



A Regional View of LEED® for Schools

Presented by:

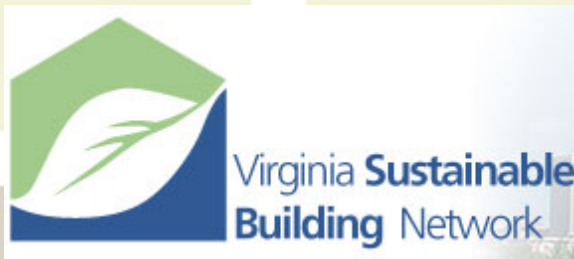
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Principal

for

**State of High Performance Schools In Virginia
Conference**

Charlottesville, VA

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Sustainable Design Consulting, LLC
Richmond, VA Silver Spring, MD

SDC Introduction

Sustainable Design Consulting, LLC

- Offices in Richmond, VA and Silver Spring, MD
- Small woman-owned business
- Focus on greener solutions for the built environment
- Consulted on nearly 200 green building and LEED-related projects
- Commercial, institutional, multi-family, educational
- Project consulting mostly to Developers/Owners and Architects
 - Green building & LEED Process Management & Advisory services
 - Lectures, Workshops and Trainings



www.sustaindesign.net

Meet the LEED Family

Current:

- **LEED-NC:** LEED for New Construction & Major Renovation (version 2.2)
- **LEED-EB:** LEED for Existing Buildings (version 2.0)
- **LEED-CI:** LEED for Commercial Interiors (version 2.0)
- **LEED-CS:** LEED for Core & Shell Development (version 2.0)
- **LEED-S:** LEED for Schools (version 2007)

Pilots:

- **LEED-H:** LEED for Homes
- **LEED-ND:** LEED for Neighborhood Development

Some LEED Application Guides also available

Four Levels of Certification

LEED-NC:

- LEED Certified 26 - 32 points
- Silver Level 33 - 38 points
- Gold Level 39 - 51 points
- Platinum Level 52 - 69 points

LEED-S:

- LEED Certified 29 - 36 points
- Silver Level 37 - 43 points
- Gold Level 44 - 57 points
- Platinum Level 58 - 79 points

What do LEED-Certified Buildings Cost?



- The average reported cost premium for all 33 buildings studied is somewhat less than 2%.

(Source: The Costs and Financial Benefits of Green Buildings, October 2003)

Where LEED Should and Shouldn't Cost More



LEED should cost more:

- Time spent up front in goal setting and team coordination.
- Time spent in the Learning Curve, if applicable.
- Hard first costs for systems and materials with high return on investment.

LEED shouldn't cost more:

- Time spent at the end “adding” green design to the project, redoing work because of poor communication or reinventing the documentation.
- Hard first costs for systems and materials with low return on investment.
- Operating expenses should cost less!

USGBC Resources

- LEED Reference Guide, and USGBC website:
 - LEED Certification Process:
<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=64&>
 - Project registration application:
<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=65&>
 - LEED Credit Templates:
<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=221&>
 - LEED Online:
<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=277&>
 - Credit Interpretation Requests Process:
<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=168&>
 - About Green Schools:
<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1586>

Green Schools Resources: General

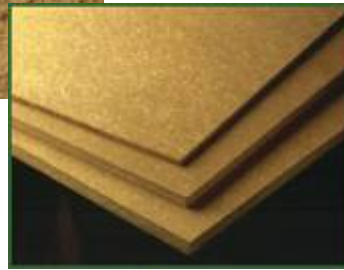
- Collaborative for High Performance Schools
 - California-based but publishes nationally-referenced criteria and documents
 - <http://www.chps.net/>
- National Clearinghouse for Educational Facilities
 - <http://www.edfacilities.org/>
- Northeast Sustainable Energy Association Green Schools Resources
 - Very comprehensive resource list
 - <http://www.nesea.org/buildings/greenschoolsresources.html>

Green Schools Resources: Energy Efficiency

- Alliance to Save Energy Green Schools Project
 - <http://www.ase.org/section/program/greenschl>
- Rebuild America Energy Smart Schools
 - <http://www.rebuild.org/sectors/ess/index.asp>
- State Legislatures Report on Schools and Energy Efficiency
 - http://www.aia.org/cote/JULY-DEC_2002/energyefficiency.pdf

Green Schools Materials

- CHPS Low-Emitting Materials Database
 - http://www.chps.net/manual/lem_table.htm
- U.S. DOE DOE High Performance Buildings Database
 - Search case studies of K-12 schools for the “Materials” topic
 - <http://www.eere.energy.gov/buildings/database/>



Dow “Woodstalk”

Green Schools Resources: Indoor Air Quality/ Health/ Green Cleaning and Maintenance:

- Healthy Schools Network, Inc.
 - <http://www.healthyschools.org/>
- Heschong-Mahone Studies on Daylight in Schools
 - <http://www.h-m-g.com/projects/daylighting/projects-PIER.htm>
- U.S EPA Healthy School Environments
 - <http://www.epa.gov/schools/>
 - U.S. EPA IAQ Tools for Schools Program
- Free comprehensive toolkit; Holds annual conference
 - <http://www.epa.gov/iaq/schools/>

Green Schools Resources: Schoolyards

- EcoSchool Design™ - Transforming asphalt into ecosystem
 - Extensive links to resources and case studies for all types of ecological school ground projects.
<http://www.ecoschools.com/>
- National Wildlife Federation, Schoolyard Wildlife Habitats
 - This program encourages schools to construct and enhance wildlife habitats on their grounds. They also offer a certification program for schoolyard habitats.
 - <http://www.nwf.org/schoolyardhabitats>

Green Schools Resources: LEED-Certified Schools (selected list with online case studies):

- Baca/Dlo'ay azhi Community School, Prewitt, NM, LEED-NC Certified in 2004
 - <http://leedcasestudies.usgbc.org/overview.cfm?ProjectID=387>
- Clearview Elementary School, Hanover, PA, LEED-NC Gold in 2004
 - <http://leedcasestudies.usgbc.org/overview.cfm?ProjectID=100>
- Clackamas High School, Clackamas, OR, LEED-NC Silver in 2003
 - <http://leedcasestudies.usgbc.org/overview.cfm?ProjectID=196>
- Third Creek Elementary School, Statesville, NC, LEED-NC Gold in 2002
 - <http://leedcasestudies.usgbc.org/overview.cfm?ProjectID=100>

MCPS Green Building Program

- LEED Pilot School, Great Seneca Creek ES in Germantown
- Montgomery County has a **Green Building Act** requiring MCPS projects of more than 10,000 sf to be LEED certified by the USGBC.
- MCPS is designing to a minimum LEED Silver level and incorporating LEED in all MCPS construction, meaning that **high performance design and LEED expertise are required for all MCPS projects**, not just the larger ones going through certification.



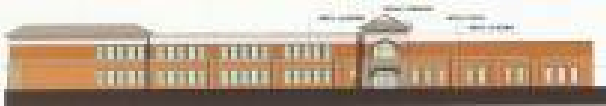
MCPS Green Building Program

- Comprehensive website: www.Schools2green.org
- **MCPS Architectural and HVAC Design Guidelines** being updated to incorporate updates and LEED for Schools.
- Project Architects and Engineers working on MCPS projects should be **LEED Accredited Professionals** with previous project experience.
- Training session **LEED for Contractors**, to which contractors and subcontractors as well as LEED Consultants are asked to attend.

MCPS Green Building Program

- **MCPS Scope for LEED projects** developed and released
- Seasonal **MCPS Green Building Newsletter** distributes relevant information to firms and consultants.
- Engages **green volunteers** to educate our students about the construction and design industry and/or green building.

MCPS Green Elementary Schools

- Montgomery County Green Schools Program
- New prototype 79,000 gsf building
- Green materials
- Ground-source heating & cooling
- Daylight & indoor air quality
- Projects: 
 - Great Seneca Creek (Northwest #7) – LEED Gold certified!
 - Little Bennett (Clarksburg/Damascus #7) – green vs. LEED
 - Clarksburg #8 –following Great Seneca Creek

Great Seneca Creek Elementary School



- (aka Northwest #7)
- Opened fall 2006
- Germantown, MD
- 79,000 gsf, 740 students
- LEED-NC v2.1 Gold Certified
- First LEED-certified k-12 in Maryland
- 39 points achieved
- MCPS case study:



www.mcps.k12.md.us/departments/facilities/greenschoolsfocus/gsc.shtm

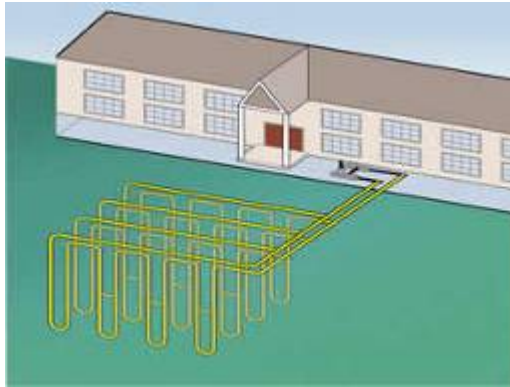
Great Seneca Creek Elementary School

- Strawboard casework substrate throughout



- Alternative transportation, stormwater quality & light pollution reduction

Great Seneca Creek Elementary School



- Ground-source heating & cooling saved ~35% energy compared with ASHRAE 90.1-1999

Great Seneca Creek Elementary School

- Sloped ceilings enhance daylight penetration in classrooms



- Roller shades still allow plenty of daylight

Other Montgomery County Public Schools

- Cashell Elementary School - using LEED for Schools, Silver-level
- Cresthaven - using LEED for Schools, Silver-level

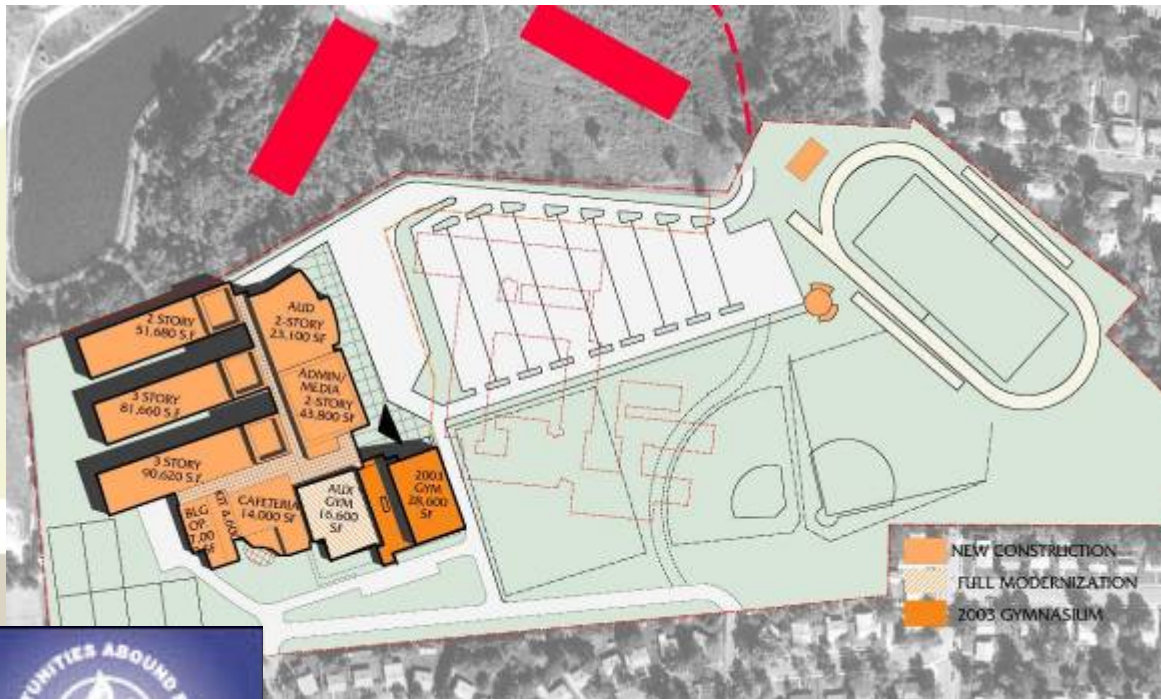


Laurel-Beltsville (Vansville) Elementary School

- Prince George's County Public Schools
- 81,000 gsf new construction
- Under construction
- Pursuing LEED Silver-level certification
- Ground-source heating & cooling system
- Thermal Comfort survey

Oxon Hill High School

- Prince George's County Public Schools, Maryland
- 362,000 gsf replacement, including 18,000 gsf renovation
- Design development phase



- Pursuing LEED Certified- or Silver-level certification
- Ground-source heating & cooling system

Other Prince Georges County Public Schools

- Sub-Region VI Elementary School: Following Laurel-Beltsville (Vansville)
- Fairwood Elementary School: Using LEED for Schools



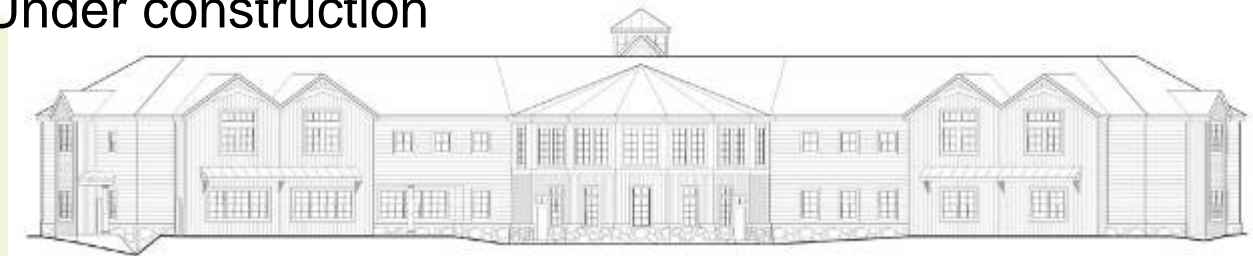
Calverton School

- Independent school campus, Huntington
- Small addition to Lower School building
- Green consulting services engaged by parent of student
- Support from new school administrator
- Revisions to project specifications
- Emphasis on indoor air quality and green materials



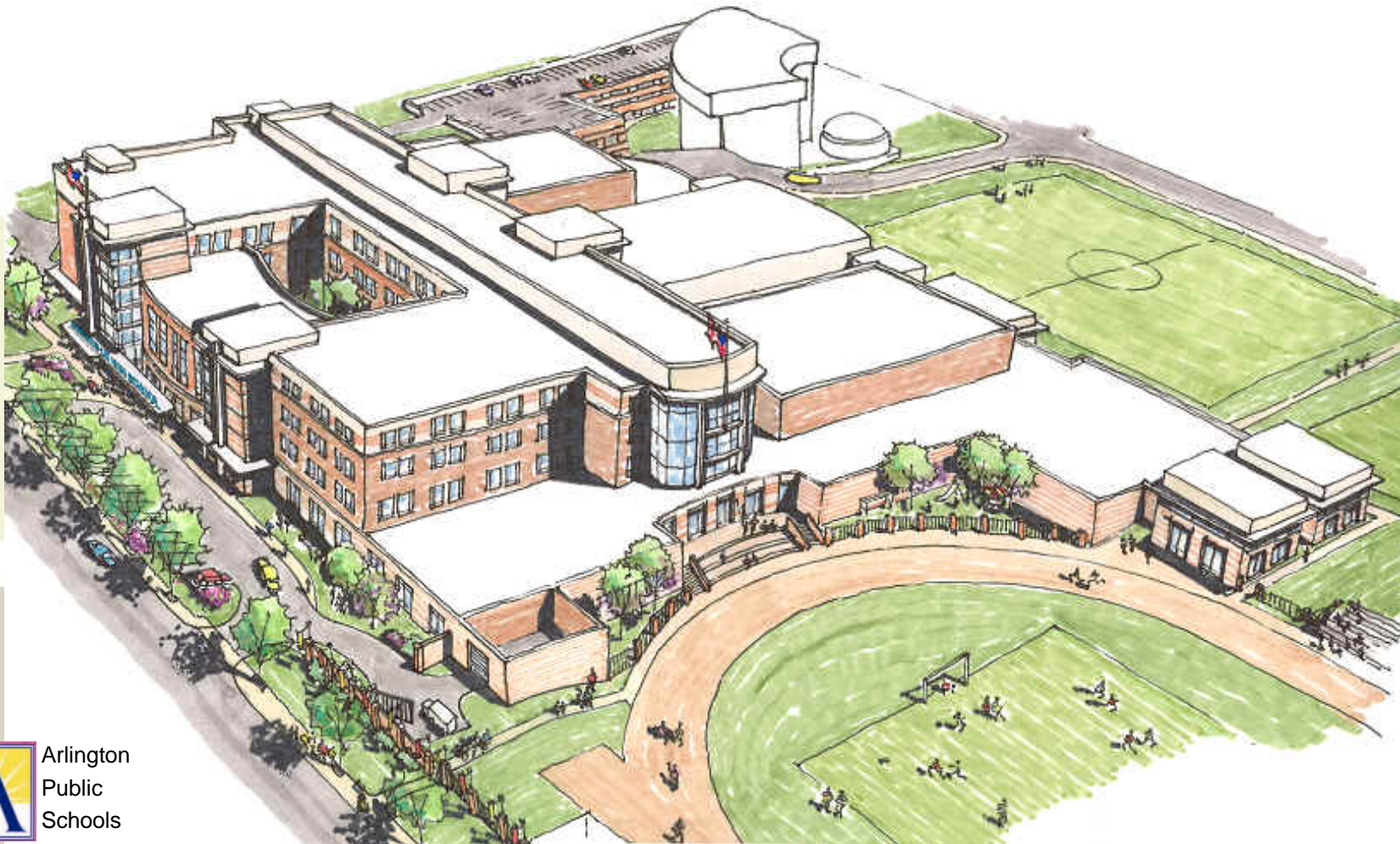
Garrison Forest School

- Independent School campus, Owings Mills
- New Middle School building
 - Pursuing LEED Certified-level certification
 - 30,000 gsf, Under construction



- New Upper School Math-Science Technical building
 - Pursuing LEED Certified- or Silver-level certification
 - Increased opportunities for educational technology (e.g. solar)
 - Construction documents phase

Washington-Lee High School: Overview



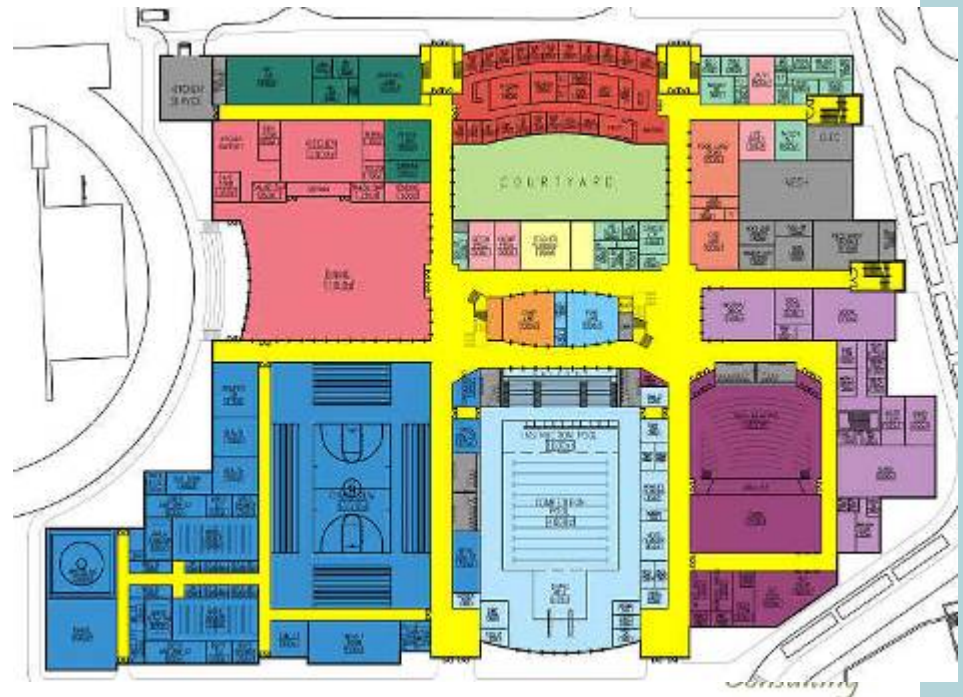
Washington-Lee High School: Overview

- Owner: Arlington Public Schools
- Architect: Grimm + Parker
- Building Size: 358,102 sf
- Occupancy: 1600 students, 200 staff



Washington-Lee High School: Overview

- Construction Type: New construction in coordination with phased demolition
- Completion Dates: Phase 1: July, 2007; Phase 2: June 2009; Phase 3 (Ballfield): Fall 2009



Washington-Lee High School: LEED Silver certification

- LEED-Registered in 2004 (LEED-NC v2.1)
- APS made the early commitment, with funding behind it, to LEED Silver certification
- A large-scale, long-term project, Washington-Lee has taught its design team many lessons in applying LEED to this particular building type.
- Project is sticking with version 2.1 in the absence of a LEED Application Guide for K-12 Schools



Washington-Lee LEED Silver Strategies: Sustainable Sites

- Alternative Transportation:

- Proximity to mass transit;
- Bicycle storage & changing;
- Alternative fuel vehicles
- Parking capacity & carpool



- APS school busses use B-20 biodiesel

- Reduced Site disturbance

- Open space is 191% the size of the building footprint

- Landscape and Exterior Design to Reduce Heat Islands: Roof & non-roof

- Non-roof: Light-colored concrete paving for over impervious surfaces
- Combination of white and green roof systems



Photo by Weston Solutions

Washington-Lee LEED Silver Strategies: Water Efficiency

- Water Efficient Landscaping:
 - No permanent irrigation system
 - Decision made early on not to irrigate the ball field
- Water Use Reduction:
 - Over 45% reduction, earns WEC3 + innovation credit
 - Waterless urinals in boys rooms
 - Dual-flush (1.1/1.6) flush valves in girls rooms and staff toilets (lengthy process to make this selection!)
 - Low flow (1.5 gpm) showerheads
 - Ultra-low-flow (0.5 gpm) lavatory aerators



Graphic by Sloan Valve Company

Washington-Lee LEED Silver Strategies: Energy and Atmosphere

- Over 25% energy savings compared with ASHRAE 90.1-1999
 - Sun shading in selected locations
 - Cooling tower optimization
 - Demand-control ventilation
 - Ground-source heat pumps considered
 - Solar pool water heating considered, not pursued
- Additional Commissioning
- Elimination of HCFCs and Halons
 - Would be challenging for elevator machine room equipment, but machineromless elevator selected



Drawing by Grimm +
Parker Architects

Washington-Lee LEED Silver Strategies: Materials and Resources

- **Construction Waste Management:**

- Diversion of 50% waste pursued
- Challenging to achieve more with constraints of demolition portion of scope



- **Local/Regional Materials:**

- Over 40% Manufactured Locally
- Earns MRc5.1 + Innovation credit

- **Recycled Content Materials**

- Ceiling tiles, toilet compartments, insulation



- **Certified Wood**

- Casework specified as straw fiberboard, but sudden shift in industry rendered this infeasible
- Casework switched to FSC wood



Washington-Lee LEED Silver Strategies: Indoor Environmental Quality

- CO2 Monitoring
 - Included in assembly spaces
 - Add alternate approved to add in classrooms
- Construction IAQ Management Plan
 - MERV-13 issue creating difficulties
 - Baseline IAQ testing before occupancy is specified
- Low-Emitting Materials: All
 - Sudden infeasibility of strawboard required urea-formaldehyde-free wood products instead
- Indoor Chemical and Pollutant Source Control
 - Science lab classrooms and storage rooms require exhaust
- Thermal Comfort



Washington-Lee LEED Silver Strategies: Innovation and Design Process

- User Education Program
 - To be tied into curriculum
 - APS champion to be identified to spearhead program
- Green Housekeeping Program
 - To be the same or similar plan as used at Langston Brown
- Exemplary performance Innovation credits
- LEED-Accredited Professionals

Contractor training sessions will lead to a smoother construction phase effort

Wakefield High School

- Arlington Public Schools, Virginia
- 338,000 gsf total, including renovation of 325,000 gsf plus new addition



- Feasibility Phase
- Exploring LEED Silver-level certification potential
- Includes natatorium, and full gymnasium facilities

Yorktown High School

- Arlington Public Schools, Virginia
- 349,000 gsf phased replacement, including 55,000 gsf existing to remain



- Design Development Phase
- Pursuing LEED Silver-level certification
- Solar water heating, greywater collection & green roof under consideration

Fluvanna County High School

- Fluvanna County Public Schools, Virginia
- 256,000 gsf total new high school to replace existing, which will become a middle school
- Rural setting on multi-purpose county land
- Using LEED for Schools
- Opportunities being explored:
 - Water reclamation
 - High-performance lighting
 - Polished concrete flooring



Christchurch School Science Building



- Christchurch, Virginia
- Rural k-12 campus
- 12,000sf new science building
- Using LEED for Schools
- Recent decision to use wood frame construction
- Acoustics may be least challenging on this project

The LEED Process Takes a Team

- **Owner:** Raise and enforce expectations of team and its product. Remind them of the opportunity they have before them. Spread the word so others will catch on.
- **Design Team:** Rise to the occasion of designing green and keep LEED and other green criteria on the front burner.
- **LEED Coordinator:** Integrate with and support team's efforts while tracking compliance with LEED and other green criteria.
- **General Contractor:** Rise to the occasion of building green and keep LEED and other green criteria on the front burner.
- **Commissioning Authority:** Help ensure Owner's requirements are met.
- **Facility Manager:** Help ensure that the building *stays* green.
- **Occupant:** Interact with building and provide feedback to managers



The Team that Play Together Wins



- Successful team integration can only lead to better buildings, now and in the future.
- Successful team integration responds better to the challenges of innovation.
- Successful team integration can itself help transform the market by evolving the project process.
- Schools buildings offer teams the unique opportunity to establish precedent and raise standards system-wide.

Client Greening Background

- Core services in building project consulting, generally:
 - Fixed design and construction schedule
 - Fixed scope and fee
 - Fixed project budget
 - Fixed goals – narrow down the many possible sustainable design strategies to those suitable for the given project
 - Too often limited to one-time services

Client Greening Possibilities

- Expanding focus from an individual building to the greater portfolio:
 - Where to start and what can be done in the near term
 - What is project-specific? What is general?
 - How to move forward in the most effective way for this client?

Elements of Client Greening

- Building by building by building direct consulting
 - Conducive when development teams are very autonomous, but leads to inconsistency of goals among various projects
- Project team advisory and oversight
 - Primarily a Client-representation role, where direct consulting may be provided by the design team
- RFP/RFQ development
 - Assisting the Client in assembling the team

Elements of Client Greening

- Training programs
 - General topic trainings, or customized to project needs at hand.
- Goal-setting sessions
 - Addressing general goals for the company overall, or goals specific to upcoming projects
- Ongoing learning
 - Providing periodic updates on industry advancements, arranging case study evaluations and tours, identifying focused training needs

Elements of Client Greening

- Existing portfolio assessments
 - Review of built projects or those in progress to identify greening opportunities
- Multi-framework consulting
 - Project reviews through various ‘lenses’ (e.g. green building, green neighborhood, green operations)
- Return on investment analysis
 - Identifying big-ticket strategies, their first cost implications, and their short and long-term returns

Elements of Client Greening

- Guidelines review
 - Green review of existing building standards
- Guidelines development
 - Development of new green buildings standards based upon goal setting, project specific consulting, ROI analysis, etc.
- Strategic partnering
 - Charting a course for implementation of future client greening and other possibilities

Greening the Whole Client

- Greening the managers
 - Start by listening – what is the story of this Client?
 - Provide introductory training
 - Provide follow-up training – customize to the market needs
 - Engage in goal-setting
 - Implement on projects
 - Evaluate success

Greening the Whole Client

- Greening the project teams
 - Assist in RFQ/RFP development
 - Assist in team selection
 - Provide project training for development managers
 - Provide project training for design, construction and facilities O&M teams
 - Provide oversight and advisory (structured vs. on-call)


Greening the Whole Client

- Greening the new projects
 - Determine whether process management vs. advisory vs. Client representation is the best fit
 - Draw from established case studies
 - Refer back to Client goals and standards
 - Determine applicable frameworks and certification strategy
 - Set a realistic schedule
 - Encourage design innovation

Greening the Whole Client

- Greening the old projects
 - Review the existing portfolio
 - Learn the facilities management culture
 - Train the facilities O&M staff
 - Develop green facilities guidelines
 - Consider existing buildings certification
 - Establish a feedback loop for continuous improvement

Case Study: Montgomery County Public Schools

- Chronology of task orders:
 - 2003: Green Schools Charrette co-facilitation, laid groundwork for Great Seneca Creek Elementary School LEED-NC Gold achievement 
 - 2003-4: Greening Facility Design Guidelines, incorporating general greening language and LEED-NC language in text boxes



Case Study: Montgomery County Public Schools

- Chronology of task orders (cont.):
 - 2005-6: Indoor Air Quality management/testing and Green Cleaning consulting
 - 2007-8: Update to greening Facility Design Guidelines, incorporating LEED for Schools (LEED-S) requirements



For More Information

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