



PROJECT MANAGEMENT  
CENTER FOR EXCELLENCE

A.J. CLARK SCHOOL OF ENGINEERING  
Civil & Environmental Engineering Department



# SUSTAINABLE CONSTRUCTION BEST PRACTICES, AND FIRST LEED PLATINUM HOTEL CASE STUDY

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## Sustainable Construction Best Practices, and First LEED Platinum Hotel Case Study

- Best practice **strategies** in the “construction phases”, that can improve project sustainability, from pre-construction through turnover
- Project is delivered in a sustainable fashion
- Outcome meets the design intent
- We will conclude with a review of the first LEED **Platinum** hotel illustrating these **strategies**.

## Sustainable Construction Best Practices, and First LEED Platinum Hotel Case Study

- Many **strategies** can be employed in each of the following three areas to improve the sustainability of a construction project, including:
- **1. Preconstruction services – best practices**
- **2. Construction engineering - best practices**
- **3. Project management - best practices**
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# 1. Preconstruction Services best practices- Summary

- Activities undertaken by construction firms to support owner project development during planning and design phases:
  - Project sustainability goal setting
  - Program analysis
  - Design and budget reviews
  - Constructability reviews
  - Value engineering
  - Life-cycle cost analysis
  - Pre-qualify bidders
  - Provide scopes of work to bidders

# Sustainability Opportunities in Preconstruction Services

- Offers a much greater role for contractors in early project planning and design.
- Owners have begun to recognize the **best value** that can be brought to early planning and design by those who will construct the designed facility.

## Preconstruction Services Requirements

- Pre-construction managers assist in defining sustainability impacts, including which materials and systems will contribute to one of the **green** rating systems.
- This preconstruction service requires knowledge and lessons learned from earlier experiences with **green** projects.

# The Preconstruction Manager

- The role of Preconstruction Manager has emerged as a function separate from the traditional Construction Project Manager.
- The Preconstruction Manager will work with the designer and owner to reduce contingencies by identifying areas of risk.

## The Preconstruction Manager-continued

- The next step in project delivery involves deciding how the project site and operations will be managed to meet sustainability objectives.
  - Next - Good construction engineering.
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## 2. Construction engineering best practices - Summary

- **Best Practices that pertain to the means and methods used on site to construct a building:**
  - Site development
  - Job site operations
  - Temporary construction
  - Prefabrication and modularization
  - Green materials
  - Materials handling
  - Commissioning, testing and balancing

## Best Practices - continued

- Site Work
- Ecosystem protection – tree protection, fencing
- Stormwater Management; Erosion and Sediment Control – stock piling topsoil, seeding, silt fencing, sediment basins, storm drain inlet protection, stabilized construction entrance, and rumble grates

## Best Practices - continued

- Control of unwanted spillovers of noise, light, vibration, and dust
- Earthworks and underground construction - blasting
- Underground construction – Tunneling and cut & cover
- Temporary construction – Field office complex
- Prefabrication – precast concrete, prefabricated door and window units, and mechanical/electrical/plumbing components

# Best Practices-continued

- Green Materials – documenting materials, if, seeking 3rd party certification such as LEED
- Low Volatile Organic Compound (VOC) Materials - paints, and adhesives
- Concrete - proper curing compounds and admixtures, flyash, and recycled aggregates
- Detailing for durability – prevent moisture from entering buildings, drainage, weep holes, flashing, dissimilar metals
- Just-in-time delivery
- Optimized material storage and staging – handle once
- Off-site offgassing of materials
- Hazardous materials management and storage

## Best Practices-continued

- Whole building commissioning – quality control of building systems by a **third party**.
- Construction-related commissioning activities – includes inspections, functional performance testing & air balancing, and remediation.
- Minimize the quantity of solid waste leaving the project site, and maximize the recovery of useful materials that would otherwise be disposed.
- Demolition debris and construction cutoffs are the most obvious sources of **waste**.

## Job Site Operations–

- Indoor air quality control – reduction of health risks for both construction workers and later building occupants.
- Green job practices and facilities - opportunity to conserve resources and to educate workers and stakeholders visiting the site on principles of sustainability.
- Green vehicles and equipment – involves the use of equipment that employs clean combustion technology or alternative fuels.
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### 3. Project Management best practices - Summary

- Practices that involve **managing** people, equipment, information and other resources to achieve the goals of a specific project related to:
  - Schedule
  - Budget
  - Level of quality and sustainability, including green procurement

## Project Management Best Practices

- Includes optimizing processes for managing the supply chain and contracting for labor and materials.
- The next sections cover best practices for green procurement; transportation; specifying job site operations; management plans; and project surroundings and public outreach.



## **Green** procurement, logistics and transportation

- Important to choose **green** products for use in a sustainable construction project, but also important how these products are brought to the site.
- Packaging and shipping optimization

# Management Plans

- Indoor Air Quality (IAQ) Management Plan –
  - HVAC protection
  - Sustainable Housekeeping
- Construction Waste Management Plan –
  - Commingling for off-site separation
  - On-site processing
- Quality Control Plan (QC Plan)
- Safety Plan
- Management of Transportation Plan

# Public Surroundings and Public Outreach

- **Stakeholder Involvement and Community Outreach** –
  - Community meetings
  - Tours
  - Kiosks, web cams or displays
  - Newsletters
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**What is the name and location of the first LEED Platinum hotel in the United States?**

## Case Study: Proximity Hotel and Print Works Bistro

- The next section presents sustainable construction best practices using a case study: the Proximity Hotel and Bistro located in Greensboro, North Carolina.

# Hotel Strategies

- The Proximity Hotel represents one of the world's **greenest**, most energy-efficient and high-performance developments.
- The sustainably designed 118,000 SF Proximity Hotel features 147 guest rooms and suites, a restaurant, and 5,000 SF of meeting space.
- Since the developer had a passion for sustainable practices in its hotel development, the Proximity Hotel incorporated many sustainability strategies.

# Hotel's Collaborative Development

- The owner's collaborative development team wanted to adapt sustainable construction practices that would not only achieve the benefits of sustainable development, but also would make sense to the bottom line in the long term, and also overcome the barrier of increased first cost.

# Hotel's Commissioning

- Many key systems required building **commissioning** to ensure proper function, including HVAC systems, kitchen equipment, solar hot water heating, and geothermal systems.
- Commissioning requirements included both fundamental commissioning and enhanced commissioning.

## GREEN FEATURES

- All members of the development team—including the **developer**, the **architect**, the **contractor**, the **landscape architect**, and other **consultants**—worked in concert to maximize efficiencies.
- This collaborative approach, known as integrated design, addressed the building as a whole rather than treating each element separately.



## Green Luxury

### Proximity Hotel Combines Green Building with Luxurious Amenities

- **PROJECT BACKGROUND**

With a Four Diamond Rating, the hotel proves that green building and luxury are not mutually exclusive.

- The hotel's high level of sustainable performance was not initially a goal, says developer Dennis Quaintance, but stemmed from making practical decisions with an eye for long-term value. "Almost every time we made a decision, we saw that there was a sustainable approach that was also practical."

## STAYING LOCAL

- Materials in the building - 46 percent were sourced regionally and most of the furniture was made within 18 miles of the site.
- The bar in the restaurant was made from native walnut trees.
- Chip Holton, the artist-in-residence for the project, created 500 pieces of art for the guest rooms while working in a temporary studio adjacent to the hotel. This eliminated packaging materials and shipping, lowering the environmental impact of the artwork.

## REDUCING THE COST OF UTILITIES

- The energy performance of the Proximity Hotel began with **demand reductions**.
- A well-insulated building envelope and high-performance operable windows reduced heating and cooling needs.

## Additional Utility Savings

- Water usage was reduced by 34% by installing high-efficiency Kohler plumbing fixtures, low-flow toilets that use 1.2 gallons per flush, waterless urinals, and low flow faucets saving three million gallons of water the first year.

**Overall, the developer saved \$140,000 a year in all utility costs.**

## MORE ABOUT SUSTAINABLE PRACTICES AT THE PROXIMITY HOTEL

*Here is an additional sampling summary for some of the 70+ sustainable practices at Proximity Hotel & Print Works Bistro:*

- The building uses 39% less energy than a conventional hotel/restaurant by using ultra efficient materials and the latest construction technology.
- The sun's energy heats hot water with 100 rooftop solar panels covering 4,000 SF, providing 60% of the hotel's water heating needs.
- 700 linear feet of stream were restored by reducing erosion, by planting local, adaptable plant species.

## Additional sustainable practices at Proximity Hotel

- Variable speed hoods in the restaurant used a series of sensors to set the power according to the kitchen's needs and adjusts to the proper level of operation to keep the air fresh.

## Additional sustainable practices at Proximity Hotel

- Geothermal energy was used for the restaurant's refrigeration equipment, using an energy efficient ground source heat pump system, instead of a standard water-cooled system, saving significant amounts of water.
- North America's first Regenerative Drive model of the Otis' Gen2 elevator reduces net energy usage by capturing the system's energy and feeds it back into the building's internal electrical grid.

## Additional sustainable practices at Proximity Hotel

- Abundant natural lighting, including large energy-efficient “operable” windows (7’-4” square) in guest rooms), connecting guests to the outdoors by achieving a direct line of sight to the outdoors for more than 97% of occupied spaces.
- Building materials with recycled content included reinforcing steel, sheetrock, and asphalt. Concrete contained 4% fly ash (224,000 pounds), the mineral residue left after the combustion of coal that is diverted from landfills.



## Additional sustainable practices at Proximity Hotel

- 87% of construction waste was recycled, diverting 1,535 tons of debris from landfills.
- Air quality was improved by circulating large amounts of outside air into guestrooms.

## Additional sustainable practices at Proximity Hotel

- Low-emitting volatile organic compound (VOC) materials were used such as paints, adhesives, and carpets, which reduced indoor air contamination.
- Guestroom shelving and the bistro's tabletops were made of walnut veneer, with no added formaldehyde.

## Additional sustainable practices at Proximity Hotel

- A green, vegetated rooftop was built. It helped reflect the heat, slowed rain runoff, and insulated the roof.
- “Education Center” for sustainable practices included tours of the “green” hotel for guests.
- Bicycles were available for guests to ride on the nearby five-mile greenway.

## SUMMARY

- The developer estimates that sustainable goals added between \$1.5 and \$2 million to the approximate \$28 million budget, but that the **green** strategies would pay for themselves in less than four years.

## SUMMARY

- In the fall of 2008, the Proximity Hotel was granted a LEED Platinum rating from the USGBC.
- Despite achieving this rating, the developer claims that it was not chasing LEED points. The development team's goal was to ensure that the building and materials met the budget, were durable, attractive, and, if possible, sustainable.
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# Conclusion

- In **conclusion**, construction firms need a strategy for moving ahead in a “new world of sustainability.”
- “BUILD IT RIGHT”, is the standard operating procedure.
- **Thank you.**
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