power Allowance ((area x LPA) + additional)
Retail – entire store	1936	1.1		2129.6
Floor area used for retail	814		500W	
Building Totals	sq. ft.			W

Additional Power Allowances:

- Retail Area 1 500 W + 0.6 W/sq.ft Floor area for all products not listed in Retail Area 2, 3 or 4.
- Retail Area 2 500 W + 0.6 W/sq.ft Floor area used for the sales of vehicles, sporting goods and small electronics.
- Retail Area 3 500 W + 1.4 W/sq.ft Floor area used for the sale of furniture, clothing, cosmetics and artwork.
- Retail Area 4 500 W + 2.5 W/sq.ft Floor area used for the sale of jewelry, crystal, and china.



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Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

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 3. Determine lighting power allowance
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Interior Lighting Power Allowance Worksheet

Area Description	Area or Linear Feet	Power Allowance (from C405.4.2(1))	Additional Interior Power Allowances (i.e. Retail)	Total Power Allowance ((area x LPA) + additional)
Retail – entire store	1936	1.1		2129.6
Floor area used for retail	814		500W 1.4w/sq.ft.	
Building Totals	sq. ft.			W

Additional Power Allowances:

- Retail Area 1 500 W + 0.6 W/sq.ft Floor area for all products not listed in Retail Area 2, 3 or 4.
- Retail Area 2 500 W + 0.6 W/sq.ft Floor area used for the sales of vehicles, sporting goods and small electronics.
- Retail Area 3 500 W + 1.4 W/sq.ft Floor area used for the sale of furniture, clothing, cosmetics and artwork.**
- Retail Area 4 500 W + 2.5 W/sq.ft Floor area used for the sale of jewelry, crystal, and china.



4. INTERIOR LIGHTING: CALCULATING TOTAL LOAD DENSITY EXERCISE

Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

- Steps:**
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Interior Lighting Power Allowance Worksheet

Area Description	Area or Linear Feet	Power Allowance (from C405.4.2(1))	Additional Interior Power Allowances (i.e. Retail)	Total Power Allowance ((area x LPA) + additional)
Retail – entire store	1936	1.1		2129.6
Floor area used for retail	814		500W 1.4w/sq.ft.	500 1139.6
Building Totals	2,750 sq. ft.			3769.2 W

Additional Power Allowances:

- Retail Area 1 500 W + 0.6 W/sq.ft Floor area for all products not listed in Retail Area 2, 3 or 4.
- Retail Area 2 500 W + 0.6 W/sq.ft Floor area used for the sales of vehicles, sporting goods and small electronics.
- Retail Area 3 500 W + 1.4 W/sq.ft Floor area used for the sale of furniture, clothing, cosmetics and artwork.**
- Retail Area 4 500 W + 2.5 W/sq.ft Floor area used for the sale of jewelry, crystal, and china.



4. INTERIOR LIGHTING: CALCULATING TOTAL LOAD DENSITY EXERCISE

Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

- Steps:**
1. Determine areas
 2. Determine total interior connected load
 3. Determine lighting power allowance
 4. Determine compliance

Interior Lighting Power Schedule Worksheet

Fixture ID	Luminaire Description (including fixture type, lamp, ballast, system watts)	# of Lamps per Fixture	Fixture Watts (system watts)	# of Fixtures	Total Watts
TOTALS					W



4. INTERIOR LIGHTING: CALCULATING TOTAL LOAD DENSITY EXERCISE

Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

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Interior Lighting Power Schedule Worksheet

Fixture ID	Luminaire Description (including fixture type, lamp, ballast, system watts)	# of Lamps per Fixture	Fixture Watts (system watts)	# of Fixtures	Total Watts
C1	26W CFL downlight	1			
TOTALS					W



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Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

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 4. Determine compliance

Interior Lighting Power Schedule Worksheet

Fixture ID	Luminaire Description (including fixture type, lamp, ballast, system watts)	# of Lamps per Fixture	Fixture Watts (system watts)	# of Fixtures	Total Watts
C1	26W CFL downlight	1	28w	2	56
TOTALS					W



4. INTERIOR LIGHTING: CALCULATING TOTAL LOAD DENSITY EXERCISE

Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

- Steps:**
1. Determine areas
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Interior Lighting Power Schedule Worksheet

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C1	26W CFL downlight	1	28w	2	56
C3	(2) 32WT8 recessed 1x4	2			
TOTALS					W



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Fixture ID	Luminaire Description (including fixture type, lamp, ballast, system watts)	# of Lamps per Fixture	Fixture Watts (system watts)	# of Fixtures	Total Watts
C1	26W CFL downlight	1	28w	2	56
C3	(2) 32WT8 recessed 1x4	2	58w	12	696
TOTALS					W



4. INTERIOR LIGHTING: CALCULATING TOTAL LOAD DENSITY EXERCISE

Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

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C1	26W CFL downlight	1	28w	2	56
C3	(2) 32WT8 recessed 1x4	2	58w	12	696
C4	(2) 32WT8 8'-0" stacklight	2	58w	2	116
TOTALS					W



4. INTERIOR LIGHTING: CALCULATING TOTAL LOAD DENSITY EXERCISE

Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

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C1	26W CFL downlight	1	28w	2	56
C3	(2) 32WT8 recessed 1x4	2	58w	12	696
C4	(2) 32WT8 8'-0" stacklight	2	58w	2	116
C5	(2) 32WT8 recessed 2x4	2	58w	3	174
TOTALS					W



4. INTERIOR LIGHTING: CALCULATING TOTAL LOAD DENSITY EXERCISE

Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

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C1	26W CFL downlight	1	28w	2	56
C3	(2) 32WT8 recessed 1x4	2	58w	12	696
C4	(2) 32WT8 8'-0" stacklight	2	58w	2	116
C5	(2) 32WT8 recessed 2x4	2	58w	3	174
C6	20WMH MR16 track light	1	26w	19	494
TOTALS					W



4. INTERIOR LIGHTING: CALCULATING TOTAL LOAD DENSITY EXERCISE

Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

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C3	(2) 32WT8 recessed 1x4	2	58w	12	696
C4	(2) 32WT8 8'-0" stacklight	2	58w	2	116
C5	(2) 32WT8 recessed 2x4	2	58w	3	174
C6	20WMH MR16 track light	1	26w	19	494
C6	30W/lin. ft. track	NA	30w	67.8	2034
TOTALS					W



4. INTERIOR LIGHTING: CALCULATING TOTAL LOAD DENSITY EXERCISE

Objective: Does the lighting for Park Place Shoes and Handbags comply with 2016 NYCECC?

- Steps:
1. Determine areas
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 4. Determine compliance

The proposed Total Watts (3,076 w) is in compliance because it is less than the Total Power Allowance (3,769.2 w).

Interior Lighting Power Schedule Worksheet

Fixture ID	Luminaire Description (including fixture type, lamp, ballast, system watts)	# of Lamps per Fixture	Fixture Watts (system watts)	# of Fixtures	Total Watts
C1	26W CFL downlight	1	28w	2	56
C3	(2) 32WT8 recessed 1x4	2	58w	12	696
C4	(2) 32WT8 8'-0" stacklight	2	58w	2	116
C5	(2) 32WT8 recessed 2x4	2	58w	3	174
C6	30W/lin. ft. track	NA	30w	67.8	2034
TOTALS					3076 w



5. EXTERIOR LIGHTING

Slides 108 to 135



5. EXTERIOR LIGHTING: OVERVIEW

In this section you will learn about:

- Exterior Lighting Applicability and Exceptions;
- Exterior Lighting Zones (based on 1 RCNY §5000-01);
- Base Site Lighting;
- Tradable Areas; and
- Non-Tradable Areas.



5. EXTERIOR LIGHTING: APPLICABILITY



■ How is it documented?

- Wattage should be identified in the fixture legend/schedule
- Lumens should be included with the lamp information in the fixture legend/schedule
- Control may be identified in the narrative or on the one-line diagram included in the electrical circuiting drawings



5. EXTERIOR LIGHTING: APPLICABILITY

What lighting might not be included in the total connected load?

Lighting supplied through the energy service of the building.



- What exterior lighting may not be supplied by the building?
 - Street lighting by NYC DOT
 - Subway station entrances under the jurisdiction of NYCT
 - Lighting in the surrounding grounds or planters controlled or maintained by DPR
 - Site Parking

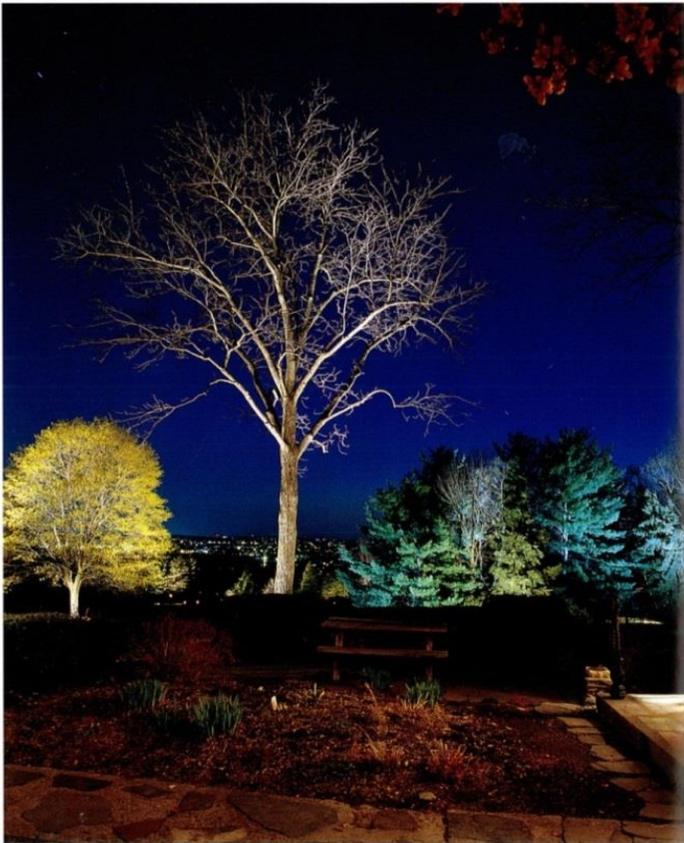
- How is it documented?
 - Shown on drawing but not identified on electrical panel schedule
 - Fixture schedule
 - Control narrative



5. EXTERIOR LIGHTING: CONNECTED POWER EXCEPTIONS

What other lighting does not need to be included?

Lighting supplied through the energy service of the building.



- These exceptions must be approved by the Borough Commissioner:
 - Lighting for safety or security
 - Lighting for signage
 - Emergency consideration



5. EXTERIOR LIGHTING: EXCEPTIONS IN ASHRAE 90.1

What are the differences between NYCECC and ASHRAE 90.1?



- Exceptions for exterior lighting are similar, but not identical, in the NYCECC and ASHRAE 90.1
- Exceptions identified in ASHRAE 90.1 but not in NYCECC:
 - Lighting for water features
 - Lighting for hazardous locations
 - Lighting for swimming pools
 - Searchlights



5. EXTERIOR LIGHTING: SIMILAR EXCEPTIONS

What are the similar exceptions between NYCECC and ASHRAE 90.1?

- **NYCECC and ASHRAE 90.1 exceptions include:**
 - Specialized **signal, directional, and marker** lighting associated with transportation
 - Advertising **signage** or directional signage
 - **Lighting integral to equipment or instrumentation** and installed by its manufacturer
 - Lighting for **theatrical purposes**, including performance stage, film production, and video production
 - Lighting for **athletic playing fields**
 - **Temporary lighting**
 - Lighting for **industrial production**, material handling, transportation sites, and associated storage areas
 - **Theme elements** in theme/amusement parks
 - Lighting used to highlight features of public monuments and registered historic landmark structures or buildings



5. EXTERIOR LIGHTING: NYC LIGHTING ZONES

What is the major change for exterior LPA?

 The NYCECC uses lighting zones to establish base site power allowances:

NYCECC Lighting Zone	NYC Zoning Resolution Districts
Zone 1	Parkland
Zone 2	R; R with C overlay; MX
Zone 3	M (except MX); C (except C5 and C6 and C overlays on R districts)
Zone 4	C5; C6

NYC Zoning Districts Key*

R = Residential
M = Manufacturing
C = Commercial
MX = Mixed Use

* Any of these districts may be overlaid by special purpose zoning districts to accommodate and enhance the unique characteristics of selected neighborhoods.



Refer to: http://www.nyc.gov/html/dcp/html/zone/zh_resdistricts.shtml



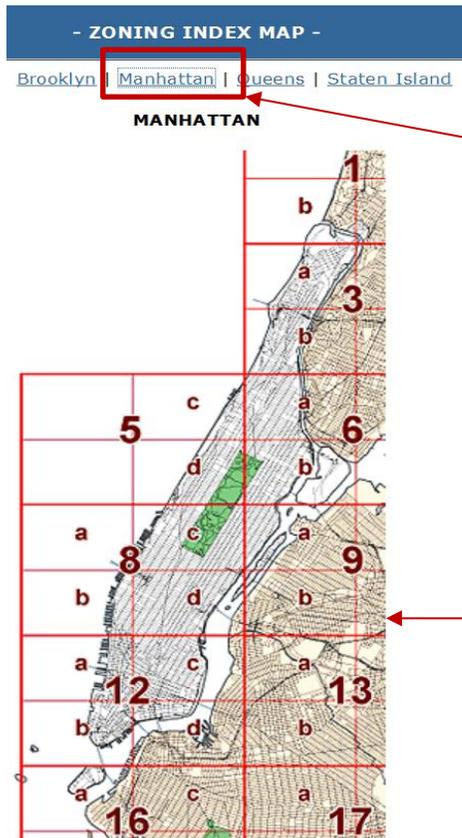
5. EXTERIOR LIGHTING: NYC LIGHTING ZONES

How is the district to comply with the base site lighting located? NYC Zoning District Graphics

To locate zoning maps of NYC Boroughs, refer to Index Map at:
http://www.nyc.gov/html/dcp/html/zone/zh_zmactable.shtml



To access individual zoning maps, refer to map table at:
<http://www.nyc.gov/html/dcp/html/zone/zonedex.shtml>



Click on borough for an area index map.

Locate desired zoning district.

- ZONING MAP TABLE - (with dates of Most Recent Zoning Changes)			
Includes sketch map of:	* PROPOSED zoning map change	* ADOPTED zoning map change	
1a - 10/11/05	1b - 10/11/05	1c - 2/15/06	1d - 2/3/10*
2a - 7/25/07	2b - 7/25/07		2d - 6/20/74
3a - 9/8/88	3b - 10/13/10	3c - 10/13/10*	3d - 10/13/10
4a - 7/19/06	4b - 6/12/08	4c - 9/30/03	4d - 10/14/09
		5c - 4/30/08	5d - 9/25/07
6a - 12/9/09*	6b - 5/25/10	6c - 10/13/10	6d - 5/28/64
7a - 4/30/08	7b - 7/29/09	7c - 12/21/05	7d - 4/22/09
8a - 2/22/90	8b - 12/21/09	8c - 3/3/10*	8d - 8/25/10
9a - 9/16/10*	9b - 9/16/10	9c - 5/25/10	9d - 7/29/10
10a - 7/29/10*	10b - 3/24/09	10c - 10/27/10	10d - 10/27/10
11a - 1/18/11	11b - 10/27/10	11c - 10/27/10	11d - 10/27/10
12a - 10/13/10	12b - 10/13/10		
13a - 7/29/09	13b - 7/29/09		

Find individual map in Zoning Map Table.

Right: Example map, District 9a



5. EXTERIOR LIGHTING: BASE SITE LIGHTING ALLOWANCE

What is meant by the base site lighting allowance?

Example

If a project is identified at the corner of 23rd Street and Broadway, at the tip of Madison Square Park, what are the Base Site watts allowed for the project?

INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS					
		Zone 1	Zone 2	Zone 3	Zone 4
Base Site Allowance (Base Allowance may be used in tradable or non-tradable surfaces)		500 W	600 W	750 W	1300 W

Excerpt from Table C405.5.2(2)

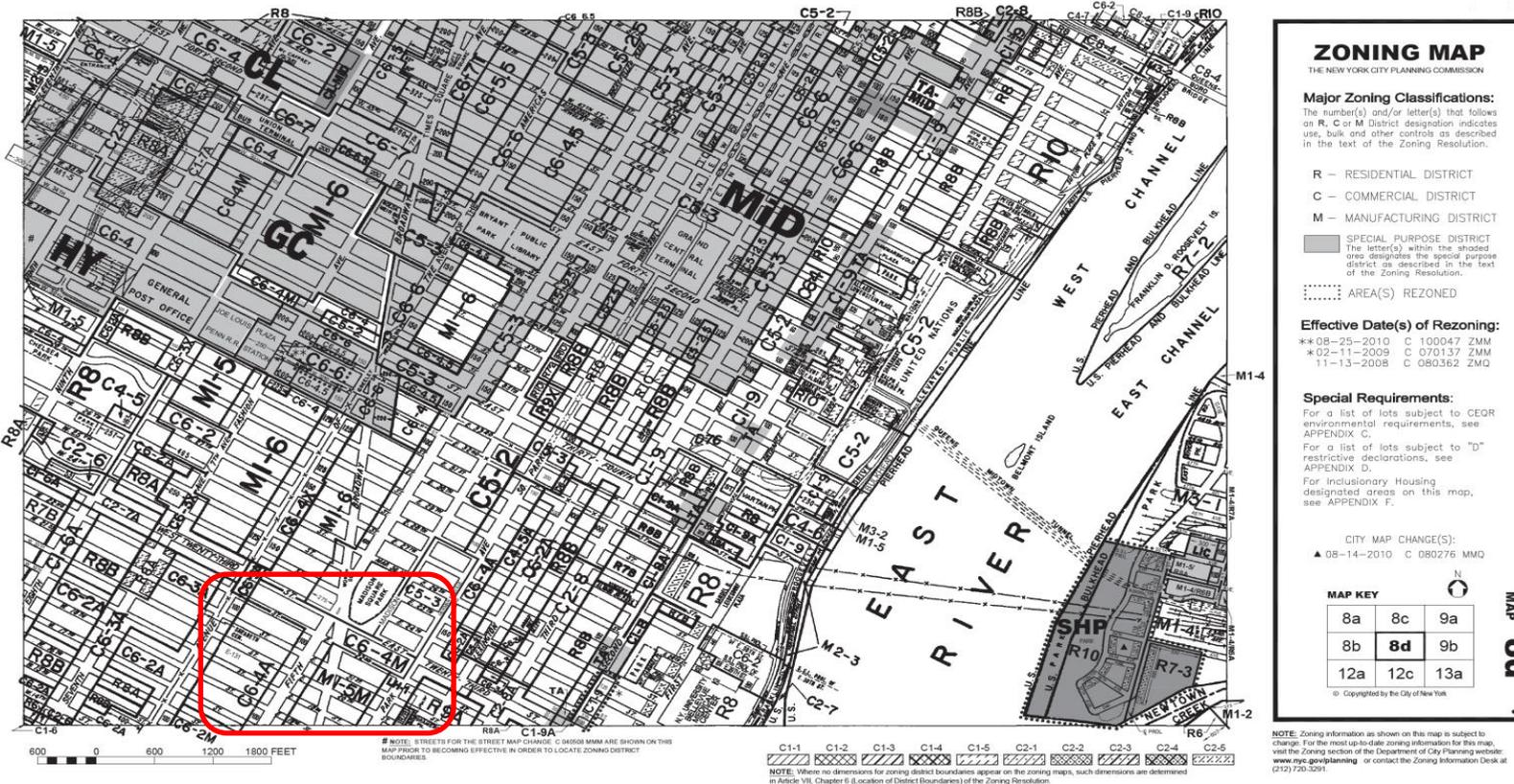


5. EXTERIOR LIGHTING: BASE SITE LIGHTING ALLOWANCE

How is the district to comply with the base site lighting located?

Example

If a project is identified at the corner of 23rd Street and Broadway, at the tip of Madison Square Park, what are the Base Site watts allowed for the project?



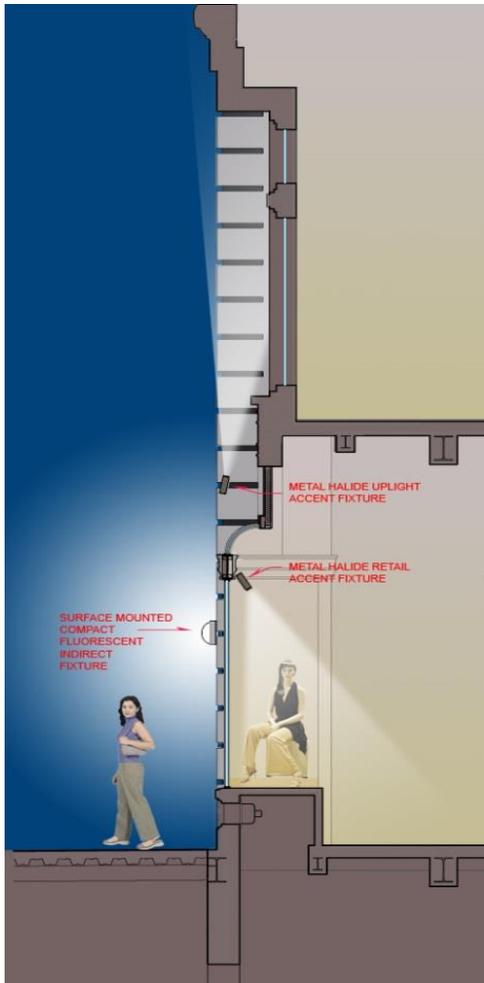
5. EXTERIOR LIGHTING: BASE SITE ALLOWANCE

How do we determine if a project meets the base site allowance?



5. EXTERIOR LIGHTING: BASE SITE ALLOWANCE

Does this project comply?



Example

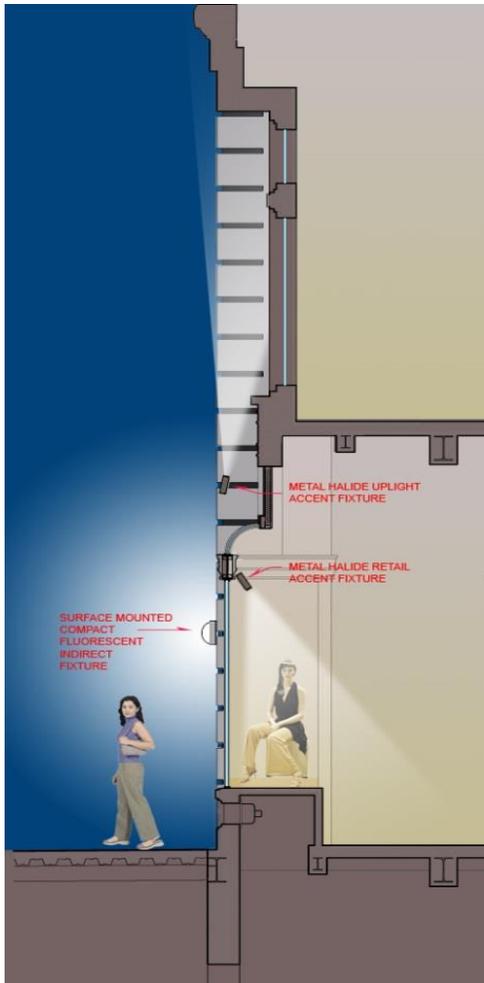
- Building located at 23rd and Broadway in Manhattan
- There are (7) 32W compact fluorescent indirect mounted sconces on the exterior pilasters
- There are (12) 39W Metal halide accent lights illuminating the 2nd story window grills



5. EXTERIOR LIGHTING: BASE SITE ALLOWANCE

Does this project comply?

Note that the fixture wattage is not equal to the lamp wattage, but includes the ballast for the CFL and MH fixtures.



Example

- Building located at 23rd Street roadway in Manhattan

Step 1. Identify the zone

- Zone 4

Step 2. Identify the base watts:

- 1300 Watts

Step 3. Calculate Total System Watts for CFL:

- $(7) \times 36W = 252$ Watts

Step 4. Calculate System Watts for MH:

- $(12) \times 45W = 540$ Watts

Does the project comply with the allowable watts?

- $252 \text{ Watts} + 540 \text{ Watts} = 792 \text{ Watts}$

PROJECT COMPLIES



5. EXTERIOR LIGHTING: TRADABLE SURFACES

What is meant by tradable surfaces?

		Zone 1	Zone 2	Zone 3	Zone 4
Uncovered Parking Areas					
Parking areas and drives		0.04 W/ft ²	0.06 W/ft ²	0.10 W/ft ²	0.13 W/ft ²
Building Grounds					
Walkway less than 10 feet wide		0.7 W/linear foot	0.7 W/linear foot	0.8 W/linear foot	1.0 W/linear foot
Walkways 10 feet wide or greater, plaza areas special feature areas		0.14 W/ft ²	0.14 W/ft ²	0.16 W/ft ²	0.2 W/ft ²
Stairways		0.75 W/ft ²	1.0 W/ft ²	1.0 W/ft ²	1.0 W/ft ²
Pedestrian Tunnels		0.15 W/ft ²	0.15 W/ft ²	0.2 W/ft ²	0.3 W/ft ²
Building Entrances and Exits					
Main Entries		20 W/ linear foot of door width	20 W/ linear foot of door width	30 W/ linear foot of door width	30 W/ linear foot of door width
Other Doors		20 W/ linear foot of door width			
Entry Canopies		0.25 W/ft ²	0.25 W/ft ²	0.4 W/ft ²	0.4 W/ft ²
Sales Canopies					
Free-standing and attached		0.6 W/ft ²	0.6 W/ft ²	0.8 W/ft ²	1.0 W/ft ²
Outdoor Sales					
Open areas (including vehicle sales lots)		0.25 W/ft ²	0.25 W/ft ²	0.5 W/ft ²	0.7 W/ft ²
Street frontage for vehicle sales lots in addition to "open area" allowance		No allowance	10 W/linear foot	10 W/linear foot	30 W/ linear foot

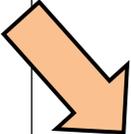
Tradable Surfaces (Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas may be tradable.)

- Tradable area allowances are **added** to the base site allowance only for relevant surfaces as listed in the table
 - Parking Areas
 - Building Grounds
 - Building Entries
 - Canopies
 - Outdoor sales
- Calculation information for tradable areas should be included in the Tabular analysis, COMcheck, and/or Energy Model



5. EXTERIOR LIGHTING: NON-TRADABLE SURFACES

What is meant by non-tradable surfaces?

INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS					
		Zone 1	Zone 2	Zone 3	Zone 4
<p><i>Excerpt from Table C405.5.2(2)</i></p>  <p>Nontradable Surfaces (Lighting power density calculations for the following applications can be used only for the specific application and cannot be traded between surfaces or with other (exterior remove exterior?) lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table"</p>	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
	Automated teller machines and night depositories	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location
	Entrances and gatehouse inspection stations at guarded facilities	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area
	Loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area
	Drive-up windows/doors	400 W per drive-through			
	Parking near 24-hour retail entrances	800 W per main entry			

- Non-Tradable area allowances are added to the base site allowance only for relevant surfaces as listed in the table
 - Building Facades
 - ATM
 - Gatehouse entries
 - Emergency services loading areas
 - Drive-up windows
 - 24-hour retail parking
- Include calculation information for non-tradable areas in the Tabular analysis, COMcheck, and/or Energy Model



5. EXTERIOR LIGHTING: NON-TRADABLE SURFACES

What is meant by non-tradable surfaces?

INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS					
		Zone 1	Zone 2	Zone 3	Zone 4
<p><i>Excerpt from Table C405.5.2(2)</i></p> <p>Nontradable Surfaces (Lighting power density calculations for the following applications can be used only for the specific application and cannot be traded between surfaces or with other (exterior remove exterior?) lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table"</p>	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
	Automated teller machines and night depositories	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location
	Entrances and gatehouse inspection stations at guarded facilities	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area

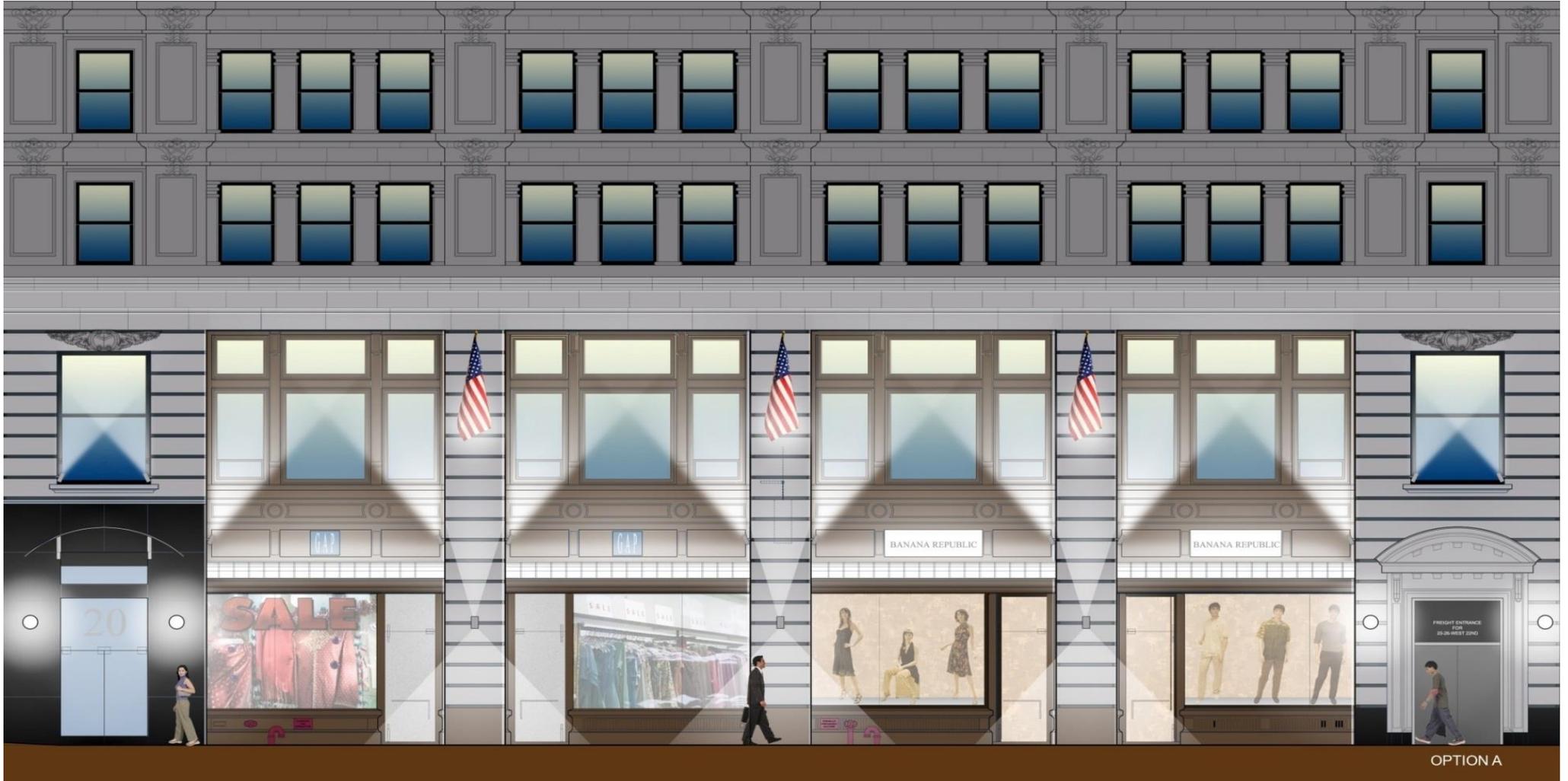
Non-tradable surfaces encompass very specific area types, many of which potentially have high energy use. The Code takes a "use it or lose it" approach – allowances for non-tradable surfaces are only applicable if the project contains that type of lighting.

- Non-Tradable area allowances are added to the base site allowance only for relevant surfaces as listed in the table
 - Building Facades
 - ATM
 - Gatehouse entries
 - Emergency services loading areas
 - Drive-up windows
 - 24-hour retail parking
- Include calculation information for non-tradable areas in the Tabular analysis, COMcheck, and/or Energy Model



5. EXTERIOR LIGHTING: TRADABLE & NON-TRADABLE EXAMPLE

How are tradable and non-tradable areas incorporated?

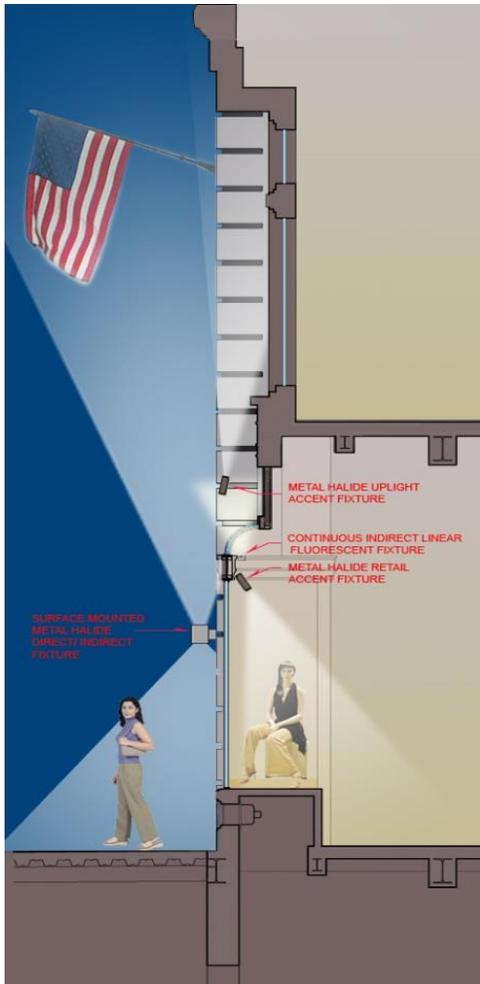


5. EXTERIOR LIGHTING: TRADABLE & NON-TRADABLE EXAMPLE

Example

The designer proposes to add additional lighting including direct illumination to light the sidewalk in front of the building and uplighting to illuminate the flags

- There are now (12) 70W metal halide (MH) accent lights.
- There are (4) 42W compact fluorescent indirect mounted sconces by the building entry doors.
- There are (3) 100W MH accent lights uplighting the flags.
- There are (3) 70W MH downlights to illuminate the sidewalk.



5. EXTERIOR LIGHTING: TRADABLE & NON-TRADABLE EXAMPLE

Note that the fixture wattage is not equal to the lamp wattage, but includes the ballast for the CFL and MH fixtures.

Example

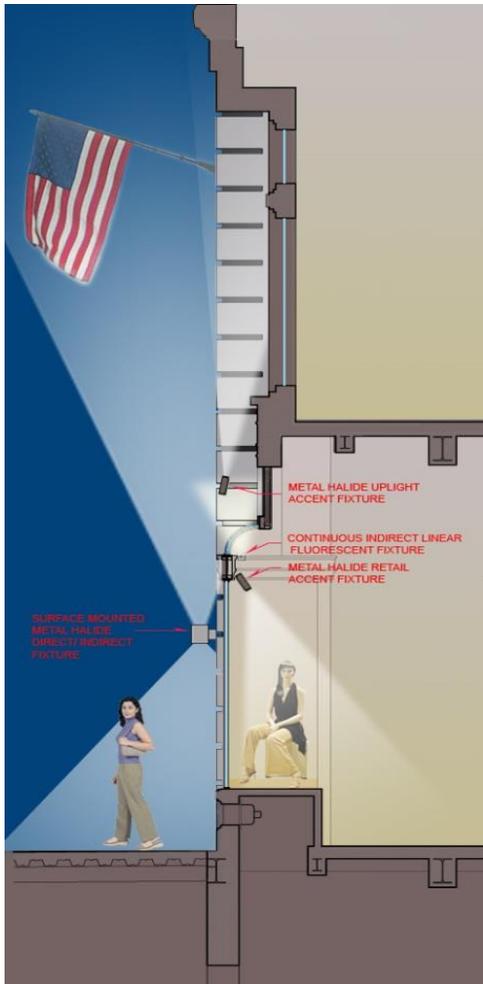
The designer proposes to add additional lighting including direct illumination to light the sidewalk in front of the building and uplighting to illuminate the flags

- There are now (12) 70W metal halide (MH) accent lights.
 $12 \times 80W = 960W$
- There are (4) 42W compact fluorescent indirect mounted sconces by the building entry doors. $4 \times 48W = 192W$
- There are (3) 100W MH accent lights uplighting the flags.
 $3 \times 110 = 330W$
- There are (3) 70W MH downlights to illuminate the sidewalk.
 $3 \times 80W = 240W$

Total Watts = 1722W

Project exceeds Base Site Allowance of 1300 W

Add Tradable/Non-tradable Surface Allowance



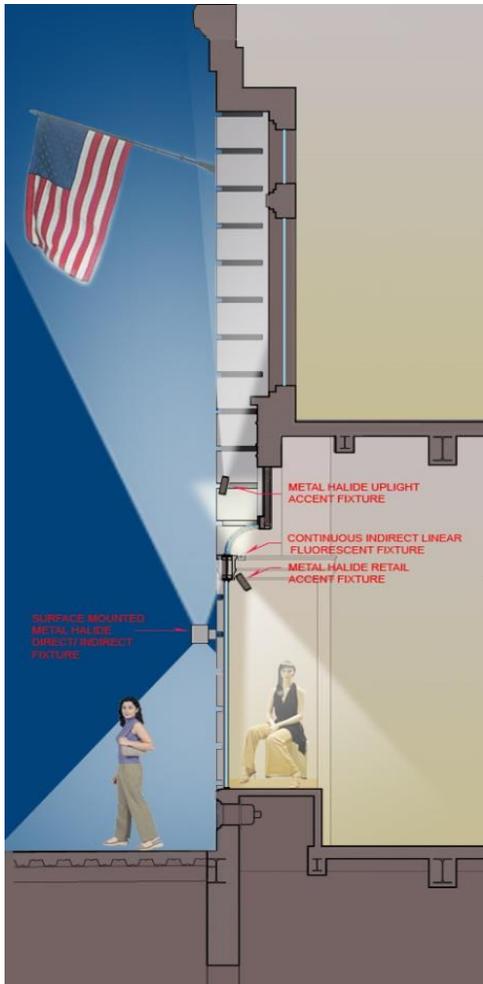
5. EXTERIOR LIGHTING: TRADABLE & NON-TRADABLE EXAMPLE

Example

Classify lighting by category (Tradable or Non-tradable) by areas they light.

The designer proposes to add additional lighting including direct illumination to light the sidewalk in front of the building and uplighting to illuminate the flags of the building

- There are now (12) 70W metal halide (MH) accent lights.
Building Façade Lighting
- There are (4) 42W compact fluorescent indirect mounted sconces by the building entry doors. **Building Entry**
- There are (3) 100W MH accent lights uplighting the flags.
 $3 \times 110 = 330W$
- There are (3) 70W MH downlights to illuminate the sidewalk.
Walkway



5. EXTERIOR LIGHTING: TRADABLE & NON-TRADABLE AREAS

Excerpt from Table C405.5.2(2)

Uncovered Parking Areas				
Parking areas and drives	0.04 W/ft ²	0.06 W/ft ²	0.10 W/ft ²	0.13 W/ft ²
Building Grounds				
Walkway less than 10 feet wide	0.7 W/linear foot	0.7 W/linear foot	0.8 W/linear foot	1.0 W/linear foot
Walkways 10 feet wide or greater, plaza areas special feature areas	0.14 W/ft ²	0.14 W/ft ²	0.16 W/ft ²	0.2 W/ft ²
Stairways	0.75 W/ft ²	1.0 W/ft ²	1.0 W/ft ²	1.0 W/ft ²
Pedestrian Tunnels	0.15 W/ft ²	0.15 W/ft ²	0.2 W/ft ²	0.3 W/ft ²
Building Entrances and Exits				
Main Entries	20 W/ linear foot of door width	20 W/ linear foot of door width	30 W/ linear foot of door width	30 W/ linear foot of door width
Other Doors	20 W/ linear foot of door width			
Entry Canopies	0.25 W/ft ²	0.25 W/ft ²	0.4 W/ft ²	0.4 W/ft ²
Sales Canopies				
Free-standing and attached	0.6 W/ft ²	0.6 W/ft ²	0.8 W/ft ²	0.1 W/ft ²
Outdoor Sales				
Open areas (including vehicle sales lots)	0.25 W/ft ²	0.25 W/ft ²	0.5 W/ft ²	
Street frontage for vehicle sales lots in addition to "open area" allowance	No allowance	10 W/linear foot	10 W/linear foot	

Tradable Surfaces (Lighting power densities for uncovered parking areas, building grounds, building entrances and exits, canopies and overhangs and outdoor sales areas may be traded.)

Tradable areas

- Sidewalk
1.0W/lin. ft.
- Building Entries
30W/lin. ft.

Remember to identify which of these additions are tradable and non-tradable areas (by category):
Façade: non-tradable; walkway: tradable.



5. EXTERIOR LIGHTING: TRADABLE & NON-TRADABLE AREAS

INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS						
<p><i>Excerpt from Table C405.5.2(2)</i></p> <p>Nontradable Surfaces (Lighting power density calculations for the following applications can be used only for the specific application and cannot be traded between surfaces or with other (exterior remove exterior?) lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table"</p>		Zone 1	Zone 2	Zone 3	Zone 4	
	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	
	Automated teller machines and night depositories	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location	270 W per location plus 90 W per additional ATM per location
	Entrances and gatehouse inspection stations at guarded facilities	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area	0.75 W/ft ² of covered and uncovered area
	Loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area	0.5 W/ft ² of covered and uncovered area
	Drive-up windows/doors	400 W per drive-through				
	Parking near 24-hour retail entrances	800 W per main entry				

Tradable areas

- Sidewalk
1.0W/lin. ft.
- Building Entries
30W/lin. ft.

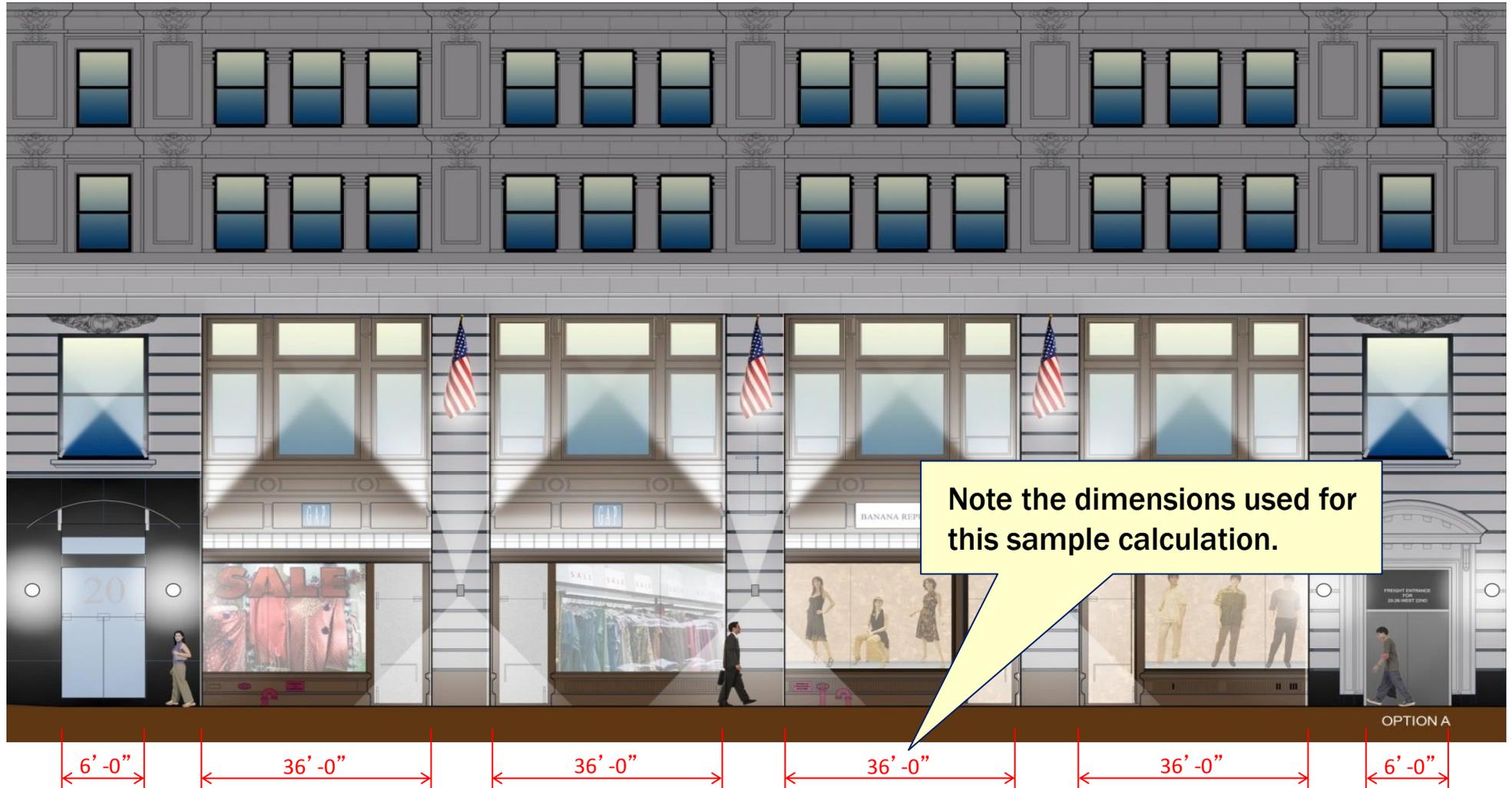
Non-Tradable areas

- Building Facades
0.15 W/ft² of gross above-grade wall area



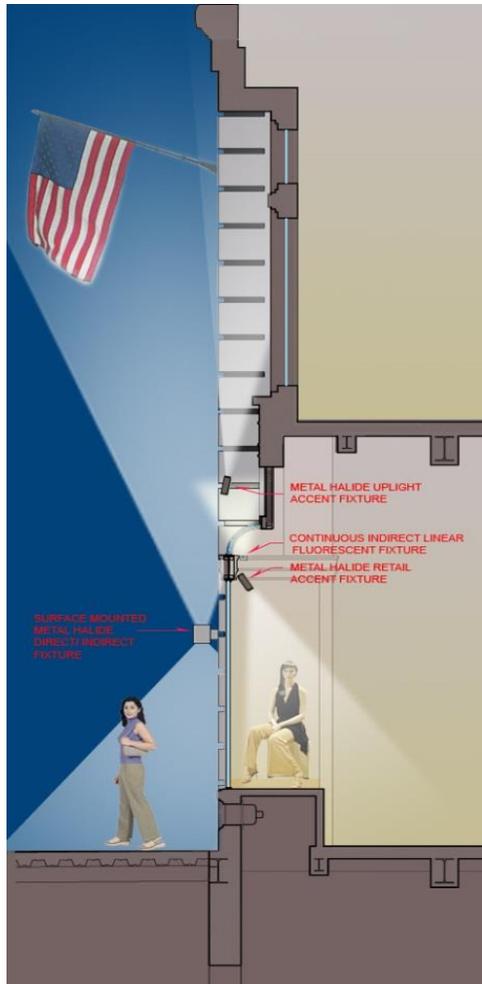
5. EXTERIOR LIGHTING: TRADABLE & NON-TRADABLE AREAS

How are tradable and non-tradable areas incorporated?



5. EXTERIOR LIGHTING: TRADABLE EXAMPLE

Does the project meet the requirements?



Tradable areas:

■ Sidewalk

Allowed: $1.0\text{W/lin. ft.} \times 170 \text{ lin. ft.} = 170 \text{ W}$

Proposed: (3) 70W MH downlights
 $3 \times 80\text{W} = 240\text{W}$

■ Building Entries

Allowed: $(30\text{W/lin. ft.} \times 6 \text{ ft.}) \times 2 = 360 \text{ W}$

Proposed: (4) 42W compact fluorescent
 $4 \times 48\text{W} = 192\text{W}$

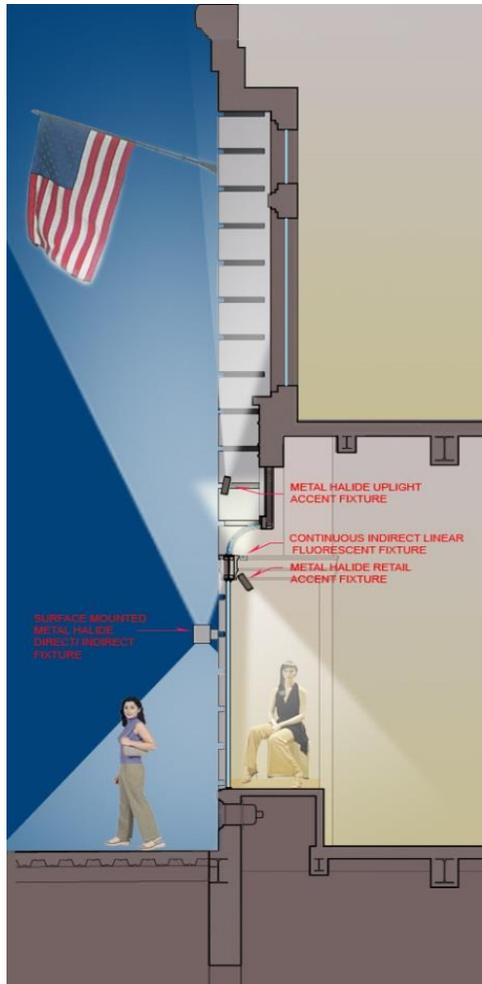
Tradable Allowed: $170\text{W} + 360\text{W} = 530\text{W}$

Tradable Proposed: $240\text{W} + 192\text{W} = 432\text{W}$



5. EXTERIOR LIGHTING: NON-TRADABLE EXAMPLE

Does the project meet the requirements?



Non-Tradable areas:

■ Building Facades

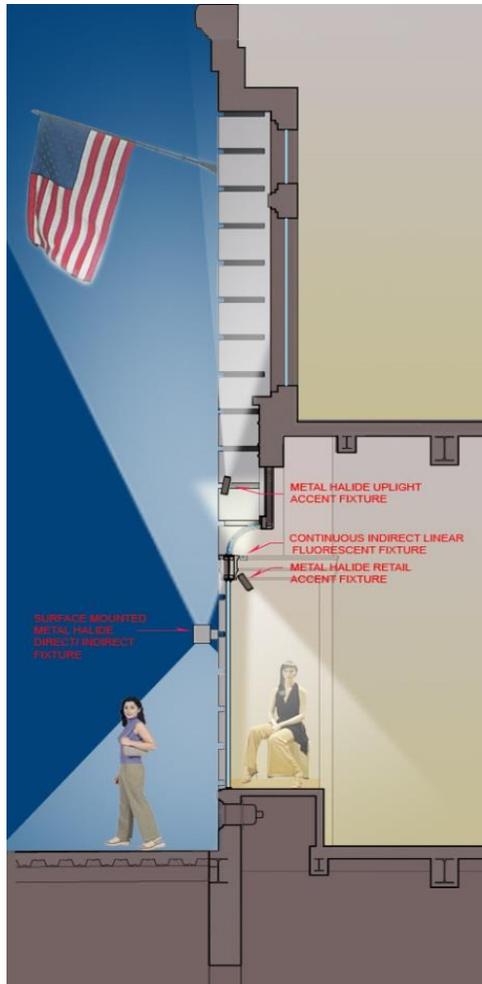
Allowed: (0.15W/ft² of gross above-grade wall area X 5100 sq. ft.) = 765W

Proposed: (12) 70W MH accent lights
12 x 80W = 960W



5. EXTERIOR LIGHTING: TRADABLE & NON-TRADABLE AREAS

Does the project comply with NYCECC?



Tradable areas:

- Sidewalk = 170W
- Building Entries = 360W

Non-Tradable areas:

- Building Facades = 765W

Total Exterior Power Allowance:

Base	1300W
+ Tradable (170W + 360W)	530W
+ Non-Tradable	765W
Total Power Allowance	2595W

Total Proposed Exterior Power:

Tradable (240W + 192W)	432W
+ Non-Tradable	960W
+ Base	330W
Total Proposed Power	1722W

PROJECT COMPLIES



6. RESOURCES

Slides 136 to 142



6. RESOURCES: SUMMARY OF LIGHTING PROGRESS INSPECTIONS

Inspection / Test (As indicated on the TR8)	Frequency
<p>Electrical energy consumption (IIC1 on TR8) The presence and operation of all required meters for monitoring total electrical energy usage, system energy usage, or electrical energy usage, system energy usage, tenant energy usage, or electrical energy usage in the building, in individual dwelling units, or in tenant spaces shall be verified by visual inspection.</p>	Prior to final electrical and construction inspection
<p>Lighting in dwelling units (IIC2 on TR8) Lamps in permanently installed lighting fixtures shall be visually inspected to verify compliance with high-efficacy standards.</p>	Prior to final electrical and construction inspection
<p>Interior lighting power (IIC3 on TR8) Installed lighting shall be verified for compliance with the lighting power allowance by visual inspection of fixtures, lamps, ballasts and transformers.</p>	Prior to final electrical and construction inspection
<p>Exterior lighting power (IIC4 on TR8) Installed lighting shall be verified for compliance with source efficacy and/or the lighting power allowance by visual inspection of fixtures, lamps, ballasts and relevant transformers.</p>	Prior to final electrical and construction inspection
<p>Lighting controls (IIC5 on TR8) Each type of required controls, including manual interior lighting controls, light-reduction controls, automatic shut-off, daylight zone controls, sleeping unit controls, and exterior lighting controls, shall be verified by visual inspection and tested for functionality and proper operation.</p>	Prior to final electrical and construction inspection



6. RESOURCES & LINKS

The resources below have been referenced in this module.

Resource	Link
2016 NYCECC	http://www1.nyc.gov/site/buildings/codes/2016-energy-conservation-code.page
Local Law 91 of 2016	http://www1.nyc.gov/assets/buildings/local_laws/ll91of2016.pdf
Local Law 125 of 2016	http://www1.nyc.gov/assets/buildings/local_laws/ll125of2016.pdf
Code Notes	http://www1.nyc.gov/site/buildings/codes/list-code-notes.page
NYCECC FAQ	http://www1.nyc.gov/site/buildings/codes/nycecc-faq.page
UPDATED - Energy Code: Supporting Documents How to Guides	http://www1.nyc.gov/assets/buildings/pdf/h2g_all.pdf
1 RCNY § 5000-01	http://www1.nyc.gov/assets/buildings/rules/1_RCNY_5000-01.pdf



6. RESOURCES & LINKS

(continued)

Resource	Link
1 RCNY § 101-07	http://www1.nyc.gov/assets/buildings/rules/1_RCNY_101-07.pdf
Buildings Bulletins	http://www1.nyc.gov/site/buildings/codes/building-bulletins/page
EN1, EN2, and TR8 Forms	http://www1.nyc.gov/site/buildings/codes/energy-code-forms.page
REScheck/COMcheck	https://www.energycodes.gov/
One City: Built to Last	http://www1.nyc.gov/site/builttolast/index.page
New York City Construction Codes	https://www1.nyc.gov/site/buildings/codes/codes.page



6. RESOURCES: DOB ASSISTANCE

Questions on the NYCECC
can be submitted to DOB at:



EnergyCode@buildings.nyc.gov



6. RESOURCES

IMAGES/PHOTO CREDITS & COPYRIGHTS

Company or Individual	Slide Numbers
John Bartelstone Photography, LLC	16, 18, 58, 79 ¹ , 82, 84
Universal Lighting Technologies	81, 82
Acuity Brand Lighting/Controls	32, 47, 52, 53, 60, 61, 63, 64, 68, 69, 79, 81
Lighting Services, Inc.	110, 111, 112, 113
NYC Department of Buildings	136



¹ Bottom right image

² Upper right image

³ Left image

6. RESOURCES

IMAGES/PHOTO CREDITS & COPYRIGHTS

Company or Individual	Slide Numbers
ICC	87, 120, 121, 126, 127, 128, 129, 132, 133, 134, 135
NYC City Planning	116, 118, 119
US DOE Building Energy Codes University	22, 44





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