2023 ANNUAL CONFERENCE
AUGUST 3-5

# LP-8 is enough?

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

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AKA Luke Lightwalker,
The Good Commissioning Provider

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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 Improvements include best practices, updates to outdated information, and align with ASHRAE Guideline 0 and the Building Commissioning Association's Best Practices.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

# Acronyms

Cx - Commissioning

CxP - Commissioning Provider (Professional)

CCP, BCxP, CxA - ANSI-accredited commissioning certifications

OPR - Owner's Project Requirements

BOD - Basis of Design

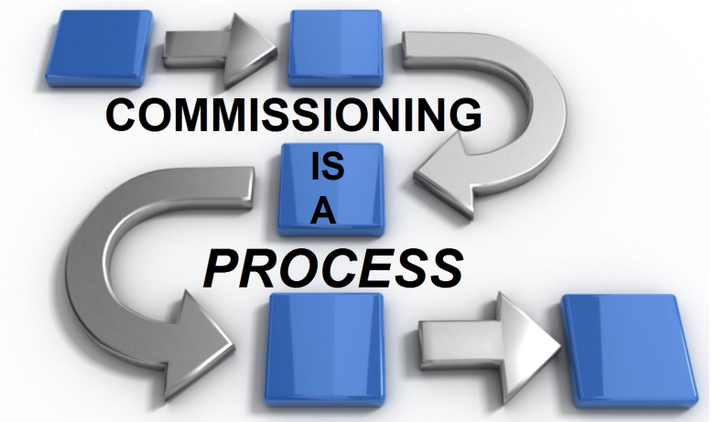
SOO – Sequence of Operation

FPT – Functional Performance Testing

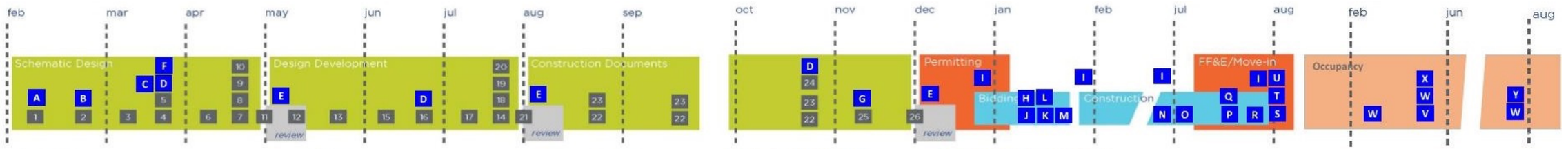
PDR – Project Deficiencies & Resolutions
(AKA: Cx Punch List)

# 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




**Schematic Design**

1. preliminary standards matrix
2. costs applied to matrix
3. conceptual floor plans
4. conceptual exterior
5. material selection/costs
6. sustainability/costs/LCC
7. approved standards matrix
8. preliminary furniture layout
9. approve floor plans
10. approve exterior
11. sumbit SDs

**Design Development**

12. updated material/color
13. updated plans and exterior
14. review matrix
15. final material/color
16. final furniture layout
17. preliminary future selections
18. final approval floor plans/systems
19. final approval exterior
20. final approval landscape
21. sumbit DDs

**Construction Documents**

22. update plans
23. update exteriors
24. final approval of furniture
25. final review of matrix/project
26. sumbit CDs

**Commissioning - Design Phase**

- A Review OPR
- B Review BOD
- C Submit Cx Specs
- D Attend Design Meeting
- E Design Review
- F Provide Cx Plan
- G Controls Integration Meeting

**Commissioning - Construction Phase**

- H Cx Kickoff
- I OAC Meeting Attendance
- J Cx Submittal Review
- K Provide Prefunctional Checklists
- L Start site visits
- M Controls Integration Meeting
- N Provide Functional Performance Tests (FPTs)
- O Review startup information
- P Functional Peformance Testing

- Q Submit Issue Logs
- R Submit Commissioning Report
- S Submit Systems Manual
- T Review and Verify Training
- U Energy Star Portfolio setup
- V Post-occupancy Review
- W Project Followup
- X Seasonal testing
- Y Warranty verification

| February | March | April | May | June | July | August | September |
|---|---|---|---|---|---|---|---|
| | | 8 10 11 | | | 18 20 | 23 | 23 |
| 1 2 | 3 4 5 | 6 7 9 | 12 13 | 15 16 17 | 14 19 | 22 | 22 |
| A B | C D F | | E | D | | E | |

## Schematic Design

| | |
|---|---|
| 1 | Preliminary Standards Matrix |
| 2 | Costs Applied to Matrix |
| 3 | Conceptual Floor Plans |
| 4 | Conceptual Exterior |
| 5 | Material Selection/Costs |
| 6 | Sustainability/Costs/LCC |
| 7 | Approved Standards Matrix |
| 8 | Preliminary Furniture Layout |
| 9 | Approve Floor Plans |
| 10 | Approve Exterior |
| 11 | Submit SDs |

## Design Development

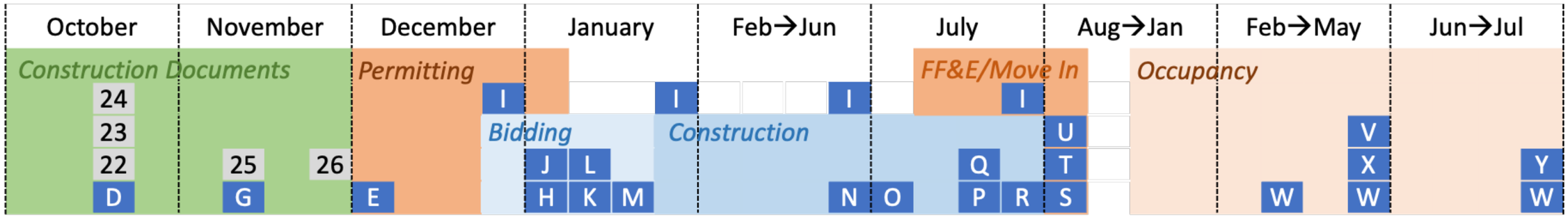
| | |
|---|---|
| 12 | Updated Material |
| 13 | Updated Plans and Exterior |
| 14 | Review Matrix |
| 15 | Final Material/Color |
| 16 | Final Furniture Layout |
| 17 | Preliminary Future Selections |
| 18 | Final Approval Floor Plans/Systems |
| 19 | Final Approval Exterior |
| 20 | Final Approval Landscape |
| 21 | Submit DDs |

## 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 | 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
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- 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

# 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

Predesign
Design
Construction

# OPR and BOD review

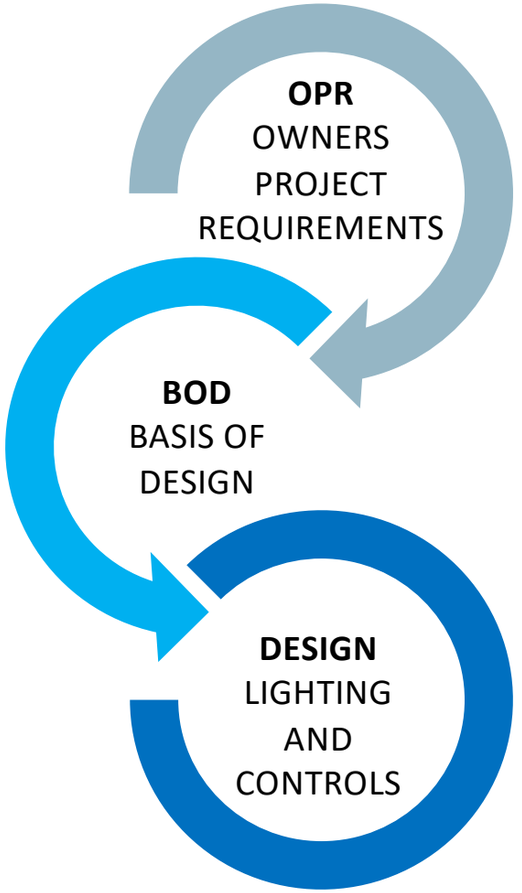
Identifying lighting issues now saves time and money later

## OPR

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

## BOD

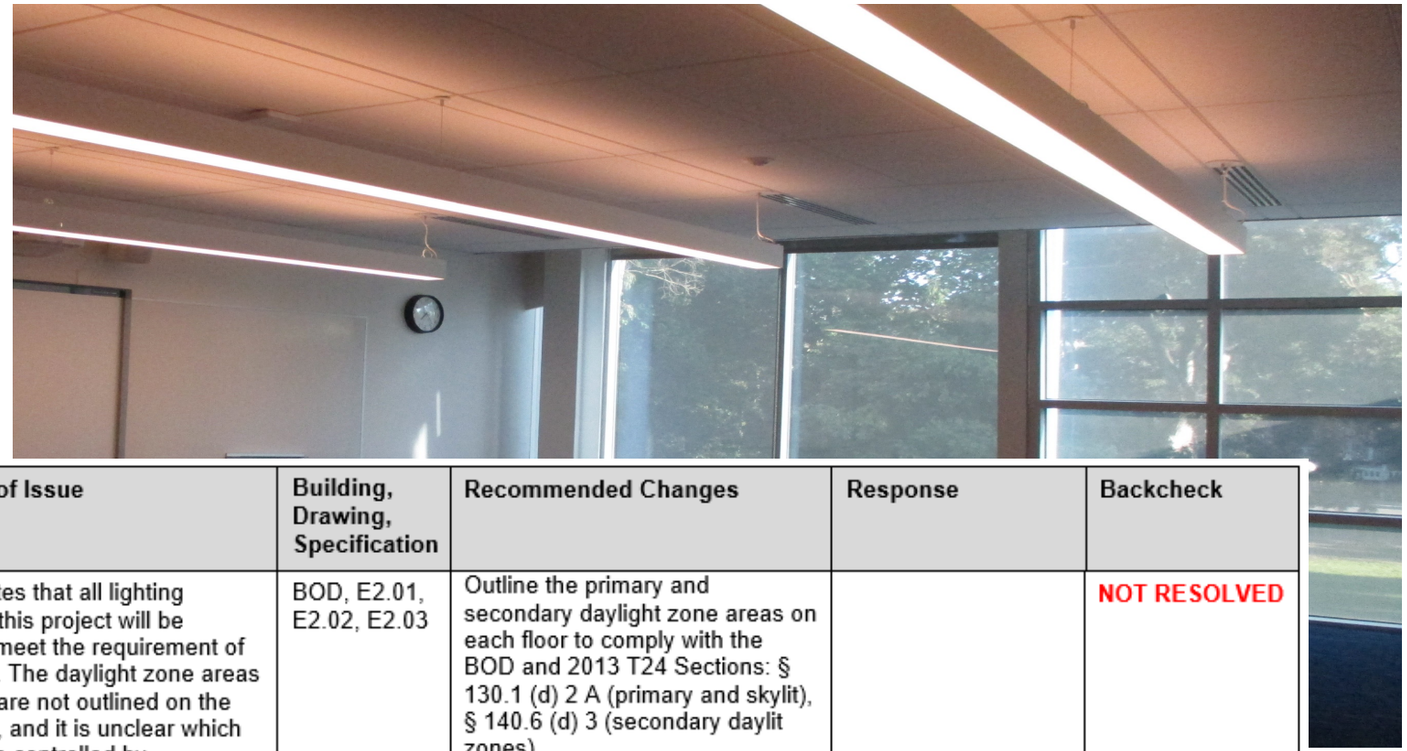
- BOD informs the design as the OPR informs the BOD
- Must align with OPR
- 80% lighting selection informs overall performance
- Control Intent Narrative (CIN) informs lighting control system selection



# Design Review

Predesign
Design
Construction

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



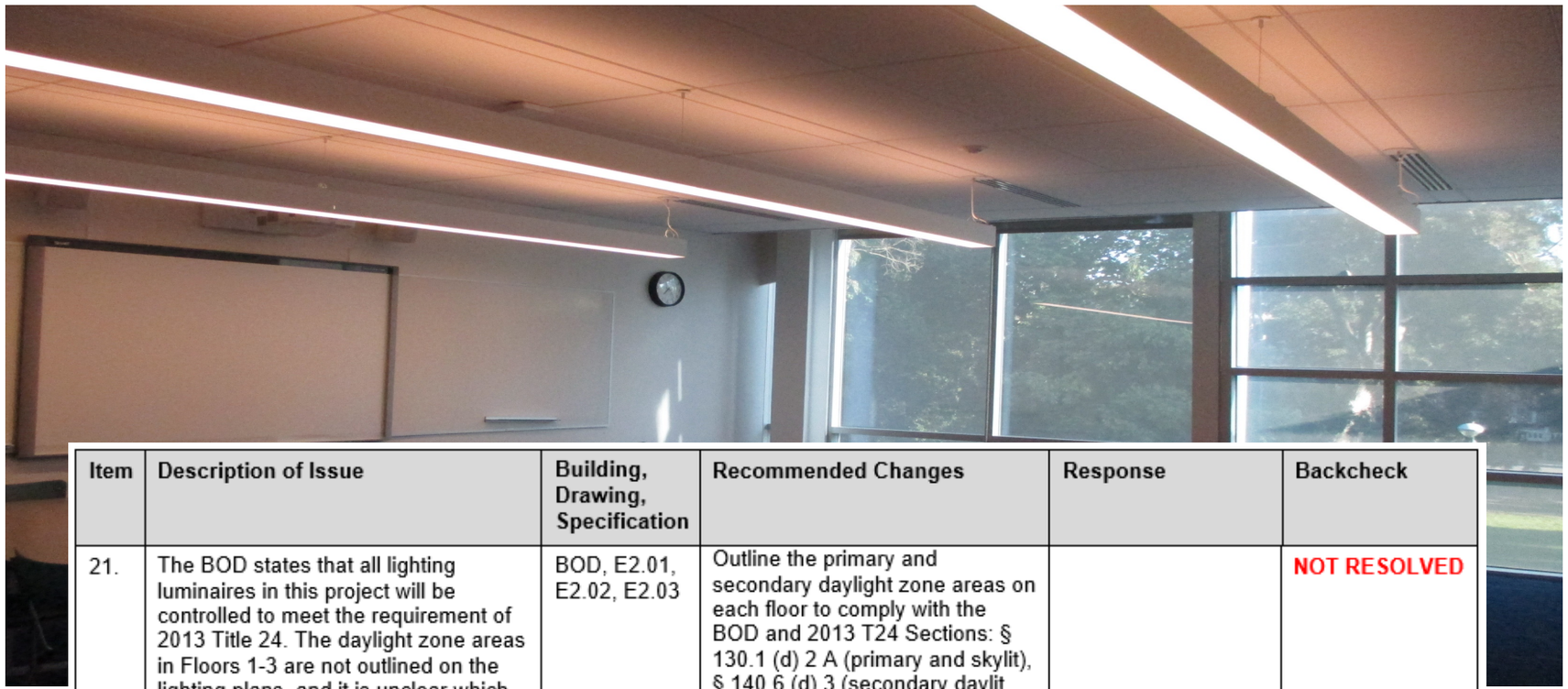
| Item | Description of Issue | Building, Drawing, Specification | Recommended Changes | Response | Backcheck |
|---|---|---|---|---|---|
| 21. | The BOD states that all lighting luminaires in this project will be controlled to meet the requirement of 2013 Title 24. The daylight zone areas in Floors 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 daylit zones)<br>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

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

To:

**Submittal**

Date: Oct 25, 2012

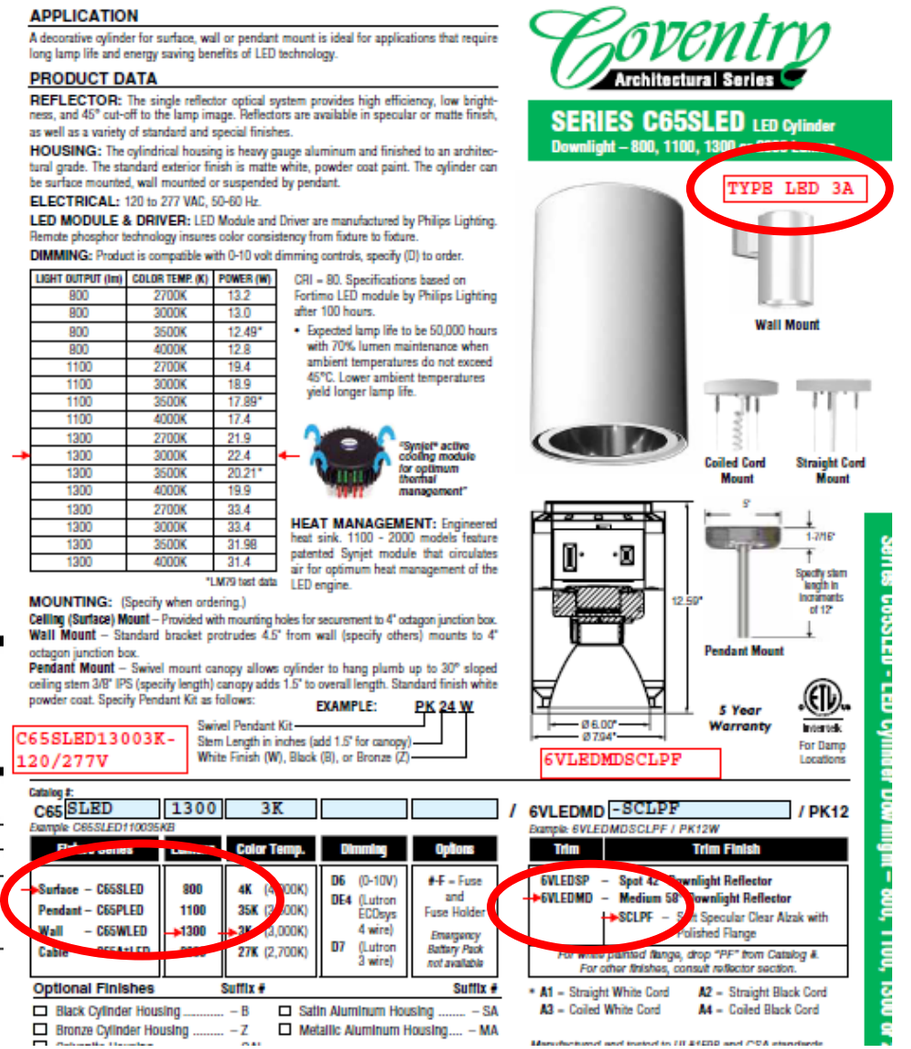
Project:

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 |




Predesign | Design | Construction

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Cx Basics | Cx Team | Prevention | The NEW LP-8 | Future

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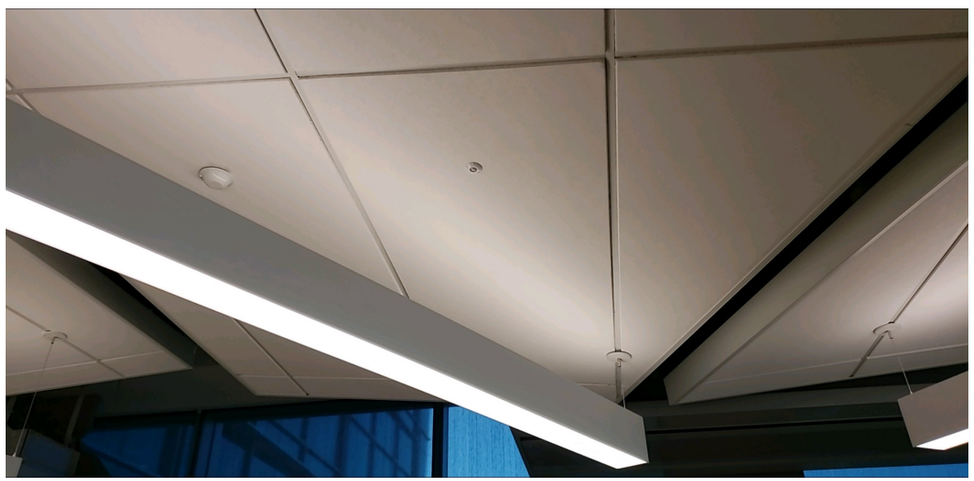
# First in Place Observations



- Prevent poor installation
- Early identification prevents re-work



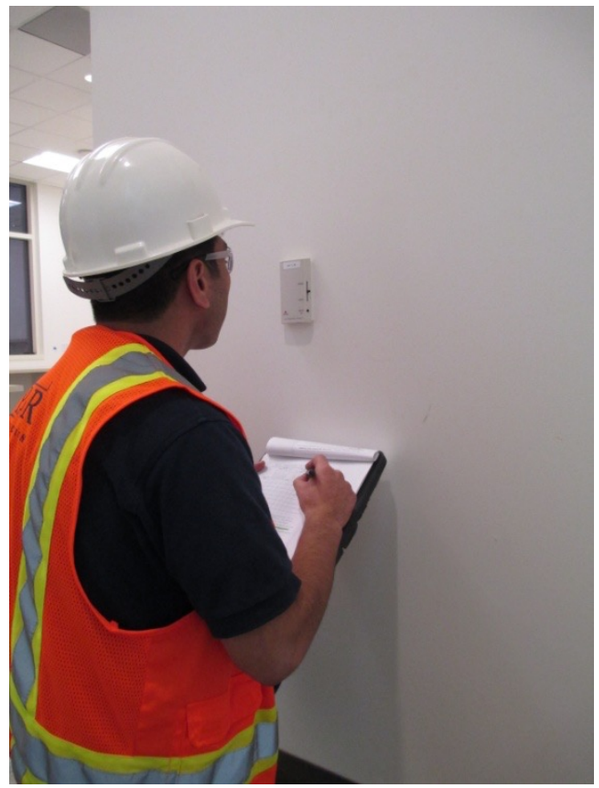
# Functional Performance Testing (FPT)

Predesign

Design

Construction

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



# 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

# 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

# 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