Commissioning:
The Most Important Component of LEED®

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LEED® and Commissioning

- EA Prerequisite
  Fundamental Commissioning
  of Building Energy Systems
- EA Credit 3
  Enhanced Commissioning
  2 Points

Fundamental Commissioning

- Designate an individual as the commissioning authority (CxA)
  - CxA must have documented CxA experience.
  - CxA must be independent of the project design and construction management.
  - CxA must report results, findings and recommendations directly to the owner.
  - For projects smaller than 50,000 gross square feet, the CxA may be a qualified person on the design or construction team who has the required experience.

Fundamental Commissioning

- The owner must prepare Owner's Project Requirements (OPR).
- The design team must develop the Basis Of Design (BOD).
- The CxA must review these documents for clarity and completeness.
- The owner and design team must be responsible for updates to their respective documents.

Fundamental Commissioning

- Develop and incorporate commissioning requirements into the construction documents.
- Develop and implement a commissioning plan.
- Verify the installation and performance of the systems to be commissioned.
- Complete a summary commissioning report.

Fundamental Commissioning

- Commissioning process activities must be completed for the following **energy-related** systems:
  - HVACR
  - Lighting and Daylighting Controls
  - Domestic Hot Water Systems
  - Renewable Energy Systems (e.g. wind, solar)

Enhanced Commissioning

- Intent: To begin the commissioning process early in the design process and execute additional activities after systems performance verification is completed.

Enhanced Commissioning

- The commissioning authority (CxA):
  - Must have documented CxA experience.
  - Must be independent of the project design and construction management.
  - Must not be an employee of the design firm, but may be contracted through them.
  - Must not be an employee of, or contracted through, a contractor or CM holding construction contracts.
  - May be a qualified employee or consultant of the owner.

Enhanced Commissioning

- Must conduct 1 or more commissioning design reviews of the OPR, BOD, and design documents prior to the mid-CD phase and back-check the review comments in the subsequent design submission.

Enhanced Commissioning

- Must review contractor submittals applicable to systems being commissioned for compliance with the OPR and BOD. This review must be concurrent with the review by the architect or engineer and submitted to the design team and the owner.

Enhanced Commissioning

- Must develop a Systems Manual that gives future operating staff the information needed to understand and optimally operate the commissioned systems.

Enhanced Commissioning

- Must verify that the requirements for training operating personnel and building occupants have been completed.

Enhanced Commissioning

- Must be involved in reviewing the operation of the building with operations and maintenance (O&M) staff and occupants within 10 months after substantial completion. A plan for resolving outstanding commissioning related issues must be included.

10 School Campuses

- 3 of these schools were new constructions
- 7 were major modernization projects
- Projects required **enhanced Cx** for HVAC systems and controls
- 700 issues were noted

700 Cx Issues

- Operational & Maintenance - 32%
- Comfort & Indoor Air Quality – 37%
- Energy – 26%
- Safety – 6%

Operational & Maintenance

- Excessive play or gap in dampers
- Overly noisy & vibrating equipment
- Improper/unsafe installation; not code
- Equipment poorly labeled
- Missing covers & fasteners
- Incomplete training
- As-built and Ops Manual incomplete
- Condensate piping improperly installed
- Incomplete/incorrect mapping of points

Comfort & Indoor Air Quality

- Improper setpoints
- Overly noisy equipment
- Dirty filters / coils
- Malfunctioning exhausts fans
- Improper flue exhaust
- Improper CO2 based purge operation
- Improper air balance
- Unapproved relocation of supply grills

Energy

- Excessive play or gap in dampers
- Equipment interlock not working
- Malfunctioning power exhausts
- Inoperative dampers/actuators
- Malfunctioning economizer controls
- Incorrect programmed SOO/control wiring
- Oversized fans (design)
- Field modifications made without approval.
- Direct wired exhaust fans – Always ON

Safety

- Water leakage on electrical equipment
- Unsecured/improperly mounted equipment
- Unsealed roof openings/electrical conduits
- Improper switching of exhaust fans
- Flue exhaust proximity to air intake
- Construction debris left on/around units
- Unsecured exposed wires inside the unit

Outside Air Damper Repair

Air Straightener Damaged

Pumps Throttled Excessively

Water Collecting in AHU

Dirt on AHU Dampers

A Tale of Two Projects

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- Which school used the LEED Cx process?

In Conclusion

- Commissioning is important

In Conclusion

- Commissioning is the **most** important

In Conclusion

- Commissioning is the **most** important
- Saves energy
- Reduces O & M costs
- Improves IAQ
- Enhances safety

Credits

- Andrew Collins
- Greg Cunningham
- Dean Francis
- Vivek Mittal

The End