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LEED Green Building and its Applicability to Swampscott, Massachusetts

A Presentation by:
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Speakers

Eileen Cahill, P.E., LEED A.P.

- Senior Project Engineer, Water Resources Group at S E A
- Currently working on infrastructure projects in Swampscott

Dan Tenney, AIA

- Principal Architect, S E A
- Specializing in building reuse, energy efficient design and improved public transportation access projects

S E A Consultants, Inc.

- Engineering and Architectural Firm currently working on sanitary, stormwater and roadway infrastructure improvements in Swampscott

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Agenda

- USGBC and LEED
- Cost and Benefits of LEED Construction
- LEED Applicability to Municipal Buildings
- S E A Project Examples
- Massachusetts Project Examples
- Funding Sources
- Question and Answer

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USGBC

USGBC = U. S. Green Building Council
(www.usgbc.org)



- Non-profit organization
- Founded in 1993
- Consists of leaders in the building industry
- Goal of USGBC is to promote buildings that are environmentally responsible, profitable and healthy places to live and work
- Developed the LEED® Green Building Rating System™

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LEED

LEED = Leadership in Energy and Environmental Design

- Green building rating system
- National standard for designing, constructing and certifying sustainable buildings
- Benchmark for design of high performance buildings
- Six categories of "points"

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LEED Categories

- ✓ Sustainable site planning
- ✓ Safeguarding water and water efficiency
- ✓ Energy efficiency and renewable energy
- ✓ Conservation of materials and resources
- ✓ Indoor environmental air quality
- ✓ Innovation in Design

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LEED ~ Common Sense Approach



- Common sense ideas that help planners and designers expand their thinking
- Highlights of LEED building design concepts:
 - Reuse sites
 - Provide access to public transportation
 - Reduce paved areas
 - Conserve and reuse water
 - Do not use CFC-based refrigerants
 - Reuse existing buildings and materials
 - Use locally manufactured building materials
 - Enhance indoor environmental air quality
 - Use low-emitting VOC materials
 - Use day lighting and energy efficient design
- LEED concepts can be applied to any design
- LEED has become commonplace. Ideas will likely integrate into building codes

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Why Make Public Buildings Green?



Good Fiscal Management

- Green buildings save operating costs
- Reduced operating costs saves tax dollars

Quality of Life Issues

- Green buildings provide improved working conditions
- Improves worker performance
- Reduces employee absenteeism and turnover

Economic Development for Green Markets

Environmental Stewardship

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Benefits of Green Building



LEED Certification Cost-Effectiveness Matrix

	Percent Change in Costs	Cost per S.F. Change in Costs
Construction, Architectural and Engineering Costs	2% Increase in Building Costs	Increase Costs of \$3 to \$5 Per S.F.
Energy Savings	30% Energy Savings	Savings of \$2 Per S.F. Per Year
Worker Productivity	1% to 1.5% Increase in Worker Productivity	Savings of \$3 to \$5 Per S.F. Per Year

Source: Green Building Costs and Financial Benefits by Gregory H. Kats

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Who is Implementing LEED?



Federal and State Initiatives

- Federal Initiative - 1999 Presidential Executive Order
 - Federal government committed to building green.
 - Armed Services, General Services Administration (GS) and Department of Interior use LEED Rating System.
 - Standard for renovations and new construction.
- MA State Initiative - Executive Order 484 (April, 2007)
 - All State agencies buildings involved with construction and major renovation over 20,000 square feet must meet LEED certification.
 - Must incorporate energy performance 20% better than MA Energy Code
 - Outdoor water reduction requirements must be verified by 3rd party authority.

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Who is Implementing LEED?



City and Town Local Initiatives

- Boston
 - Since 2004, requires LEED Silver rating for city-owned buildings
 - LEED certification for all city supported development projects
 - Boston Zoning Code requires LEED certification for all public and private projects over 50,000 square feet or proof that project would meet criteria
- Acton, MA
 - Zoning bylaw adopted in April, 2004
 - Allows a density bonus for buildings that achieve LEED certification
- Arlington, MA
 - Since May, 2003, new Town buildings and major renovations shall achieve LEED Silver rating, unless impractical
 - Upcoming Town meeting vote – all major projects submit LEED checklist

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Project Examples



SEA Projects

- Adams Visitor Center
- MIT Brain and Cognitive Sciences Complex
- Forest City – University Park at MIT
- SEA Office
- Utility Projects

MA Municipal LEED Certified Projects

- Stanley Elementary School in Waltham
- Cambridge City Hall Annex
- North Adams Public Library

Green Design Project

- Woburn Memorial High School

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Adams Visitor Center



Heating and cooling requirements derived from geothermal energy from water extracted from a 1,500 foot well and circulated through heat pumps.

Use of soil aggregate piers to support the building in response to the contaminated substrata (12-foot deep piers made of gravel aggregate reinforcing the soil and minimizing excavation and treatment of contaminated material).

Daylighting of all spaces from windows and skylights.



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MIT Brain and Cognitive Sciences Complex



Received LEED Silver Rating

- Site Selection
- Urban Redevelopment
- Brownfield Redevelopment
- Alternative Transportation, Public Transportation Access
- Alternative Transportation, Bicycle Storage & Changing Rooms
- Stormwater Management – Rate & Quantity
- Stormwater Management – Treatment
- Innovative Wastewater Technologies
- Water Use Reduction – 20% Reduction



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Forest City Group University Park at MIT, Cambridge



SEA Design of the Green Roof System

- Roof top detention
- Reduces post-development 25-year runoff rates to match pre-development 2-year runoff rates
- Roof holds up to 4-inches of rainwater during storms
- Green roof treats stormwater
- Green roof enhances views for surrounding buildings



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SEA Office Designed to meet LEED criteria



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SEA Office Material Selections



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Stanley Elementary School Waltham, MA



- Received LEED Silver Rating
- 600 students
- 148,000 SF building on 11 acres
- Project Cost = \$16.7 million
- Completed December, 2002
- Solar panels save \$33,000 in annual energy costs
- Received ~ \$500,000 from MTC
- Sited to optimize sunlight capture
- Drainage diverted to on-site leaching system
- White roof



Exterior Photovoltaic Panels
Photos by www.learnitplydesign.biz

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Cambridge City Hall Annex Cambridge, MA



- Received LEED Gold Rating
- Historic 33,200 SF building renovation
- Received \$337,500 from MA Renewable Energy Trust Fund
- Recycling saved \$55,000
- Recycled 80% of construction waste



Photo by HKT Architects



Photo by HKT Architects

- Photovoltaic system provides 10% of building's electricity
- Ground source heat pump system provides heating and cooling
- Maximized daylighting
- Intelligent lighting
- Pre-heats incoming air with heat from outgoing air

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North Adams Public Library North Adams, MA



- Received LEED Certification
- Renovation and expansion (2003-2005)
- Geothermal wells to heat and cool building
- Energy saving lighting, insulation, windows and environmental friendly materials
- Solar panels for electricity
- Recycled and reused construction material



Photo by NAPL website

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Woburn Memorial High School Woburn, MA



Green Design Highlights

- Reuse of existing school site
- Reuse of historical artifacts from old school
- Reduced heat island effect with shaded parking
- Water efficient bathroom fixtures
- 100,000 gallon rainwater collection system to flush toilets and irrigate landscape

Results = Savings per Year

- 719,000 kWh @ \$108,000
- 39,000 therms @ \$46,800
- 421 tons of CO2 emissions
- 1,640,000 gallons of water



Information and photo courtesy of MA Technology Collaborative

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Sources of Funding



- Massachusetts Technology Collaborative (MTC) Renewable Energy Trust
- Utility Companies (NSTAR Electric and KeySpan)
- Example – Woburn Memorial High School Green Design
 - \$470,000 construction grant from MTC
 - Solar photovoltaic system
 - Kalwall panels for daylighting and insulation
 - Thicker roof insulation
 - \$180,000 in curriculum, feasibility study and design MTC grants
 - \$385,000 in rebates from NSTAR and KeySpan for energy efficiency measures

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Questions?



Thank you.



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