

PoE LIGHTING AND AUTOMATION THE WHO, WHAT, & WHEN

Larry Jones

Lessons learned and best practices during the design and construction process



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ABOUT ME

Over 40 years of engineering experience in building design and construction, including electrical power distribution, lighting, and communications systems design for a wide variety of commercial, industrial, and institutional facilities.

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TYPICAL PROJECT PHASES

00 *Project Planning*

01 *Schematic Design*

02 *Design
Development*

03 *Contract
Documents*

04 *Bidding and
Negotiation*

05 *Construction
Administration*



PROJECT PLANNING PHASE

Architect and Owner Establish Design Parameters

- What is needed
- When it is needed
- Quality desired
- Sustainability
- Project Budget

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TA1 Ref Defining Scope Presentation
Tyler Andrews, 6/12/2020

PROJECT PLANNING PHASE

Intelligent Building Tasks:

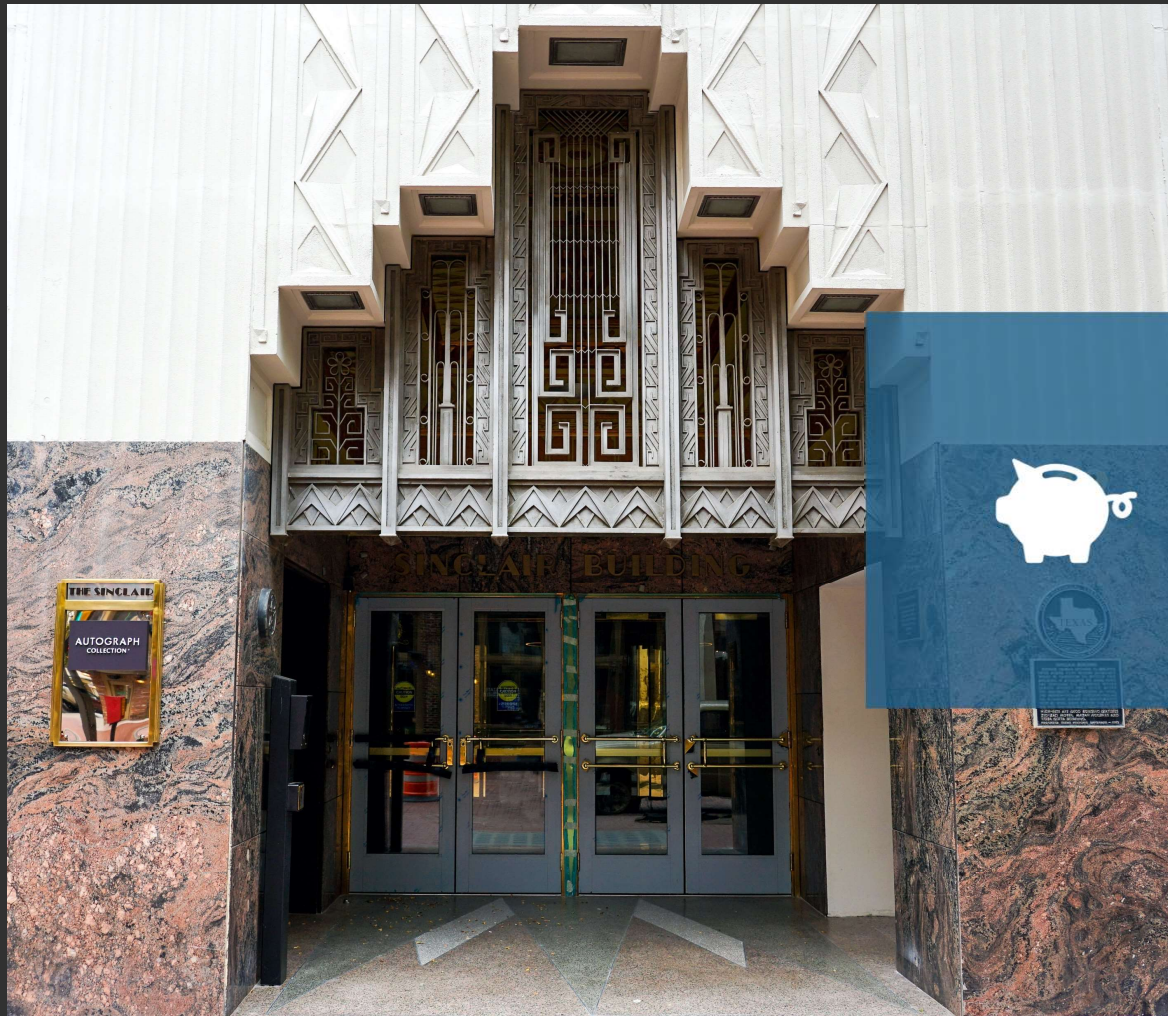
Commitment by Owner to an Intelligent Building

- Commit to additional scope
- Commit to which building systems will be intelligent
- Commit to involvement of IT and OT staff from the outset
- Commit to additional floor space required for equipment
- Commit to earlier involvement of consultants in design process



Slide 6

- TA2** Talk to where code requires intelligence; the rest is part of business model of owner - ASHRAE 90.1
Tyler Andrews, 6/12/2020
- TA3** How do we handle costing/pricing exercises up front?
Tyler Andrews, 6/12/2020
- TA4** Increased equipment cost, savings on labor
Tyler Andrews, 6/12/2020
- TA6** Budget layout will be very different, so difficult to do a line item comparison
Tyler Andrews, 6/12/2020
- TA7** Driven by partners and decisions around hardware selection
Tyler Andrews, 6/12/2020
- TA8** The real cost savings can happen here at the front end, rather than trying to squeeze this at the end
Tyler Andrews, 6/12/2020
- TA9** Recommend a design charrett
Tyler Andrews, 6/12/2020



**THE BIG
QUESTION:
WHAT
ABOUT
COSTS?**

HOW DO THE COSTS COMPARE?

- *Historical cost data is limited since PoE lighting is new technology*
- *There are a number of factors that affect construction cost*
 - *Size of the project*
 - *Quality and completeness of the Contract Documents*
 - *Experience of the bidders and suppliers*
 - *Market at the time of bidding*

WHAT'S THE BOTTOM LINE?

When the design is clear and experienced contractors are used, the cost of a PoE lighting system is about the same or less than the cost of the equivalent line voltage lighting system

TWO BIGGEST FACTORS IN THE COST OF PoE

1. *Less manhours are required to install PoE lighting systems*
 - ✓ *Class 2 Wiring*
 - ✓ *Power and controls provided over a single cable*

2. *PoE lighting system eliminates the need for a separate control system that is required for line voltage lighting*

SCHEMATIC DESIGN PHASE

Architect Develops Conceptual Plan

- Conceptual floor plans, elevations, and sections to show scale and relationship of spaces
- Narrative description of materials, systems, and equipment proposed



SCHEMATIC DESIGN PHASE

Intelligent Building Tasks:

- Work with Owner's IT and OT groups to define requirements for intelligent building systems and equipment
- Research applicable local and national codes and standards
- Contact AHJ and involve them from the outset
- Determine approximate size and location of spaces required for intelligent building equipment
- Develop narrative description of proposed intelligent building systems
 - ✓ Topology
 - ✓ Functionality
 - ✓ Locations of equipment
 - ✓ Proposed level of systems integration



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TA10 What document do we use to record the narrative? Do we have a template for this?
Tyler Andrews, 6/12/2020

RECOMMENDED BEST PRACTICES

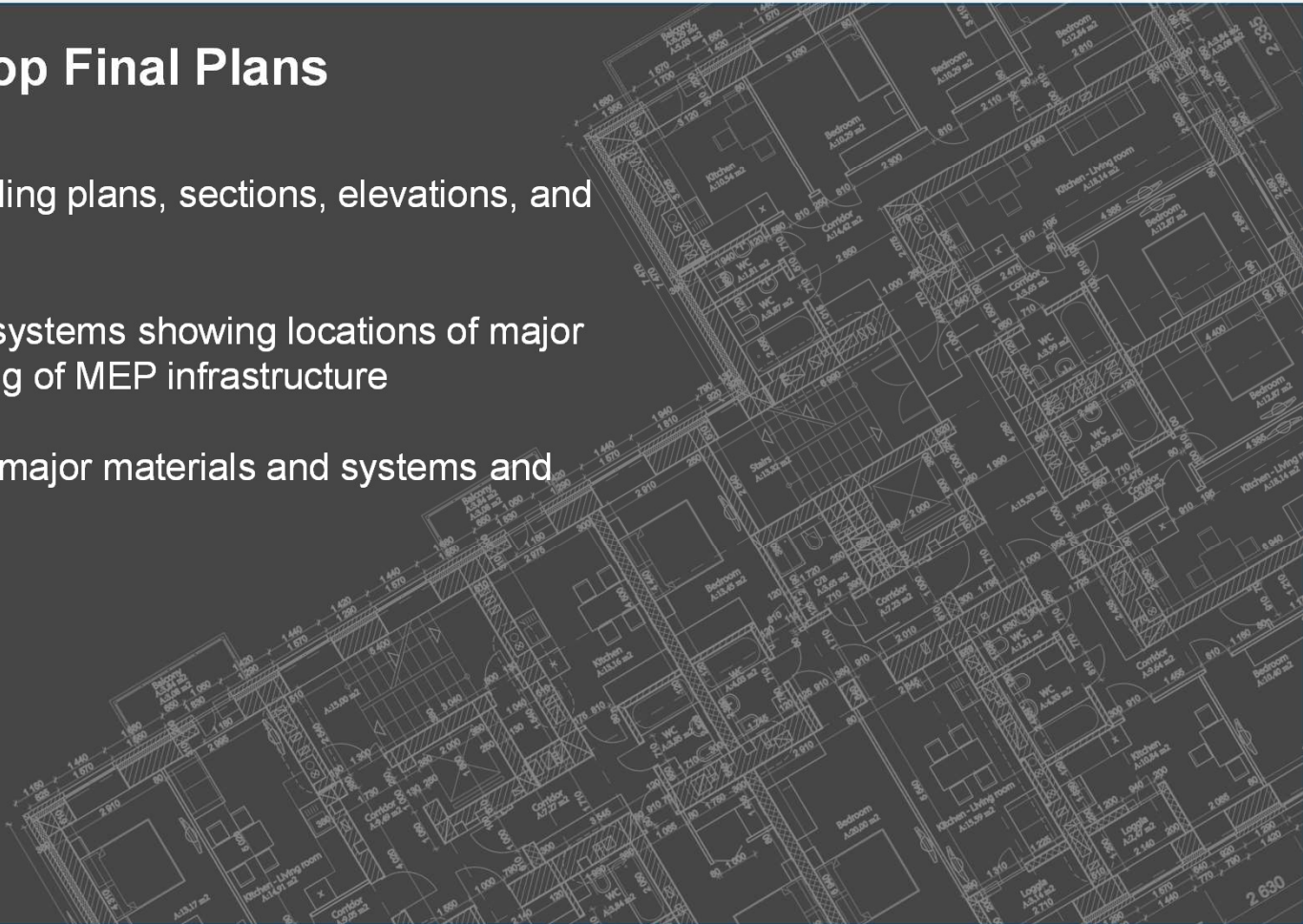
- *Plan for PoE lighting and other intelligent building systems from the outset of the project*
- *Conduct a design charrette involving all stakeholders*
 - ✓ *Stakeholder Responsibilities*
 - ✓ *Corporate Standards*
 - ✓ *Preferred Topology*
 - ✓ *Level of Systems Integration*



DESIGN DEVELOPMENT PHASE

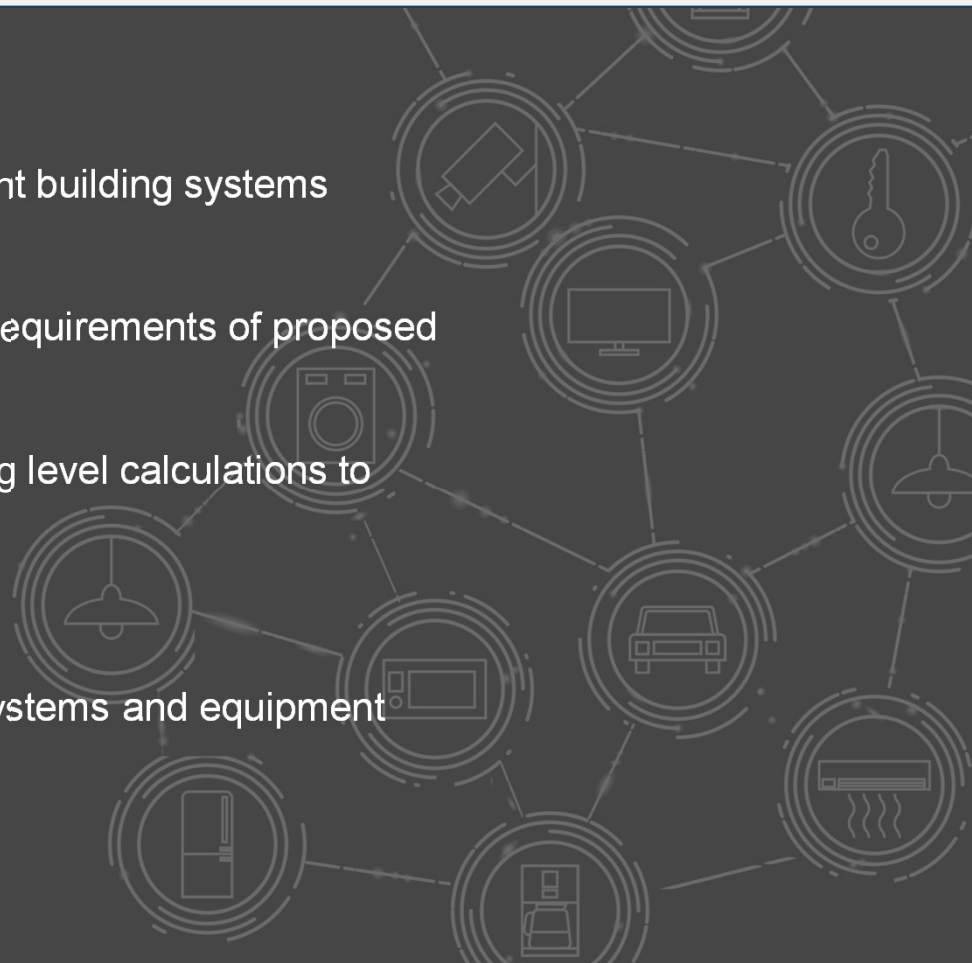
Architect Starts to Develop Final Plans

- Detailed floor plans, reflected ceiling plans, sections, elevations, and construction details
- Diagrammatic drawings of MEP systems showing locations of major components and proposed routing of MEP infrastructure
- Outline specifications identifying major materials and systems and establishing quality levels



DESIGN DEVELOPMENT PHASE

Intelligent Building Tasks:

- Finalize locations and space requirements for intelligent building systems equipment
 - Provide preliminary electrical power and cooling load requirements of proposed intelligent building equipment to MEP Engineer
 - Design team selects PoE light fixtures and runs lighting level calculations to validate fixture selection and layout
 - Prepare preliminary Light Fixture Schedule
 - Develop outline specifications for intelligent building systems and equipment
- 

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TA11 Highlight topics they may not be familiar with
Tyler Andrews, 6/12/2020

TA13 switching hardware - size, power, heat
Tyler Andrews, 6/12/2020

CONTRACT DOCUMENTS PHASE

A/E Team Completes Design and Issues Drawings for Bidding, Permitting and Construction

- Complete set of sealed construction drawings for all disciplines
- Project Manual with sealed specifications for all disciplines

CONTRACT DOCUMENTS PHASE

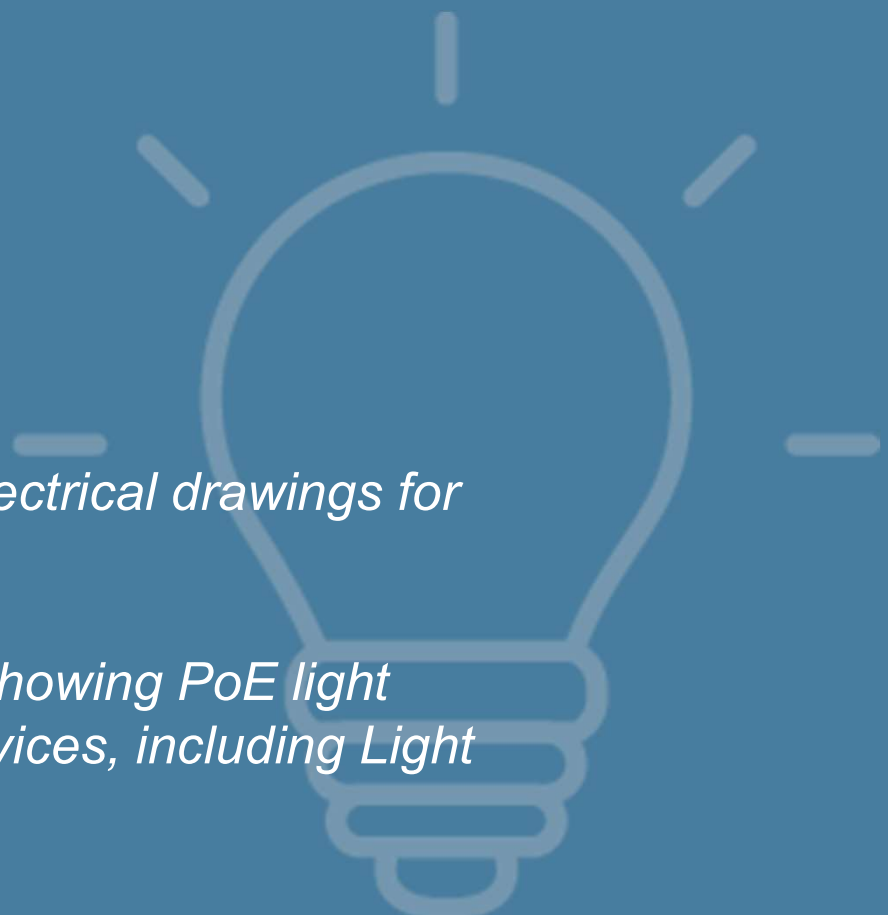
Intelligent Building Tasks:

- Finalize PoE light fixture selections and locations
- Finalize equipment selections and update MEP Engineer on requirements
- Prepare COMcheck or other energy code Certificate of Compliance acceptable to the AHJ certifying that the PoE lighting systems and its controls comply with energy code requirements
- Show all PoE light fixtures, nodes, control devices, sensors and cabling on the drawings, including daylighting zones, if applicable
- Identify on the drawings which PoE switch port each node is served from and show switch locations if using a distributed topology
- Identify emergency lighting, emergency power source, and how local control of emergency fixtures is overridden upon loss of normal power

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- TA15** Is there a difference in the LoD for intelligent buildings?
Tyler Andrews, 6/19/2020
- TA18** What is the best practice?
Tyler Andrews, 6/19/2020
- TA19** RCDD lays out cabling pathways - contractor?
Tyler Andrews, 6/19/2020
- TA20** Increased LoD to locate controls and IP based equipment - coordinated with the centralized OT network
Tyler Andrews, 6/19/2020
- TA16** Are groupings and logic provided by the lighting designer, architect, owner, or installation contractor?
Tyler Andrews, 6/19/2020
- TA21** Lighting designer creates groupings - best practices - identify fixture to switch using sub-letters
Tyler Andrews, 6/19/2020
- TA22** Alternatively, create a matrix
Tyler Andrews, 6/19/2020
- TA17** How do you record where node controls are organized? Table, online, etc?
Tyler Andrews, 6/19/2020

RECOMMENDED BEST PRACTICES

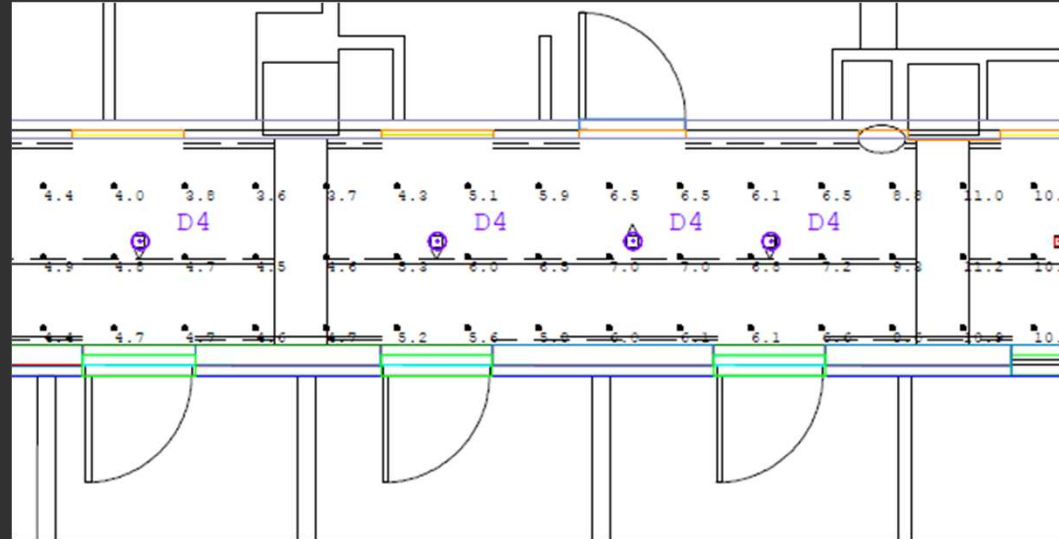
- *Show PoE lighting fixture locations on electrical drawings for coordination only*
 - *Provide separate low voltage drawings showing PoE light fixtures and all associated wiring and devices, including Light Fixture Schedule and node schedule*
 - *Add provision in the Specifications requiring that low voltage systems installer submit proof of prior experience and be BICSI Certified*
- 

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TA23 Can we show some drawing examples?
Tyler Andrews, 6/19/2020



A FEW EXAMPLES



CORRIDOR LIGHTING

Calculated lighting levels (above)

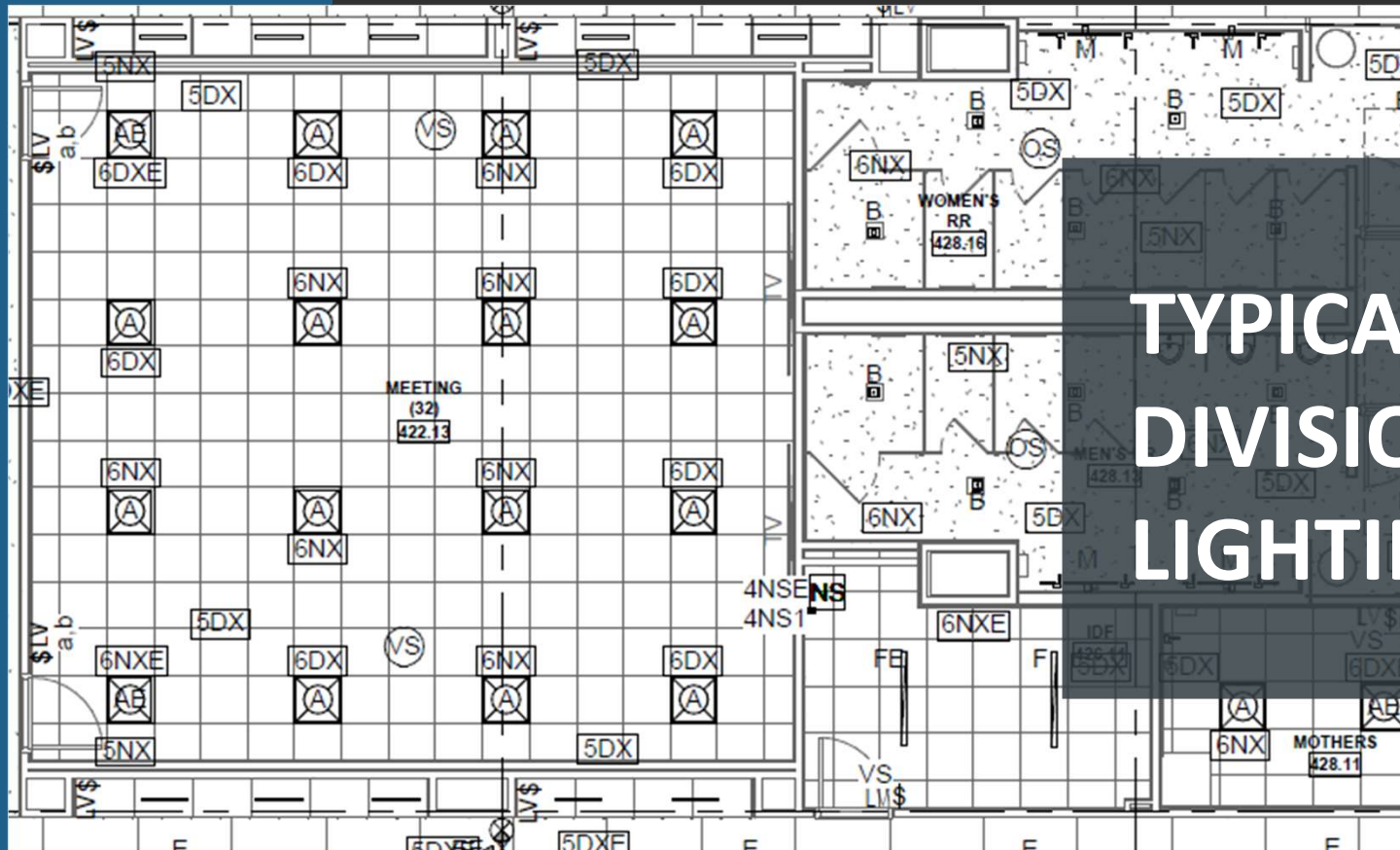
Rendering (left)



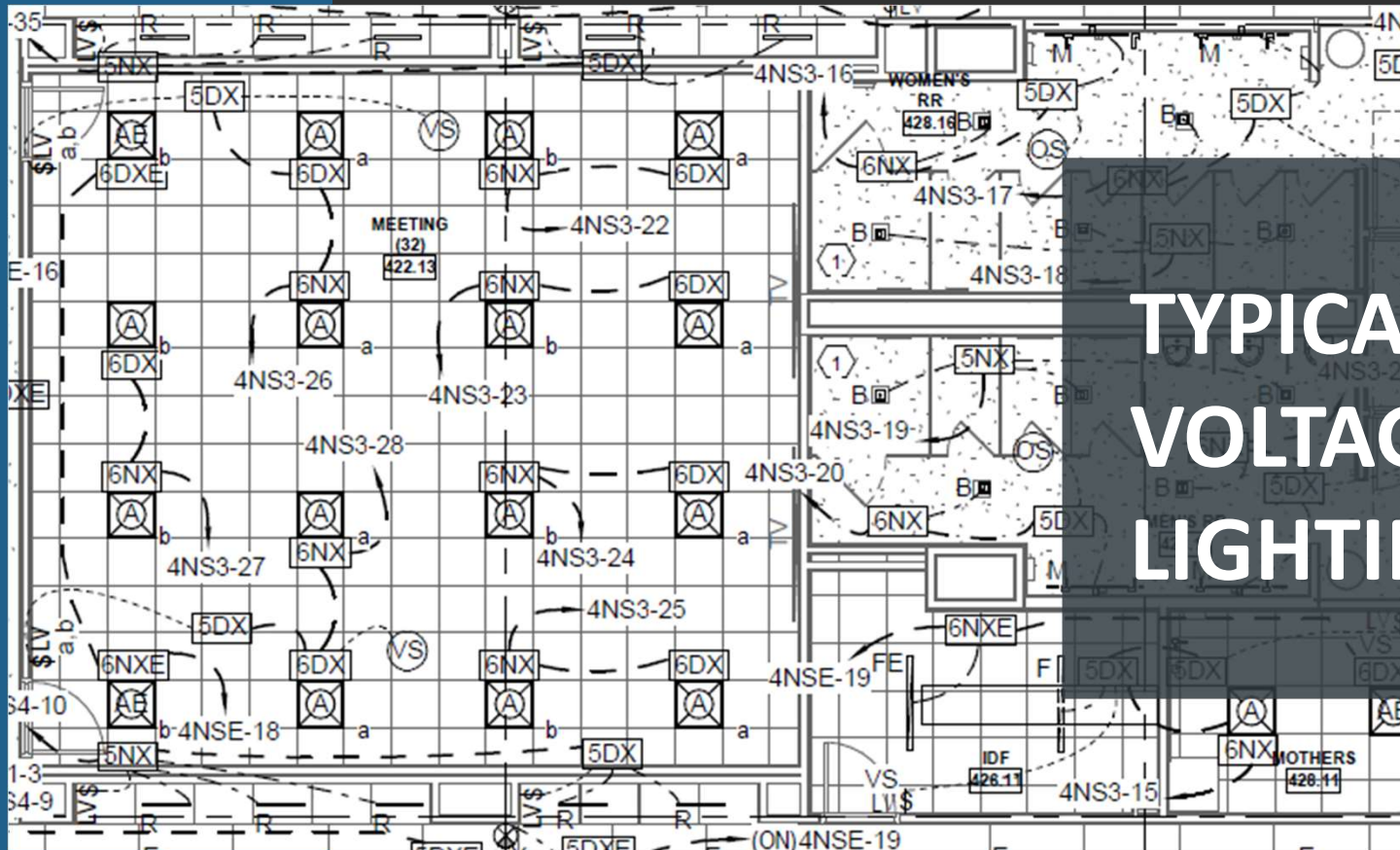
MORE EXAMPLES

Lobby lighting rendering (above)

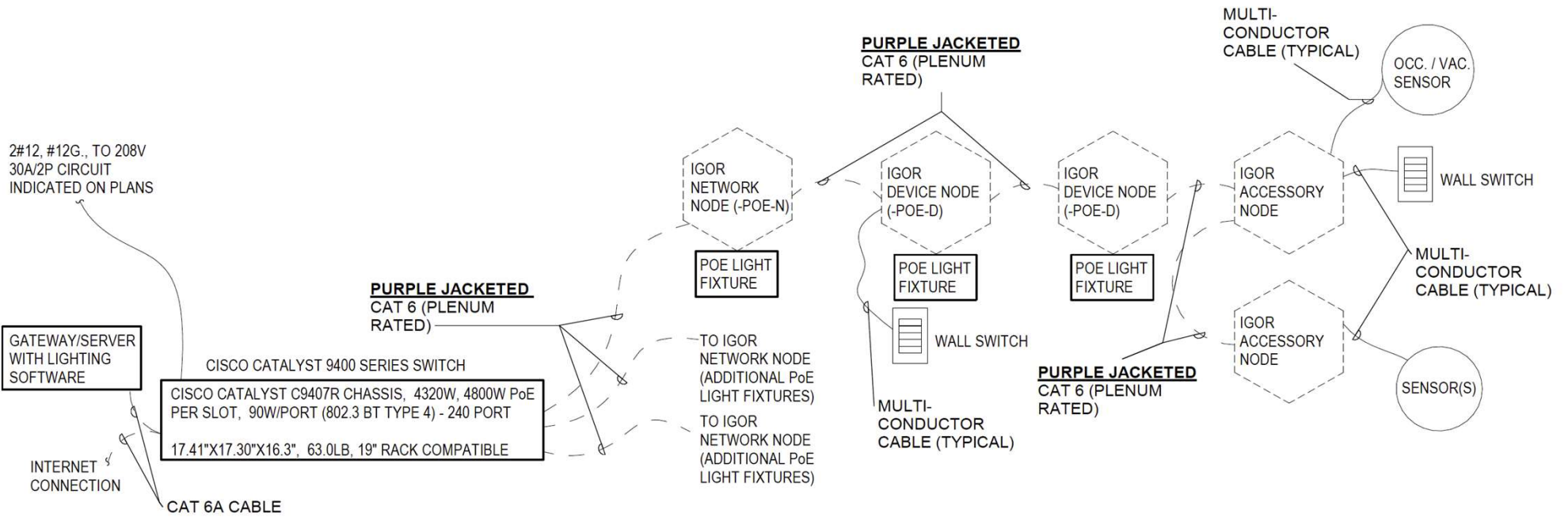
Corridor lighting rendering (left)



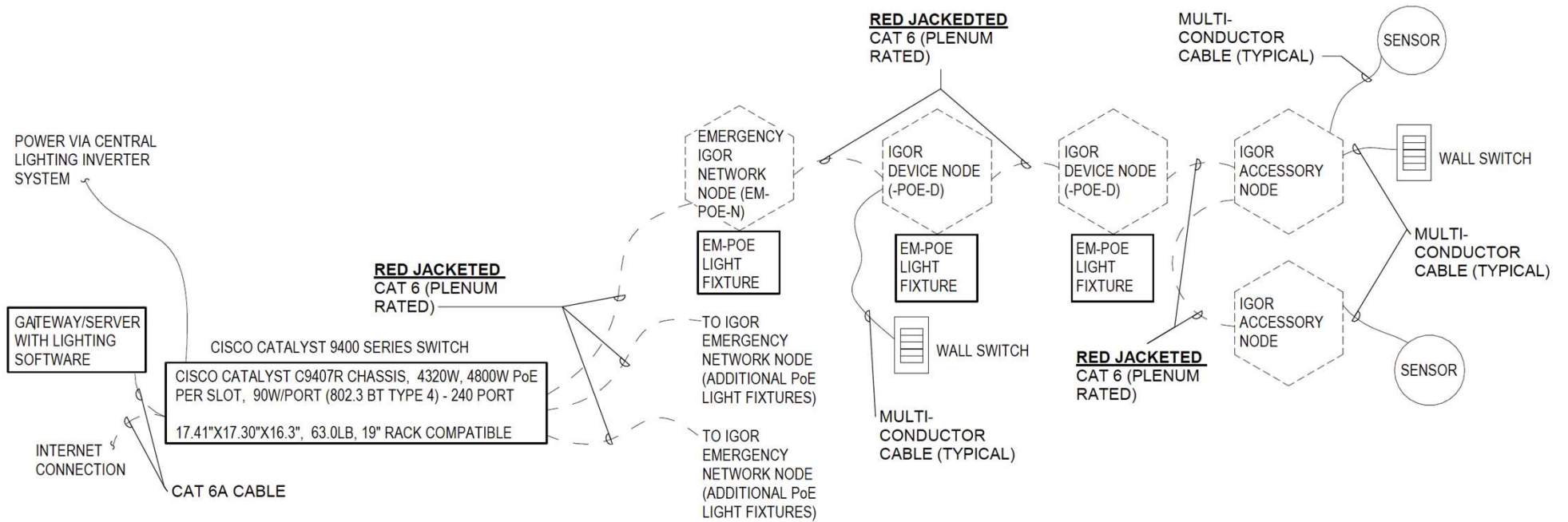
TYPICAL DIVISION 26 LIGHTING PLAN



TYPICAL LOW VOLTAGE LIGHTING PLAN



TYPICAL NORMAL SOURCE PoE CONNECTIONS



TYPICAL EMERGENCY SOURCE PoE CONNECTIONS

BIDDING AND NEGOTIATION PHASE

A/E Team Assists Owner with Bidding Process

- Conduct Pre-Bid Conference to acquaint prospective bidders with the content of the Contract Documents and with bidding procedures
- Respond to questions from bidders and prepare addendums if needed
- Assist Owner in reviewing bids

BIDDING AND NEGOTIATION PHASE

Intelligent Building Tasks:

- Make sure bidders are clear on the extent of the low voltage systems work included in the Contract and where and how that work is shown in the Contract Documents
- Respond to questions during bidding and prepare any addendums necessary to modify or clarify the bid documents



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- TA24** Do we have some project management/bidding best practices?
Tyler Andrews, 6/19/2020
- TA25** ie how to break up the bid packages?
Tyler Andrews, 6/19/2020
- TA26** Separately bid structured cabling or include in the GC scope? NEEDS TO BE REALLY CLEAR
Tyler Andrews, 6/19/2020
- TA27** IT vs OT scope?
Tyler Andrews, 6/19/2020
- TA28** Don't bid the whole package to a elec. contractor without experience.
Tyler Andrews, 6/19/2020
- TA29** Notes on the kinds of subcontractors you need to qualify.
Tyler Andrews, 6/19/2020

RECOMMENDED BEST PRACTICES

- *Encourage General Contractors to bid PoE lighting and other intelligent building systems Work separately from Work of other trades*



CONSTRUCTION ADMINISTRATION PHASE

A/E Team Assists Owner with Construction Process

- Review Contractor submittals
- Make periodic visits to the site to observe construction progress
- Answer Contractor RFIs
- Review and approve Contractor pay applications



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- TA30** What kinds of things are you looking for on shop drawings and submittals?
Tyler Andrews, 6/19/2020
- TA32** Cut sheets on fixtures and devices
Tyler Andrews, 6/19/2020
- TA33** Node devices, control switches, stations, control system details
Tyler Andrews, 6/19/2020
- TA34** Colors selections
Tyler Andrews, 6/19/2020
- TA31** Do you expect the PoE controls supplier to review submittals?
Tyler Andrews, 6/19/2020
- TA35** Happens informally - control manufacturer needs to be involved in the development of the submittal package
Tyler Andrews, 6/19/2020



QUESTIONS?



THANK YOU!