
Implementing LEED

how you can do it, too



LEED – Leadership in Energy and Environmental Design

- The information and tools in this presentation will make it easier for conservation engineers to make LEED work for their agency or organization.
 - What's different about LEED buildings
 - Cost effective LEED strategies
 - How to contract for LEED design services
 - How to work with designers and contractors on LEED buildings
 - How to write specs for LEED buildings
 - How to contract construction work with LEED requirements
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LEED - It's REQUIRED for some

- For Federal Agencies

- LEED for new and/or existing buildings is required by several agencies as a partial method of complying with
 - Energy Independence and Security Act of 2007 (PL 110-140)
 - Executive Order 13423 (2007) Strengthening Federal Environmental, Energy, and Transportation Management
- For Forest Service
 - USDA Departmental Regulation 5500-001, Facilities Energy and Water Conservation and Utilities Management
 - Handbook 7309.11, Chapter 70—Sustainable Building

- For State and Local Agencies

- Many state and local governments require LEED for new buildings
 - More will likely require LEED or another sustainable performance rating for new construction as time goes on
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LEED - It's the RIGHT thing to do

- Environmental benefits
 - Reduce the impacts of natural resource consumption
 - Economic benefits
 - Lower facilities costs long term
 - Better employee productivity
 - Health and safety benefits
 - Enhance occupant comfort and health
 - Community benefits
 - Minimize strain on local infrastructures
 - Improve quality of life
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LEED - It's the SMART thing to do

- For conservation and land management agencies, it “proves”, in a manner generally understood and accepted by the public and industry, that your agency really does care about the land you manage and about the condition of the planet in general.



Sylamore Ranger District Office in Mountain View, Arkansas

The LEED process

- Step 1: Project Registration \$450 (\$600 non-members)
 - Fill out the form (online)
 - Step 2: Design & Construction
 - Credit Inquiries & Rulings and other LEED Resources
 - Commissioning usually 1-2% of construction cost
 - Step 3: Building Certification \$4,750 + up (more for non-members) (rebate for Platinum)
 - Apply and Submit Documentation (online)
 - *Green Building Certification Institute* Review (30 days?)
 - Granting of Certification, Silver, Gold, or Platinum (or not)
 - Appeals... (\$500/credit, could take WAY more than 30 days)
 - Celebration!
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Bessey RD & Nursery, Nebraska NF, Rocky Mountain Region



LEED Categories

- LEED for New Construction
 - Includes major renovation/addition
 - LEED for Existing Buildings: Ops & Maintenance
 - LEED for Commercial Interiors
 - LEED for Core and Shell
 - LEED for Schools
 - LEED for Retail
 - LEED for Healthcare
 - LEED for Homes
 - LEED for Neighborhood Development
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LEED Evolves

- Changes as technology progresses
 - Changes as committees refine requirements
 - LEED Version 3 rolled out April 27th
 - Emphasizes energy efficiency, water efficiency, greenhouse gas reduction, human health, and transportation
 - Point total same (100) for all categories
 - Similar credits homogenized across categories
 - For more info, see:
 - <http://continuingeducation.construction.com/article.php?L=5&C=509&P=1> (from *Architectural Record*)
 - USGBC web page:
<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1971>
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LEED Evolves

- LEED Version 3 – Biggest Changes from V2.2
 - Regional credits: double your points (up to 4) for achieving strategies that are priorities for your region
 - Point weighting awards more points for strategies that have greater positive impacts on the environment – energy efficiency and CO2 reductions
 - Credits were evaluated (using EPA's TRACI, NIST priority tool) for potential to reduce environmental impact
 - Credit value is based on mitigation potential
 - Varying points give more value to credits with higher potential for making the biggest change
 - Continuing energy use monitoring & reporting is required for 5 years following construction
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LEED for New Construction V3

- Minimum Program Requirements – all LEED projects
 - Comply with applicable Federal, state & local environmental laws
 - Permanent building on existing land
 - Reasonable site boundary
 - Project boundary includes disturbed & support land
 - Land must be owned by building owner or dedicated to support
 - If on campus, doesn't leave land gaps or double counts
 - No gerrymandering
 - Minimum 1,000 SF floor area
 - Must be 1 or more full time equivalent occupants or no IAQ credits
 - Must share energy & water use data for at least 5 years
 - Building occupies at least 2% of site
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LEED for New Construction V3

- Prerequisites – Required for All LEED Projects
 - Sustainable Sites:
 - Construction Activity Pollution Prevention
 - Water Efficiency:
 - Water Use (20% under standard practice)
 - Energy & Atmosphere:
 - Fundamental Commissioning
 - Energy Performance (10% under ASHRAE 90.1-2007)
 - No CFCs
 - Materials & Resources:
 - Storage & Collection of Recyclables
 - Indoor Environmental Quality:
 - Air Quality (ASHRAE 62-1-2007 sections 4-7)
 - Tobacco Smoke Control (prohibit smoking inside and near the building, or limit it to designated, vented space)
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LEED for New Construction V3

- Points required for each level (out of 100 total)
 - Certified 40–49 points
 - Silver 50–59 points
 - Gold 60–79 points
 - Platinum 80 points and above
 - Sustainable strategies
 - Sustainable Sites: 1 prerequisite, 26 possible points
 - Water Efficiency: 1 prerequisites, 10 possible points
 - Energy & Atmosphere: 3 prerequisites, 35 possible points
 - Materials & Resources: 1 prerequisite, 14 possible points
 - Indoor Environmental Quality: 2 prerequisites, 15 possible points
 - Innovation & Design: 0 prerequisites, 6 possible points
 - Regional Priority: 0 prerequisites, 4 possible points
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- Similar but not identical for other categories

LEED Design Strategies – Making LEED Happen

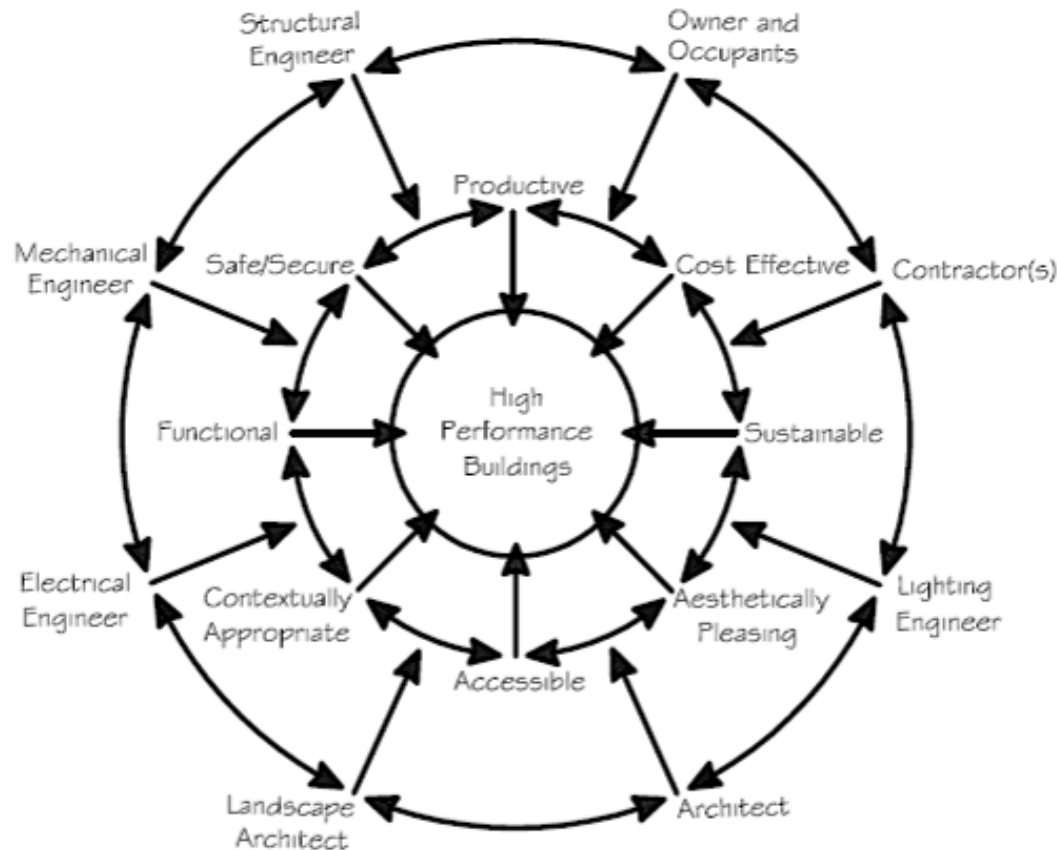
- Building performance goals defined first
 - Project Prospectus (report pa. 5)
 - Include LEED certification requirement
 - Include your agency's sustainability requirements
 - Optional: include a list of which LEED strategies are required/preferred/impractical (see table report pa.22)

What Your Boss Needs to Know

Focus on durable and energy-efficient LEED strategies to maximize cost effectiveness over the life of the building. A building with better insulation, more efficient lighting & HVAC, and durable finishes & systems will save money every day for the life of the building.

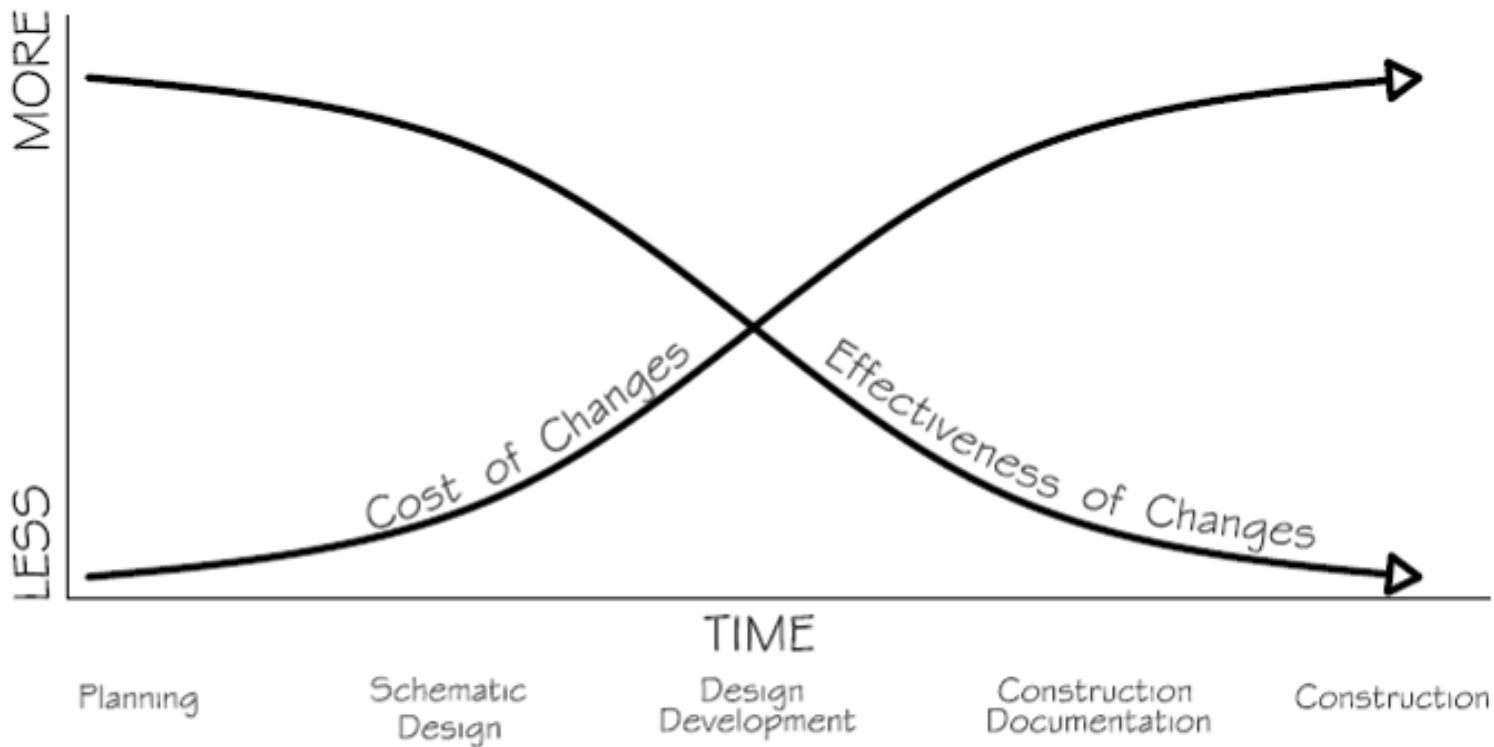
LEED Design Strategies

- Integrated Design - what



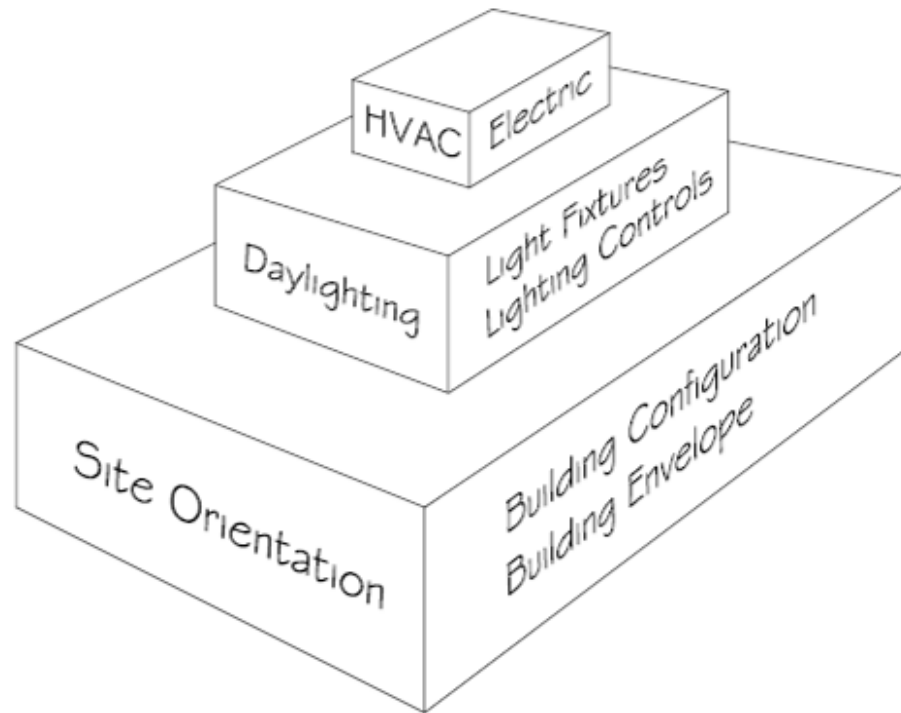
LEED Design Strategies

- Integrated Design - why



LEED Design Strategies

- Integrated Design - example



LEED Design Strategies

- Design RFP, Contract, & Evaluation Criteria should include:
 - Requirement for LEED-APs on staff
 - Architect
 - Mechanical engineer
 - Demonstrate completion of LEED-certified projects of similar size/scope
 - Use integrated design process
 - Same for Agency designers on LEED projects
 - See report pa. 8 & 9 for example contract language
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LEED Design Strategies

- Design RFP, Contract, & Evaluation Criteria

What Contracting Officers Need to Know

Design prospectus and contract should:

- Require that design will achieve LEED (at req'd level) if constructed as designed
 - Include list of required/preferred/impractical LEED credits, if you have one
 - Identify whether the design firm will be responsible for LEED documentation only during design, or also during construction
 - Identify whether or not the design firm must complete the LEED certification process after construction is completed
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LEED Design Strategies

- Communicating with the Design Team
 - LEED kick off meeting at start of design: design team, Agency representatives, and LEED consultant (if separate)
 - Need integrated design team
 - Periodically review status of LEED with all parties
 - Need to confirm which LEED credits make sense & assign responsibilities – check them against the list, if there is one
 - Set up LEED online and make sure design templates are completed during design or shortly after design completed
 - Set up checklists or spreadsheets to
 - Track responsibilities
 - Show which LEED credits will be achieved through which design strategies
 - Confirm when design & specs for each credit are complete
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LEED Design Strategies

- Communicating with the Design Team



**Sabine Ranger
District Office
National Forests
in Texas**

What Your Boss Needs to Know

It is critical that the design team understands from the beginning of the project that it must focus on selecting **cost-effective methods** of achieving LEED certification.

Don't assume there's no other choice if a designer says an expensive material, construction method, or system is needed to achieve LEED points.

LEED Design strategies

- LEED documentation completed or begun during design:
 - All sustainable sites credits
 - All water efficiency credits
 - Energy performance and daylighting modeling
 - Onsite renewable energy generation
 - Building and materials reuse
 - Ventilation and indoor air quality
 - Lighting and HVAC controllability
 - Innovation in design
 - Use LEED-Online – assign 1 person to assure it gets done
 - Check out Harvard's credit documentation (see report pa.12)
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LEED Design Strategies

- LEED Philosophy

- For cost effectiveness, concentrate on
 - Energy-tight building shell
 - Energy-efficient and water-efficient fixtures and systems
 - Durable materials
 - Indoor air quality (because employees cost more than buildings)

- LEED Credits that work for Conservation Agencies are different from what works in cities

- Preserving open space: usually
 - Public transportation: hardly ever
 - See the table in the report on page 22
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FS Commonly Used Strategies

■ Sustainable Sites

- ❑ 1 Site Selection
- ❑ 4.2 Bicycle racks, changing rooms, showers
- ❑ 4.3 Preferred low emitting/carpool parking
- ❑ 5.1 Protected habitat; limit earthwork, clearing, grubbing
- ❑ 5.2 Designated open space
- ❑ 6.1, 6.2 Storm water management
- ❑ 8 Light Pollution Reduction



FS Commonly Used Strategies

■ **Water Efficiency**

- ❑ 1 Native landscaping w/limited or no permanent irrigation
- ❑ 2, 3 Waterless or pint flush urinals, dual flush toilets, low flow faucets, sensing faucets, low flow showers

Western Oregon



Eastern Washington



Arizona



FS Commonly Used Strategies

■ **Energy & Atmosphere**

- ❑ 1 Optimize Energy Performance
 - Efficient lighting, occupancy sensors, daylighting
 - Energy & lighting modeling
 - Geothermal heating & cooling
 - Low-e, thermally efficient windows, shading
 - Well insulated building
- ❑ 2 On-site renewable power generation
- ❑ 6 Renewable energy credits



FS Commonly Used Strategies

■ **Materials & Resources**

- ❑ 2 Construction waste management/recycling
- ❑ 4 Recycled content carpet, drywall, ceiling, tiles
- ❑ 5 Locally produced/extracted materials

**Shoal Creek RD Office
Heflin, AL**



local cypress siding - local rock

FS Commonly Used Strategies

■ Indoor Environmental Quality

- ❑ 1 HVAC/CO₂ monitoring
- ❑ 3.1, 3.2 Construction & pre-occupancy IAQ plans
- ❑ 4.1, 4.2, 4.3, 4.4 Low emitting materials: paint, adhesives, sealants, carpeting, composite wood
- ❑ 5 Separate exhaust for bathrooms, janitor rooms, copy rooms
- ❑ 6.1, 6.2 Lotsa lighting and HVAC control zones
- ❑ 8.1 Outdoor views for all

**Shoal Creek RD Office
Heflin, AL**



FS Commonly Used Strategies

■ Innovation in Design

- ❑ Increase protected habitat/open space
- ❑ Increase purchase or production of green power
- ❑ Integrated pest management plan
- ❑ Green education for public
- ❑ Radon mitigation
- ❑ Increased water savings
- ❑ More effective air filtration
- ❑ Low VOC furnishings
- ❑ Green housekeeping plans
- ❑ LEED accredited professional on staff



**Savannah River Lab, SRS
Aiken, SC**

LEED Construction Specifications

- Good specs are no guarantee, but are a big help
 - Vague specs or making contractor figure out what materials meet LEED = \$\$\$\$\$
 - Include LEED stuff within section on related work, not all in one LEED section
 - Specs should include
 - Required LEED certification level
 - LEED documentation responsibility
 - IAQ, construction debris, erosion & sedimentation control, etc. plans
 - Makes & models that will achieve points desired
 - Standards that “or equals” must meet
 - See report pa. 13 for example spec sources
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LEED Construction Engineering Strategies

■ Selecting and Working with Contractors

- Include LEED experience as selection criteria
 - No LEED experience =
 - high bids
 - changes that lead to not achieving LEED points
 - problems with documentation
- Talk about LEED at all meetings
- Confirm contractor's plans for achieving LEED credits, & who's responsible

What Contracting Officers Need to Know

- Make sure LEED requirements are in contract
- Remind the contractor about LEED at Preconstruction Conference and all other meetings
- Make progress & final payments conditional on proper, timely submittal of LEED documentation

LEED Construction Engineering Strategies

- Construction engineering costs more on LEED projects

What Your Boss Needs to Know

LEED projects take at least 15% more construction engineering time. Time can easily double or triple if agency personnel are doing LEED documentation or commissioning.

Be sure the construction engineering budget is big enough to cover increased costs.

- Agency people **gotta** know what they're doing (see report page 17 for training sources)
 - CORs should be LEED APs or have LEED training
 - COs and Inspectors should have LEED training
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LEED Construction Engineering Strategies

- **Commissioning is required**
 - ❑ Comprehensive, systematic investigation and tune-up of all operating systems
 - ❑ Assures that building is constructed & will operate as intended and satisfy the owner's needs
 - ❑ Costs around 1%
 - ❑ See report pa.18 for commissioning info & specs

What Contracting Officers Need to Know

Unless commissioning is done by Agency people, it's best to hire a commissioner separately from the design and construction contractors. Don't want commissioner to compromise quality due to pressure from employer. 2nd choice: have the design firm handle commissioning.

LEED Construction Engineering Strategies

- LEED documentation during construction:
 - ❑ Specific makes & models of installed equipment
 - ❑ Material cut sheets showing how material meets LEED requirements
 - ❑ Evidence of performance of work such as erosion control, air quality management, construction debris recycling, etc.
 - ❑ O&M manuals & training that are more thorough than normal
 - ❑ Filling out LEED templates
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Other LEED thoughts from the field:

- Emphasize energy efficiency first, since there are long term energy savings
 - Most indoor air quality credits are low to no cost and have great benefits to occupants.
 - Find at least 4 innovation credits that are operational based (no or low construction costs)
 - Maximize low cost credits in site and water efficiency.
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Is there a LEED Cost Premium?

- Several examples (following) show there is no one right answer to this
- Generally speaking:
 - Life-cycle: no cost premium if you do it smart
 - Initial cost: it depends

What Your Boss Needs to Know

New directives and regulations for many agencies in the last couple of years mandate use of many of the sustainable design strategies that earn LEED points, whether the building must be LEED certified or not.

This means better buildings, but initial cost increases in some cases.

Is there a LEED Cost Premium?

- Rocky Mountain Region: 5% to 15% additional cost
 - Several LEED accredited professionals on in-house staff
 - Example: Bessey RS/Nursery Office (7,700 SF, silver):
 - +11% additional costs for design, energy modeling, commissioning, construction, LEED documentation
 - \$143/SF in Halsey, Nebraska
 - Also increased building footprint for showers, recycling
 - Higher % LEED premium for smaller buildings
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Bessey Ranger District and Nursery Office

Is there a LEED Cost Premium?

- Southern Region: no design premium, no or minimal construction premium
 - Awarded new A&E contracts Sept 07
 - Includes LEED design, posting credits, energy modeling
 - NTE 6% construction cost, and no complaints so far
 - Do commissioning in-house, hire measurements out
 - Often do design-build based on in-house conceptualls
 - Sometimes do much of LEED documentation in-house
 - Several LEED accredited professionals on staff
 - Example: Sylamore RS Office (5,900 SF, certified)
 - No cost premium compared to “standard” construction
 - \$127/SF design/build in Mountain View, Arkansas
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Sylamore Ranger District Office

Is there a LEED Cost Premium?

- Southern Research Station:
BIG cost premium
 - One LEED certified professional on staff
 - Example: Savannah River Lab (3,734 SF, Silver)
 - 35% cost premium
 - \$223/SF in Aiken, SC
 - Contractor inexperienced with LEED
 - Stringent design standards at County Research Campus added to costs separate from LEED
 - Labs are complex, more challenges to get LEED credits than offices
 - Small, specialized building
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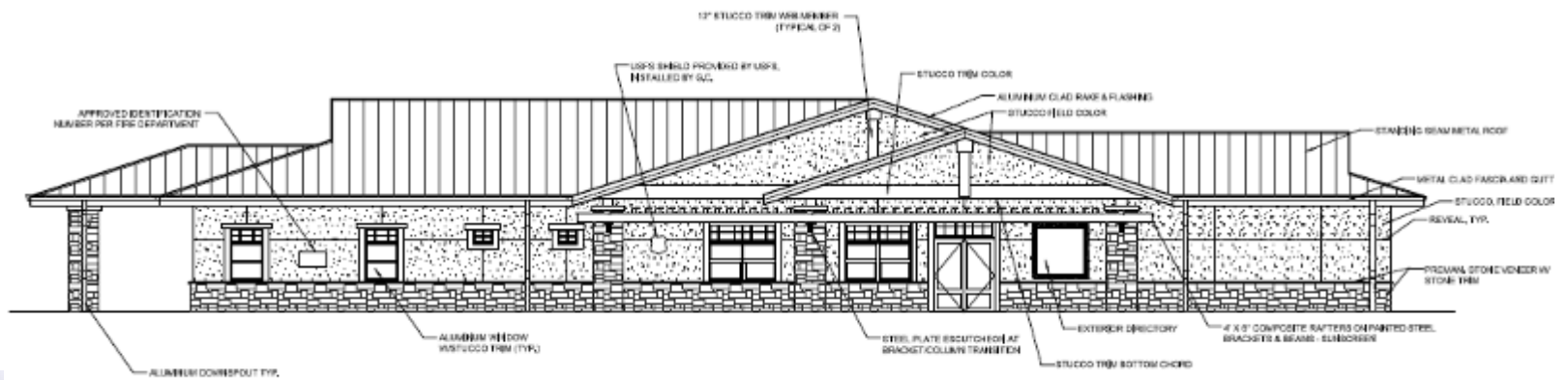


Savannah River Laboratory



Is there a LEED Cost Premium?

- Southwestern Region: No cost premium
 - Example: Verde and Sacramento RD offices
 - 8,000 – 10,000 SF offices, Silver
 - Cloudcroft, NM and Camp Verde, AZ
 - First try: advertised design-build locally
 - No bidders!
 - Local contractors and architects: LEED silver certification is too time consuming, plenty other local work without LEED
 - Second try: advertised design-build nationally based on their in-house conceptual designs
 - 15 bidders
 - Probably no extra costs for LEED silver in the awarded contracts – choosing cost-effective methods
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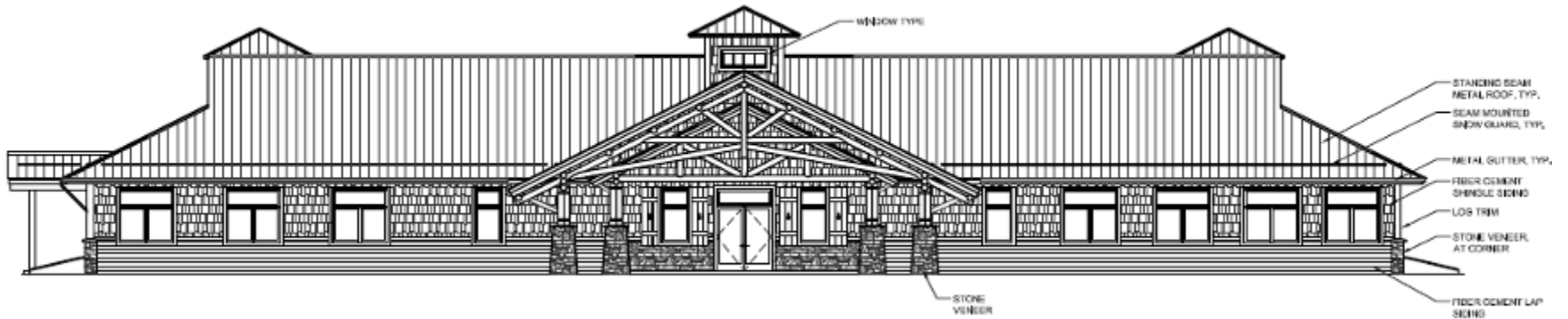


Verde RS

Sacramento RS

Is there a LEED Cost Premium?

- Northern Region: BIG cost premium
 - Several LEED certified professionals on staff
 - Example: Sandpoint RS (14,000 SF, Silver)
 - Design fee of \$25,000 or so
 - \$250 +/-SF in Sandpoint ID
 - A&E Contractor inexperienced with LEED, used LEED consultant
 - Stringent Mechanical Commissioning standards will need to be hired out.
 - District employees did not want to use LEED on their building.
 - Using ground source heat/cooling system.
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Sandpoint RS

LEED Cost Lesson

- It pays (literally) to hire people who are comfortable and experienced with LEED design and construction

**White Mountain
SO**

**independent
commissioner
says go for
LEED gold**



Who's doing LEED in the FS?

Almost everybody

- Projects actually certified:
 - Sylamore Ranger's Office: Certified
 - Bessey Ranger's Office: Silver
 - Savannah River Lab: Silver
 - Lee Ranger's Office & Visitor Center: Certified
 - Projects in the certification process:
 - 24 projects
 - Every Region, plus Research, Forest Products Lab, & International Institute of Tropical Forestry
 - Offices, Visitor Centers, Laboratories
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The Future of Sustainable Buildings

- Sustainability IS the future for FS buildings, and probably for your agency, too
 - More emphasis on existing buildings
 - Sustainability folded into EMS
 - FS will continue to use LEED
 - May add other options – Green Globes?
 - LEED will continue to evolve
 - Will include Life Cycle Assessment (see pa.20)
 - Will be updated every couple of years
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LEED Can Work for You, too...



Questions?

Thank you!

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