LIGHTING AND POWER

CHAPTER 5

COMMERCIAL ENERGY EFFICIENCY

New York City Energy Conservation Code 2011

Effective December 28, 2010

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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 2011 NYCECC;
- Applicability of the 2011 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 90.1-2007 alternative compliance is also included.

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.

Slide Navigation Guide

Introduction

Look for the following icons:

The **NYC Buildings** logo takes you to the NYCECC 2011 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 y

The **Documentation** icon add

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 Module Menu

Slide Navigation

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The main menu slide is interactive; clicking on each line item will take you to the respective sub-module. Use this feature to navigate throughout the presentation. The menu icon at the bottom right corner of each slide will always bring the you back to the main menu slide.

Lighting

Slides 8 to 18

1. Key Updates & Code Applicability

Photo: Comstock / Jupiter Images

Key Updates & Code Applicability

Learning Objectives

In this section you will learn about:

- Key changes and additions to the 2011 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.

Key Updates to the Code - 1

What are the most pertinent lighting changes in the NYCECC?

- Lighting within **dwelling units no longer exempted**
- Refinement to **automatic lighting shutoff** provisions
- **Daylight zone control** (new requirement)
- **Exterior lighting control** refinements
- **Interior lighting power allowance exceptions**
- Space-by-space lighting power allowances no longer included
- Exterior **luminaire efficacies are more stringent**
- Exterior lighting allowances: **compliance basis changed**
- **Changes in occupancy or use** [per Table 505.5.2]

This slide summarizes key lighting updates in the 2011 NYCECC, as compared to the previous 2009 version. These changes are addressed in more detail throughout the module.

Key Updates to the Code - 2

? What other changes to the NYCECC should be given consideration?

Additions:

- Must comply alone, or the

Per NYCECC 101.4.3, when less than 50% 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 50% 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 50% 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 replac
  no increase in the installed

Issues related to Additions, alterations, replacements, and repairs are addressed in **Buildings Bulletin 2010 – 032**. See next slide for link.

Local Laws, Rules & Bulletins

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

Local Laws

- LL1 of 2011– Established the current 2011 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

Bulletins

- Buildings Bulletin 2010-032
  - Clarifies when an addition, alteration, renovation, or repair to a lighting or electrical power system, or control equipment, may <u>not</u> be required to comply with the energy code

Code Applicability

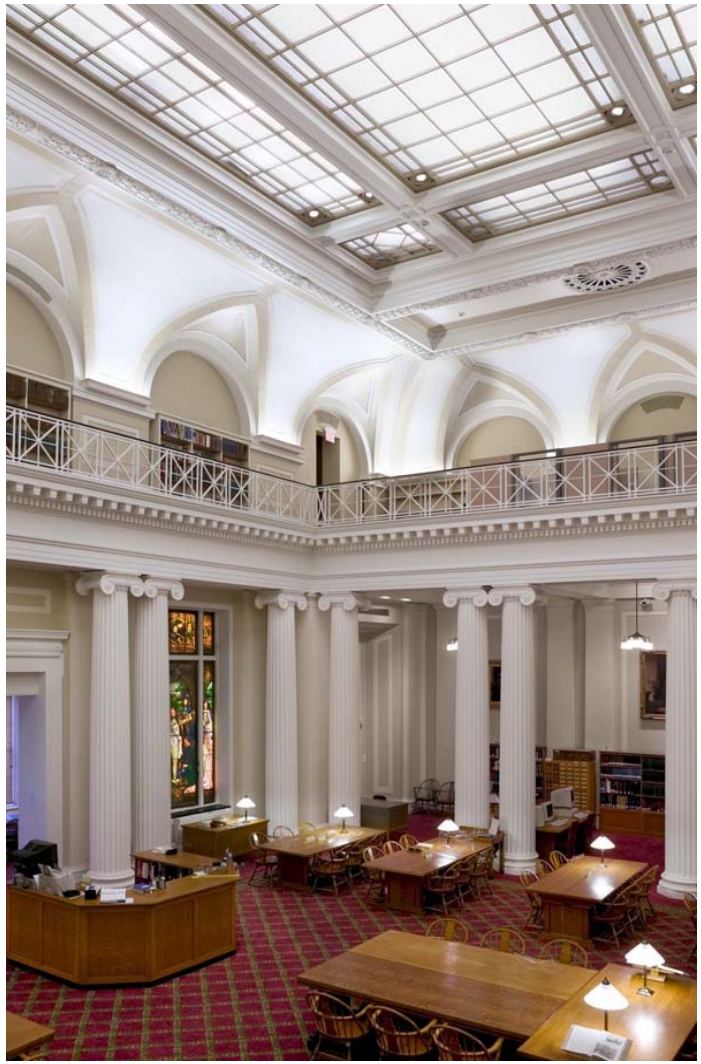
? What exemptions exist under the new NYCECC?

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



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 505.5.2 Interior Lighting Power allowance for a multi-family building (0.7 W/sf);

  OR
  - Providing a minimum of 50% of the permanently installed light fixtures with high-efficacy lamps.
- Separate metering for individual tenant units is required

NYCECC: 505.5.3, 505.7

Dwelling Unit Compliance

? What must be provided for dwelling units to comply?

High-Efficacy Lamps Requirement

- A minimum of 50% of permanently installed luminaires must have high-efficacy lamps

What is considered a high-efficacy lamp?

- Compact fluorescent lamps
- 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

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.

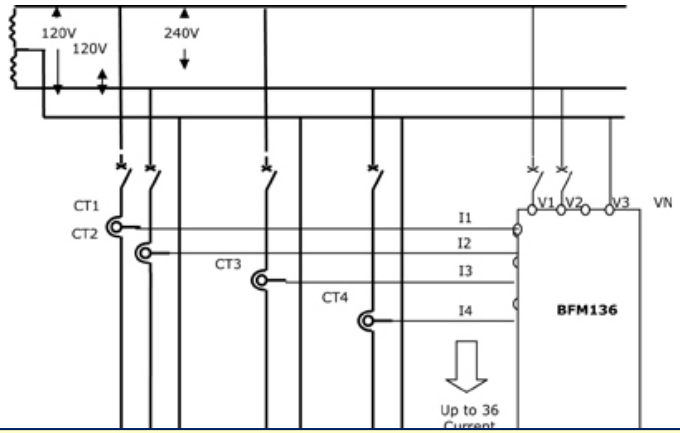
Metering

? What must be provided to comply with NYCECC?

Metering

- Separate metering (e.g. utility met[illegible] 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 accessib[illegible] to the owner and the tenant

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

ASHRAE 90.1 Alternative Compliance - 1

1. Updates & Applicability

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

- All disciplines of a project team must use **either** Chapter 5 of the NYCECC **or** ASHRAE Standard 90.1, and the d
  requirement)

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

- Compliance via ASHRAE 90.1 off more flexibility for lighting
  - Prescriptive Path:
    - » Space-by-Space method of prescriptive compliance is available
  - Performance Path:
    - » Allows trade off between disciplines
    - » Typically used for demonstration of LEED compliance
    - » Provides credit for use of automatic daylight controls
    - » Provides credit for automatic lighting systems to reduce energy

ECCCNYS also has a performance based compliance path called "Total Building Performance".

- Some differences in approaches between NYCECC & A
  - To be reviewed through

ASHRAE 90.1 Appendix G Table G3.2 provides simple percent reductions for use of automatic controls. ECCCNYS does not have a similar provision.

ASHRAE 90.1 Alternative Compliance - 2

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

More Extensive Mandatory Provisions:

- Power, Section 8.4, has maximum voltage drop requirements for main feeders (2%) and branch circuits (3%)

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

Lighting

Slides 19 to 40

2. Required Documentation

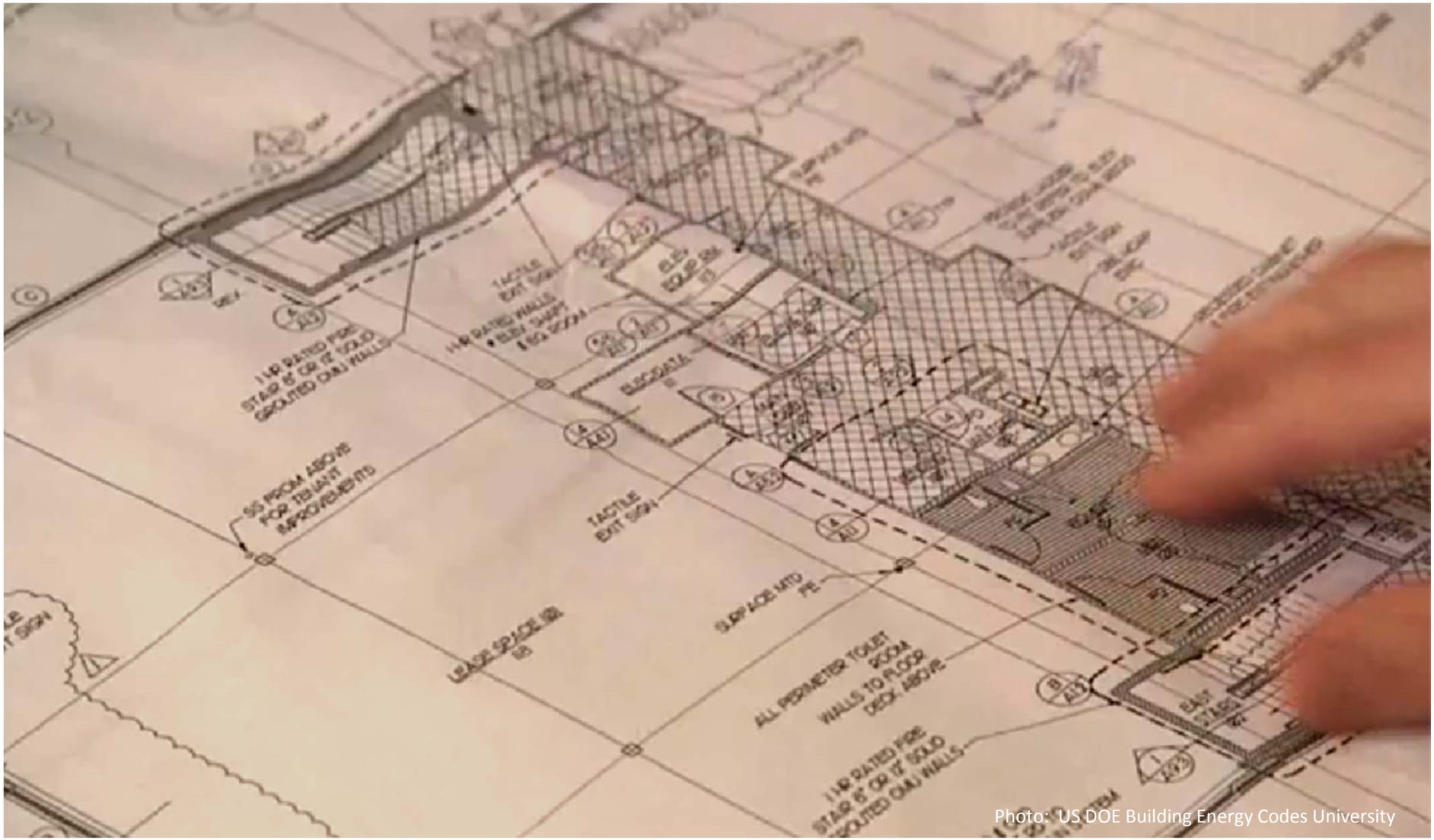


Photo: US DOE Building Energy Codes University

Required Documentation

Learning Objectives

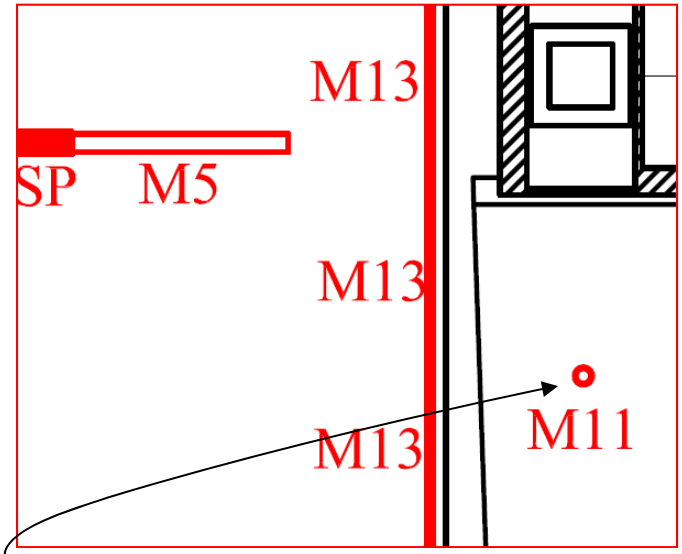
In this section you will learn about:

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

Reflected Ceiling Plans

2. Required Documentation

What information needs to be identified on the RCP?



- Fixtures should be keyed to the legend.

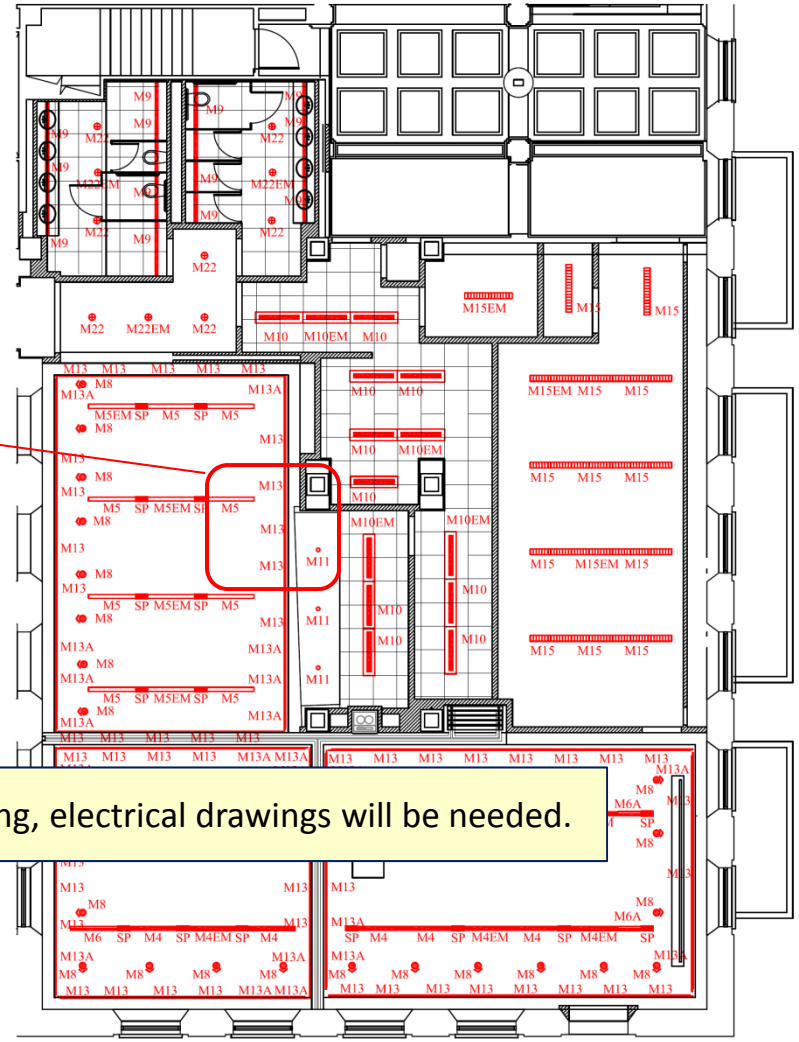
M11 — RECESSED (1) SINGLE LAMP ... HALIDE DOWNLIGHT WITH ELECTRONIC ...

M12 — DECORATIVE R... DOWNLIGHT W...

M12EM — DECORATIVE RECESSED (1) SINGLE LAMP 42W COMPACT FLUORESCENT DOWNLIGHT WITH EMERGENCY BATTERY PACK [48W][.95BF]

M13 — CONTINUOUS TELESCOPING SURFACE MOUNT (2) TWO LAMP 28W T5 (4'-0") LINEAR FLUORESCENT STRIP MOUNTED IN ARCHITECTURAL COVE WITH ELECTRONIC BALLAST [64W] [1.00 BF]

Where architectural RCP tags are missing, electrical drawings will be needed.



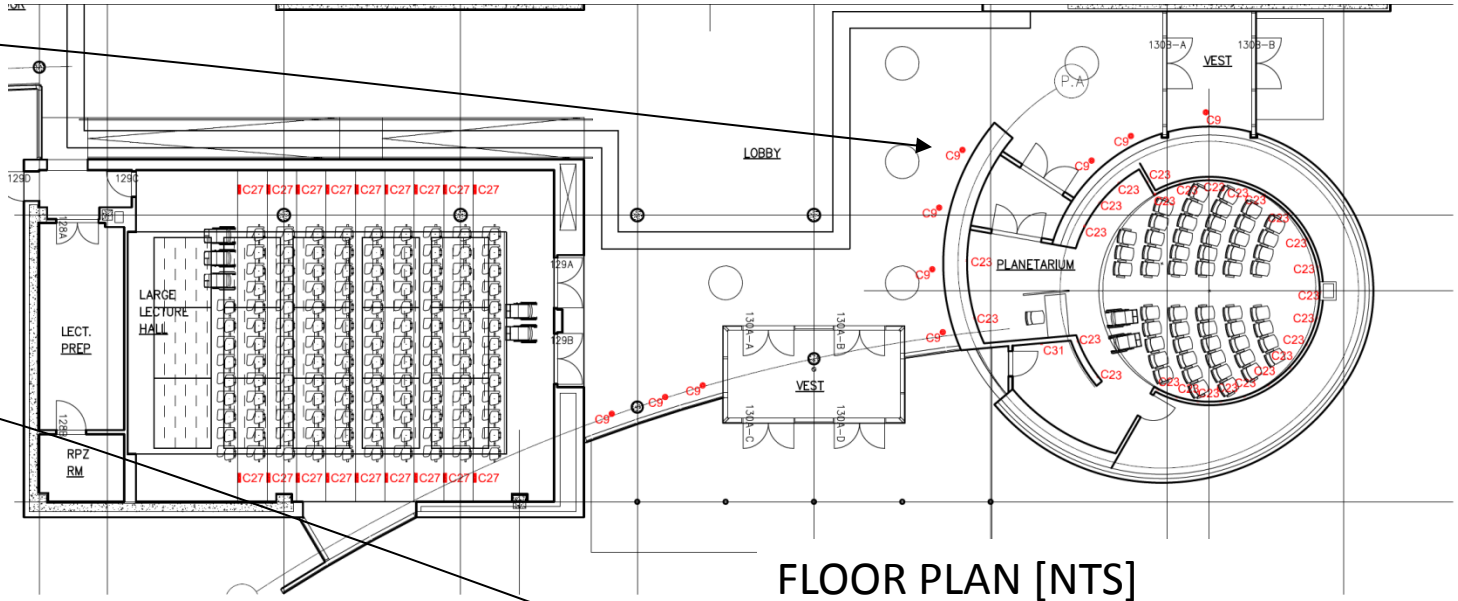
Floor Plans & Elevations

2. Required Documentation

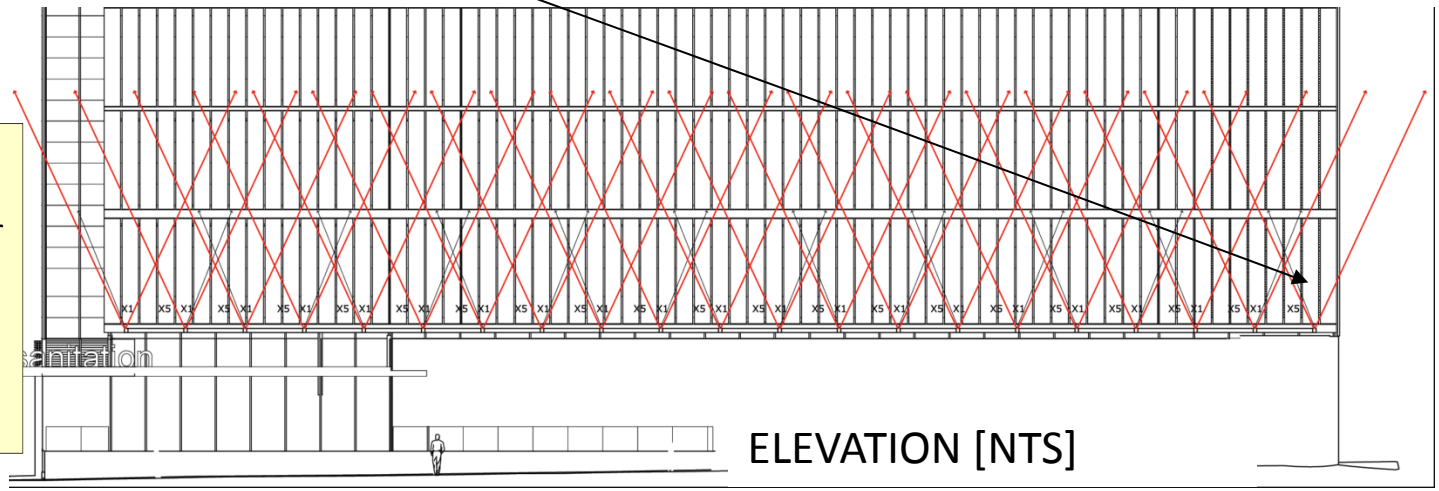
? Is lighting ever shown on floor plans or elevations?

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

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



FLOOR PLAN [NTS]



ELEVATION [NTS]

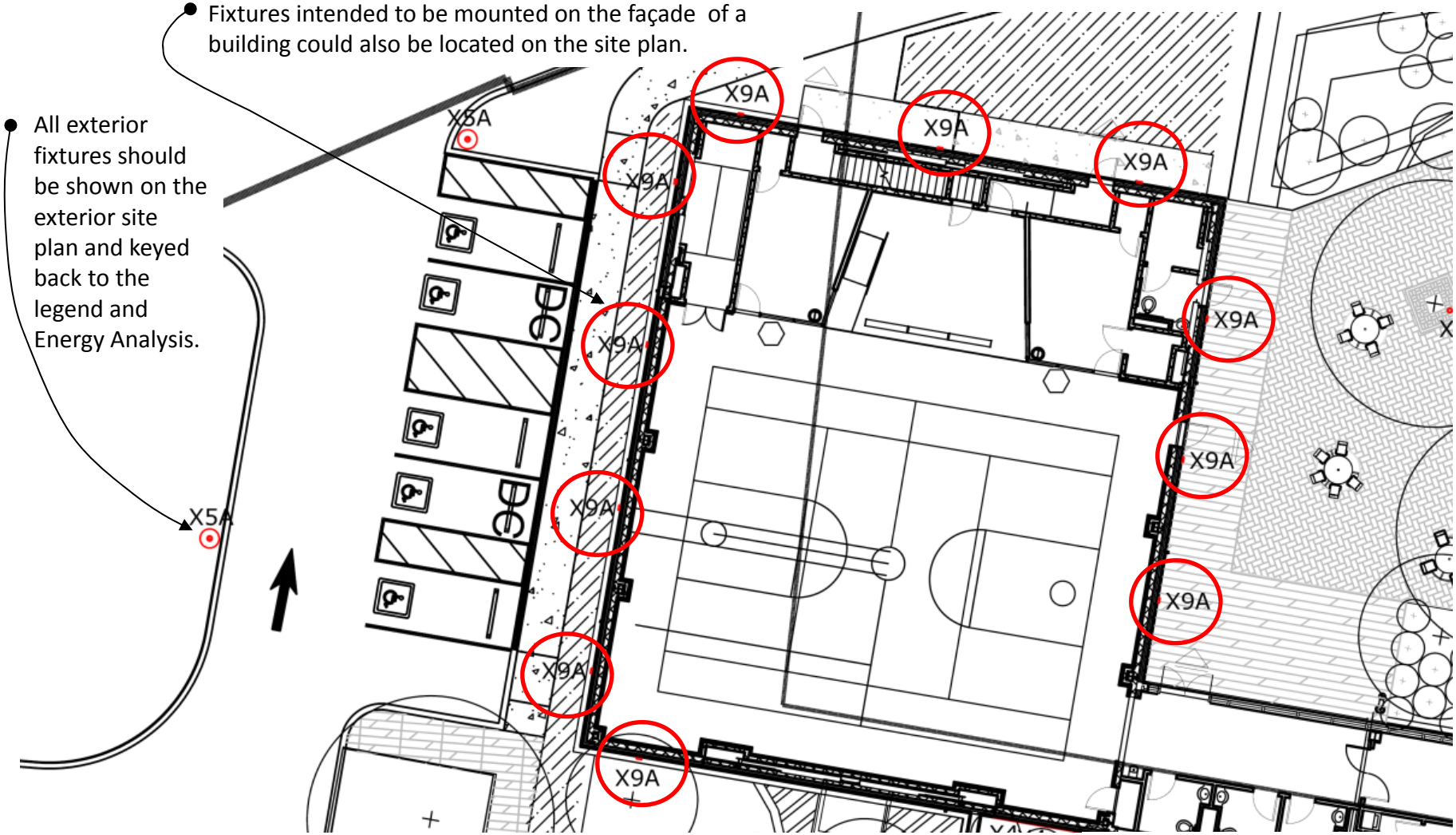
Supporting documentation may need to include floor plans and elevations for some lighting conditions, as well as reflected ceiling plans.

Exterior Site Plan with Lighting

2. Required Documentation

? 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.



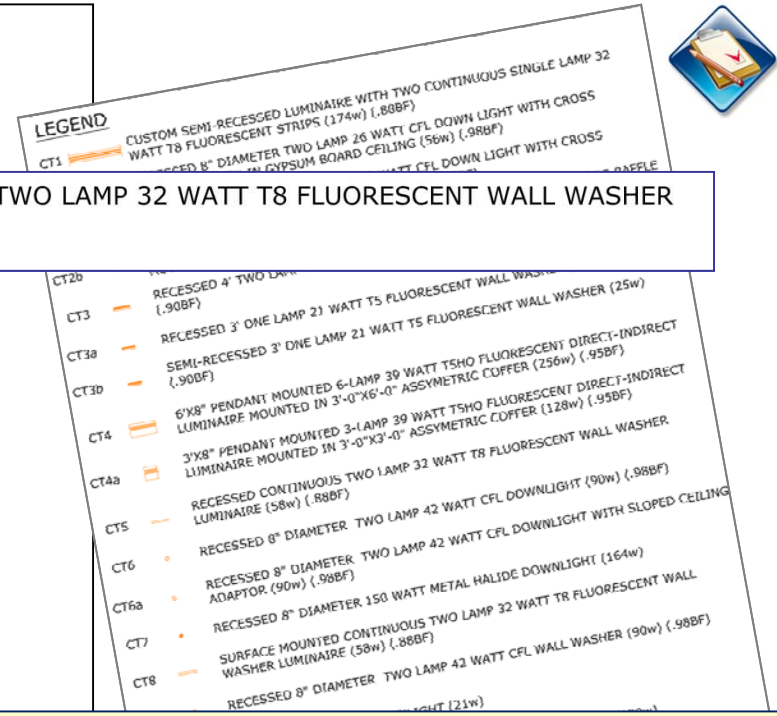
SITE PLAN [NTS]

Lighting Legend

2. Required Documentation

What information is included in a completed legend?

- Fixture type
- Fixture description
- Lamp type
- Lamp wattage
- Quantity of lamps per fixture
- Ballast/transformer/driver typ
  - Especially if high-efficiency e
    being specified
- System watts per fixture
  - Lamp/bal



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

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.

Lighting Schedule

2. Required Documentation ? 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.

TYPE	DESCRIPTION
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]

SYSTEM WATTS

LIGHTING FIXTURE SCHEDULE

1 OF 2

TYPE		DESCRIPTION	PHOTOMETRY	SYSTEM WATTS	VOLT	CONTROL INTENT	MANUFACTURER
H1	Description: Lamp: Optics: Location/Remarks: Ballast: Pole:	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] 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 III DISTRIBUTION REFLECTOR. [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 LATCH PROVIDING TOOL-LESS 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 1.88" TO 2.38" O.D. X MINIMUM 8' LONG HORIZONTAL ARM. TOTAL LUMINAIRE EFFICIENCY SHALL BE MINIMUM 75%. ENTIRE ASSEMBLY SHALL BE UL LISTED, SUITABLE FOR WET LOCATION. ICW140TLS [PHILIPS] [BALLAST TEMPERATURE RANGE -20°C/+50°C] BALLAST SHALL BE ASSEMBLED ON A UNITIZED REMOVABLE TRAY WITH QUICK DISCONNECT PLUG. 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"A AFG. POLE TO ACCOMMODATE STANDARD NYCDOT 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.	NOTE: POLAR CURVE REFLECTS 175w MH.		120 V	PHOTOCELL ON/ TIMECLOCK OFF PHOTOCELL TO BE LOCATED ON EACH INDIVIDUAL FIXTURE AS PER DOT SPEC.	LUMINAIRE: *HOLOPHANE* # 15DHP-12-F-F-AS-R POLE: NYCDOT WEST HOUSTON BASE: GCT/ FLATBUSH AVE TRANSFORMER TYPE *OR APPROVED EQUAL BY TBD.*
H2	Description: Lamp: Optics: Location/Remarks: Ballast: Pole:	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] FULL CUTOFF, TYPE V DISTRIBUTION. LENS SHALL BE FLAT, CLEAR TEMPERED GLASS MECHANICALLY ASSEMBLED TO THE FIXTURE FRAME. [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 LUMINAIRE EFFICIENCY SHALL BE MINIMUM 71%. ENTIRE ASSEMBLY SHALL BE UL LISTED, SUITABLE FOR WET LOCATION. ICW60NLS [PHILIPS] [BALLAST TEMPERATURE RANGE -20°C/+50°C] BALLAST SHALL BE ASSEMBLED ON A UNITIZED REMOVABLE TRAY WITH QUICK DISCONNECT PLUG. 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 STA CONCEALED WEATHER RESISTANT GFCI RECEPTACLE. POLE SH		99 watts	120 V	PHOTOCELL ON/ TIMECLOCK OFF PHOTOCELL TO BE LOCATED ON EACH INDIVIDUAL FIXTURE AS PER DOT SPEC.	*SENTRY:* 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.

Lighting Schedule

2. Required Documentation

? 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.

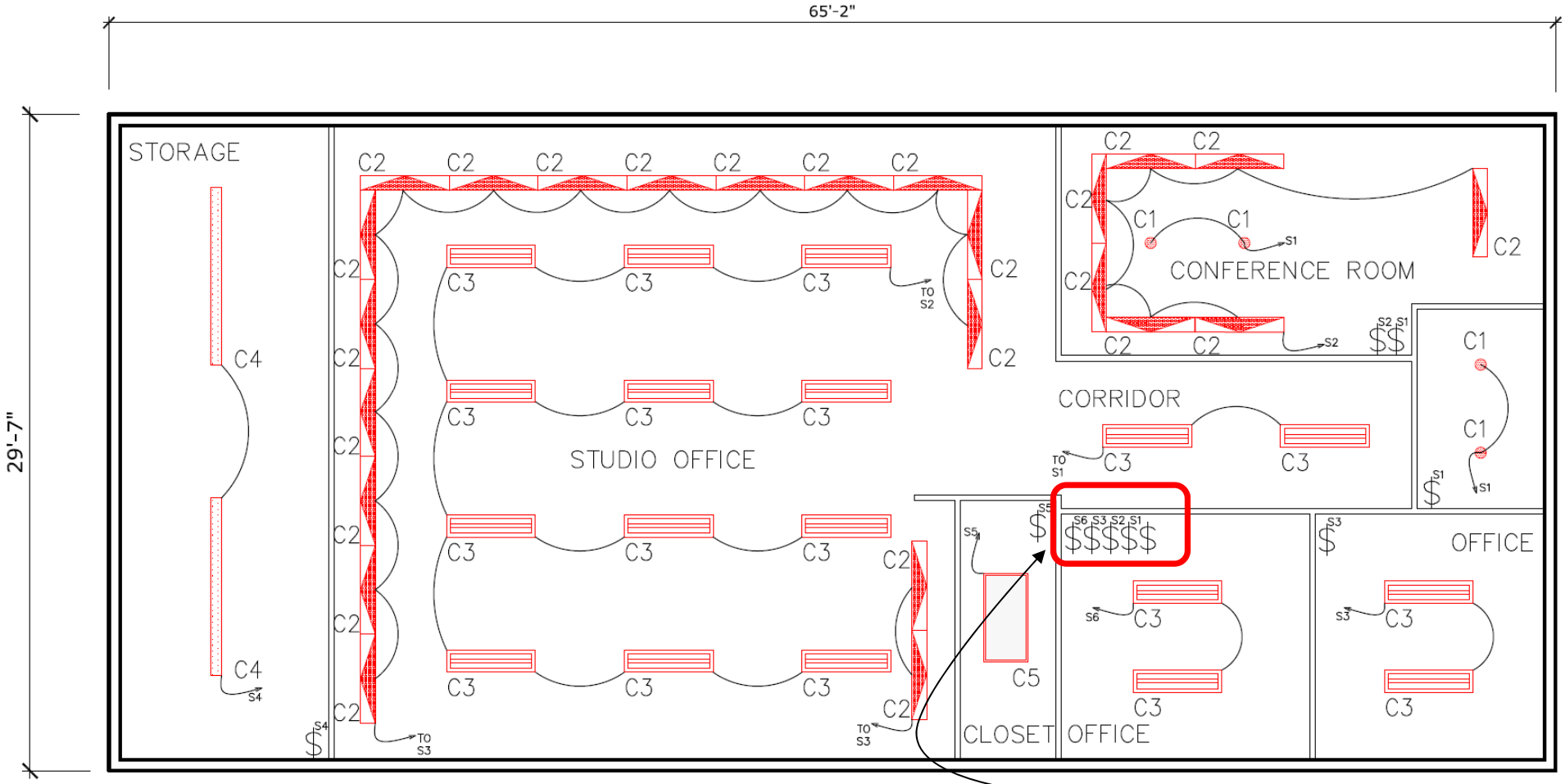
- If a luminaire schedule is provided then all of the same information that is required in a legend must be included in a luminaire schedule, including system watts.

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 [26W]	CUSTOM	LED	CUSTOM	CUSTOM	N/A	277V	UL DAMP LOCATION	RECESSED MTD	PHILLIPS. Catalog #:CDM35TC/830... 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-FX2/13-227V-H	2801-FX2-13-2	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 28WT5 LINEAR FL TASKLIGHT [30W]	KENALL	AUCDL-S-MW-48.EB-277V	AUCDL-I-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 28WT5 LINEAR FL 6"X4'-0" WITH ACRYLIC LENS [30W]	NEORAY	S7-24.8R-2T8-6R-1EB-DU	7-648-R-2-T5-6R-2-28W	MW	MW	277V	UL DAMP LOCATION	RECESSED MTD	SYLVANIA Catalog #: FP28/830/ECO. QTY: (1)	30	390

Lighting Controls

2. Required Documentation

What is required to be shown for circuiting?

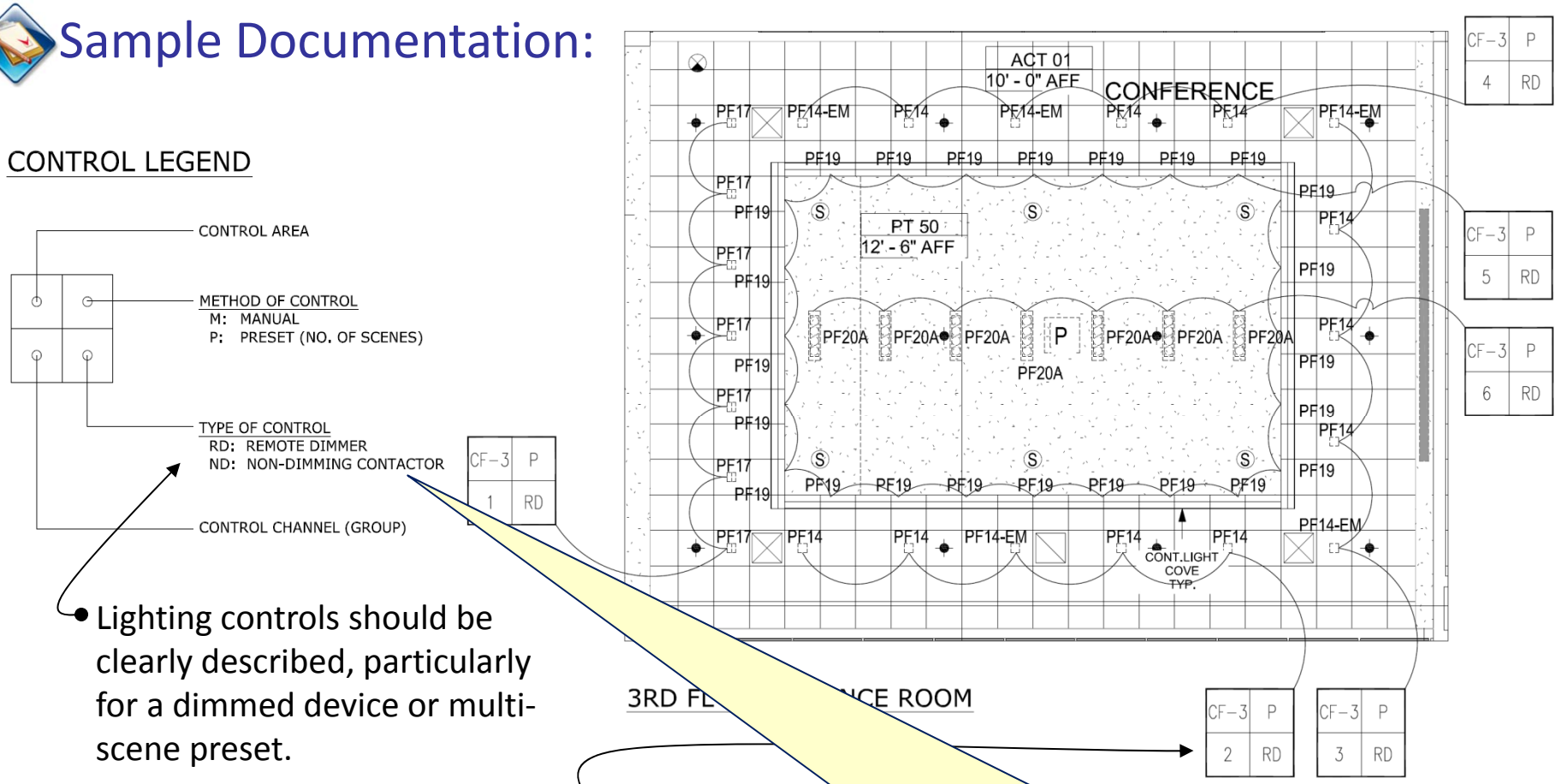


Circuit numbers should be shown at light switches.

Lighting Controls

How are control zones (groups) to be identified?

Sample Documentation:



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

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

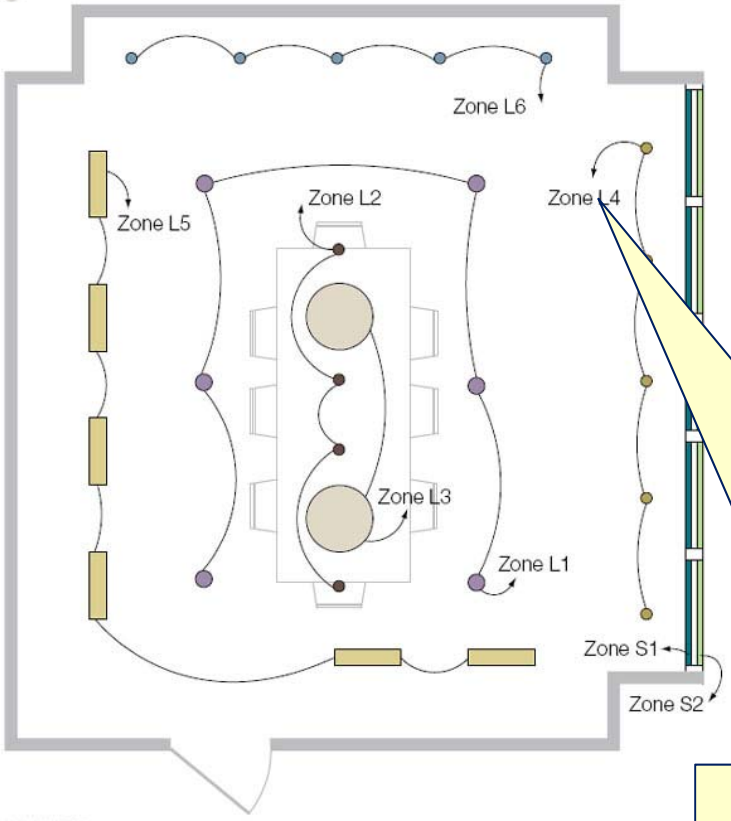
Drawings should describe what is being dimmed vs. switched.

Lighting Controls

2. Required Documentation

? Does the lighting control pad clearly identify the zones?

Sample Field Condition:



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

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

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
  - **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 or text. Which will be provided will vary by depend upon control project and is often based on complexity of the controls.

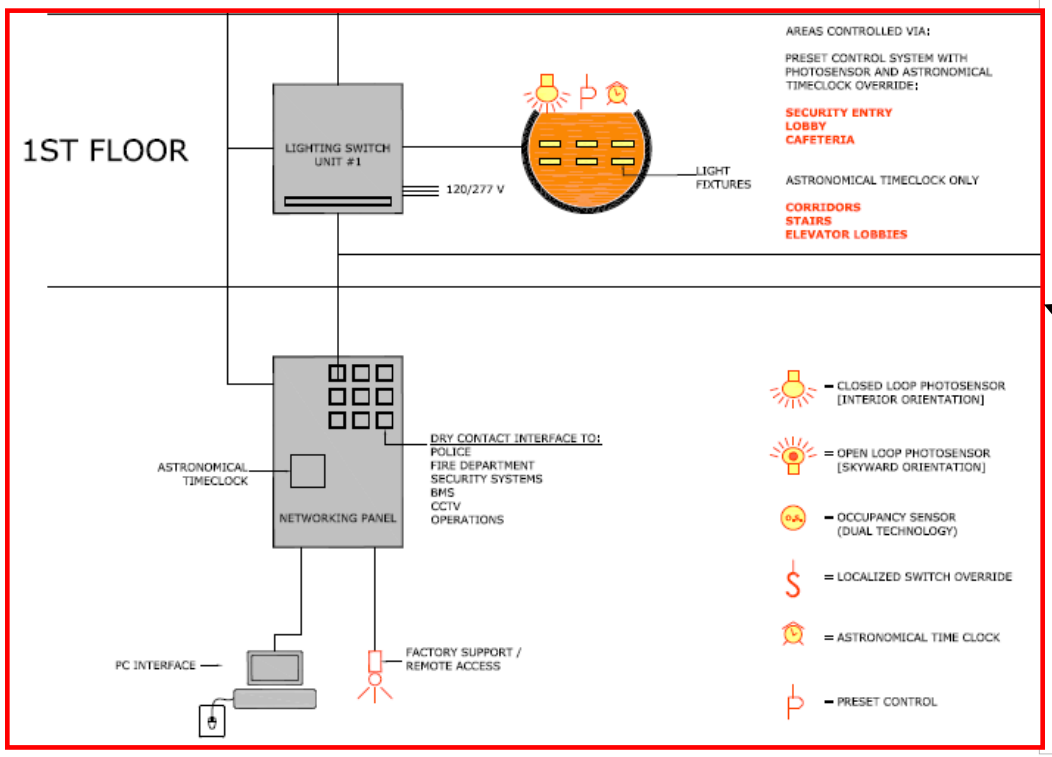
Basics must include intent, type, location, exceptions, and holiday scheduling requirements.

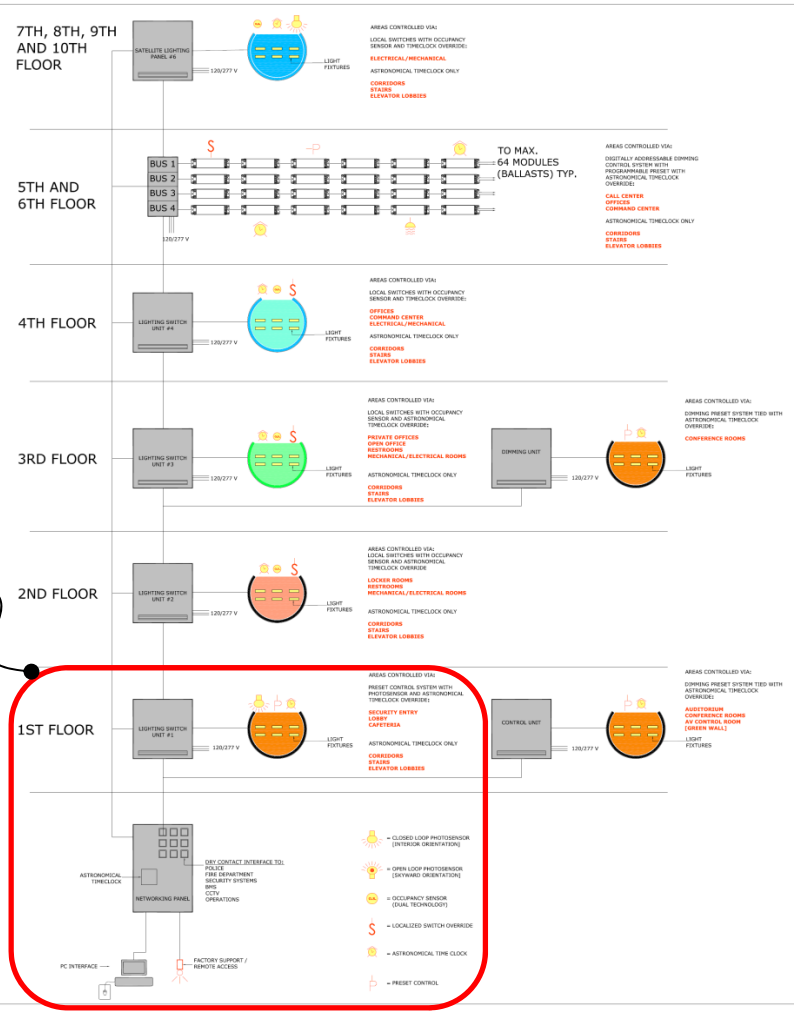
Controls Narrative

2. Required Documentation

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)



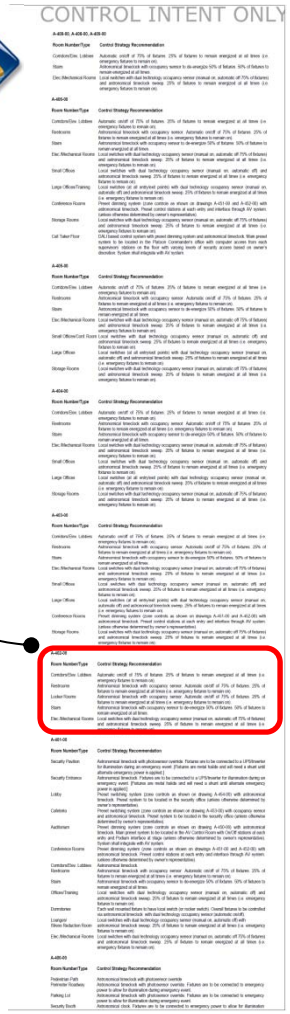


Controls Narrative

2. Required Documentation

? 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 of for 75% of fixtures, with astronomical timeclock)



A-402-00

Room Number/Type	Control Strategy F
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).

Controls Narrative

2. Required Documentation

? 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

CONTROL INTENT
PHOTOCELL ON/ TIMECLOCK OFF PHOTOCELL TO BE LOCATED ON EACH INDIVIDUAL FIXTURE AS PER DOT SPEC.

TYPE		DESCRIPTION			VOL	CONTROL INTENT
H1	Description:	ARM-MOUNTED COSMO OR LED NYCDOT LIGHTPOLE 29'-0" A.F.G. WITH DAVIT ARM AND OCTAGONAL POLE				
	Lamp:	(1) CPO-TW 140W/728 [2800°K] [14,020 LUMENS] [PHILIPS]				
	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 III DISTRI				PHOTOCELL ON/ TIMECLOCK OFF
	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 LATCH F 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 1.88" TO 2.38" O.D. X MINIMUM 8" LONG HORIZ LUMINAIRE EFFICIENCY SHALL BE MINIMUM 75%. ENTIRE ASSEMBLY SHALL BE UL LISTED, SUITABLE FOR WET LOCATION.			120 V	PHOTOCELL TO BE LOCATED ON EACH INDIVIDUAL FIXTURE AS PER DOT SPEC.
	Ballast:	ICW140TLS [PHILIPS] [BALLAST TEMPERATURE RANGE -20°C/+50°C] BALLAST SHALL BE ASSEMBLED ON A UNITIZED REMOVABLE TRAY WITH QUICK DISCONNECT PLUG.				
	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"A AFG. POLE TO ACCOMMODAT 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.				
H2	Description:	POST-TOP MOUNTED 1-LAMP LENSED PEDESTRIAN LUMINAIRE MOUNTED TO POLE AT 12'-0" A.F.G.	NOTE: POLAR CURVE SHOWN FOR 90w COSMO MH AND SHALL SHALL BE MODIFIED FOR TYPE V DISTRIBUTION.			
	Lamp:	(1) CPO-TW 90W/728 [2800°K] [8200 LUMENS] [PHILIPS]				
	Optics:	FULL CUTOFF, TYPE V DISTRIBUTION. LENS SHALL BE FLAT, CLEAR TEMPERED GLASS MECHANICALLY ASSEMBLED TO THE FIXTURE FRAME.				PHOTOCELL ON/ TIMECLOCK OFF
	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.		99 watts	120 V	PHOTOCELL TO BE LOCATED ON EACH INDIVIDUAL FIXTURE AS PER DOT SPEC.
	Ballast:	ICW90NLS [PHILIPS] [BALLAST TEMPERATURE RANGE -20°C/+50°C] BALLAST SHALL BE ASSEMBLED ON A UNITIZED REMOVABLE TRAY WITH QUICK DISCONNECT PLUG.				
	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.				

Energy Analysis

? In what formats should the energy analysis be submitted?

Tabular Analysis (Prescriptive Compliance)

- Identifies energy compliance
- Table must include item description, proposed design value, code-prescribed value, and citation

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

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

- Identify compliance via NYCECC Chapter 5 or ASHRAE 90.1-2007

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.

	DESIGN VALUE	VALUE AND CITATION	SUPPORTING DOCUMENTATION
Interior Lighting			
Total connected load of proposed interior lighting for office building type	0.77 w/ sq.ft.	1.0 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)

Tabular Analysis

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

- Keep the tabular analysis simple unless Space-by-Space is used
- Space-by-Space analysis might be used when:
  - Project opts to follow ASHRAE 90.1
  - When the retail allowances apply
  - Large projects with complex occupancies

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

ITEM DESCRIPTION	AREA (SQ.FT.)	PROPOSED DESIGN VALUE		CODE PRESCRIPTIVE VALUE AND CITATION		REFERENCE DRAWINGS
Space Type	Area (SQ.FT.)	Design Wattage	Design LPD [W/SF]	ASHRAE 90.1-2007 LPA [W/SF]	Wattage Allowance	Drawing Numbers
Auditorium	8633 Sq Ft	7,171 W	0.83	0.7	6043 W	A - 401, E-601
Circulation	9183 Sq Ft	5,403 W	0.59	0.2	1837 W	A-401 - 409, E-601-609
Lobby	4836 Sq Ft	3,150 W	0.65	1.9	9188 W	A - 401, E-601
Cafeteria/Kitchen	8777 Sq Ft	5,590 W	0.64	1.3	11410 W	A - 401, E-601
Bathrooms	1641 Sq Ft	1,508 W	0.92	0.6	985 W	A-401 - 409, E-601-609
Stairs	802 Sq Ft	464 W	0.58	1.1	882 W	A-401 - 409, E-601-609
Mechanical/Electrical	2428 Sq Ft	1,694 W	0.70	0.5	1214 W	A-401 - 409, E-601-609
Lounge/Quiet Room	1494 Sq Ft	1,912 W	1.28	0.8	1195 W	A - 401, E-601
Offices	24675 Sq Ft	20,455 W	0.83	1	24675 W	A-401 - 409, E-601-609
Conference Rooms	1054 Sq Ft	1,616 W	1.53	0.6	632 W	A-401 - 409, E-601-609
TOTALS FOR OFFICE BUILDING	63523 Sq Ft	48,963 W	**0.77**	**1.0**	58,062 W	

- Description of the item (building/space type)
- Design value
- Prescribed value

ComCheck – Interior Lighting

2. Required Documentation

? What information must be completed on a COMcheck form?

- COMcheck Analysis must reflect appropriate standard:
  - Either 2010 ECCCNYS
  - Or 2007 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"

COM*check* Software Version 3.8.1

Interior Lighting Compliance Certificate

2010 New York Energy Conservation Construction Code

Section 1: Project Information

Project Type: **New Construction**
Project Title :

Construction Site: Bronx, NY
Owner/Agent: NY, NY
Designer/Contractor:

Section 2: Interior Lighting and Power Calculation

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B x C)
Auditorium (Office)	8633	1	8633
Circulation (Office)	9183	1	9183
Lobby (Office)	4836	1	4836
Cafeteria/Kitchen (Office)	8777	1	8777
Bathrooms (Office)	1641	1	1641
Stairs (Office)	802	1	802
Mechanical/Electrical (Office)	2428	1	2428
Lounge/Quiet room (Office)	1494	1	1494
Conference rooms (Office)	1054	1	1054
		Total Allowed Watts =	38848

Section 3: Interior Lighting Fixture Schedule

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt	E (C X D)
Auditorium (Office 8633 sq.ft.)				
Linear Fluorescent 1: PF2/PF7: 48" T8 32W / Electronic	1	225	30	6750
Linear Fluorescent 2: PF11: 48" T8 32W / Electronic	2	5	58	290
Compact Fluorescent 1: PF5/PF14: Triple 4-pin 26W / Electronic	2	31	45	1395
Circulation (Office 9183 sq.ft.)				
Linear Fluorescent 3: PF2/PF10: 48" T8 32W / Electronic	1	116	30	3480
Linear Fluorescent 4: PF1: 48" T8 32W / Electronic	2	23	58	1334
Compact Fluorescent 2: PF5/PF14: Triple 4-pin 26W / Electronic	2	9	45	405
Linear Fluorescent 12: PB1: 48" T8 32W / Electronic	2	2	92	184
Lobby (Office 4836 sq.ft.)				
Linear Fluorescent 5: PF2/PF10: 48" T8 32W / Electronic	1	105	30	3150
Cafeteria/Kitchen (Office 8777 sq.ft.)				
Linear Fluorescent 6: PF2/PF10: 48" T8 32W / Electronic	1	138	30	4140
Linear Fluorescent 7: PF1/PF15: 48" T8 32W / Electronic	2	25	58	1450
Bathrooms (Office 1641 sq.ft.)				
Linear Fluorescent 8: PF6: 48" T8 32W / Electronic	1	10	30	300
Linear Fluorescent 9: PB2: 48" T8 32W / Electronic	2	2	64	128
Compact Fluorescent 3: PF5/PF14: Triple 4-pin 26W / Electronic	2	24	45	1080
Stairs (Office 802 sq.ft.)				
Linear Fluorescent 10: PB3: 48" T8 32W / Electronic	2	8	58	464
Mechanical/Electrical (Office 2428 sq.ft.)				
Linear Fluorescent 13: PB1: 48" T8 32W / Electronic	2	14	92	1288
Linear Fluorescent 14: PF11/PB2: 48" T8 32W / Electronic	2	7	58	406
Lounge/Quiet room (Office 1494 sq.ft.)				
Linear Fluorescent 15: PF11: 48" T8 32W / Electronic	2	4	58	232
Compact Fluorescent 4: PF12: Triple 4-pin 26W / Electronic	5	12	140	1680
Conference rooms (Office 1054 sq.ft.)				
Linear Fluorescent 11: 48" T8 32W / Electronic	1	16	30	480
Halogen 1: Halogen MR-16 71W	2	8	142	1136
			Total Proposed Watts =	29772

Project Title:
Data filename: C:\Users\apena\Desktop\205-check.cck
Report date: 03/02/1
Page 2 of 7

Section 4: Requirements Checklist

Lighting Wattage:

☑ 1. Total proposed watts must be less than or equal to total allowed watts.

Allowed Watts	Proposed Watts	Complies
38848	29772	YES

Exterior Lighting:

☑ 2. Comply with Sections 401.3.1 and 401.3.1.1 of 90.1-1989 Code and attach documentation.

Controls, Switching, and Wiring:

☐ 3. Master switch at entry to hotel/motel guest room.

☑ 4. Minimum of one manual control for each space with no task activity (i.e. storage). Multiple manual controls, occupancy sensor, automatic timer, or dimmer in other spaces.

Exceptions:

☑ Lighting for emergency or exit egress or intended for continuous operation.

☑ 5. Photocell/astronomical time switch on exterior lights.

Exceptions:

☑ Lighting intended for 24 hour use.

☑ 6. Tandem wired one-lamp and three-lamp ballasted luminaires (No single-lamp ballasts).

Exceptions:

☑ Luminaires with three lamp ballasts (or electronic high-frequency single-lamp ballasts).

Interior Lighting PASSES: Design 23% better than code.

Section 5: Compliance Statement

Compliance Statement: The proposed lighting design represented in this document is consistent with the building plans, specifications and other calculations submitted with this permit application. The proposed lighting system has been designed to meet the 2010 New York Energy Conservation Construction Code requirements in COM*check* Version 3.8.1 and to comply with the mandatory requirements in the Requirements Checklist.

Name - Title | Signature | Date

Stamp

Project Title:
Data filename: C:\Users\apena\Desktop\205-check.cck
Report date: 03/02/11
Page 3 of 7

ComCheck – Exterior Lighting

2. Required Documentation

? What information must be completed on a COMcheck form?

- COMcheck Analysis must reflect appropriate standard:
  - Either 2010 ECCCNYS
  - Or 2007 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"

COMcheck Software Version 3.8.1

Exterior Lighting Compliance Certificate

2010 New York Energy Conservation Construction Code

Section 1: Project Information

Project Type: **New Construction**
Project Title :
Exterior Lighting Zone: **2 (Neighborhood business district)**

Construction Site: Bronx, NY
Owner/Agent: NY, NY
Designer/Contractor:

Section 2: Exterior Lighting Area/Surface Power Calculation

A Exterior Area/Surface	B Quantity	C Allowed Watts / Unit	D Tradable Wattage	E Allowed Watts (B x C)	F Proposed Watts
Parking (Parking area)	100274 ft2	0.06	Yes	6016	7696
Roadway (Parking area)	45583 ft2	0.06	Yes	2735	3498
Landscape (Other door (not main entry))	5941 ft of door width	20	Yes	118820	2830
Path (Walkway < 10 feet wide)	14361 ft of walkway length	0.7	Yes	10053	3605
Security (Emergency services, loading area)	1915 ft2	0.5	No	958	120
			Total Tradable Watts* =	137624	21569
			Total Allowed Watts =	139582	
			Total Allowed Supplemental Watts** =	600	

* Wattage tradeoffs are only allowed between tradable areas/surfaces.
** A supplemental allowance equal to 600 watts may be applied toward compliance of both non-tradable and tradable areas/surfaces.

Section 3: Exterior Lighting Fixture Schedule

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
Parking (Parking area 100274 ft2): Tradable Wattage				
HID 1: PX1: Metal Halide 150W / Pulse start	1	9	664	5976
HID 2: PX2: Metal Halide 150W / Pulse start	2	5	332	1660
Roadway (Parking area 45583 ft2): Tradable Wattage				
HID 3: PX2: Metal Halide 150W / Pulse start	2	1	332	332
HID 4: PX4: Metal Halide 150W / Pulse start	3	7	498	3486
Linear Fluorescent 1: PX8: 48" T8 32W / Electronic	1	12	30	360
HID 5: PX5: Metal Halide 150W / Pulse start	4	5	664	3320
Landscape (Other door (not main entry) 5941 ft of door width): Tradable Wattage				
HID 6: PX7: Ceramic Metal Halide 39W / Standard	1	50	45	2250
Linear Fluorescent 2: PX10: 48" T8 32W / Electronic	2	10	58	580
Path (Walkway < 10 feet wide 14361 ft of walkway length): Tradable Wattage				
Compact Fluorescent 1: PX6: Triple 4-pin 26W / Electronic	1	95	28	2660
HID 8: PX7: Ceramic Metal Halide 39W / Standard	1	21	45	945
Security (Emergency services, loading area 1915 ft2): Non-tradable Wattage				
Compact Fluorescent 2: PX8: Triple 4-pin 26W / Electronic	1	4	30	120
			Total Tradable Proposed Watts =	21569

Project Title:
Data filename: C:\Users\apena\Desktop\205-check.cck
Report date: 03/02/
Page 4 of 7

Section 4: Requirements Checklist

Lighting Wattage:

☑ 1. Within each non-tradable area/surface, total proposed watts must be less than or equal to total allowed watts. Across all tradable areas/surfaces, total proposed watts must be less than or equal to total allowed watts.

Compliance: Passes.

Controls, Switching, and Wiring:

☐ 2. All exemption claims are associated with fixtures that have a control device independent of the control of the nonexempt lighting.
☑ 3. All lighting fixtures are controlled by a photosensor or astronomical time switch that is capable of automatically turning off the fixture when sufficient daylight is available or the lighting is not required.

Exceptions:
☑ Covered vehicle entrance/exit areas requiring lighting for safety, security and eye adaptation.

Exterior Lighting Efficacy:

☑ 4. All exterior building grounds luminaires that operate at greater than 100W have minimum efficacy of 60 lumen/watt.

Exceptions:
☐ Lighting that has been claimed as exempt and is identified as such in Section 3 table above.
☐ Lighting that is specifically designated as required by a health or life safety statue, ordinance, or regulation.
☑ Emergency lighting that is automatically off during normal building operation.
☐ Lighting that is controlled by motion sensor.

Exterior Lighting PASSES: Design 84% better than code.

Section 5: 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 lighting system has been designed to meet the 2010 New York Energy Conservation Construction Code requirements in COMcheck Version 3.8.1 and to comply with the mandatory requirements in the Requirements Checklist.

Name - Title | Signature | Date

Stamp

Project Title:
Data filename: C:\Users\apena\Desktop\205-check.cck
Report date: 03/02/11
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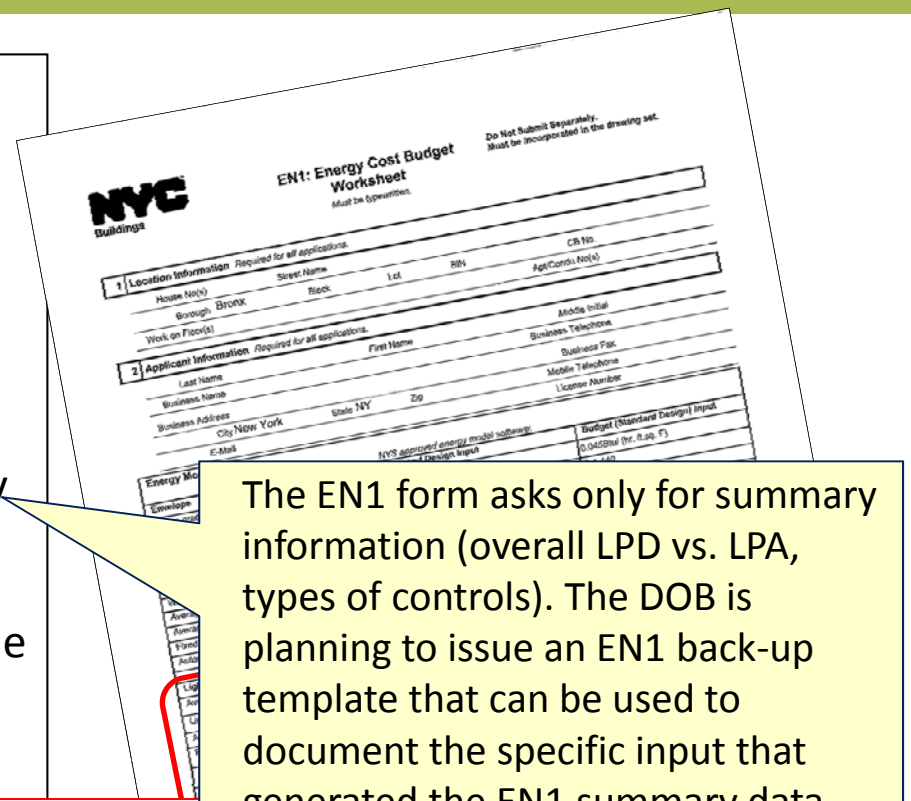
Energy Analysis

2. Required Documentation

? What information is required on the EN1 form to show compliance?

EN1 form

- Energy models may be performed using DOE-2 or updates of DOE-2 (DOE-2.1E, Visual DOE, EnergyPlus, and eQuest)
- All other energy modeling programs must be approved by the Secretary of State of New York State
- The commissioner may request that energy modeling back-up be submitted if the project is audited
- Total building compliance is evaluated in the boxes on Page 2 of the form, and that page must be complete



The EN1 form asks only for summary information (overall LPD vs. LPA, types of controls). The DOB is planning to issue an EN1 back-up template that can be used to document the specific input that generated the EN1 summary data.

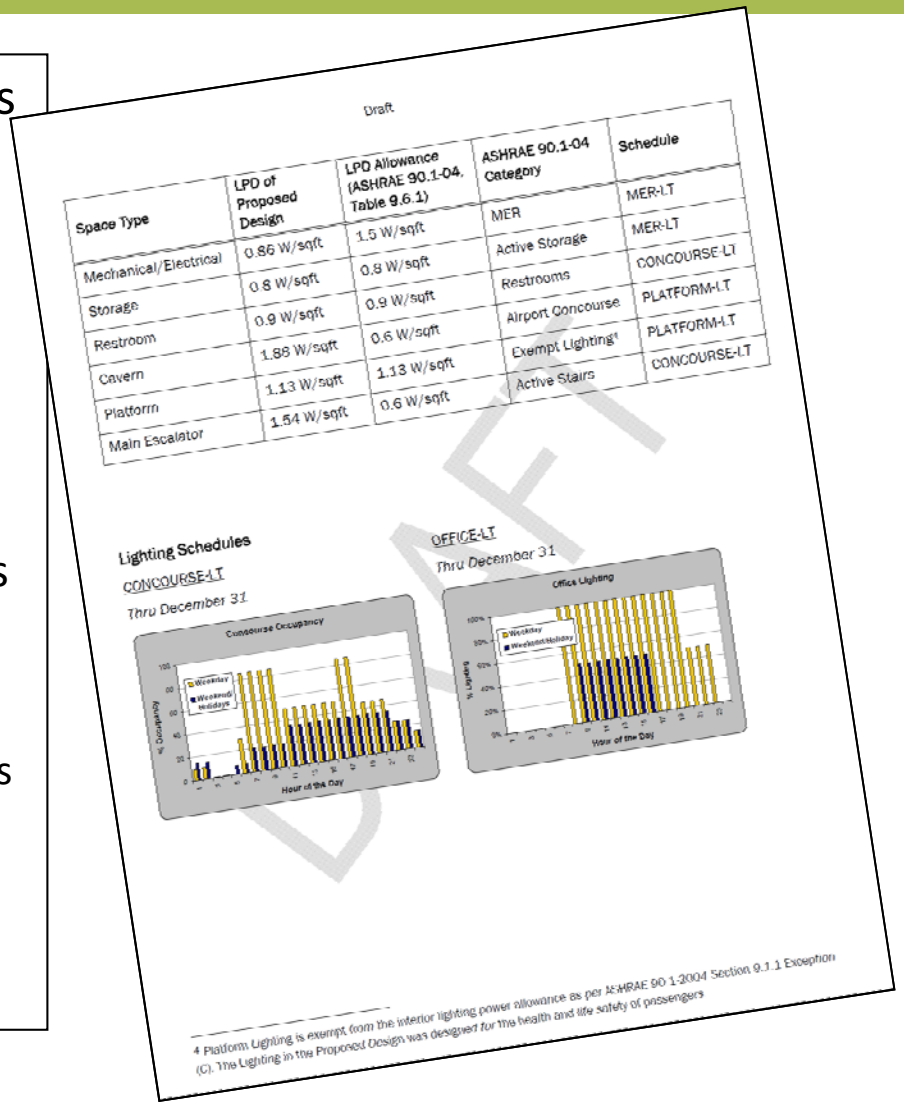
Lighting		
Average ambient lighting power density (W/SF)	.77	1
Lighting occupant sensor controls (yes/no)	Yes: Lockers, Conference Rm, Loungue, Lobby,	No
Automatic daylighting controls (yes/no)	No	No
Exterior lighting power (tradable surfaces) (kW)	21.54Kw	28.15Kw
Exterior lighting power (non-tradable surfaces) (kW)	5.1Kw	4.7Kw

Energy Analysis

2. Required Documentation

? Why might a team use energy modeling for compliance?

- Energy modeling may be advantageous when:
  - Energy savings are realized based on controls for:
    - » Daylight harvesting
    - » Occupant scheduling
    - » Energy management strategies
  - A project team chooses to use trade-offs between disciplines
    - » Lighting may or may not comply as a discipline, but the overall building complies using the performance method



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Space Type	LPD of Proposed Design	LPD Allowance (ASHRAE 90.1-04, Table 9.6.1)	ASHRAE 90.1-04 Category	Schedule
Mechanical/Electrical	0.86 W/sqft	1.5 W/sqft	MER	MER-LT
Storage	0.8 W/sqft	0.8 W/sqft	Active Storage	MER-LT
Restroom	0.9 W/sqft	0.9 W/sqft	Restrooms	CONCOURSE-LT
Cavern	1.88 W/sqft	0.6 W/sqft	Airport Concourse	PLATFORM-LT
Platform	1.13 W/sqft	1.13 W/sqft	Exempt Lighting[4]	PLATFORM-LT
Main Escalator	1.54 W/sqft	0.6 W/sqft	Active Stairs	CONCOURSE-LT

Lighting Schedules

CONCOURSE-LT

Thru December 31

OFFICE-LT

Thru December 31

4 Platform Lighting is exempt from the interior lighting power allowance as per ASHRAE 90.1-2004 Section 9.1.1 Exception (C). The Lighting in the Proposed Design was designed for the health and life safety of passengers

DRAFT

Building Lighting

Slides 41 to 63

3. Mandatory Provisions

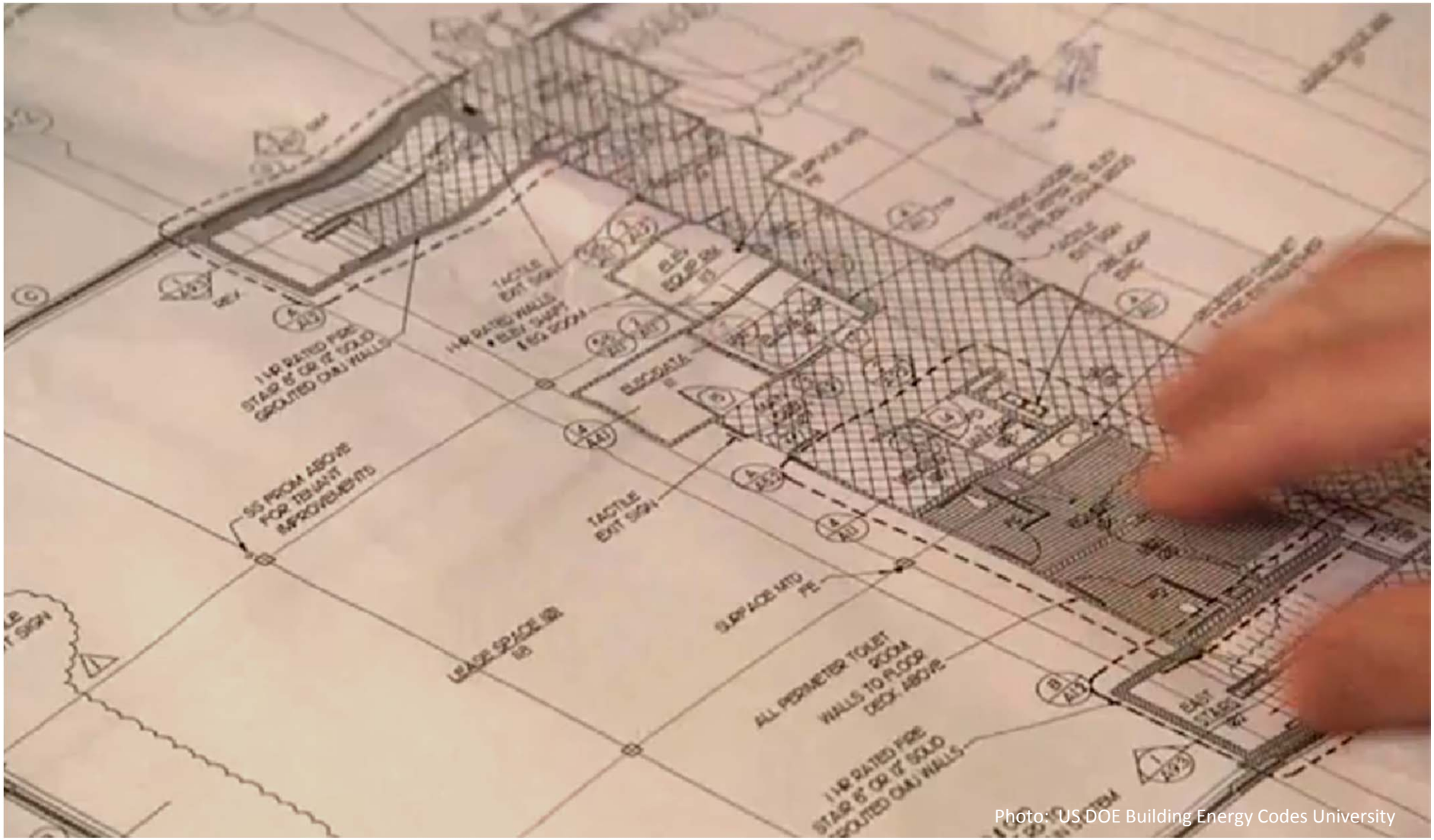


Photo: US DOE Building Energy Codes University

Mandatory Provisions

Learning Objectives

In this section you will learn about:

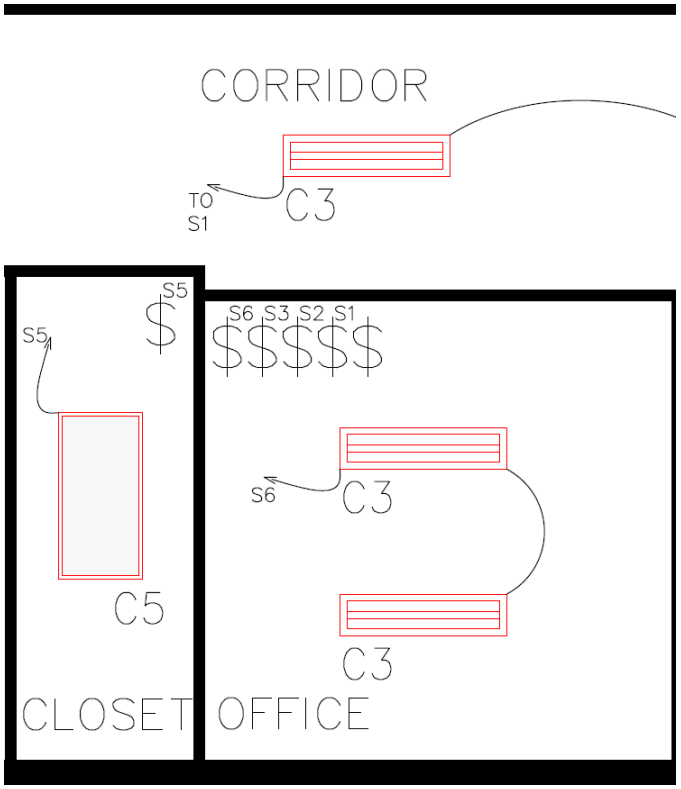
- Manual controls;
- Additional controls;
- ASHRAE 90.1 alternative compliance controls;
- Tandem wiring; and
- Exit signs.

Manual Controls

What are the minimum controls required ?

- All areas determined by floor-to-ceiling walls must have at least **one manual control** for the lighting in that area
- If the switch is not located within that area then the **remote switch** must identify the lights being **controlled** and their status (on/off)

Sample Documentation:



Manual Controls

What are the minimum controls required ?

- All areas determined by floor-to-ceiling walls must have at least **one manual control** for the lighting in that area
- If the switch is not located within that area then the **remote switch** must identify the lights being **controlled** and their status (on/off)

Sample Field Condition:

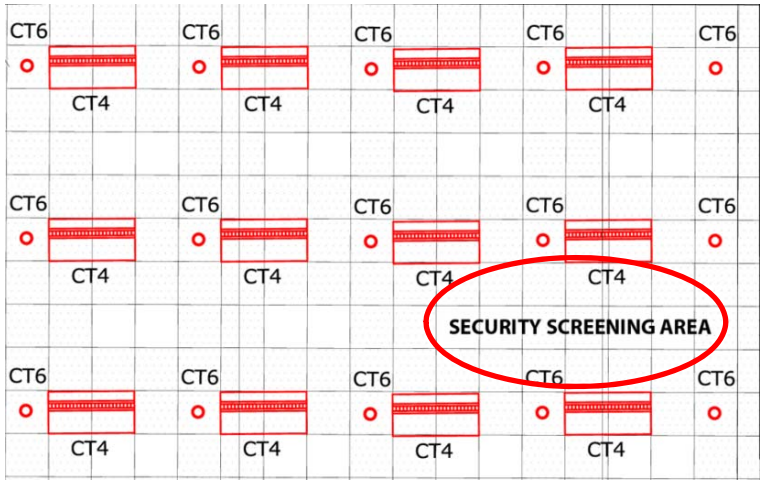
Manual Controls

Are there any areas which do not require manual controls?

Exceptions:

- 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 or corridors designed as **means of egress**

Sample Documentation:



Manual Controls

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- Possible spaces could include:
  - Airport Security Checkpoint
  - Subway Station
  - Police Precinct
- Lighting of stairs or corridors designed as **means of egress**

Sample Field Condition:

Additional Controls (505.2.2)

Are there any other controls required?

- Lighting reduction controls
- Automatic lighting shut-off
- Occupant override
- Holiday scheduling
- Daylight zone control
- Sleeping unit 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.

Automatic Lighting Shut-off is required for buildings larger than 5,000 sq. ft. Information should be included in the controls narrative and/or notes.

Occupant Override is required when an automatic time switch is installed.

Holiday Scheduling is required when an automatic time switch is installed.

Daylight Zone Control is required to control the lighting independent of general area lighting. Zoning diagrams or circuiting should identify each of the lighting circuits. Notes and/or narrative should identify method of daylight control (i.e. photo sensor).

Sleeping Unit Controls are required to have at least one master switch at the main entry door. A switch should be identified at the main entry door.

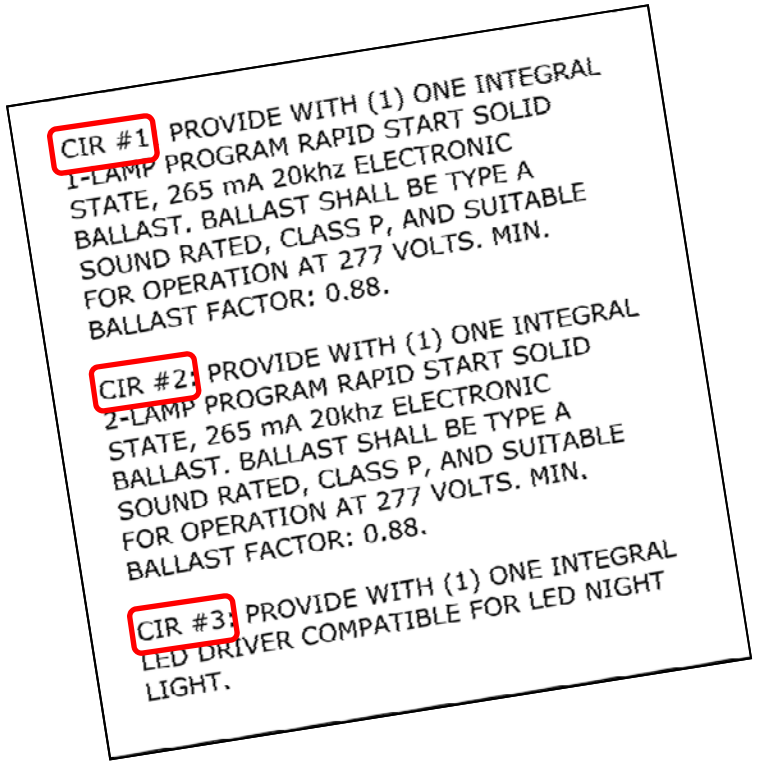
Additional Controls

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

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

- 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

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.

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%.

- Possible methods include:
  - Designating multiple lamps in same fixture on separate circuits
  - Placing fixtures on alternate circuits providin a uniform distribution of light
  - Specifying dimming system with appro zoning and com

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

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

Sample Field Condition:

Circuit #1

Circuit #2

Additional Controls

? When are automatic shut-off controls required?

Buildings > 5,000 sf. shall be equipped with an automatic control device to shut off lighting.

- 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 30 minutes**.
  - No override switch for automatic on
  - Local Law 48 specifically requires **manual** control. Sensors and controls are **NOT** to provide override control that allows for automatic-on functionality

Sample Field Condition:

Local Law 48 refers to:

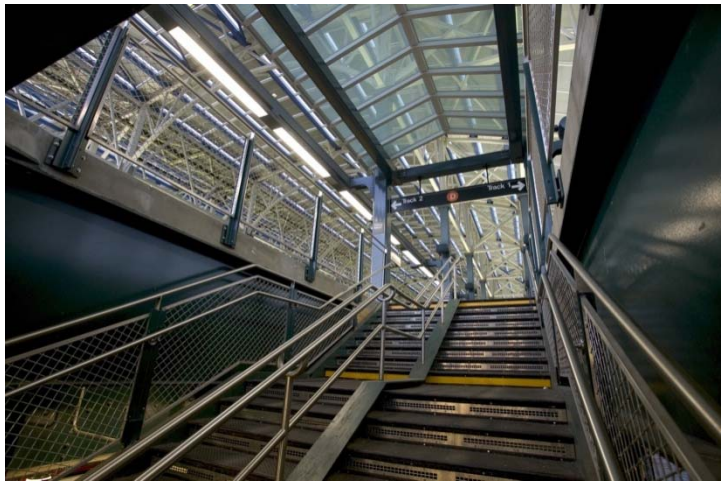
1. Classrooms (not including shop class rooms, laboratory classrooms, and preschool class rooms)
2. Conference/meeting rooms
3. Employee lunch and break rooms
4. Offices smaller than 200 sq.ft. (exceptions for offices smaller than 200 sq.ft. equipped with photosensor)

Additional Controls - ASHRAE 90.1

What are the differences between NYCECC and ASHRAE 90.1?

- Exceptions for Automatic Shut-off in ASHRAE 90.1:
  - Lighting intended for 24-hour operation
  - Lighting in spaces where patient care is rendered
  - Lighting in spaces where an automatic shutoff would endanger the safety or security of the room or building occupants
  - Lighting in classrooms, conference/meeting rooms, and employee lunch and break area that are equipped with a multi-scene control
- LL48 Manual on requirement for automatic controls is also applicable to projects complying via ASHRAE 90.1 – refer to Local Law 48 Appendix A.

Sample Field Condition:



Additional Controls

? Where automatic shutoff is required what other control requirements apply?

Occupant override is required when automatic or occupant sensor switch is installed.

- 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

Sample Field Condition:

Additional Controls

? What control is required for holiday scheduling?

Incorporate an automatic Holiday Scheduling feature.

- 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

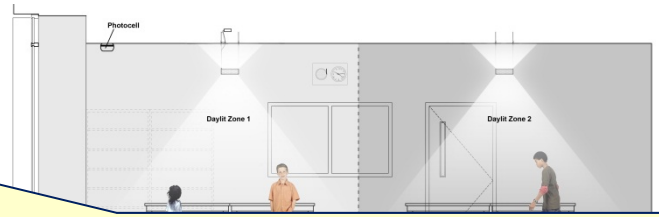
This provision is included in both the NYCECC and ASHRAE 90.1

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 nearest ceiling height opaque partition
- 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)



This is NEW and only requires that an additional control ZONE be created. The requirement may be met with MANUAL controls; automatic daylight control is not required.

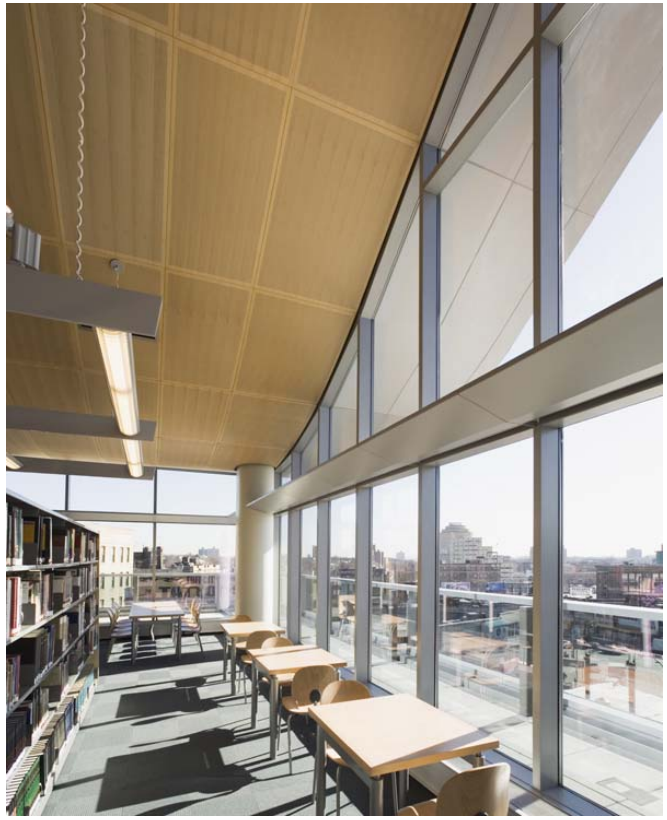
Additional Controls

? 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
- 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)

Sample Field Condition:



Additional Controls

What provisions are required for daylighting controls under skylights?

- Daylight Zone for Skylights
  - Area under skylight, **equal to skylight dimension,** plus:
    - » Floor-to-ceiling height
    - » Distance to full height opaque partition, or
    - » Half-distance to adjacent skylight or window.
- Lighting fixtures under skylights must be controlled separately from window zones if they are greater than 15 feet from the windows
- 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:

Additional Controls

What controls are required for hotel rooms?

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

- Master switch should control:
  - All permanently wired luminaires
  - All switched outlets
- Master switch is not required to control bathroom luminaires or outlets
- Control strategy should be documented in controls narrative and on constructions drawings

Sample Field Condition:

Additional Controls

? Are there additional controls required for ASHRAE 90.1?

- Areas that require separate controls device
  - Display/Accent Lighting
  - Case Lighting
  - Demonstration Lighting (sale or educational demonstrations)
  - Non-visual Lighting (i.e. plant growth and food warming)

- Guest Room Lighting
  - Must have one or more control devices at the entry door that collectively control all permanently installed luminaires and switched receptacles, except in the bathroom.
  - Bathrooms shall have control device to automatically turn off the lights

- Task Lighting
  - Lighting shall have an integral or wall-mounted control device provided it is located where occupant can see the lighting and readily accessible

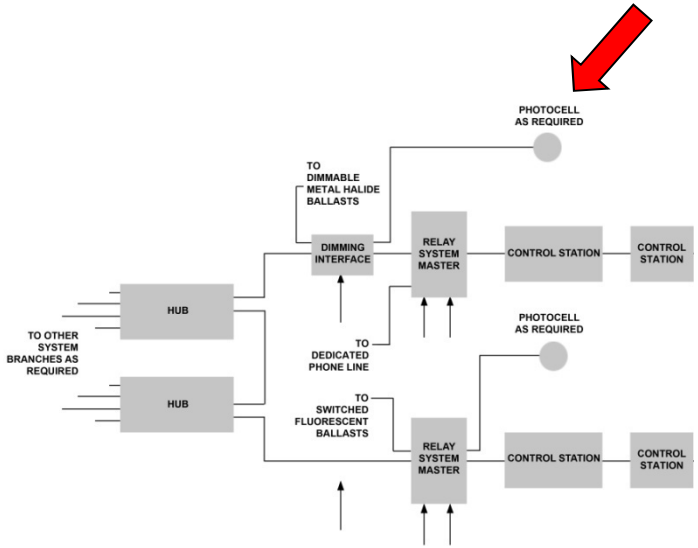
Only ASHRAE regulates controls for task lighting. The NYCECC has no similar requirement.

Exterior Controls

What mandatory controls are required for exterior lighting?

- 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

Sample Documentation:



Exterior Controls

What Mandatory Controls are Required for Exterior Lighting?

- 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

Sample Field Condition:

Tandem Wiring

? What requires tandem wiring; and how is it documented?

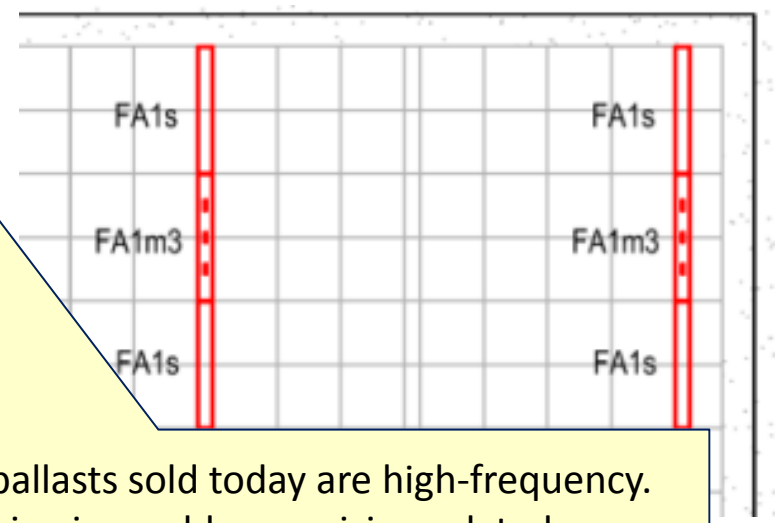
- Affected fixtures include:
  - Fixtures with odd number of lamps
  - Recessed fluorescent fixtures located ≤ 10’-0” center-to-center
  - Pendant or surface mounted fluorescent fixtures mounted ≤ 1’-0” edge-to-edge
- Exceptions:
  - Luminaires with high-frequency ballasts
  - Luminaires on emergency circuits
  - Luminaires with no available pair within required distances

Sample Documentation:

FA1m2 — RECESSED 4'–0" SINGLE LAMP 32W T8 FLUORESCENT LUMINAIRE WITH 2–LAMP BALLAST – MASTER [74w]

FA1m3 — RECESSED 4'–0" SINGLE LAMP 32W T8 FLUORESCENT LUMINAIRE WITH 3–LAMP BALLAST – MASTER [110w]

FA1s — RECESSED 4'–0" SINGLE LAMP 32W T8 FLUORESCENT LUMINAIRE WITHOUT BALLAST – SLAVE [0w]



Electronic ballasts sold today are high-frequency. Tandem wiring is an older provision related predominantly to magnetic ballasts.

Tandem Wiring

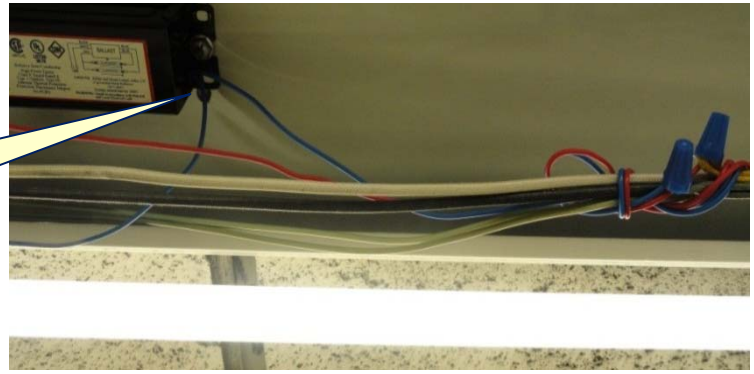
How is tandem wiring identified in the field?

- Affected fixtures include:
  - Fixtures with odd number of lamps
  - Recessed fluorescent fixtures located ≤ 10’-0” center-to-center
  - Pendant or surface mounted fluorescent fixtures mounted ≤ 1’-0” edge-to-edge
- Exceptions:
  - Luminaires with high-frequency ballasts
  - Luminaires on emergency circuits
  - Luminaires with no available pair within required distances

Tandem wiring is difficult to identify in the field without checking the wiring in the fixture. Progress Inspectors should have the opportunity to check for tandem wiring during the rough-out.

Sample Field Condition:

(2) Lamp ballast with single lamp fixture and wires running to next fixture immediately adjacent.

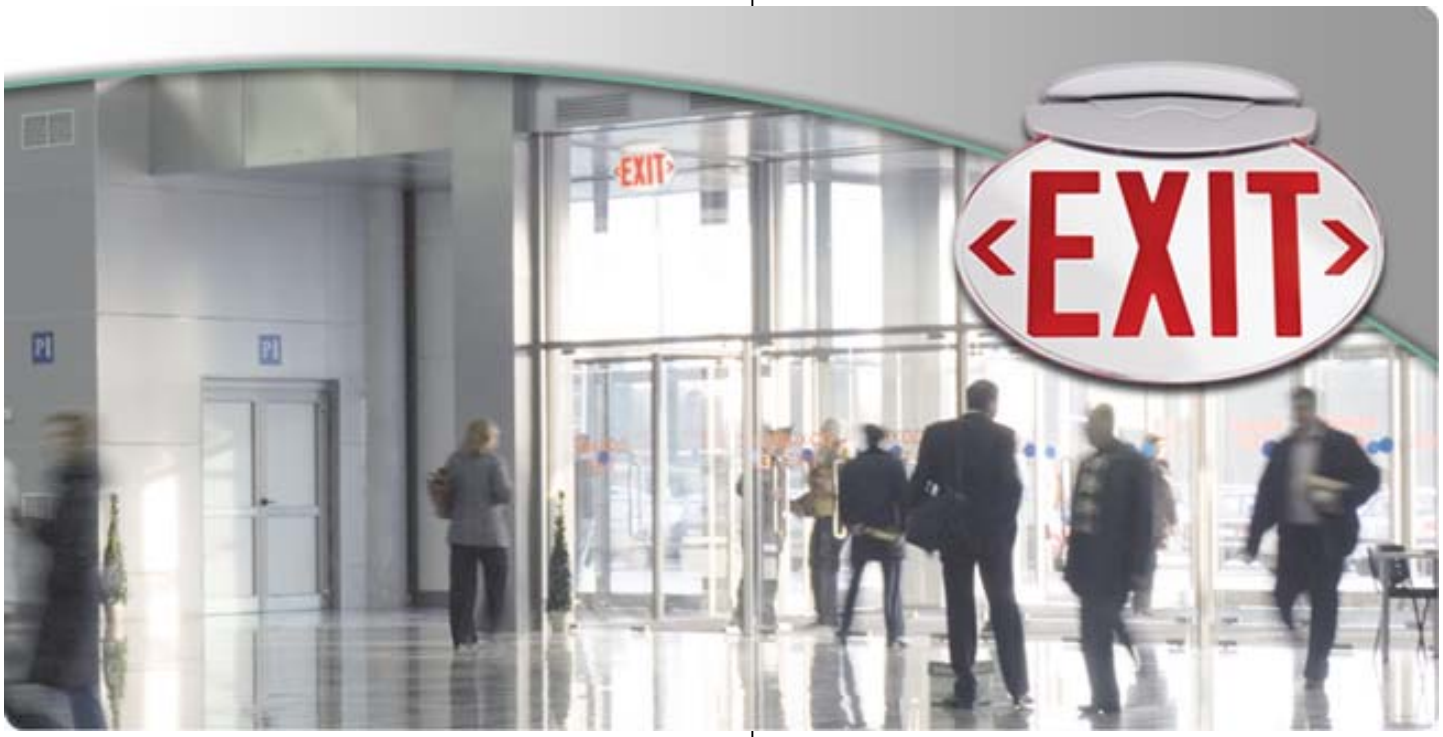


Exit Signs

What is required for exit signs?

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

Sample Field Condition:



Building Lighting

Slides 64 to 100

4. Interior Lighting Requirements

Interior Lighting Requirements

Learning Objectives

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.

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

Connected Lighting Power

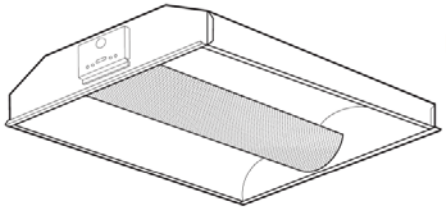
? How are system watts determined?

The total connected lighting power is the sum of the watts of all interior lighting equipment.

- 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'

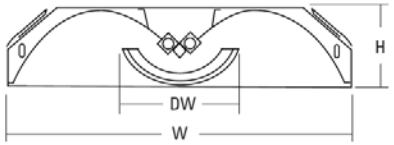


Linear Fluorescent
T8
1, 2 or 3 lamps

Specifications

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

All dimensions are inches (millimeters).



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

Trim type
G Grid trim
ST Screw slot

Number of lamps
1
2
3
Not included.

Air function
(blank) **Static (no air function)**
A Air return/supply

17

Lamp type
17 17W T8 (24")

Diffuser
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[3]
Others available.

Voltage
MVOLT[2]
347
Others available.

Options
GEB10IS Electronic ballast, ≤ 10% THD, instamt 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

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.

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

Connected Lighting Power

4. Interior Lighting Requirements

? Where is the information for the ballast draw found?

- System watts per fixture includes the lamp and the ballast draw
- Example:
  - If you have a 2’-0” x 4’-0” recessed parabolic fixture with (2) 32W T8 linear fluorescent lamps what is 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)

F32T8

- Low Profile Designs Featured
- Instant & Programmed Rapid Starting Options
- 2 Lamp Applications

TRIAD® ELECTRONIC BALLASTS FOR (2) F32T8 LAMPS

Fluorescent-Electronic

Lamp Qty.	Lamp Starting Method	Line Volts	Catalog Number	Certification UL	Certification CSA	Certification NOM	Line Current (Amps)	Input Power (Watts)	Power Factor (PF)	Ballast Factor (BF)	Ballast Efficacy Factor (BEF)	THD %	Min. F/C Start Temp	Wiring Diag.	Dim.
F32T8 - Two Lamp Applications															
2	PAR-IS	120	B232I120L-A	•	•		0.44	51	> 95	0.78	1.53	< 20	0/-18	3	-A
		277	B232I277L-A	•	•		0.19	51	> 95	0.78	1.53	< 20	0/-18	3	-A
		347	B232I347L-A		•		0.15	51	> 98	0.78	1.53	< 20	0/-18	3	-A
		120	B232I120RES-A*	•	•	•	0.80	56	> 50	0.88	1.57	< 120	0/-18	3	-A
		120	B232I120RES-G*	•	•	•	0.80	56	> 50	0.88	1.57	< 130	0/-18	3	-G
		120	B232I120RH-A	•	•	•	0.49	58	> 98	0.88	1.52	< 20	0/-18	3	-A
		277	B232I277RH-A	•	•	•	0.22	58	> 98	0.88	1.52	< 20	0/-18	3	-A
		347	B232I347RH-A		•		0.17	58	> 99	0.88	1.52	< 20	0/-18	3	-A
		120	B232I120RHH-A	•	•		0.66	77	> 98	1.18	1.53	< 20	0/-18	3	-A
		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
		120 277	B232IUNVHP-B	•	•	•	0.47 0.19	56 55	> 99	0.88	1.57 1.60	< 10	0/-18	3	-B
		347	B232I347HP-A		•		0.17	58	> 99	0.88	1.52	< 10	0/-18	3	-A
		120 277	B232IUNV-C	•	•		0.48 0.20	58 56	> 98	0.88	1.52 1.57	< 10	0/-18	21	-C
		120 277	B232IUNVEL-A	•	•		0.40 0.17	48	> 95	0.77	1.60	< 10	0/-18	3	-A
		120	B232I120EL	•	•		0.40	47	> 98	0.77	1.64	< 10	0/-18	3	ST
		277	B232I277EL	•	•		0.18	47	> 98	0.77	1.64	< 10	0/-18	3	ST
		120 277	B232IUNVHE-A	•	•		0.45 0.20	55 54	> 95	0.87	1.58 1.61	< 10	0/-18	3	-A
		120 277	B232IUNVHEH-A	•	•		0.62 0.26	74 73	> 95	1.18	1.59 1.62	< 10	0/-18	3	-A
		120	B232I120HE	•	•		0.45	54	> 98	0.87	1.61	< 10	0/-18	3	ST
		277	B232I277HE	•	•		0.20	53	> 98	0.87	1.64	< 10	0/-18	3	ST
2	SER-IS	347 480	B332IHRVHB-E	•	•		0.22 0.17	76	> 97 > 90	1.22	1.61	< 10	0/-18	46	-E
		120 277	ES1608A	•	•		0.48 0.21	57 56	> 97	0.87	1.53 1.55	< 10	0/-18	39	ESA
		120	B332I120L-A	•	•		0.51	58	> 95	0.92	1.59	< 25	0/-18	6	-A
		277	B332I277L-A	•	•		0.21	61	> 98	0.92	1.51	< 20	0/-18	6	-A
		347	B332I347L		•		0.16	56	> 99	0.87	1.55	< 20	0/-18	6	ST
		120	B332I120RH-A	•	•	•	0.59	69	> 95	1.03	1.49	< 25	0/-18	6	-A
		277	B332I277RH-A	•	•	•	0.26	69	> 95	1.04	1.51	< 25	0/-18	6	-A
		347	B332I347RH		•		0.19	65	> 95	0.99	1.52	< 20	0/-18	6	ST
		347	B332I347HPL		•		0.16	56	> 99	0.87	1.55	< 10	0/-18	6	ST
2	PAR-IS	120 277	B332IUNVHP-A	•	•	•	0.53 0.24	63	> 99 > 95	0.99	1.57	< 10	0/-18	6	-A
		347	B332I347HP		•		0.19	66	> 99	0.99	1.50	< 10	0/-18	6	ST
		120 277	B332IUNVEL-A	•	•		0.48 0.21	57 56	> 99 > 97	0.89	1.56 1.59	< 10	0/-18	6	-A
		120	B332I120EL	•	•		0.45	53	> 98	0.86	1.62	< 10	0/-18	6	ST
		277	B332I277EL	•	•		0.20	55	> 98	0.87	1.58	< 10	0/-18	6	ST
		120 277	B332IUNVHE-A	•	•		0.53 0.23	64 63	> 99 > 98	0.99	1.55 1.57	< 10	0/-18	6	-A
		120	B332I120HE	•	•		0.50	60	> 98	0.96	1.60	< 10	0/-18	6	ST
		277	B332I277HE	•	•		0.23	61	> 98	1.01	1.66	< 10	0/-18	6	ST
		120 277	B332IUNVHEH-A[1]	•	•		0.69 0.30	83 81	> 95	1.27	1.53 1.57	< 10	0/-18	6	-A
2	SER-PRS	120 277	B232PUNVEL-A	•			0.40 0.17	47 46	> 90 > 90	0.71	1.51 1.54	< 10	0/-18	30	-A
		120 277	B232PUNVHE-A	•			0.47 0.20	56 55	> 90 > 90	0.88	1.57 1.60	< 10	0/-18	30	-A
		120 277	B232PUNVHP-A	•	•	•	0.52 0.22	62 60	> 99 > 98	0.88	1.42 1.47	< 10	0/-18	30	-A

* For Residential Use Only
[1] Consult lamp manufacturers

See page 2-23 for Dimensions and Wiring Diagrams

Universal Lighting Technologies

PAGE 2-20

FOR MORE INFORMATION CALL 1-800-BALLAST (225-5278)

Connected Lighting Power

4. Interior Lighting Requirements

? 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	120 277	B232IUNVHP-B	•	•	•	0.47 0.19	56 55	> .99	0.88	1.57 1.60	< 10	0/-18	3	-B
		347	B232I347HP-A		•		0.17	58	> .99	0.88	1.52	< 10	0/-18	3	-A
		120 277	B232IUNV-C	•	•		0.48 0.20	58 56	> .98	0.88	1.52 1.57	< 10	0/-18	21	-C

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

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.

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.

Connected Lighting Power

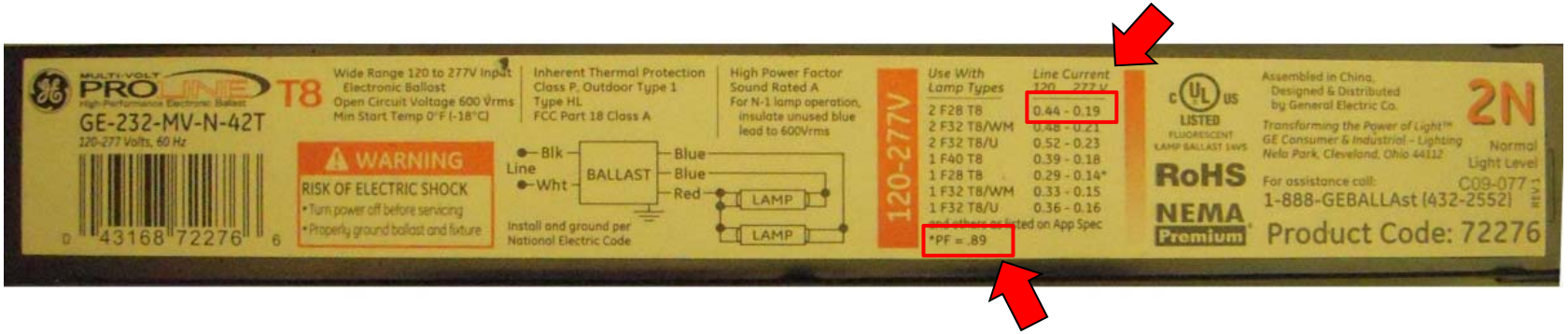
? How are system watts on site verified?

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

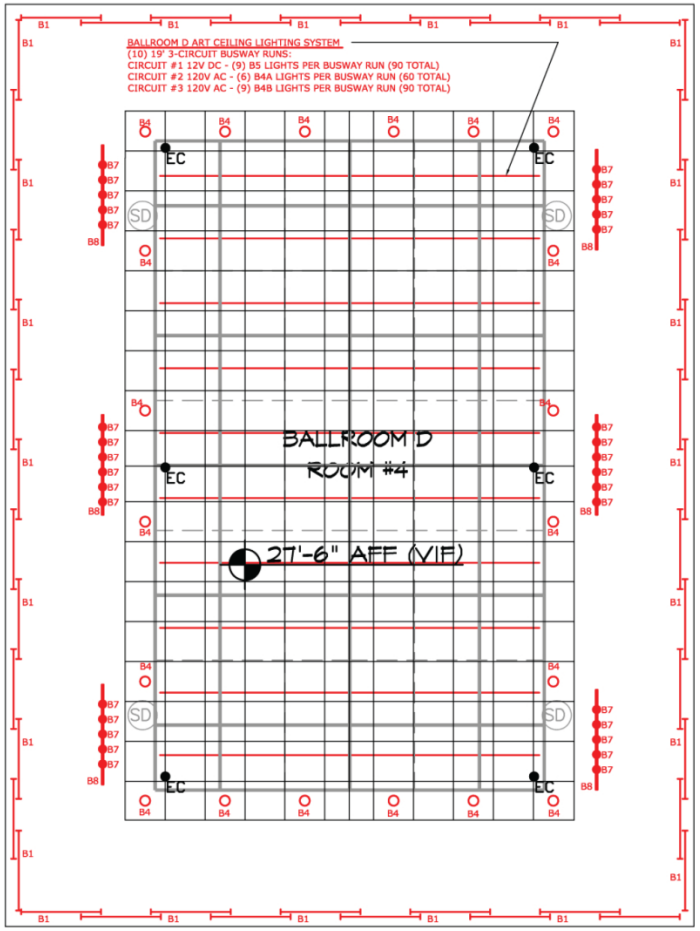


Determining Power for Track

? 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



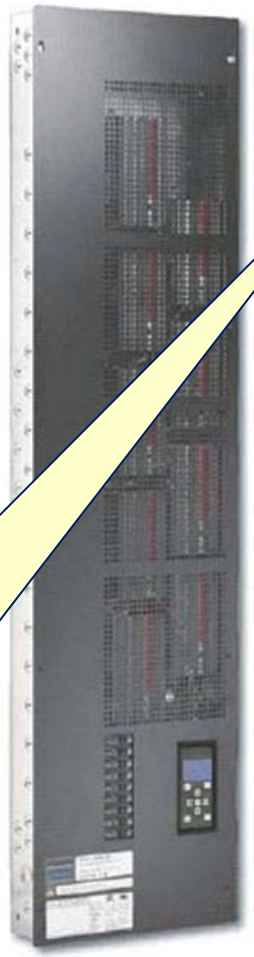
Determining Power for Track

? How is the power for the installed track checked?

Sample Field Condition:

- Wattage of circuit breaker
  - Check circuit breaker at panel
- Wattage of track limiting device
  - Check at the end of the run of track for a track limiting device
- Wattage of luminaires on track (minimum 30w/lin.ft)
  - Identify length of track, count the fixtures o the track, and look at the lamp to identif lamp wattage

For Progress Inspectors: Check at panel, look at end of track (device image at upper right), or count fixtures.



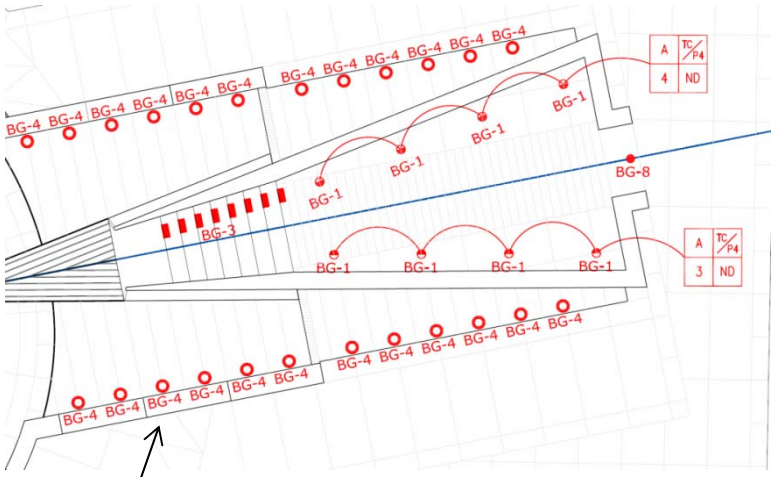
Determining Power for Low-Voltage Lighting

? How is the power for low-voltage lighting determined?

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

- 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.

Sample Documentation:



BG-4 O UNDERWATER NICHE MOUNTED 50 WATT MR16 LOW VOLTAGE TUNGSTEN HALOGEN ADJUSTABLE ACCENT LIGHT [REMOTE 120/12V TRANSFORMER] [60VA]

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.

- 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.

Sample Field Condition:

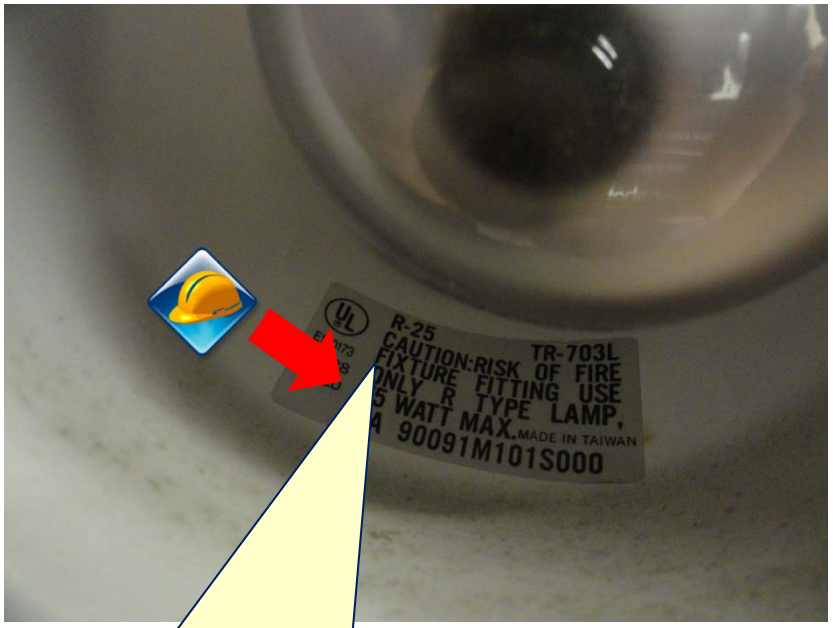
Integral

Remote

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.

Lighting Power Allowances (LPA)

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

Sample COMcheck:

Compare the **Allowed Watts** with the **Proposed Watts**

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

Section 2: Interior Lighting and Power Calculation

A Area Category	B Floor Area (ft2)	C Allowed Watts / ft2	D Allowed Watts (B x C)
School/University	82262	1.2	98714
Click to select category.	0	0	0
		Total Allowed Watts =	98714

Section 3: Interior Lighting Fixture Schedule

A Fixture ID : Description / Lamp / Wattage Per Lamp / Ballast	B Lamps/ Fixture	C # of Fixtures	D Fixture Watt.	E (C X D)
School/University (82262 sq.ft.)				
Linear Fluorescent 1: Other / Electronic	2	89	68	6052
Linear Fluorescent 2: Other / Electronic	1	9	34	306
Linear Fluorescent 3: Other / Electronic	1	25	34	850
Linear Fluorescent 4: Other / Electronic	1	14	26	364
Linear Fluorescent 5: Other / Electronic	2	10	68	680
Linear Fluorescent 6: Other / Electronic	1	11	34	374
Linear Fluorescent 7: Other / Electronic	2	7	57	399
Linear Fluorescent 8: Other / Electronic	1	2	34	68
Linear Fluorescent 9: Other / Electronic	2	2	57	114
Linear Fluorescent 10: Other / Electronic	2	2	68	136
Linear Fluorescent 11: Other / Electronic	1	7	34	238
Linear Fluorescent 12: Other / Electronic	2	22	57	1254
Linear Fluorescent 13: Other / Electronic	1	17	34	578
Linear Fluorescent 14: Other / Electronic	1	4	9	36
Linear Fluorescent 15: Other / Electronic	1	9	8	72
Linear Fluorescent 16: Other / Electronic	1	31	34	1054
Linear Fluorescent 22: 46" T5 28W / Electronic	1	29	34	986
Linear Fluorescent 23: 46" T5 28W / Electronic	2	1	57	57
Linear Fluorescent 24: 46" T5 28W / Electronic	1	12	34	408
Linear Fluorescent 25: Other / Electronic	1	4	26	104
Compact Fluorescent 1: Quad 2-pin 26W / Electronic	1	8	28	224
		Total Proposed Watts =		14354

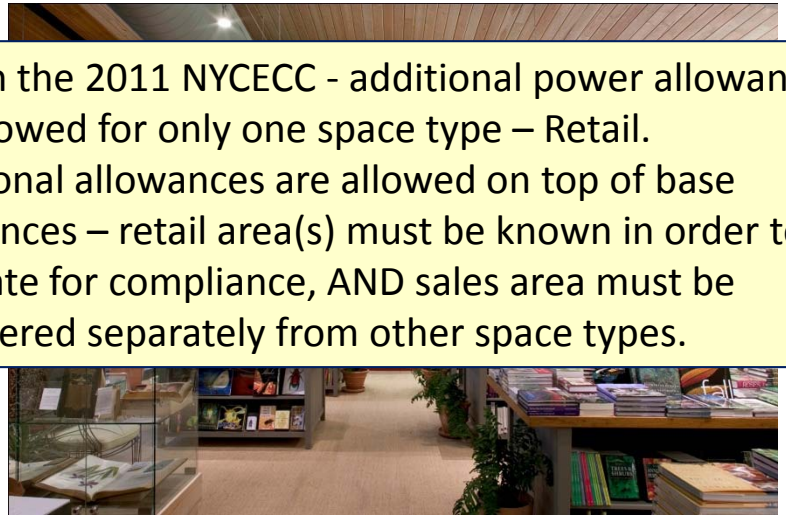
Additional Lighting Power Allowances (LPA)

? What happens to all of the additional wattage allowances?

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

- Retail Area 4
  - Jewelry, Crystal, China
  - 1000W + (Area x 2.5w/sq.ft.)
- Retail Area 3
  - Furniture, Clothing, Cosmetics, Artwork
  - 1000W + (Area x 1.4 w/sq.ft.)
- Retail Area 2
  - Vehicles, Sporting Goods, Small Electronics
  - 1000W + (Area x 0.6 w/sq.ft.)
- Retail Area 1
  - All other products not identified above
  - 1000W + (Area x 0.6 w/sq.ft.)

New in the 2011 NYCECC - 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.



Note: The w/sq.ft. allowances are cumulative if the building has mixed merchandise but the 1000W is only counted once per building.

Exceptions to Lighting Power Allowances (LPA)

4. Interior Lighting Requirements ? **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 historic landmarks
- Casino gaming areas
- 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

Exceptions to Lighting Power Allowances (LPA)

4. Interior Lighting Requirements

! 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

Exceptions in ASHRAE 90.1

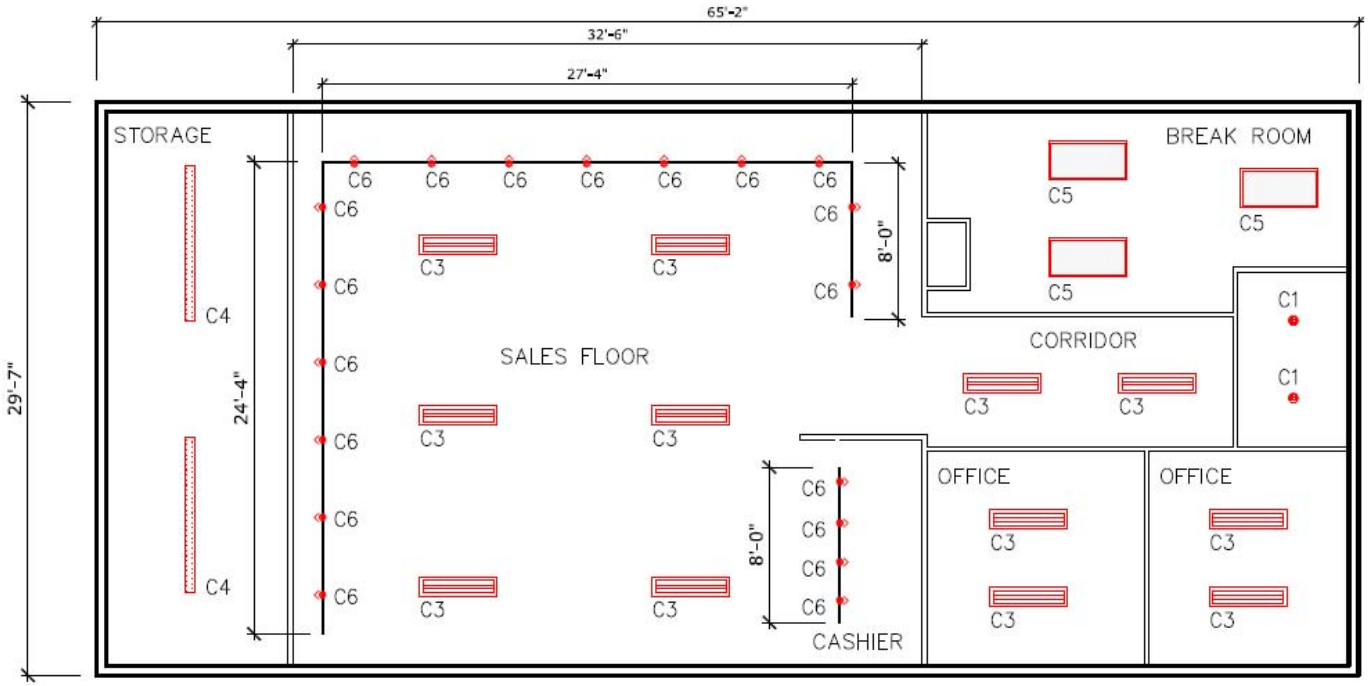
? How do NYCECC and ASHRAE 90.1 compare on interior power?

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)

Calculating Total Load Density Exercise

4. Interior Lighting Requirements



1 RETAIL LIGHTING LAYOUT
SCALE: 3/16"=1'-0"

LIGHTING LEGEND

C1	[1] 26W CFL DOWNLIGHT WITH ELECTRONIC BALLAST [.95BF] [28W]
C2	NOT USED
C3	1'X4' [2] 32WT8 REGRESSED LENSED LUMINAIRE WITH ELECTRONIC BALLAST [.88BF] [58W]
C4	6"X 8' [2] 32WT8 SURFACE MOUNTED STACK LIGHT WITH ELECTRONIC BALLAST [.88BF] [58W]
C5	2'X4' [2] 32WT8 RECESSED PARABOLIC LUMINAIRE WITH ELECTRONIC BALLAST [.88BF] [58W]
C6	[1] 20W MH MR16 ADJUSTABLE TRACK LIGHT WITH ELECTRONIC BALLAST [26W]

PARK PLACE SHOES AND HANDBAGS

LIGHTING LAYOUT TITLE_3

LL_002

Calculating Total Load Density Exercise

4. Interior Lighting Requirements

New York City Department of Buildings Energy Code Training
Lighting Power Worksheets
Exercise Handout #2

Objective: Does the lighting for Park Place Shoes and Hangbags Store comply with ECC-2011?

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 505.5.2)	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	1000 W + 0.6 W/sq.ft	Floor area for all products not listed in Retail Area 2, 3 or 4.
Retail Area 2	1000 W + 0.6 W/sq.ft	Floor area used for the sales of vehicles, sporting goods and small electronics.
Retail Area 3	1000 W + 1.4 W/sq.ft	Floor area used for the sale of furniture, clothing, cosmetics and artwork.
Retail Area 4	1000 W + 2.5 W/sq.ft	Floor area used for the sale of jewelry, crystal, and china.

Calculating Total Load Density Exercise

4. Interior Lighting Requirements

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Interior Lighting Power Allowance Worksheet

Area Description	Area or Linear Feet	Power Allowance (from 505.5.2)	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	1000 W + 0.6 W/sq.ft	Floor area for all products not listed in Retail Area 2, 3 or 4.
Retail Area 2	1000 W + 0.6 W/sq.ft	Floor area used for the sales of vehicles, sporting goods and small electronics.
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Calculating Total Load Density Exercise

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Post Office	1.1
Religious Building	1.3
Retail	1.5
School/University	1.2
Sports Arena	1.1

Lighting Power Density

Building Area Type	LPD, W/ft²
Automotive Facility	0.9
Convention Center	1.2
Court House	1.2
Dining: Bar Lounge/Leisure	1.3
Dining: Cafeteria/Fast Food	1.4
Dining: Family	1.6
Dormitory	1
Exercise Center	1
Gymnasium	1.1
Healthcare-Clinic	1
Hospital	1.2
Hotel	1
Library	1.3
Manufacturing Facility	1.3
Motel	1
Motion Picture Theatre	1.2
Multi-Family	0.7
Museum	1.1
Office	1
Parking Garage	0.3
Penitentiary	1
Performing Arts Theatre	1.6
Police/Fire Station	1
Post Office	1.1
Religious Building	1.3
Retail	1.5
School/University	1.2
Sports Arena	1.1
Town Hall	1.1
Transportation	1
Warehouse	0.8
Workshop	1.4

Calculating Total Load Density Exercise

4. Interior Lighting Requirements

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Retail – entire store	1936	1.5		

Building Totals	sq. ft.			W

Additional Power Allowances:

Retail Area 1	1000 W + 0.6 W/sq.ft	Floor area for all products not listed in Retail Area 2, 3 or 4.
Retail Area 2	1000 W + 0.6 W/sq.ft	Floor area used for the sales of vehicles, sporting goods and small electronics.
Retail Area 3	1000 W + 1.4 W/sq.ft	Floor area used for the sale of furniture, clothing, cosmetics and artwork.
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Calculating Total Load Density Exercise

4. Interior Lighting Requirements

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Interior Lighting Power Allowance Worksheet

Area Description	Area or Linear Feet	Power Allowance (from 505.5.2)	Additional Interior Power Allowances (i.e. Retail)	Total Power Allowance ((area x LPA) + additional)
Retail – entire store	1936	1.5		2904

Building Totals	sq. ft.			W

Additional Power Allowances:

Retail Area 1	1000 W + 0.6 W/sq.ft	Floor area for all products not listed in Retail Area 2, 3 or 4.
Retail Area 2	1000 W + 0.6 W/sq.ft	Floor area used for the sales of vehicles, sporting goods and small electronics.
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Retail – entire store	1936	1.5		
Floor area used for retail			1000W	
Building Totals	sq. ft.			W

Additional Power Allowances:

Retail Area 1	1000 W + 0.6 W/sq.ft	Floor area for all products not listed in Retail Area 2, 3 or 4.
Retail Area 2	1000 W + 0.6 W/sq.ft	Floor area used for the sales of vehicles, sporting goods and small electronics.
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Calculating Total Load Density Exercise

4. Interior Lighting Requirements

New York City Department of Buildings Energy Code Training
Lighting Power Worksheets
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Area Description	Area or Linear Feet	Power Allowance (from 505.5.2)	Additional Interior Power Allowances (i.e. Retail)	Total Power Allowance ((area x LPA) + additional)
Retail – entire store	1936	1.5		
Floor area used for retail			1000W	
	814			

Building Totals	sq. ft.			W

Additional Power Allowances:

Retail Area 1	1000 W + 0.6 W/sq.ft	Floor area for all products not listed in Retail Area 2, 3 or 4.
Retail Area 2	1000 W + 0.6 W/sq.ft	Floor area used for the sales of vehicles, sporting goods and small electronics.
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Calculating Total Load Density Exercise

4. Interior Lighting Requirements

New York City Department of Buildings Energy Code Training
Lighting Power Worksheets
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Interior Lighting Power Allowance Worksheet

Area Description	Area or Linear Feet	Power Allowance (from 505.5.2)	Additional Interior Power Allowances (i.e. Retail)	Total Power Allowance ((area x LPA) + additional)
Retail – entire store	1936	1.5		2904
Floor area used for retail			1000W	
	814		1.4w/sq.ft.	

Building Totals	sq. ft.			W

Additional Power Allowances:

Retail Area 1	1000 W + 0.6 W/sq.ft	Floor area for all products not listed in Retail Area 2, 3 or 4.
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Calculating Total Load Density Exercise

4. Interior Lighting Requirements

New York City Department of Buildings Energy Code Training
Lighting Power Worksheets
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Interior Lighting Power Allowance Worksheet

Area Description	Area or Linear Feet	Power Allowance (from 505.5.2)	Additional Interior Power Allowances (i.e. Retail)	Total Power Allowance ((area x LPA) + additional)
Retail – entire store	1936	1.5		2904
Floor area used for retail			1000W	1000
	814		1.4w/sq.ft.	1139.6
Building Totals	sq. ft.			5043.6 W

Additional Power Allowances:

Retail Area 1	1000 W + 0.6 W/sq.ft	Floor area for all products not listed in Retail Area 2, 3 or 4.
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Calculating Total Load Density Exercise

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Steps:

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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
TOTALS					W

Calculating Total Load Density Exercise

4. Interior Lighting Requirements

New York City Department of Buildings Energy Code Training
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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

Calculating Total Load Density Exercise

4. Interior Lighting Requirements

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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

Calculating Total Load Density Exercise

4. Interior Lighting Requirements

New York City Department of Buildings Energy Code Training
Lighting Power Worksheets
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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			
TOTALS					W

Calculating Total Load Density Exercise

4. Interior Lighting Requirements

New York City Department of Buildings Energy Code Training
Lighting Power Worksheets
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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

Calculating Total Load Density Exercise

4. Interior Lighting Requirements

New York City Department of Buildings Energy Code Training
Lighting Power Worksheets
Exercise Handout #2

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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
C4	(2) 32WT8 8'-0" stacklight	2	58w	2	116
TOTALS					W

Calculating Total Load Density Exercise

4. Interior Lighting Requirements

New York City Department of Buildings Energy Code Training
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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	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

Calculating Total Load Density Exercise

4. Interior Lighting Requirements

New York City Department of Buildings Energy Code Training
Lighting Power Worksheets
Exercise Handout #2

Objective: Does the lighting for Park Place Shoes and Hangbags Store comply with ECC-2011?

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
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C5	(2) 32WT8 recessed 2x4	2	58w	3	174
C6	20WMH MR16 track light	1	26w	19	494
TOTALS					W

Calculating Total Load Density Exercise

4. Interior Lighting Requirements

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C6	20WMH MR16 track light	1	26w	19	494
C6	30W/lin. ft. track	NA	30w	67.8	2034
TOTALS					W

Calculating Total Load Density Exercise

4. Interior Lighting Requirements

New York City Department of Buildings Energy Code Training
Lighting Power Worksheets
Exercise Handout #2

Objective: Does the lighting for Park Place Shoes and Hangbags Store comply with ECC-2011?

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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
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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					3076 W

Slides 101 to 127

5. Exterior Lighting Requirements

Exterior Lighting Requirements

Learning Objectives

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.

Applicability

? Is there a base efficacy requirement for luminaires?

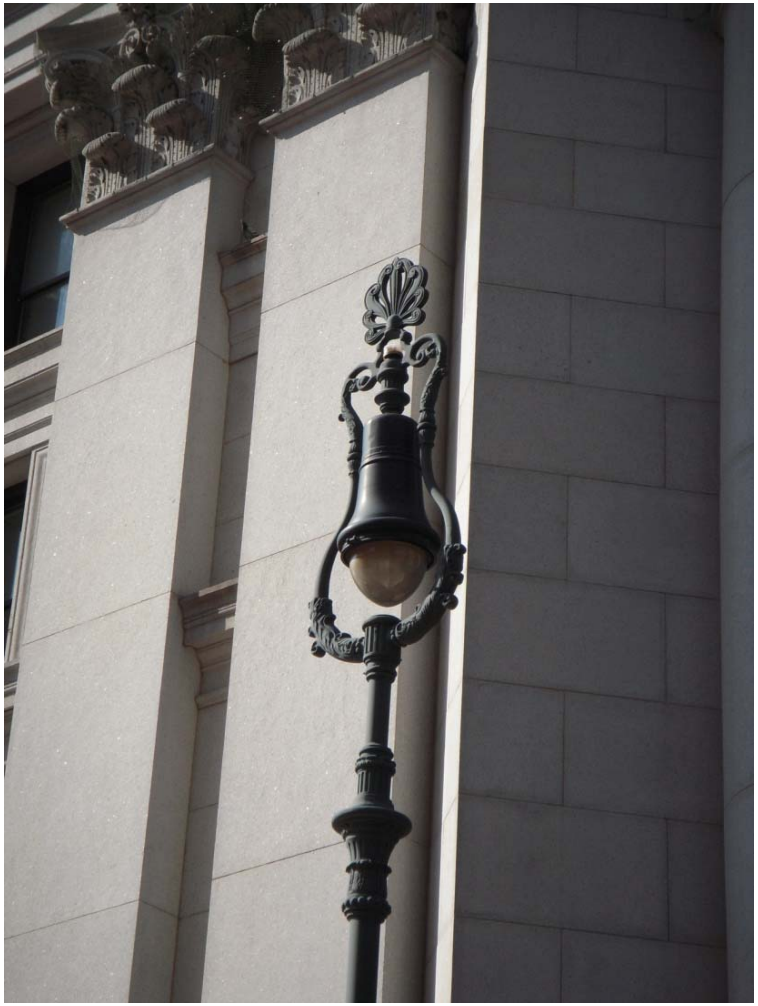
- All exterior luminaires greater than 100W shall have a minimum efficacy of 60 lm/W.
  - Unless controlled by a motion sensor
  - Or qualifies for one of the exceptions
- How is it documented?
  - Wattage should be identified in the fixture legend/schedule
  - Lumens should be included with the lamp 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

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



Connected Power Exceptions

5. Exterior Lighting Requirements

? What other lighting does not need to be included?

- Exceptions
  - Low-voltage landscape lighting
  - Less than 110v (typically 24V or 12V)

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

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 *not* identified in ASHRAE 90.1:
  - Low-voltage landscape lighting
- Exceptions *not* applicable to NYCECC:
  - Lighting used to highlight features of public monuments and registered historic landmark structures or buildings – delete per Ian's email to Adrian, cc'd to dft, 11/29/2011

Similar Exceptions

? What are the similar exceptions between NYCECC and ASHRAE?

- 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

NYC Light Zones

What is the major change for exterior LPA?

The most noted change in the new NYCECC is the use of 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

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

NYC Zoning District Graphics

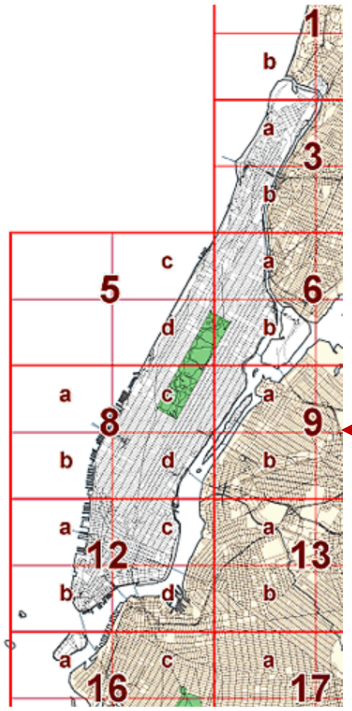
To locate zoning maps of NYC Boroughs, refer to Index Map at:
http://www.nyc.gov/html/dcp/html/zone/zh_zmaptable.shtml

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

- ZONING INDEX MAP -

Brooklyn | Manhattan | Queens | Staten Island

MANHATTAN



Click on borough for an area index map.

Locate desired zoning district.

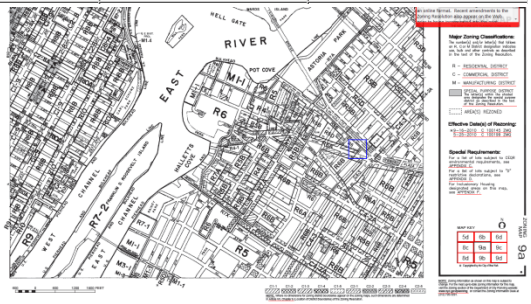
- ZONING MAP TABLE -
(with dates of Most Recent Zoning Changes)

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 - 12/20/06	11d - 10/14/09
12a - 10/13/10	12b - 3/11/09	12c - 10/27/10	12d - 07/29/10*
13a - 7/29/09	13b - 12/21/09	13c - 7/29/09	13d - 7/29/09

Find individual map in Zoning Map Table.

Right: Example map, District 9a



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

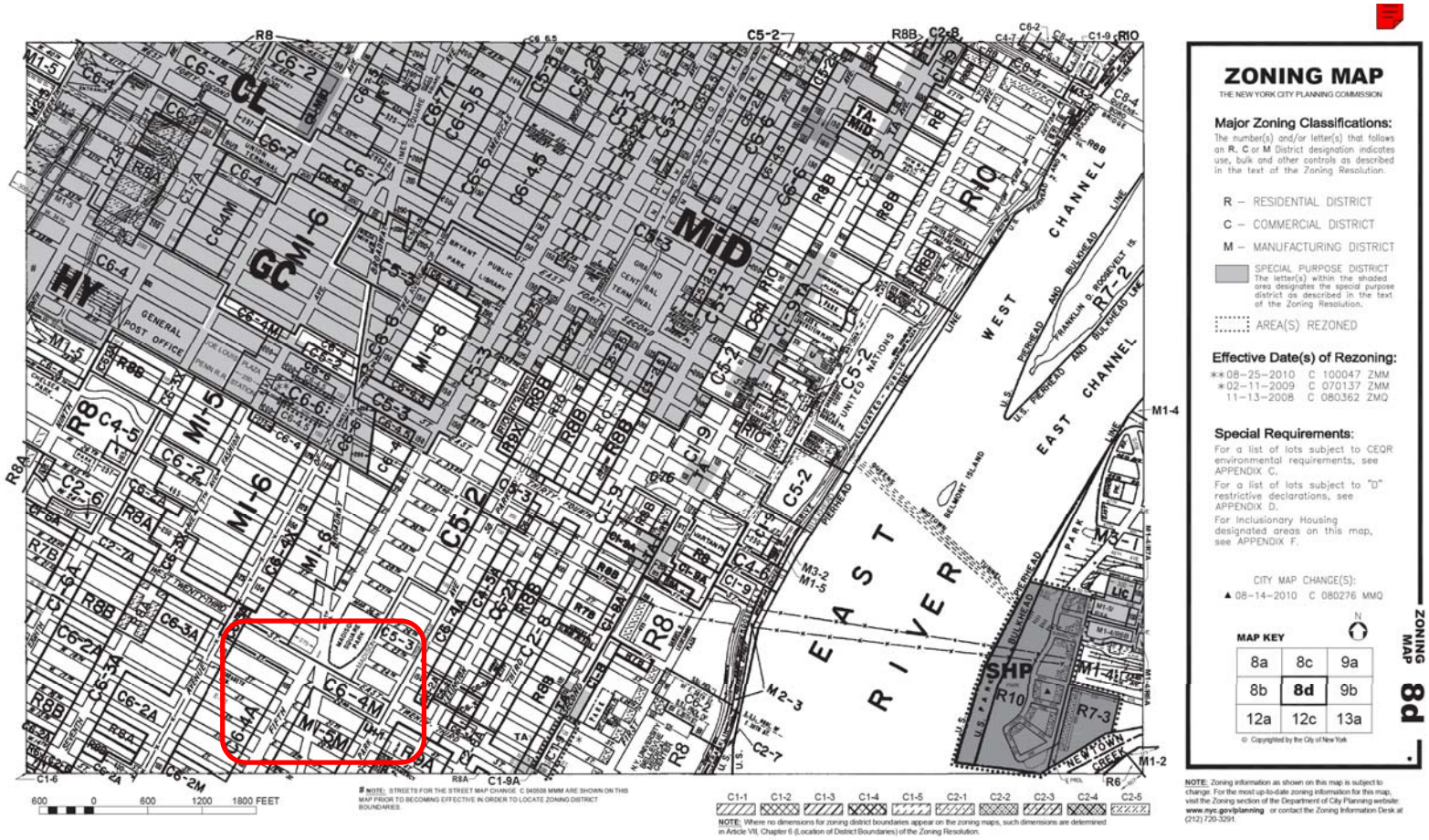
Excerpt from Table 505.6.2 (2)

Base Site Lighting Allowance

5. Exterior Lighting Requirements ? **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?



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?

ECCCNYS Lighting Zone	NYC Zoning Resolution Districts
LZ1	Parkland
LZ2	R R with C overlay MX
LZ3	M (except MX) C (except C5 and C6)
LZ4	C5 C6

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

Base Site Allowance

5. Exterior Lighting Requirements

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

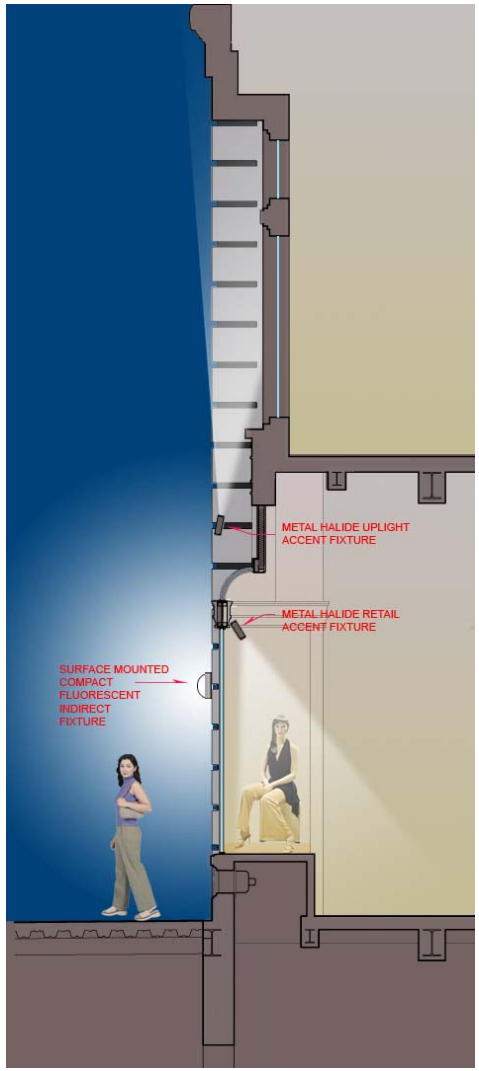
Base Site Allowance

5. Exterior Lighting Requirements

? 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



Base Site Allowance

? Does this project comply?

Example:

- Building located at 23rd and Broadway 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) x 36W = 252 Watts

Step 4. Calculate System Watts for MH.

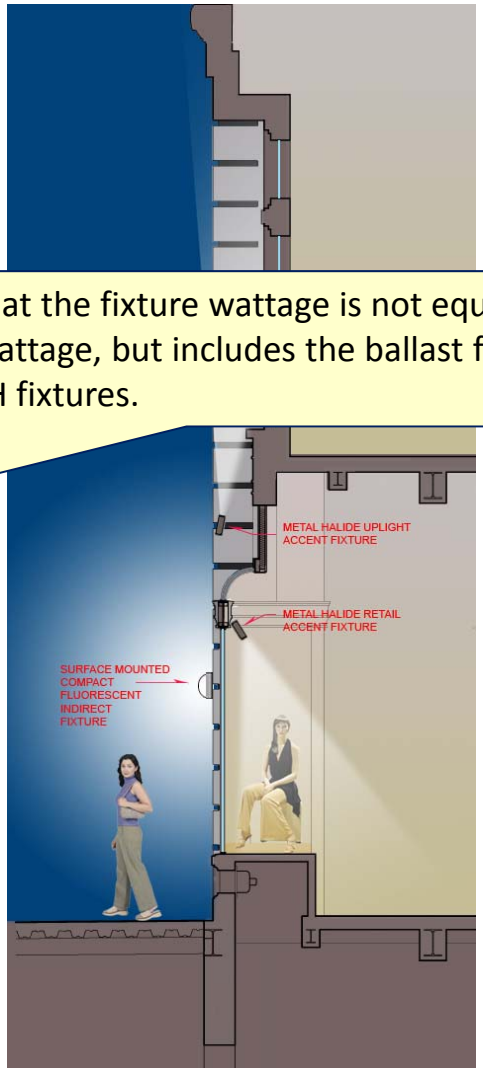
- (12) x 45W = 540 Watts

Does the project comply with the allowable watts?

- 252 Watts + 540Watts = 792 Watts

PROJECT COMPLIES

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



Tradable Surfaces

? What is meant by tradable surfaces?

- 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.

Excerpt from Table 505.6.2 (2)

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.)

Uncovered Parking Areas				
Parking areas and drives	0.04 W/ft²	0.06 W/ft²	0.10 W/ft²	0.13 W/ft²
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 features areas	0.14 W/ft²	0.14 W/ft²	0.16 W/ft²	0.2 W/ft²
Stairways	0.75 W/ft²	1.0 W/ft²	1.0 W/ft²	1.0 W/ft²
Pedestrian Tunnels	0.15 W/ft²	0.15 W/ft²	0.2 W/ft²	0.3 W/ft²
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	20 W/ linear foot of door width	20 W/ linear foot of door width	20 W/ linear foot of door width
Entry Canopies	0.25 W/ft²	0.25 W/ft²	0.4 W/ft²	0.4 W/ft²
Sales Canopies				
Free-standing and attatched	0.6 W/ft²	0.6 W/ft²	0.4 W/ft²	0.4 W/ft²
Outdoor Sales				
Open areas (including vehicle sales lots)	0.25 W/ft²	0.25 W/ft²	0.5 W/ft²	0.7 W/ft²
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

Non-Tradable Surfaces

? What is meant by non-tradable surfaces?

- 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.

INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS

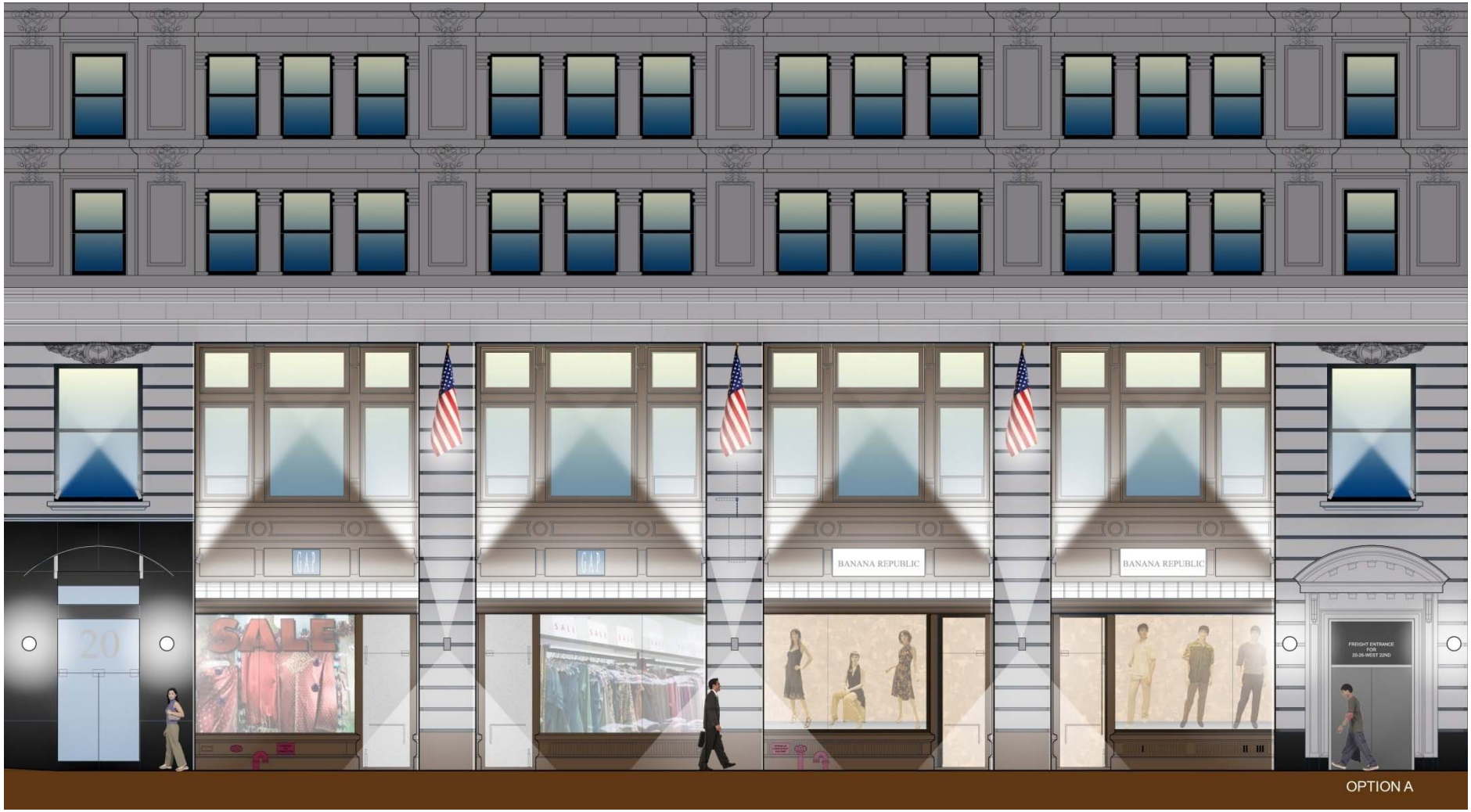
		Zone 1	Zone 2	Zone 3	Zone 4
Excerpt from Table 505.6.2 (2)	Building Facades	No allowance	0.1 W/ft² for each illuminated wall or surface or 2.5 W/linear foot for each illuminated wall or surface length	0.15 W/ft² for each illuminated wall or surface or 3.75 W/linear foot for each illuminated wall or surface length	0.2 W/ft² for each illuminated wall or surface or 5.0 W/linear foot for each illuminated wall or surface length
Nontradable Surfaces (Lighting power density calculations for following applications can be used only for the specific application and cannot be traded between surfaces or with exterior lighting. The follow nces are in addition to otherwise permitte "Tradable Surfaces" section this t	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/ft² of covered and uncovered area	0.75 W/ft² of covered and uncovered area	0.75 W/ft² of covered and uncovered area	0.75 W/ft² of covered and uncovered area
	for			a	0.5 W/ft² of covered and uncovered area
					400 W per drive-through
				n	800 W per main entry

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.

Tradable and Non-Tradable Example

5. Exterior Lighting Requirements

? How are tradable and non-tradable areas incorporated?

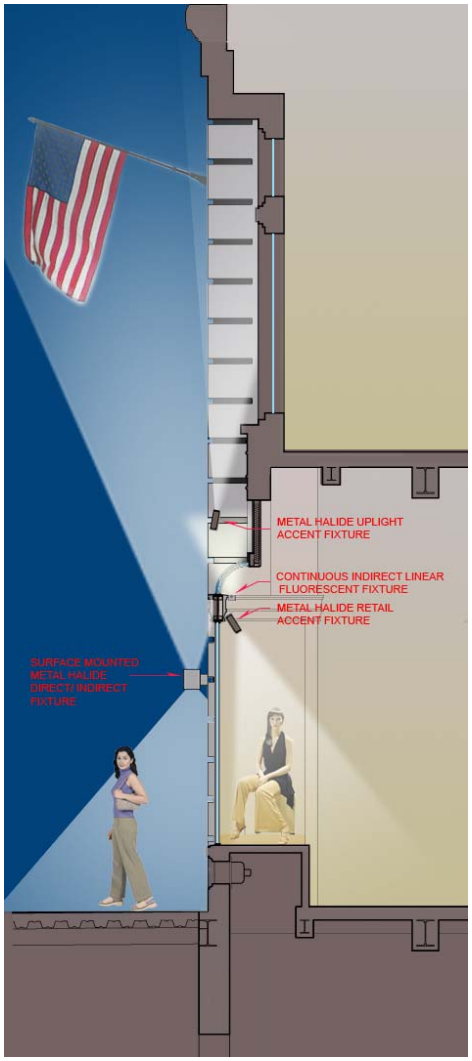


Tradable and Non-Tradable Example

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



Tradable and Non-Tradable Example

Example:

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

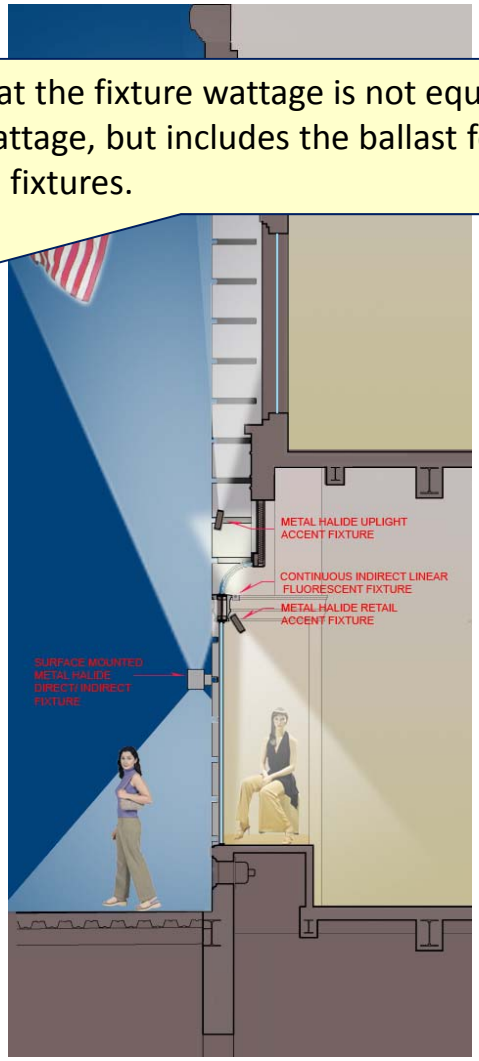
- There are now (12) 70W metal halide (MH) accent lights. 12 x 80W = 960W
- There are (4) 42W compact fluorescent indirect mounted sconces by the building entry doors. 4 x 48W = 192W
- There are (3) 100W MH accent lights uplighting the flags. 3 x 110 = 330W
- There are (3) 70W MH downlights to illuminate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

Total Watts = 1722W

Project exceeds Base Site Allowance of 1300 W

Add Tradable/Non-tradable Surface Allowances

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



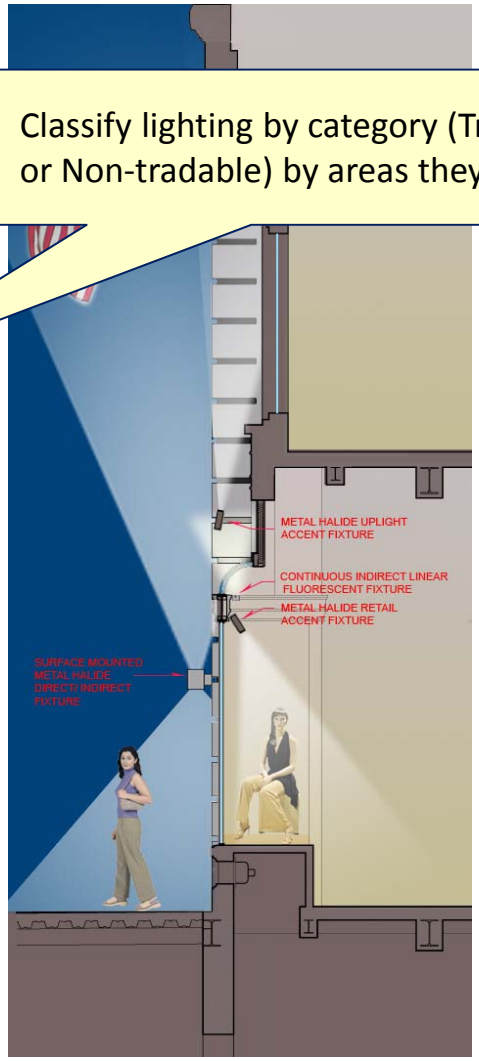
Tradable and Non-Tradable Example

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. 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.
- There are (3) 70W MH downlights to illuminate the sidewalk. Walkway

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



Tradable and Non-Tradable Areas

5. Exterior Lighting Requirements

Tradable areas:

- Sidewalk

  1.0W/lin. ft.

- Building Entries

  30W/lin. ft.

Excerpt from Table 505.6.2 (2)

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.)

Uncovered Parking Areas				
Parking areas and drives	0.04 W/ft²	0.06 W/ft²	0.10 W/ft²	0.13 W/ft²
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 features areas	0.14 W/ft²	0.14 W/ft²	0.16 W/ft²	0.2 W/ft²
Stairways	0.75 W/ft²	1.0 W/ft²	1.0 W/ft²	1.0 W/ft²
Pedestrian Tunnels	0.15 W/ft²	0.15 W/ft²	0.2 W/ft²	0.3 W/ft²
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	20 W/ linear foot of door width	20 W/ linear foot of door width	20 W/ linear foot of door width
Entry Canopies	0.25 W/ft²	0.25 W/ft²	0.4 W/ft²	0.4 W/ft²
Sales Canopies				
Free-standing and	0.6 W/ft²	0.6 W/ft²	0.4 W/ft²	0.4 W/ft²
Outdoor Sales				
	5 W/ft²	0.25 W/ft²	0.5 W/ft²	0.7 W/ft²
for vehicle sales lots in addition to "open area" allowance	No allowance	10 W/linear foot	10 W/linear foot	30 W/ linear foot

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

Tradable and Non-Tradable Areas

5. Exterior Lighting Requirements

Tradable areas:

- Sidewalk

  1.0W/lin. ft.
- Building Entries

  30W/lin. ft.

Non-Tradable areas:

- Building Facades

  0.2W/sq. ft.

  or

  5.0W/lin. ft.

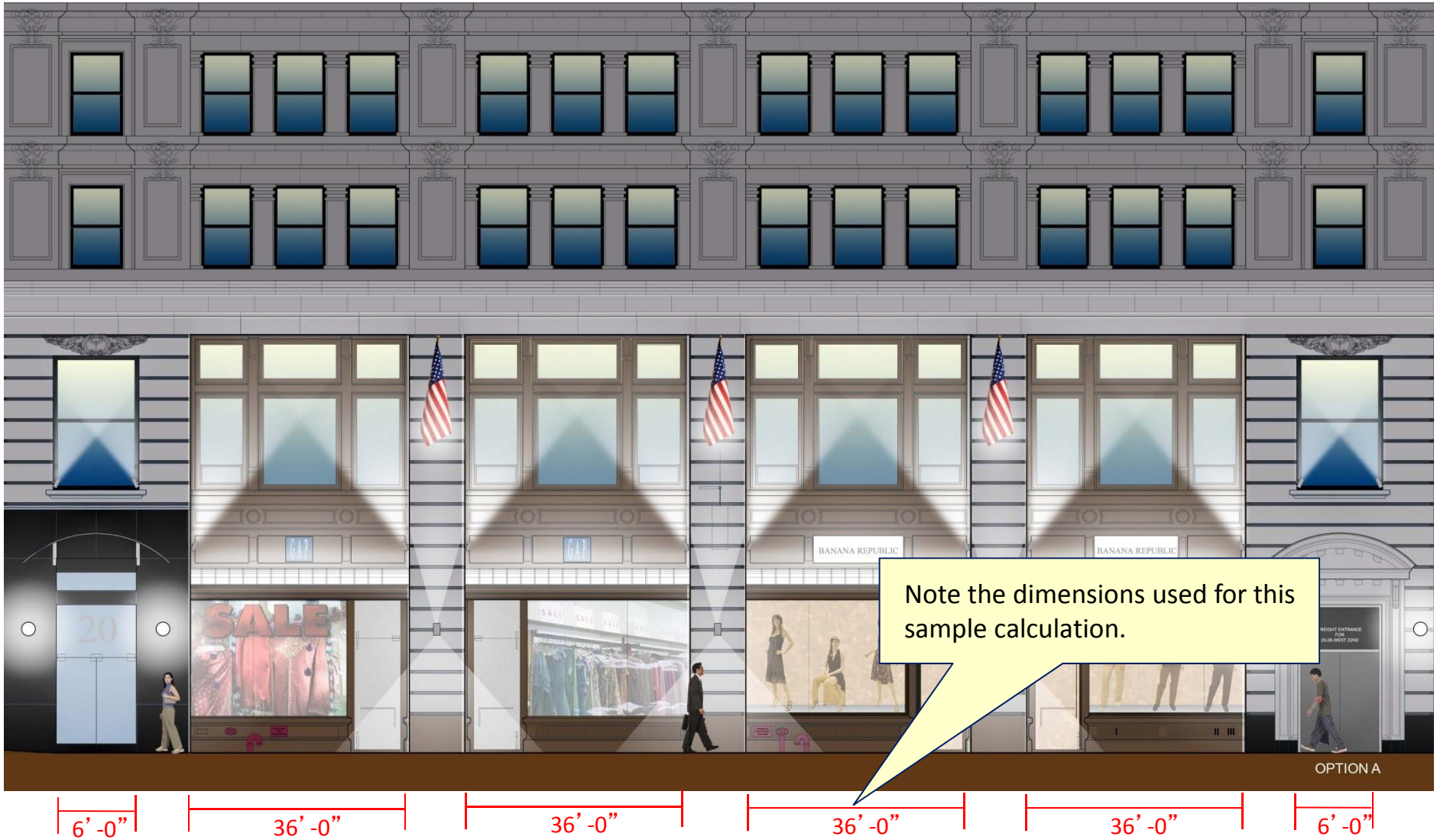
INDIVIDUAL LIGHTING POWER ALLOWANCES FOR BUILDING EXTERIORS

		Zone 1	Zone 2	Zone 3	Zone 4
Excerpt from Table 505.6.2 (2)	Building Facades	No allowance	0.1 W/ft² for each illuminated wall or surface or 2.5 W/linear foot for each illuminated wall or surface length	0.15 W/ft² for each illuminated wall or surface or 3.75 W/linear foot for each illuminated wall or surface length	0.2 W/ft² for each illuminated wall or surface or 5.0 W/linear foot for each illuminated wall or surface length
Nontradable Surfaces (Lighting power density calculations for following applications can be used only for the specific application and cannot be traded between surfaces or with other exterior lighting. The following allowances are in addition to any allowance otherwise permitted in the "Tradable Surfaces" section of this table"	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/ft² of covered and uncovered area	0.75 W/ft² of covered and uncovered area	0.75 W/ft² of covered and uncovered area	0.75 W/ft² of covered and uncovered area
	Loading areas for law enforcement, fire, ambulance and other emergency service vehicles	0.5 W/ft² of covered and uncovered area	0.5 W/ft² of covered and uncovered area	0.5 W/ft² of covered and uncovered area	0.5 W/ft² of covered and uncovered area
	Drive-up windows/doors	400 W per drive-through	400 W per drive-through	400 W per drive-through	400 W per drive-through
	Parking near 24-hour retail entrances	800 W per main entry	800 W per main entry	800 W per main entry	800 W per main entry

Tradable and Non-Tradable Areas

5. Exterior Lighting Requirements

? How are tradable and non-tradable areas incorporated?



Note the dimensions used for this sample calculation.

Tradable Example

? Does the project meet the requirements?

Tradable areas:

- Sidewalk

  Allowed: 1.0W/lin. ft. x 170 lin. ft. = 170 W

  Proposed: (3) 70W MH downlights

  3 x 80W = 240W

- Building Entries

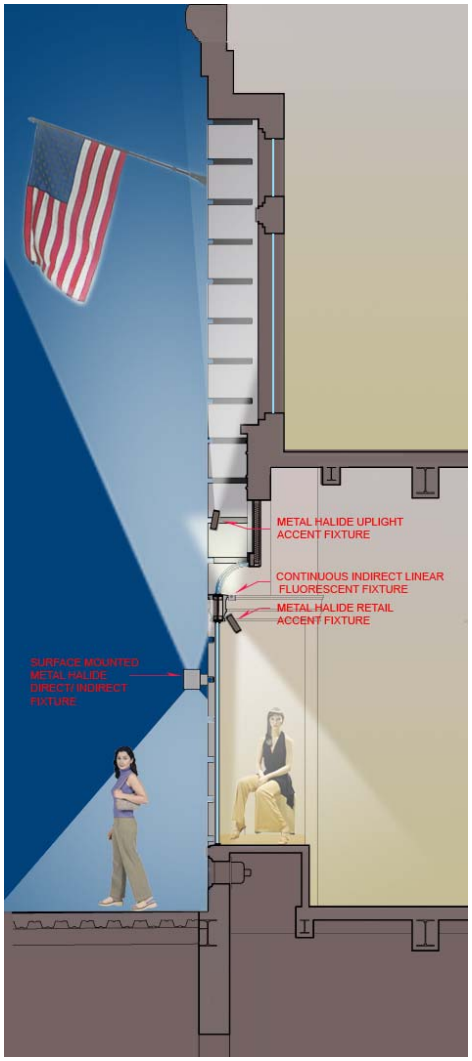
  Allowed: (30W/lin. ft. x 6 ft.) x 2 = 360 W

  Proposed: (4) 42W compact fluorescent

  4 x 48W = 192W

Tradable Allowed: 170W + 360W = **530W**

Tradable Proposed: 240W + 192W = **432W**



Non-Tradable Example

? Does the project meet all the requirements?

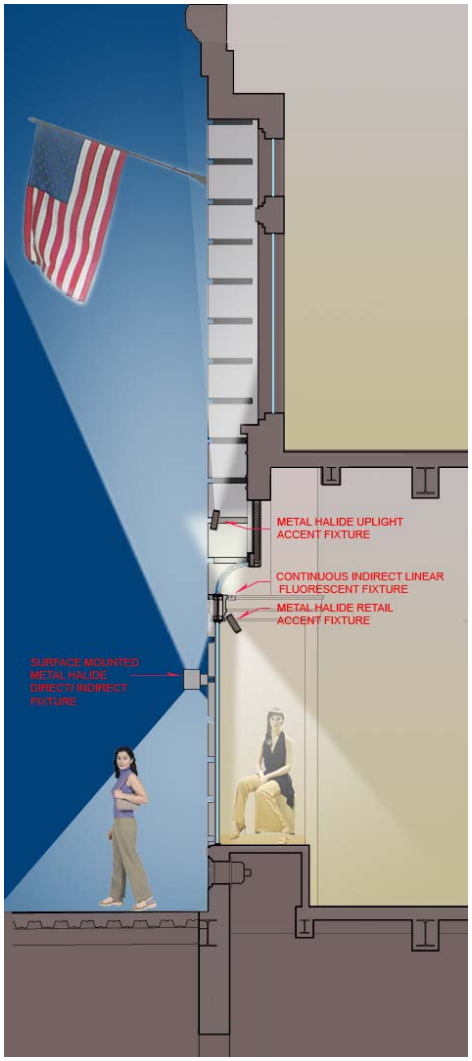
Non-Tradable areas:

- Building Facades

  Allowed: (5.0W/lin.ft. X 36 ft.) x 4 = 720W

  Proposed:(12) 70W MH accent lights

  12 x 80W = 960W



Tradable and Non-Tradable Areas

5. Exterior Lighting Requirements

? Does the project comply with NYCECC?

Tradable areas:

- Sidewalk = 170 W
- Building Entries = 360 W

Non-Tradable areas:

- Building Facades = 720W

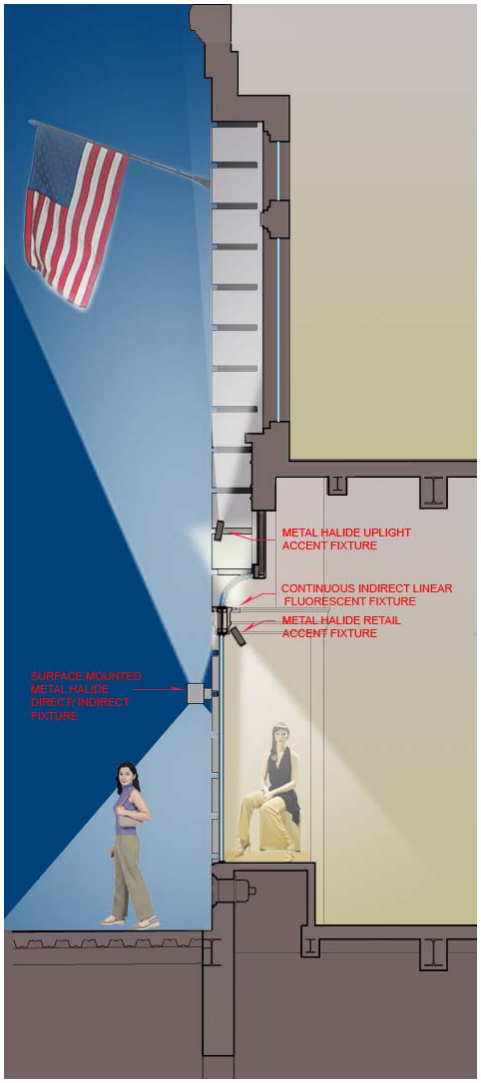
Total Exterior Power Allowance:

Base	1300W
+ Tradable (170W + 360W)	530W
+ Non-tradable	720W
Total Power Allowance	**2550W**

Total Proposed Exterior Power :

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

PROJECT COMPLIES



Slides 128 to 133

6. Resources

Summary of Lighting Progress Inspections

Inspection / Test	Frequency
Lighting in Dwelling Units Lamps in permanently installed lighting fixtures shall be visually inspected to verify compliance with high-efficacy standards.	Prior to final electrical and construction inspection
Electrical Metering The presence and operation of individual meters or other means of monitoring individual dwelling units shall be verified by visual inspection of all dwelling units.	Prior to final electrical and construction inspection
Interior Lighting Power Installed lighting shall be verified for compliance with the lighting power allowance by visual inspection of fixtures, lamps, ballasts and transformers	Prior to final electrical and construction inspection
Exterior Lighting 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	Prior to final electrical and construction inspection
Lighting Controls 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.	Prior to final electrical and construction inspection
Exit Signs Installed exit signs shall be visually inspected to verify that the label indicates that they do not exceed maximum permitted wattage.	Prior to final electrical and construction
Tandem Wiring Tandem wiring shall be tested for functionality.	Prior to final electrical and construction

Resources and Links

6. Resources

The resources below have been referenced in this module

Resource	Link
Local Law 1 of 2011	http://www1.nyc.gov/assets/buildings/pdf/ll1of2011.pdf
Local Law 48 of 2010	http://www1.nyc.gov/assets/buildings/pdf/ll48of2010.pdf
1 RCNY § 5000-01	http://www1.nyc.gov/assets/buildings/rules/1_RCNY_5000-01.pdf
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
NYCECC Reference	http://www1.nyc.gov/site/buildings/codes/energy-conservation-code.page
REScheck/COMcheck	http://www.energycodes.gov/compliance/tools
PlaNYC	http://www.nyc.gov/html/planyc2030/html/home/home.shtml
New York City Construction Codes	http://www2.iccsafe.org/states/newyorkcity/

DOB Assistance

Questions on the NYCECC can be submitted to the DOB at:

EnergyCode@buildings.nyc.gov

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Universal Lighting Technologies	68, 69
Lutron Electronics, Inc.	29, 57, 72[3]
Acuity Brand Lighting/Controls	44, 50, 52, 60, 63, 67, 75[3], 103
Lighting Services, Inc.	72[2], 74
Samantha Modell	128

[1] Bottom right image
[2] Upper right image
[3] Left image

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