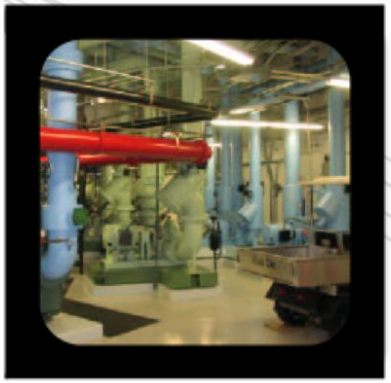


LEED for Existing Buildings: Operation and Maintenance

Presented to:

South Texas Association of School Maintenance Officials

South Texas Association
of
School Maintenance Officials

Introduction by:

Peter E. Falletta, P.E.

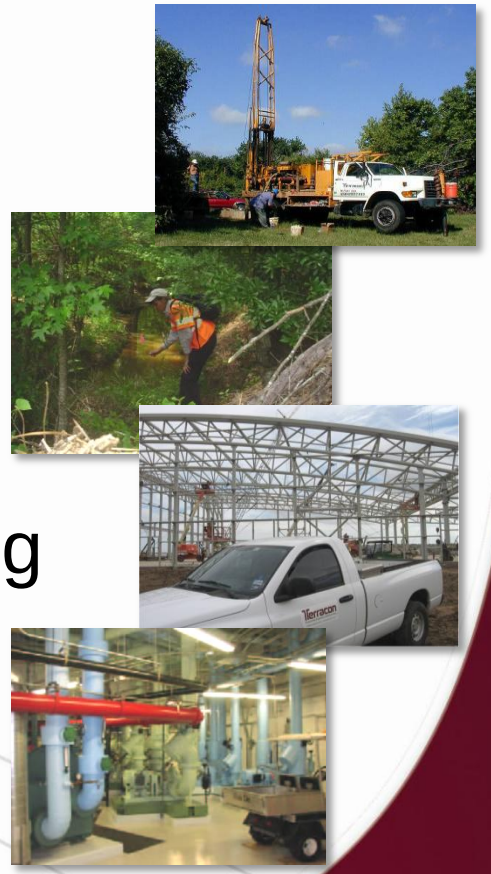
September 27, 2011

Terracon

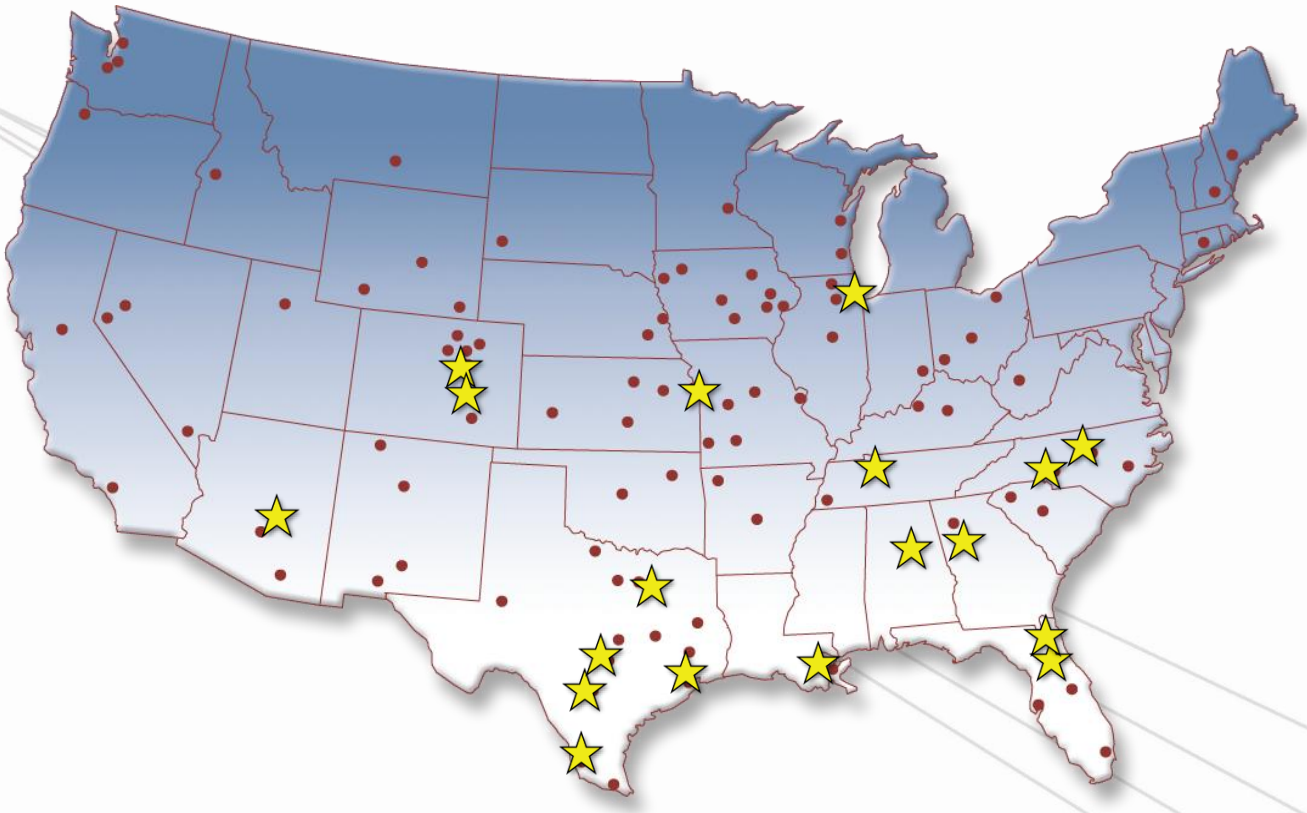
Terracon Services

Four major areas of focus

- Geotechnical Engineering
- Environmental Consulting
- Construction Materials Engineering and Testing
- **Facilities Engineering Services**



If a Building has Problems or is Underperforming, Terracon's Facilities Specialists Can Mobilize Quickly to Help!



- Birmingham, AL
- Phoenix, AZ
- Denver, CO
- Colorado Springs, CO
- Houston, TX
- Dallas, TX
- Pharr, TX
- Round Rock, TX
- San Antonio, TX
- Lenexa, KS
- Chicago, IL
- Nashville, TN
- Atlanta, GA
- Orlando, FL
- Baton Rouge, LA
- Charlotte, NC
- Raleigh, NC
- Jacksonville, FL

★ Office Locations with Facilities Personnel

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Terracon Facilities Services

What does this Division do?

Service Clients in 5 Key Areas

- Building Science and Forensics
- Roof and Building Envelope Consulting
- Facility Condition Assessments/Asset Management
- Energy / LEED / MEP/Commissioning
- Disaster Response

Terracon Facilities Services

Our national staff includes:

- Forensic Engineering Professionals
- Roofing/Building Envelope Professionals
- Structural Engineers
- Architects
- LEED AP’s
- Mechanical Engineers/Energy Specialists
- Commissioning Agents

Our clients are commercial property owners, A&E firms, government agencies, lenders, investors, insurance companies, ISD's….

- Educational Facilities
- Retail
- Industrial
- Office
- Multi-family
- Recreational
- Hotels/Leisure
- Storage Facilities
- Agricultural
- Parking Structures/Lots

.

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Terracon Facilities Services

Specialized equipment includes:

- Infrared Cameras
- Boroscopes
- Temperature and RH meters
- Building envelope testing equipment (ASTM)
- Moisture Meters
- Manometers
- Anemometers

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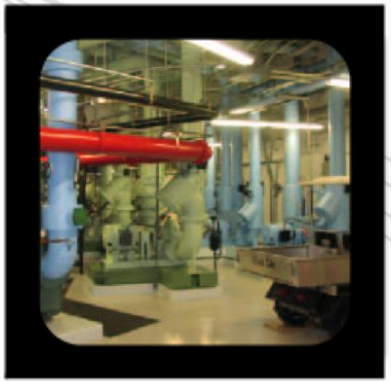

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Jeffrey A. Miller, P.E., LEED AP, CBCP, EBCP

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What is LEED EBOM?

- LEED EBOM Building Rating Systems are voluntary, consensus based, market driven
- Evaluate environmental performance from a whole building perspective of a building's life cycle
- A definitive standard for what constitutes a green building in design, construction, operation

What is LEED EBOM?

- Performance Standards for certifying the Operations and Maintenance of existing commercial or institutional buildings
- Certify buildings that are:
  - Sustainable
  - High Performance
  - Healthful
  - Durable
  - Affordable
  - Environmentally Sound

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LEED EBOM Credit Ratings

- Rating Credit Categories:
  - Sustainable Sites – building exterior and site maintenance, pest management, landscaping plan, storm water control, heat island reduction
  - Water Efficiency – plumbing fixture and fitting efficiency, water usage performance, landscaping efficiency, cooling water management

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LEED EBOM Credit Ratings

- Rating Credit Categories:
  - Energy and Atmosphere – Energy efficiency management, minimum and optimized energy performance, refrigerant management, commissioning, performance measurement, renewable energy
  - Materials and Resources - environmentally preferred products and practices for cleaning and operations, sustainable purchasing, waste stream management, facility alterations

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LEED EBOM Credit Ratings

- Rating Credit Categories:
  - Indoor Environmental Quality – ventilation control, green cleaning policy, temperature/RH control, particulate control, occupant survey, lighting, daylight/views
  - Innovation in Operations - innovative strategies, exemplary performance, pilot credits, LEED AP directives
  - Regional Priority – geographic specific environmental priorities

LEED EBOM Credits

- Allocates points based on potential environmental impacts and human effects on operation and maintenance of building
  - GHG emissions
  - Fossil fuel use
  - Toxins
  - Air and water pollutants
  - Indoor environmental conditions

- LEED 2009 uses the EPA's TRACI environmental impact categories and weightings developed by NIST

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LEED EBOM Credit Certifications

- Certified 40-49 points
- Silver 50-59 points
- Gold 60-79 points
- Platinum 80 points or more

- Must file for re-certification at least every five years
- Certification period must be continuous, unbroken time typically minimum of 3-months except energy records are 1-year

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LEED 2009 for Existing Buildings: Operations & Maintenance

Project Checklist

Project Name

Date

Sustainable Sites — Possible Points: 26

Y	?	N			
			Credit 1	LEED Certified Design and Construction	4
			Credit 2	Building Exterior and Hardscape Management Plan	1
			Credit 3	Integrated Pest Mgmt, Erosion Control, and Landscape Mgmt Plan	1
			Credit 4	Alternative Commuting Transportation	3 to 15
			Credit 5	Site Development—Protect or Restore Open Habitat	1
			Credit 6	Stormwater Quantity Control	1
			Credit 7.1	Heat Island Reduction—Non-Roof	1
			Credit 7.2	Heat Island Reduction—Roof	1
			Credit 8	Light Pollution Reduction	1

Water Efficiency — Possible Points: 14

Y			Prereq 1	Minimum Indoor Plumbing Fixture and Fitting Efficiency	
			Credit 1	Water Performance Measurement	1 to 2
			Credit 2	Additional Indoor Plumbing Fixture and Fitting Efficiency	1 to 5
			Credit 3	Water Efficient Landscaping	1 to 5
			Credit 4	Cooling Tower Water Management	1 to 2

Energy and Atmosphere — Possible Points: 35

Y			Prereq 1	Energy Efficiency Best Management Practices	
Y			Prereq 2	Minimum Energy Efficiency Performance	
Y			Prereq 3	Fundamental Refrigerant Management	
			Credit 1	Optimize Energy Efficiency Performance	1 to 18
			Credit 2.1	Existing Building Commissioning—Investigation and Analysis	2
			Credit 2.2	Existing Building Commissioning—Implementation	2
			Credit 2.3	Existing Building Commissioning—Ongoing Commissioning	2
			Credit 3.1	Performance Measurement—Building Automation System	1
			Credit 3.2	Performance Measurement—System-Level Metering	1 to 2
			Credit 4	On-site and Off-site Renewable Energy	1 to 6
			Credit 5	Enhanced Refrigerant Management	1
			Credit 6	Emissions Reduction Reporting	1

Materials and Resources — Possible Points: 10

Y			Prereq 1	Sustainable Purchasing Policy	
Y			Prereq 2	Solid Waste Management Policy	
			Credit 1	Sustainable Purchasing—Ongoing Consumables	1
			Credit 2.1	Sustainable Purchasing—Electric	1
			Credit 2.2	Sustainable Purchasing—Furniture	1
			Credit 3	Sustainable Purchasing—Facility Alterations and Additions	1
			Credit 4	Sustainable Purchasing—Reduced Mercury in Lamps	1
			Credit 5	Sustainable Purchasing—Food	1

Materials and Resources, Continued

Y	?	N			
			Credit 6	Solid Waste Management—Waste Stream Audit	1
			Credit 7	Solid Waste Management—Ongoing Consumables	1
			Credit 8	Solid Waste Management—Durable Goods	1
			Credit 9	Solid Waste Management—Facility Alterations and Additions	1

Indoor Environmental Quality — Possible Points: 15

Y			Prereq 1	Minimum IAQ Performance	
Y			Prereq 2	Environmental Tobacco Smoke (ETS) Control	
Y			Prereq 3	Green Cleaning Policy	
			Credit 1.1	IAQ Best Mgmt Practices—IAQ Management Program	1
			Credit 1.2	IAQ Best Mgmt Practices—Outdoor Air	1
			Credit 1.3	IAQ Best Mgmt Practices—Increased Ventilation	1
			Credit 1.4	IAQ Best Mgmt Practices—Reduce Particulates in Air Distribution	1
			Credit 1.5	IAQ Mgmt Plan—IAQ Mgmt for Facility Alterations and Additions	1
			Credit 2.1	Occupant Comfort—Occupant Survey	1
			Credit 2.2	Controllability of Systems—Lighting	1
			Credit 2.3	Occupant Comfort—Thermal Comfort Monitoring	1
			Credit 2.4	Daylight and Views	1
			Credit 3.1	Green Cleaning—High Performance Cleaning Program	1
			Credit 3.2	Green Cleaning—Custodial Effectiveness Assessment	1
			Credit 3.3	Green Cleaning—Sustainable Cleaning Products, Materials Purchases	1
			Credit 3.4	Green Cleaning—Sustainable Cleaning Equipment	1
			Credit 3.5	Green Cleaning—Indoor Chemical and Pollutant Source Control	1
			Credit 3.6	Green Cleaning—Indoor Integrated Pest Management	1

Innovation in Operations — Possible Points: 6

			Credit 1.1	Innovation in Operations: Specific Title	1
			Credit 1.2	Innovation in Operations: Specific Title	1
			Credit 1.3	Innovation in Operations: Specific Title	1
			Credit 1.4	Innovation in Operations: Specific Title	1
			Credit 2	LEED Accredited Professional	1
			Credit 3	Documenting Sustainable Building Cost Impacts	1

Regional Priority Credits — Possible Points: 4

			Credit 1.1	Regional Priority: Specific Credit	1
			Credit 1.2	Regional Priority: Specific Credit	1
			Credit 1.3	Regional Priority: Specific Credit	1
			Credit 1.4	Regional Priority: Specific Credit	1

Total — Possible Points: 110

Certified 40 to 49 points Silver 50 to 59 points Gold 60 to 79 points Platinum 80 to 110

LEED EBOM Requirements

- Comply with environmental laws in normal building operations
- Must be existing, permanent building or space
- Uses a reasonable site boundary and includes all contiguous land
- Minimum of 1,000 SF of gross floor area

LEED EBOM Requirements

- Must be occupied and *typical* physical occupancy with all building systems operating
- Commit to sharing actual whole project energy and usage for a period of 5-years
- Gross floor area must be not less that 2% for land area

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Sustainable Sites

- LEED Certified Design and Construction
- Building Exterior and Hardscape Management Plan
- Integrated Pest Management, Erosion Control, and Landscape Management Plan
- Alternative Commuting Transportation – 3 to 15 points

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Sustainable Sites

- Site Disturbance – Protect or Restore Open Habitat
- Storm Water Quantity Control
- Heat Island Reduction – Hardscapes, Paving
- Heat Island Reduction – Roof
- Light Pollution Reduction – Interior and Exterior

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Water Efficiency

- Prerequisite – Minimum Indoor Plumbing Fixture and Fitting Efficiency – Reduce burdens on domestic water supplies
- Water Performance Measurement - Metering
- Enhanced Plumbing Fixture and Fitting Efficiency
- Water Efficient Landscaping
- Cooling Tower Management

Energy and Atmosphere

- Prerequisite 1 - Energy Efficiency Best Management Practices – Planning, Documentation, and Opportunity Assessment
- Prerequisite 2 – Minimum Energy Efficiency Performance – Energy Star
- Prerequisite 3 - Fundamental Refrigerant Management

Energy and Atmosphere

- Optimize Energy Efficiency Performance – 1 to 18 pts
- Existing Building Commissioning
  - Investigation and Analysis
  - Implementation
  - Ongoing Commissioning
- Performance Measurement
  - Building Automation System
  - System Level Metering

Energy and Atmosphere

- On-site and Off-site Renewable Energy
- Enhanced Refrigerant Management
- Emissions Reduction Reporting

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Materials and Resources

- Prerequisite 1 – Sustainable Purchasing Policy
  - Ongoing consumables, electric powered equipment, furniture, facility alterations, reduced mercury in lamps
- Prerequisite 2 – Solid Waste Management Policy
  - Ongoing consumables, mercury containing lamps, durable goods, facility alterations

Materials and Resources

- Sustainable Purchasing
  - Post consumer materials, rapidly renewable materials, locally produced materials, certified paper products, rechargeable batteries
  - Electric powered equipment
  - Furniture of post consumer materials, rapidly renewable materials, locally produced materials, certified paper products

Materials and Resources

- Sustainable purchasing
  - Facility alterations and additions
  - Reduced mercury in lamps
  - Food

Materials and Resources

- Solid Waste Management
  - Waste stream audit
  - Ongoing consumables
  - Durable goods
  - Facility alterations and additions

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Indoor Environmental Quality

- Prerequisite - Minimum Indoor Quality Performance
  - ASHRAE 62.1-2007
- Prerequisite – Environmental Tobacco Smoke Control
  - Prohibit smoking within 25-feet of building air intakes
- Prerequisite – Green Cleaning Policy

Indoor Environmental Quality

- Indoor Air Quality Best Management Practices
  - Indoor Air Quality Management Program
  - Outdoor Air Delivery Monitoring
  - Increased Ventilation
  - Reduce Particulates in Air Distribution
  - Indoor Air Quality Management for Additions and Operations

Indoor Environmental Quality

- Occupant Comfort – Occupant Survey
- Controllability of Systems – Lighting
- Occupant Comfort – Thermal Comfort Monitoring
- Daylight and Views – 50% of all occupied spaces achieve 25-fc

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Indoor Environmental Quality

- Green Cleaning
  - High Performance Cleaning Program
  - Custodial Effectiveness Assessment
  - Purchase of Sustainable Cleaning Products and Materials
  - Sustainable Cleaning Equipment
  - Indoor Chemical and Pollutant Source Control
  - Indoor Integrated Pest Management

Innovation in Operations

- Innovation in Operations – next logical step in energy or water conservation
- Exemplary Performance
- Pilot Credit
- LEED AP on project team
- Documenting Sustainable Building Cost Impacts

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Regional Priority

- Regional Priority – geographically specific environmental priorities
- Defined by US zip code

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LEED Developments

- American Clean Energy and Security Act
  - Retrofit for Energy and Environmental Performance (REEP) program to promote comprehensive energy efficiency retrofits to reduce consumption by 20% or more
  - Provision directing building codes be strengthened to reduce energy consumption in new buildings by 30% in 2010 and 50% in 2016

LEED Developments

- Provision establishing building labeling program such that owners and prospective buyers and tenants can compare energy use of a particular building to similar in a locality
- Energy performance disclosure beginning in 2011 for many localities

LEED Developments

- ASTM Building Energy Performance Assessment
  - New standard ASTM E2797-11 on *Energy Performance Disclosure for Buildings involved in Real Estate Transactions*.
  - Standardize how energy use numbers are determined, normalized, and reported
  - New standard to be used by professionals conducting due diligence for prospective purchasers and lessees

LEED Developments

- Buildings seeking LEED EBOM to provide performance data. Projects can comply in one of three ways.
  - The building is re-certified on a two year cycle
  - The building provides energy and water usage data on an on-going basis
  - The owner signs a release that authorizes USGBC to access building's utility usage data directly

LEED Developments

- Green Building Code took effect in California in August 2009. Code is voluntary until adopted by local municipalities.
  - Storm water retention during construction
  - Achieve 15% reduction in energy use compared to California 2007 Energy Code
  - Building automation of HVAC and lighting
  - Building commissioning
  - Air sealing of building envelope
  - Use of on-site renewable energy and Green power
  - Demand control of elevators/escalators
  - Energy efficient steel framing

LEED Developments

- Plumbing fixtures that reduce water use by 20%
- Landscape irrigation that reduces water use by 50% or eliminates use
- Use advanced wood framing techniques such as 24-inch stud wall spacing
- Use materials obtained or manufactured within 500-miles of site
- Use of bio-based building materials, rapidly renewable materials, re-used materials, and recycled materials
- Construction waste reduction, disposal, and re-cycling
- Building operation and maintenance manual
- Indoor pollutant and moisture control, increased ventilation

Questions

Contact Information:

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