

# Maximizing Design Review

An Integrated Approach to Link  
LEED®-NC & -EB



## Best Practice

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## Learning Objectives

- Preparing for transition from **LEED NC to LEED EB**
- Understand value of **independent** design reviews
- View complex integrated systems **holistically**
- Think **globally** about buildings (short **and** long term)
- Apply design review **strategies** for success
- Recognize **lessons learned** from previous design review **successes and failures**



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## Evolution of Building System Designs

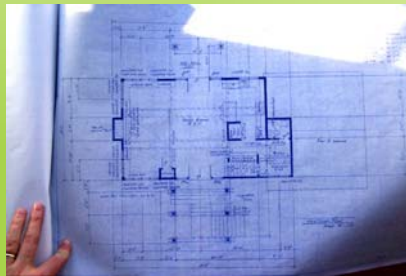
<i>Pre-1980's</i>	<i>Through 1990's</i>	<i>2000 - Present</i>
<b>No Reviews Performed!</b>	<b>Forced to Review!</b>	<b>Sustaining the Euphoria!</b>
<ul style="list-style-type: none"> <li>• Simple buildings</li> <li>• Simple systems</li> <li>• Limited integration</li> <li>• Buildings "worked"</li> <li>• Energy consumption less of a concern</li> </ul>	<ul style="list-style-type: none"> <li>• Systems complexity</li> <li>• Multiple system interface</li> <li>• New design technology</li> <li>• System failures</li> <li>• Inability to operate</li> <li>• Corrective action cost</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainable designs</li> <li>• Quality assurance</li> <li>• Strategic focus</li> <li>• Energy conservation</li> <li>• Training operations</li> <li>• Value added</li> <li>• LEED certification</li> </ul>



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## What Is a Design Review?

*"The objectives of a design review are typically to verify that the designer has considered the range of consequences of design decisions, and to verify that the **owner's project requirements** are likely to be met from a **building systems design perspective.**" -ARAMARK*



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## Why Perform a Design Review?

- Verify system design will meet the **design's intent**
- Provide **clear documentation**
- Optimize **energy use** within the systems design
- Verify **long term viability**
- Ensure adherence of **design practices**
- **Minimize** future change orders
- Provide **cross-functional** system coordination
- “Design green, build it green, keep it green”
  - LEED NC → LEED EB → High Performance Buildings



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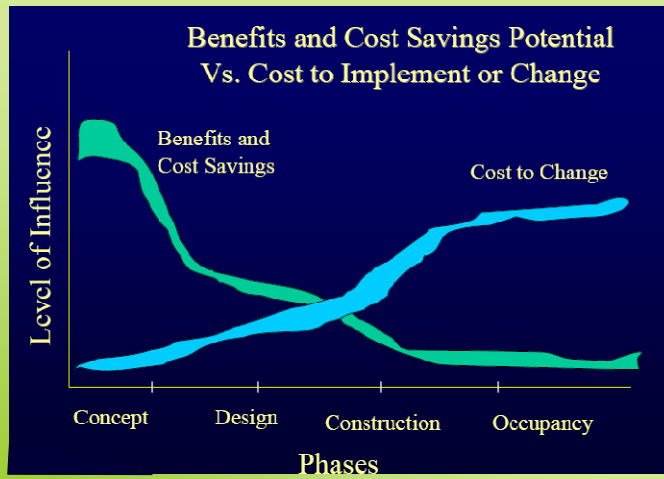
## Who Performs a Design Review?

- **Engineering Design Firms**
  - Focus on engineering aspects
  - **Not** on operational impacts
- **Installing Contractors**
  - Focus on constructability and initial costs
  - **Not** on energy efficiency or operational impacts
- **Owners**
  - Knowledge of campus
  - Understand system operation and capabilities
- **Third Party Engineers / Commissioning Agents**
  - **Holistic** review
  - LEED AP perspective
  - Program and operational requirement focus
  - **No financial implications to the project**



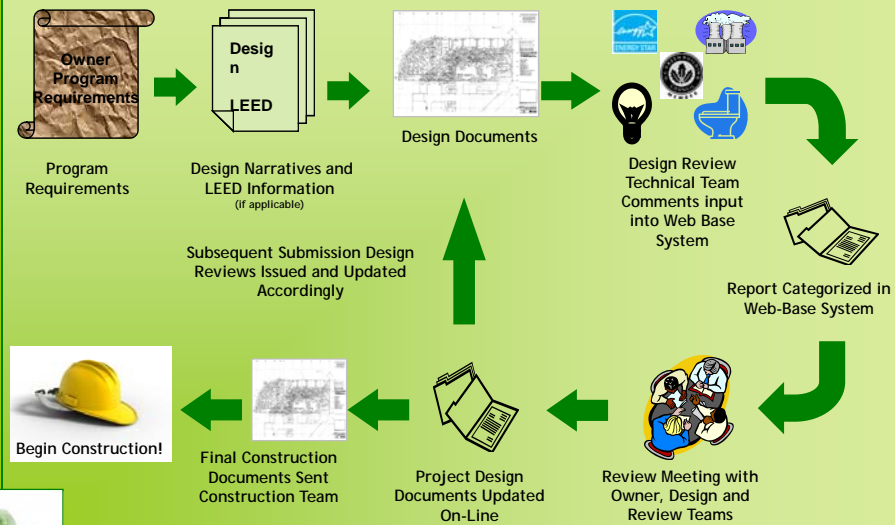
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# When to Conduct a Design Review?



Source: [http://www.peci.org/ncbc/proceedings/2007/Willis\\_ppt\\_NCBC2007.pdf](http://www.peci.org/ncbc/proceedings/2007/Willis_ppt_NCBC2007.pdf)

# Process



## Approach

### Third Party

Allow for **independent third party** verification

### Understanding

Understand **project design** and **program** requirements

### Campus System

Review campus systems for availability from a **generation and distribution perspective**

### Consistency

Identify **inconsistencies** between design and intent

### Design Intentions

Verify final construction documents = **design intent**

### Equipment Selections

Review equipment specifications and schedules for **design requirement coordination**



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## Approach (cont.)

### Capacity

Ensure system design **capacity** meets building needs

### Integration Meeting

Coordinate **cross-functional** review

### Resolution Management

Resolve design discrepancies before **construction**

### Operations

Integrate review with **operational** perspective

### LEED

Recognize **sustainable** design features for LEED EB: O&M



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## Management & Communication

- Web Application
  - Instant and simultaneous access to
    - Building owners
    - Contractors
    - Designers
    - Commissioning agents
  - Provides a place to effectively centralize, integrate, and communicate
  - Paperless transactions
  - Real-time single point resource



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## Commonly Found Issues in Design Process

**Intention  
Lost**

- Loss of **program intentions** during design
- No **documentation** of basis of design for operators
- Inability to meet **program demands**
- **Undesired project scope of change**

**Project Capital  
Cost**

- **Project value engineering** due to cost overruns
- **Under or over-sized equipment**
- **Incomplete design=change orders** during construction
- **System integration and control systems deficient**

**Operational  
Impact**

- **Accelerated design schedule** leading to owner & contractor interpretations
- Design not corresponding with **campus central system**
- Inability to **operate** due to complexity of design
- System configurations not allowing for future **LEED EB certification**

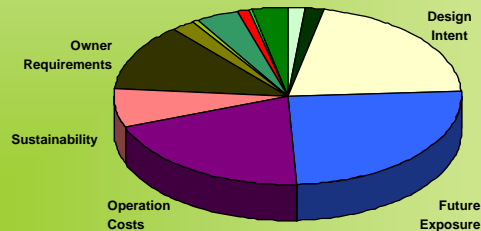


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## Commonly Found Problems

- Top Issue Categories Stem from
  - Design Intent Consistency
  - Future System Exposures
  - Operational Costs
  - Owner Project Requirements

**Problems Found in Design Review**

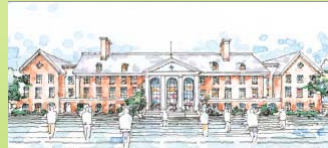


–Data compiled from Franklin & Marshall, Drew University, Washington College, Immaculata, East Stroudsburg, and Rutgers University

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## Pre-Construction Design Review

- Franklin & Marshall College
  - Life Sciences & Philosophy Bldg
  - Design Review
    - Performed before construction.
  - Problems found:



Description	Type	Impact	Status
Condensate High-Limit	Reliability and Operations	Prevent possible operational problems should condensate from the main boiler loop cause overflow if the system is operating on the summer boiler.	Resolved, all condensate pumps to be specified with high level alarm. Alarm to report to the BMS through the common alarm contact.
AHU Humidity Control	Reliability and Operations	Prevent inconsistent humidity levels to ensure an equilibrium state for the Vivarium labs.	Resolved, sequences have been revised to control off of relative humidity.
S&C Low Boy Medium Voltage Switch	Future Adaptability	Allows for easy removal and upgrade of existing CUP transformer and outdoor switchgear.	Resolved, redesigned drawings.
Primary Metering Compartment	Future Adaptability	Allows for upgrading metering components to LEED EB standards.	Resolved, final CD's were given subsequent provisions.



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## Mid-Construction Design Review

- East Stroudsburg University
  - Science & Technology Center
  - Design Review
    - Performed during construction.
  - Problems found:



Description	Type	Impact	Status
Missing Reheat Piping Insulation	Reliability and Operations	Unnecessary loss of energy, possible performance drop.	Resolved, insulation purchased and installed.
Lab Facility Emergency Power	Reliability and Operations	Possibility of significant loss of research during power outage.	Resolved, design review team researched exact amount of time necessary to lose research; emergency power was supplied to the lab facility.
Roof Top Chillers Lacking Isolation Valves for Chilled Water	Reliability and Operations	Unnecessary loss of energy and less control over units.	Resolved, valves installed.
Air Handling Units Missing Smoke Detectors	Life Safety, Reliability	FAA recommendation, possibility of combustion particles circulating throughout building.	Resolved, smoke detectors installed.



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## LEED Requirements: Design Review

- Commissioning Agent



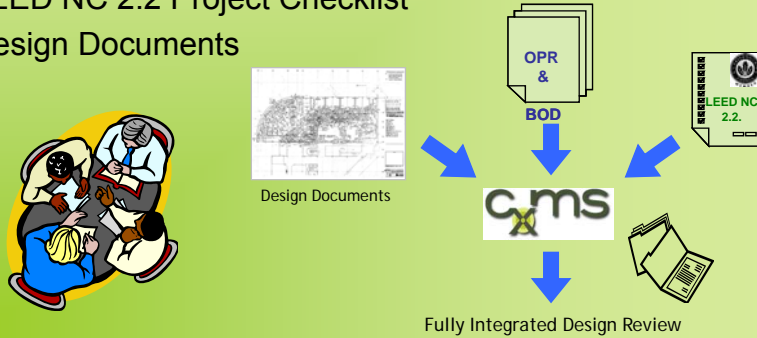
- LEED NC E&A Pr1: Pre-requisite
  - Review owner project requirements (OPR) and basis of design (BOD) for clarity and completeness
    - Owner and design team shall be responsible for updates
- LEED NC E&A Cr3: Enhanced Commissioning
  - Prior to mid-construction documents phase
    - Review OPR, BOD, and design documents
    - Back-check review comments in subsequent submissions
  - Review applicable contractor submittals



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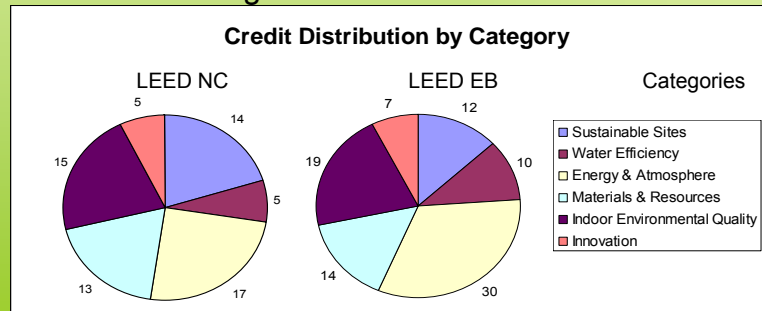
## Integrated Review of Key Documentation

- Owner Project Requirements (OPR)
  - Functional requirements and expectations for project
- Basis of Design (BOD)
  - Continually updated design narrative and assumption outline
- LEED NC 2.2 Project Checklist
- Design Documents



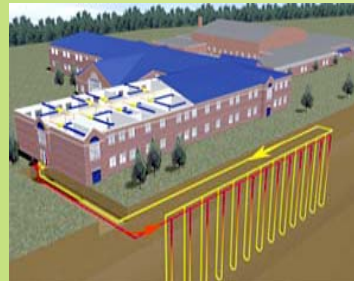
## LEED NC & EB Synergies

- LEED NC does **not** ensure LEED EB
- Smart Design Review
  - Can prepare for LEED EB certified status in the future
- USGBC offers free registration for all previously certified LEED NC buildings



## Preparing for LEED EB During NC

- **Sustainable Sites**
  - Alternative transportation
  - Maximize open space
  - Storm water management
  - Heat island reduction
  - Light pollution reduction
- **Water Efficiency**
  - Water efficient landscaping
- **Energy & Atmosphere**
  - Optimize energy performance
  - On and off-site renewable energy
  - Refrigerant management



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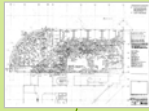
## Preparing for LEED EB During NC (cont.)

- **Indoor Environmental Quality**
  - IAQ management program
  - Outdoor air delivery monitoring
  - Increased ventilation
  - Occupant-controlled lighting
  - Thermal comfort monitoring
  - Entryway systems
- **Innovation**
  - Utilize LEED accredited professionals
  - Building green
  - Begin documenting cost impacts



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## Value Proposition



Cost savings

Training

Sustainable

Operations

- Capital cost avoidance
- Minimize change orders
- Reduce project delays
- Sustain green building performance
- Reduce energy & operation cost
- Provide holistic systemic training
- Preparation for operation



Program



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## Presentation Team

Questions and Answers



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