

2023 ANNUAL CONFERENCE

AUGUST 3-5

LP-8 is enough?

Updates to the standard for (true) commissioning for lighting and lighting control systems

Lyn Gomes, PE, LC, CCP, LEED AP
DPR Construction
AKA Luke Lightwalker,
The Good Commissioning Provider

Michael Poplawski
Pacific Northwest National Laboratory
AKA Free Solo,
The Cowboy Commissioning Provider



Abstract

A long time ago in a galaxy far, far away, DG-29, the standard for commissioning of lighting, was created. Time has passed, the industry has matured, and technology has advanced to the point that this standard required a major update both in content and name. When released later this year, it will become ANSI/IES LP-8, the Standard for Commissioning for Lighting and Lighting Control Systems. This document is a resource not only for commissioning providers, but also for the commissioning team (e.g., owners, architects, designers, engineers, contractors, distributors).

Master Yoda didn't become a Jedi overnight – it was a process of mind and body training. Similarly, Commissioning is a systematic process (a series of discreet activities) that seeks to enhance delivery of a project. It focuses on verifying and documenting that all the commissioned systems and assemblies are planned, designed, installed, tested, operated, and maintained to meet the Owner's Project Requirements (OPR). Commissioning starts in the predesign phase, continues into occupancy, and throughout the building's lifetime. COMMISSIONING IS NOT STARTUP.

The update will improve on the original and serve as a practical, boots-on-the-ground resource for commissioning of lighting and lighting control systems that can be read and utilized in standalone sections. It will cover commissioning for large and small projects. Improvements include best practices, updates to outdated information, and align with ASHRAE Guideline 0 and the Building Commissioning Association's Best Practices. (Commissioning providers will recognize these documents as the equivalent of the Jedi Path for Jedi Initiates.) It defines responsibilities for key members of the commissioning team and describes scope and sets minimum performance criteria for commissioning providers. Entirely new sections were created, including commissioning for existing buildings (aka retrocommissioning). Sample resources were added, including functional tests, design review checklists, and OPR and BOD examples and questionnaires.

As technology advances, so must the practice of commissioning. Our committee recognized this need and created content to explore future of the commissioning process. This presentation will be given by committee members (including a Jedi Commissioning Master) and serve as a pre-release preview of the standard. Come to this presentation to glean insights into best practices and weigh in on the future for true commissioning.



Learning Objectives

- Define commissioning and the difference between commissioning and startup.
- Compare LP-8 with standard commissioning practices defined by ASHRAE, BCxA, and others.
- Use LP-8 to better define the commissioning scope of services and value offered to building owners and operators.
- Use LP-8 to improve lighting and control system performance in new and existing buildings by better preventing, identifying, and resolving operational issues.

Introduction

- What is commissioning?
- The commissioning *team*
- The role of prevention
- The **New** LP-8
- The future of commissioning



Cx Basics

Cx Team

Prevention

The NEW LP-8

Future

Acronyms

Cx - Commissioning

CxP - Commissioning Provider (Professional)

CCP, BCxP, CxA - ANSI-accredited commissioning certifications

OPR - Owner's Project Requirements

BOD - Basis of Design

SOO – Sequence of Operation

FPT – Functional Performance Testing

PDR – Project Deficiencies & Resolutions
(AKA: Cx Punch List)



Cx Basics

Cx Team

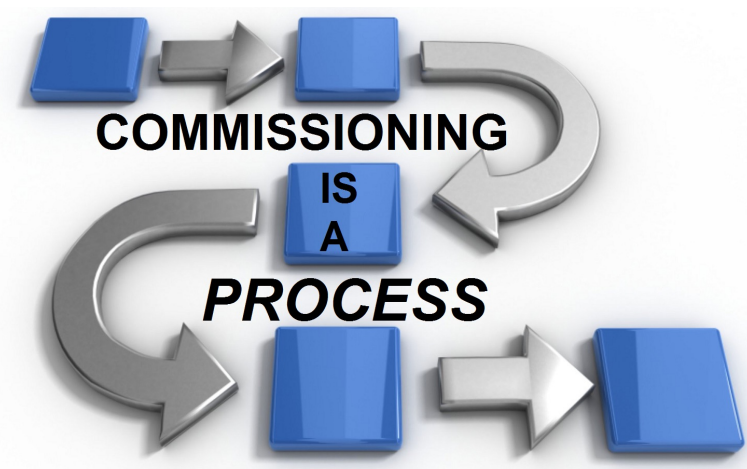
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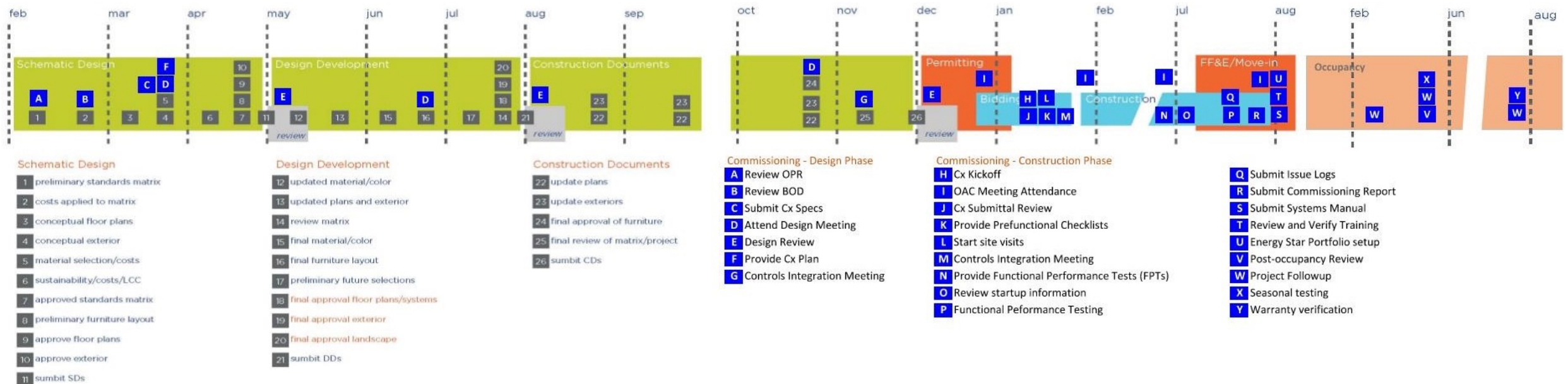
Future

What is commissioning?

- Commissioning (Cx) is a process that seeks to ensure the delivered project meets the owner's requirements.
- ASHRAE/ANSI Guideline 0-2019, The Commissioning Process
- Commissioning is
 - NOT startup
 - NOT configuration
 - NOT programming
 - NOT (just) functional testing at the end



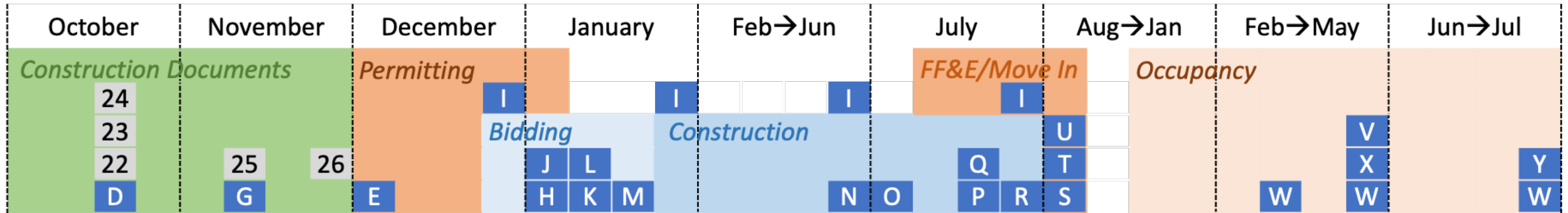
Commissioning is a process



February		March			April			May		June		July		August		September			
						8	10	11							23		23		
1	2	3	4	5	6	7	9		12	13	15	16	17	18	20		22	23	
A	B		C	D	F			E				D				E			
Schematic Design									Design Development						Construction Documents				
1	Preliminary Standards Matrix								12	Updated Material							22	Update Plans	
2	Costs Applied to Matrix								13	Updated Plans and Exterior							23	Update Exteriors	
3	Conceptual Floor Plans								14	Review Matrix							24	Final Approval Furniture	
4	Conceptual Exterior								15	Final Material/Color							25	Final Review Matrix	
5	Material Selection/Costs								16	Final Furniture Layout							26	Submit CDs	
6	Sustainability/Costs/LCC								17	Preliminary Future Selections									
7	Approved Standards Matrix								18	Final Approval Floor Plans/Systems									
8	Preliminary Furniture Layout								19	Final Approval Exterior									
9	Approve Floor Plans								20	Final Approval Landscape									
10	Approve Exterior								21	Submit DDs									
11	Submit SDs																		

Commissioning – Design Phase					
A	Review OPR	D	Design Mtg	F	Provide Cx Plan
B	Review BOD	E	Design Review	G	Controls Integration Mtg
C	Submit Cx Specifications				





Construction Documents

- 22 Update Plans
- 23 Update Exteriors

- 24 Final Approval Furniture
- 25 Final Review Matrix

- 26 Submit CDs

Commissioning – Design Phase

- A Review OPR
- B Review OPD
- C Submit Cx Specifications
- D Design Mtg
- E Design Review
- F Provide Cx Plan
- G Controls Integration Meeting

Commissioning – Construction Phase

- H Cx Kickoff
- I OAC Meeting
- J Cx Submittal Review
- K Provide Prefunctional Checklists
- L Start Site Visits
- M Controls Integration Mtg
- N Provide Functional Performance Tests
- O Review Startup Information
- P Functional Performance Testing

- Q Submit Issues Logs
- R Submit Commissioning Report
- S Submit Systems Manual
- T Review and Verify Training
- U EnergyStar Portfolio Setup
- V Post-Occupancy Review
- W Project Follow-up
- Y Seasonal Testing
- Z Warranty Verification



The commissioning team

- Owner
- Construction manager
- Design Team
 - Architect
 - Lighting Designer
 - Engineers
- Commissioning Provider (CxP)
 - Plans, coordinates, documents the process
- GC
 - Manages the submittals, schedules
- Subcontractors
 - Verifies installation
 - Scheduling and coordination
 - Testing
 - Training
 - Corrects deficiencies
 - Documentation
- Controls Contractor
 - Programming and trending



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Differentiating the roles

- Commissioning Provider (CxP)
 - When? Pre-design through post-occupancy
 - Scope:
 - Review & verification
 - MEP + irrigation, envelope, security, fire alarm, metering...
 - Avoid: Commissioning Agent/Authority
- Installer
 - When: construction through equipment placement
 - Scope: install per plans
- Startup Technician
 - When: Equipment placement through functional testing
 - Scope: checkout & programming
- Programmer
 - When: after installation
 - Scope: program/configure system per plans
- Acceptance Test Technician (ATT) (*this is a California thing*)
 - When: *after* startup
 - Scope: HVAC & Lighting Control Systems



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Future

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OPR and BOD review

Identifying lighting issues now saves time and money later

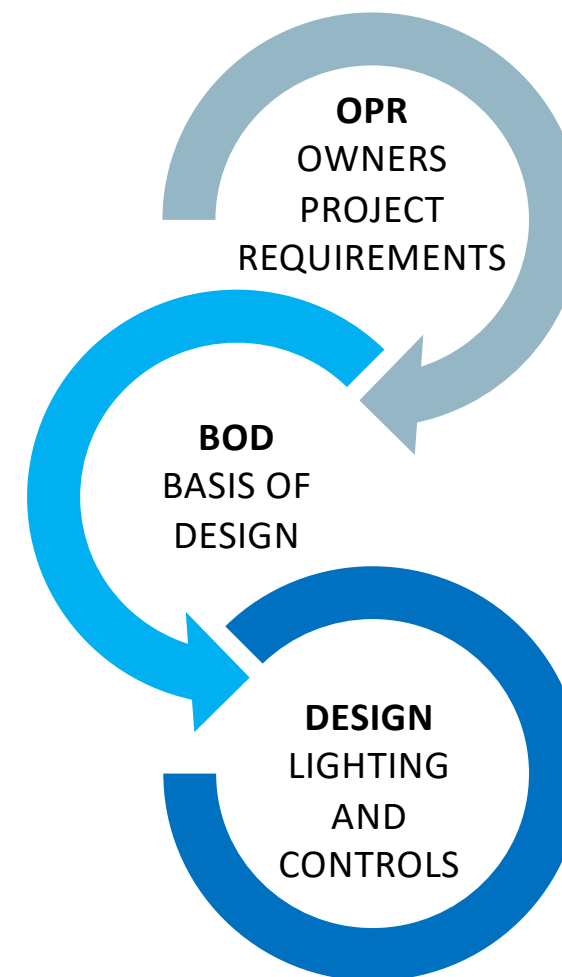


OPR

- OPR = Road map for energy and maintainability
- NOT an architectural narrative
- CxP reviews for
 - Maintainability
 - Energy efficiency
 - Commissionability

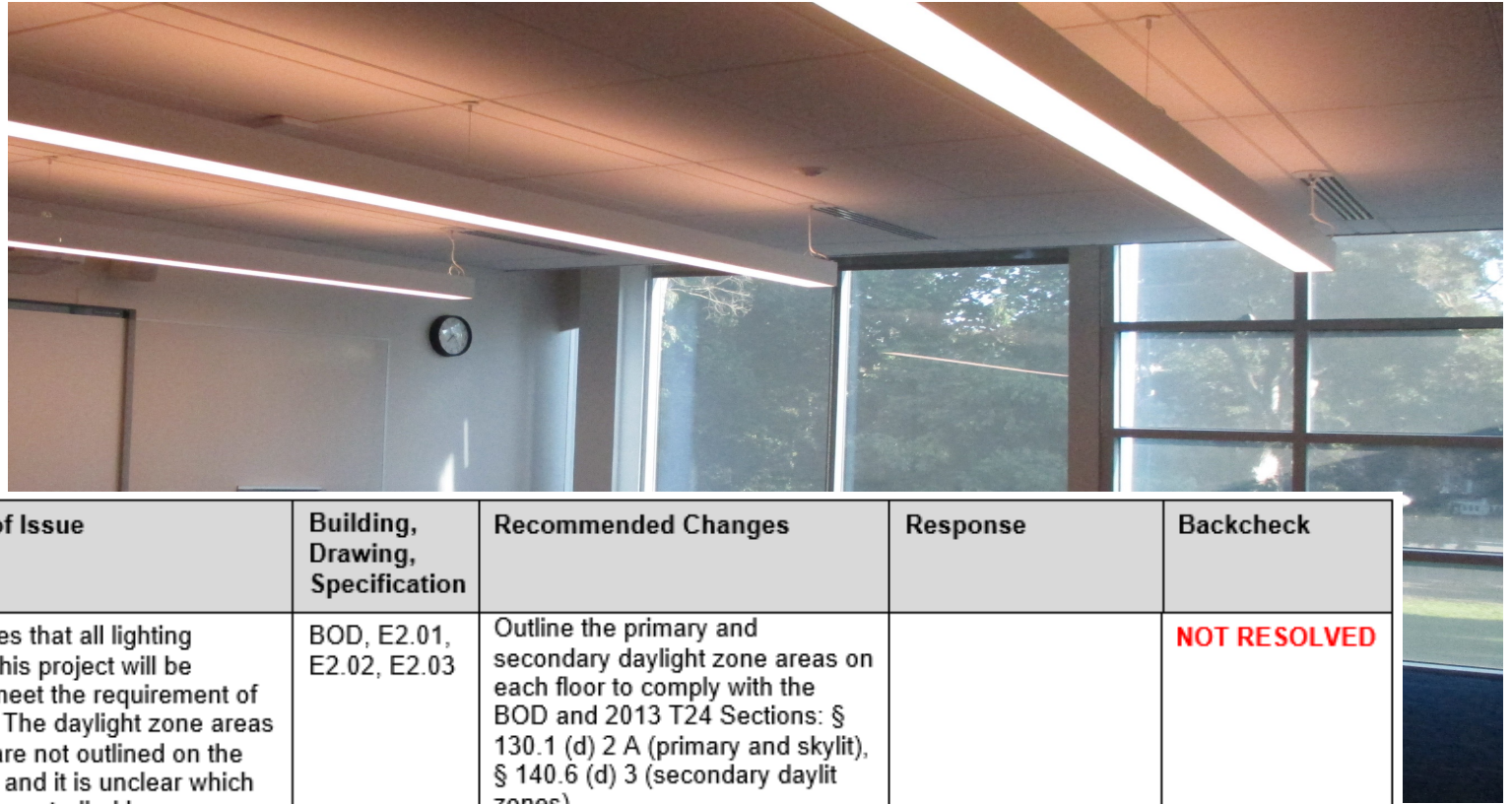
BOD

- BOD informs the design as the OPR informs the BOD
- Must align with OPR
- 80% lighting selection informs overall performance
- Control Intent Narrative (CIN) informs lighting control system selection



Design Review

- Prevention
- CxP provides comments
- Designer reviews
- Respond
- Changes made *at their discretion*

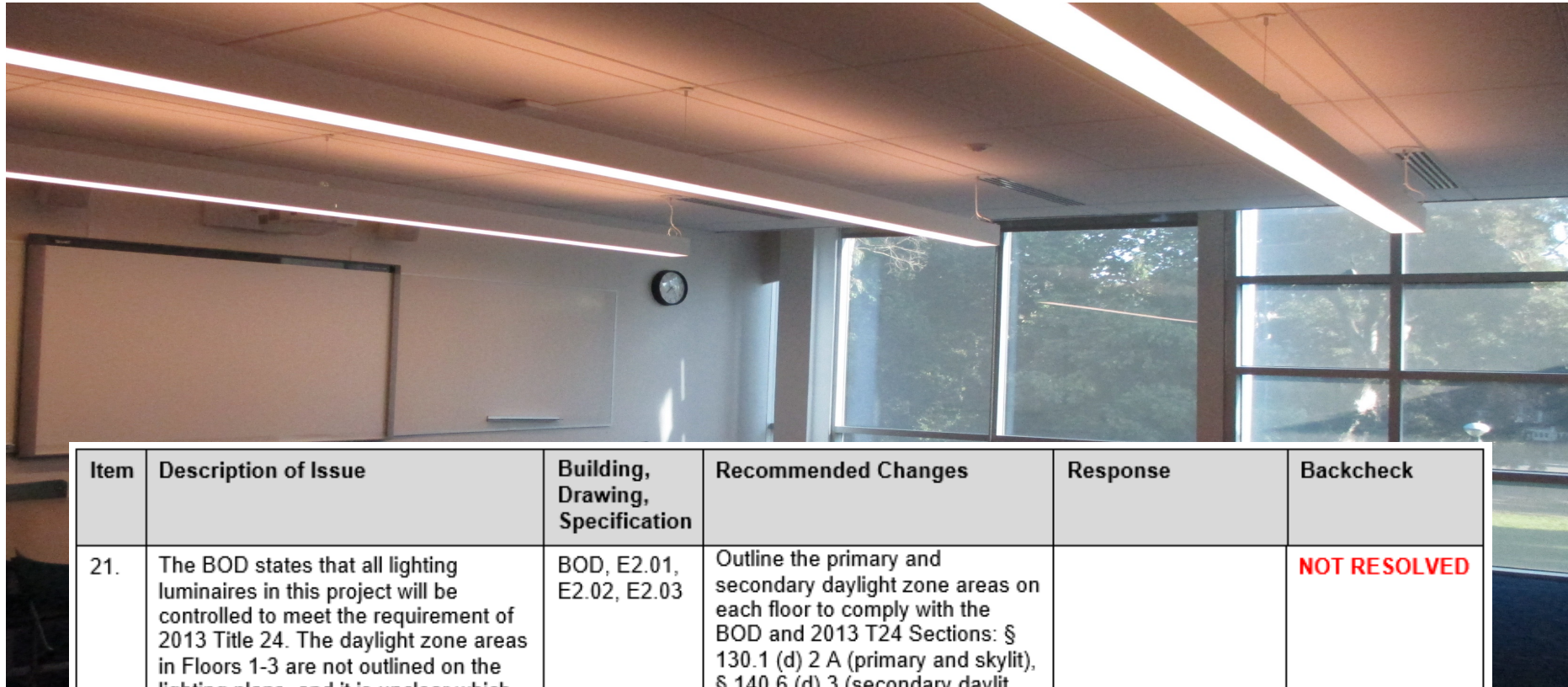


Item	Description of Issue	Building, Drawing, Specification	Recommended Changes	Response	Backcheck
21.	The BOD states that all lighting luminaires in this project will be controlled to meet the requirement of 2013 Title 24. The daylight zone areas in Floors 1-3 are not outlined on the lighting plans, and it is unclear which fixtures will be controlled by photocells. Note that multiple drivers may be required for fixtures that span multiple daylight zones.	BOD, E2.01, E2.02, E2.03	Outline the primary and secondary daylight zone areas on each floor to comply with the BOD and 2013 T24 Sections: § 130.1 (d) 2 A (primary and skylit), § 140.6 (d) 3 (secondary daylight zones) Add notes to the schedule to specify multiple drivers for fixtures that span multiple zones.		NOT RESOLVED



The role of prevention

Predesign
 Design
 Construction



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Submittal Review

Pre-design

Design

Construction

- Last stop for quality!
- Consistency with design (and OPR)
- Substitutions
- Designer has final say

To: **Submittal**

Date: Oct 25, 2012

Project:

Attn:

Original Submittal for Approval
1 Copy of Submittals is Attached

TYPE	MFG	DESCRIPTION
LED3	PATHWAY	6VLED13003K-120/277V / 6VLEDMDSCLPF / 26UBH
LED3A	PATHWAY	C65SLED13003K-120/277V / 6VLEDMDSCLPF
LED4	COLOR KINETI	523-000069-04

APPLICATION
A decorative cylinder for surface, wall or pendant mount is ideal for applications that require long lamp life and energy saving benefits of LED technology.

PRODUCT DATA

REFLECTOR: The single reflector optical system provides high efficiency, low brightness, and 45° cut-off to the lamp image. Reflectors are available in specular or matte finish, as well as a variety of standard and special finishes.

HOUSING: The cylindrical housing is heavy gauge aluminum and finished to an architectural grade. The standard exterior finish is matte white, powder coat paint. The cylinder can be surface mounted, wall mounted or suspended by pendant.

ELECTRICAL: 120 to 277 VAC, 50-60 Hz.

LED MODULE & DRIVER: LED Module and Driver are manufactured by Philips Lighting. Remote phosphor technology insures color consistency from fixture to fixture.

DIMMING: Product is compatible with 0-10 volt dimming controls, specify (D) to order.

LIGHT OUTPUT (lm)	COLOR TEMP. (K)	POWER (W)
800	2700K	13.2
800	3000K	13.0
800	3500K	12.49*
800	4000K	12.8
1100	2700K	19.4
1100	3000K	18.9
1100	3500K	17.89*
1100	4000K	17.4
1300	2700K	21.9
1300	3000K	22.4
1300	3500K	20.21*
1300	4000K	19.9
1300	2700K	33.4
1300	3000K	33.4
1300	3500K	31.98
1300	4000K	31.4

*LM79 test data

CRI = 80. Specifications based on Fortimo LED module by Philips Lighting after 100 hours.

- Expected lamp life to be 50,000 hours with 70% lumen maintenance when ambient temperatures do not exceed 45°C. Lower ambient temperatures yield longer lamp life.

HEAT MANAGEMENT: Engineered heat sink. 1100 - 2000 models feature patented Synjet module that circulates air for optimum heat management of the LED engine.

MOUNTING: (Specify when ordering.)
Ceiling (Surface) Mount - Provided with mounting holes for securement to 4" octagon junction box.
Wall Mount - Standard bracket protrudes 4.5" from wall (specify others) mounts to 4" octagon junction box.
Pendant Mount - Swivel mount canopy allows cylinder to hang plumb up to 30° sloped ceiling stem 3/8" IPS (specify length) canopy adds 1.5" to overall length. Standard finish white powder coat. Specify Pendant Kit as follows:

EXAMPLE: PK 24 W

C65SLED13003K-120/277V Swivel Pendant Kit - Stem Length in inches (add 1.5" for canopy). White Finish (W), Black (B), or Bronze (Z)

6VLEDMDSCLPF

Coventry Architectural Series

SERIES C65SLED LED Cylinder
Downlight - 800, 1100, 1300

TYPE LED 3A

5 Year Warranty

6VLEDMDSCLPF

Catalog #:

C65SLED	1300	3K	6VLEDMDSCLPF	PK12W
Surface - C65SLED	800	4K (4,000K)	D6 (0-10V)	#F - Fuse and Fuse Holder
Pendant - C65PLED	1100	35K (3,000K)	DE4 (Lutron ECDeys 4 wire)	Emergency Battery Pack not available
Wall - C65WLED	1300	2K (2,000K)	D7 (Lutron 3 wire)	
Cable - C65CLED		27K (2,700K)		

Optional Finishes

Suffix #	Suffix #	Suffix #
Black Cylinder Housing - B	Satin Aluminum Housing - SA	
Bronze Cylinder Housing - Z	Metallic Aluminum Housing..... - MA	

6VLEDMDSCLPF / PK12W

Trim	Trim Finish
6VLEDSP - Spot 4" Downlight Reflector	
6VLEMD - Medium 5.8" Downlight Reflector	
SCLPF - 5.8" Specular Clear Alzak with Polished Flange	

* A1 - Straight White Cord A2 - Straight Black Cord
A3 - Coiled White Cord A4 - Coiled Black Cord



First in Place Observations

- Prevent poor installation
- Early identification prevents re-work



Predesign

Design

Construction



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Future

Functional Performance Testing (FPT)

Predesign

Design

Construction

- Evaluate dynamic operation
 - Passive observation
 - Active testing
 - Automated monitoring
- Ensures building equipment and systems work, and work together



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Testing

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Future

The New LP-8

- Last update was 2011
- Covers large and small projects
- Significant updates
- Alignment with
 - ASHRAE Guideline 0
 - Building Commissioning Association's Best Practices
- Practical resource
- Guidance
- Responsibilities
- Minimum performance criteria

for clients, lighting designers,
CxPs, contractors



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Future

The Future

- Centralized AND distributed equipment
- Cybersecurity
- Information tagging (*see: Project Haystack*)
- Semantic/Metadata modeling (*see: Brick, ASHRAE 223*)
- Simulated functional testing
- Automated functional testing
- Digital twins



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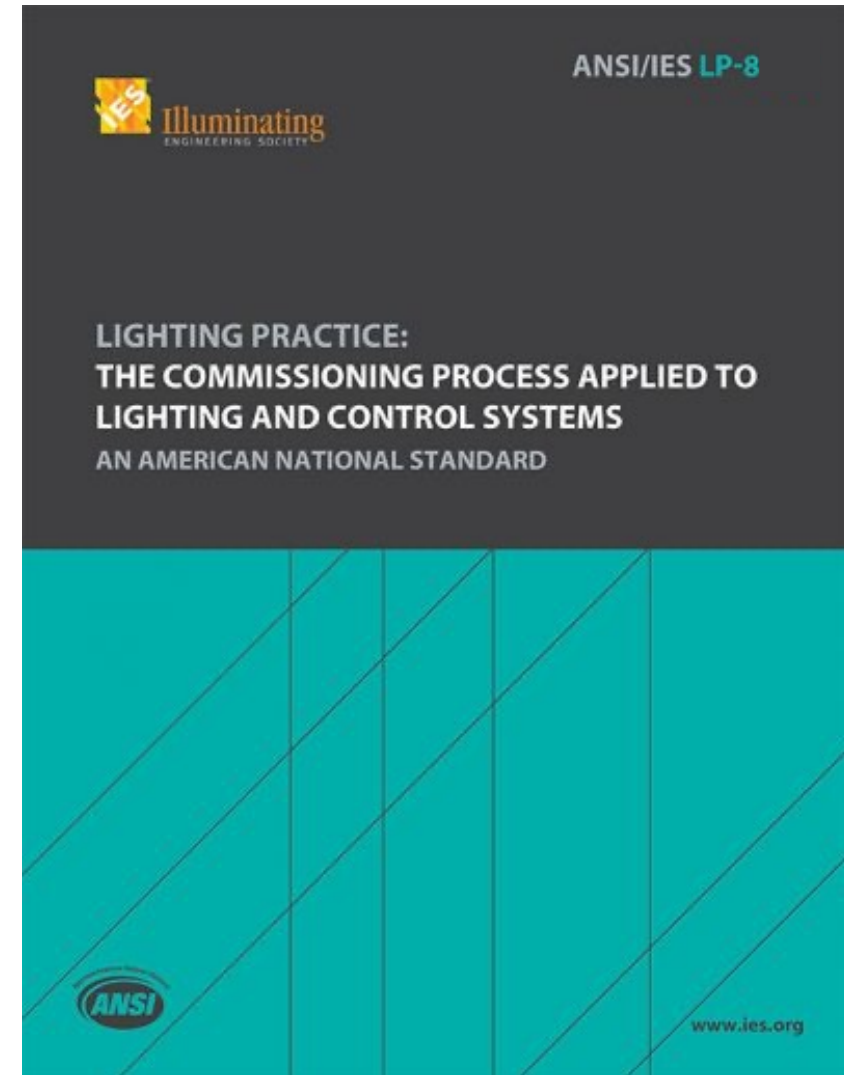
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Future

Wrapping it up

- LP-8 is your go-to resource
 - OPR
 - BOD
 - Commissioning
- It's a process!
- Best started early
- Commissioning is about
 - Quality
 - Preventing problems
 - Owner satisfaction



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