LEED Lessons Learned

2006 Efficient Electro-Technology Exposition & Conference

Ralph DiNola
Principal
Green Building Services, Inc.

Elaine Aye
Principal
Green Building Services, Inc.

www.greenbuildingservices.com

LEED Lessons Learned

1. Start Early
2. Process Matters
3. Understanding and Fulfilling the Owner's Requirements
4. LEED Documentation
5. Operating & Maintaining a Green Building

1. Start Early

Green Building Services GBS

Eco Charrette

Goal Setting

Opportunities Assessment

Eco-Charrette

Green Building Services GBS

- Sets green building goals
- Identifies strategies
- Fosters integrated design process
- Develops working relationships
- Creates “stakeholders”

Eco-Charrette

Sets green building goals

"Building as an educational tool"

"Market differentiation"

"Provide healthy interiors"

"Provide daylight and views to all building occupants"

"Minimum 10% ROI"

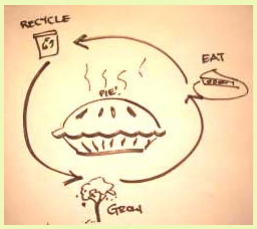
"Increase worker productivity"

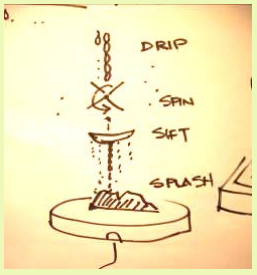
"Timeless, long-lasting and durable"

Eco-Charrette

Identifies strategies

- Identify site and program challenges
- Look for opportunities
- Create synergies
- Inventory benefits
- Develop action plan





Eco-Charrette

Develops working relationships

Creates "stakeholders"

2. Process Matters

Communication

Integrated Design

Case Studies

1. Stoller Winery
2. Armory
3. Kelly Engineering
4. Providence

Green Building Process

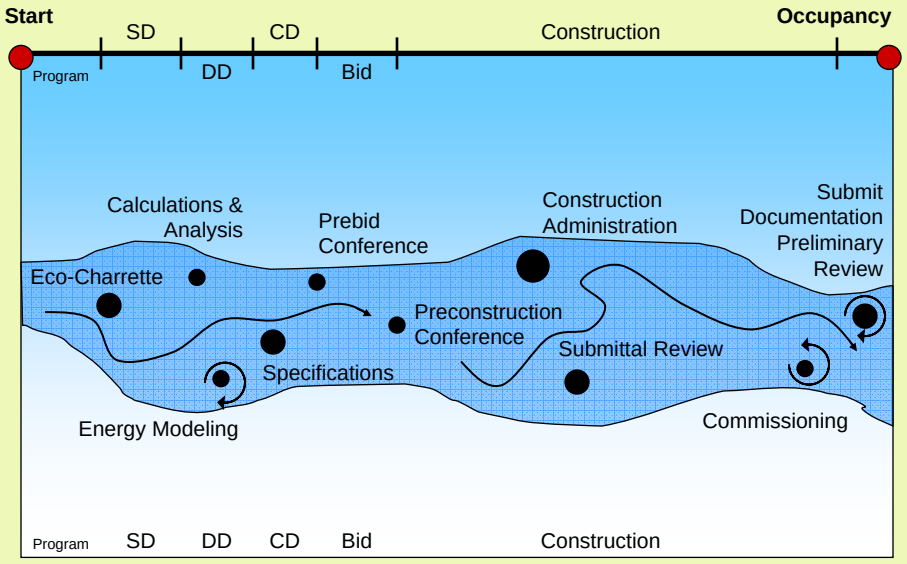
Conventional Process

- **Design to meet code minimum standards**
- **Specifications to meet quality and performance standards**
- **Construction administration to verify and document compliance with CDs**

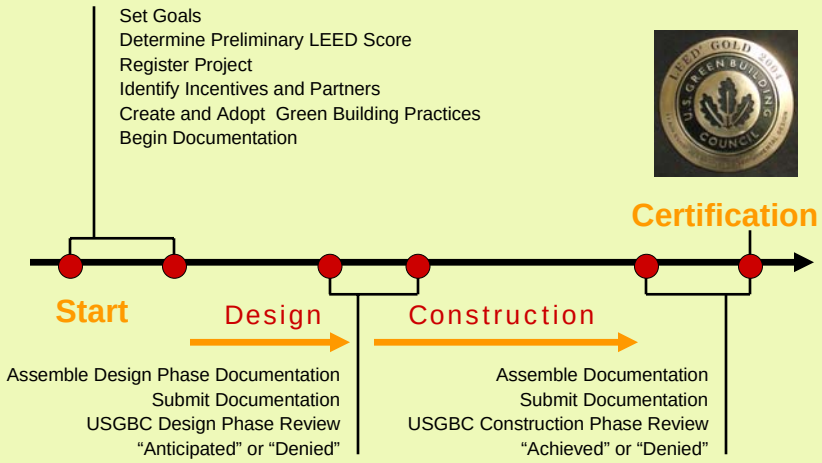
Green Process

- **Design to meet optimized environmental performance standards**
- **Specifications to meet expanded quality and performance standards**
- **Construction administration to verify and document compliance with CDs**

Green Building Process



LEED-NC v2.2 Certification Process



3. Understanding and Fulfilling the Owner's Requirements

OPR: Owner's Projects Requirements

- Defines owners desires for the buildings performance
- Occupant needs and specific task needs
- HVAC, plumbing and electrical
- Temperature, humidity, air quality
- Daylighting, lighting, glare
- Etc…

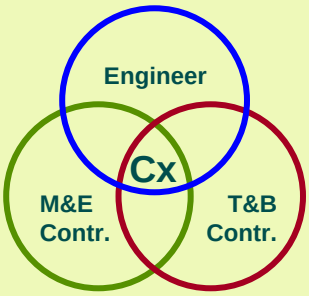
BOD: Basis of Design

- Design team's response to owner's requirements
- Mechanical, Electrical and Plumbing system narrative

Commissioning

Conventional M&E Process

Green M&E Process



LEED Commissioning

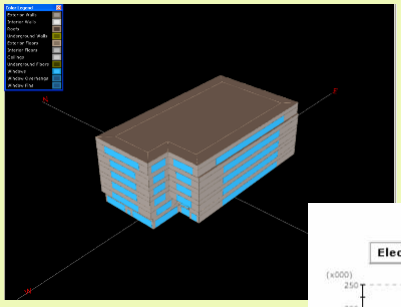
EA Prerequisite 1:
Fundamental Building Systems Commissioning

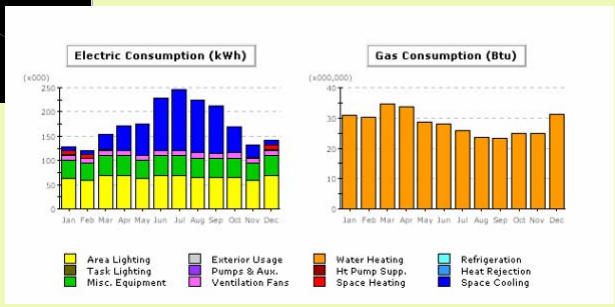
EA Credit 3:
Enhanced Commissioning

- **Intent**
  - Verify and ensure that fundamental building elements and systems are designed, installed and calibrated to operate as intended.

Energy Modeling

Computer simulation of energy use in a building





Energy Modeling

What are the inputs from the design team?

Architect
- Analysis of the Objective (Why are we performing this analysis?)
- Site and Weather Data
- Building (Architectural) Data like form, materials, structure etc.

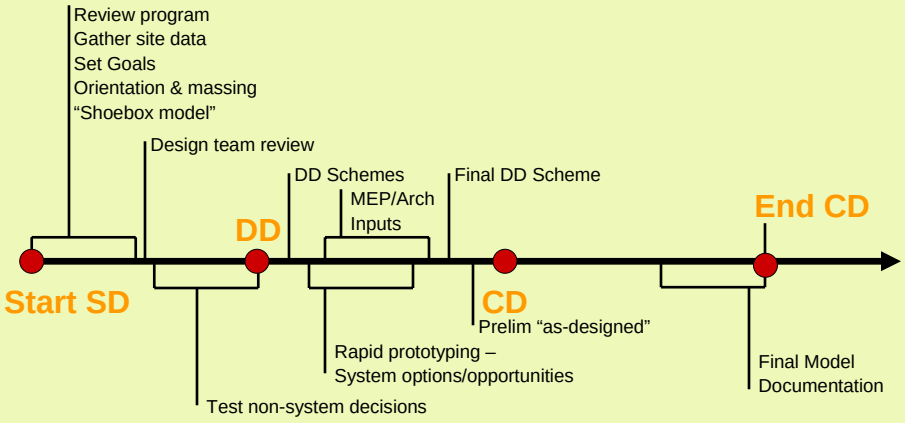
Engineer
- Internal Loads
- HVAC Equipment performance

Owner
- Building Operations and Schedule (present or proposed)
- Utility Rates

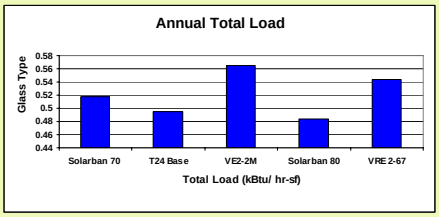
Modeler
- Weather Data
- Building geometry
- EEMs

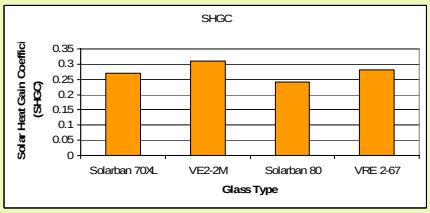
Energy Modeling

What is the process and how is the design team best involved and when?



SoCal Tower Glazing Analysis

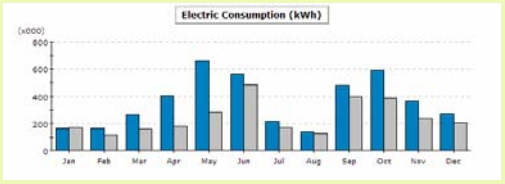




Glass	SHGC	winter u-value
Solarban 70XL	0.27	0.29
VE2-2M	0.31	0.29
Solarban 80	0.24	0.29
VRE 2-67	0.28	0.30

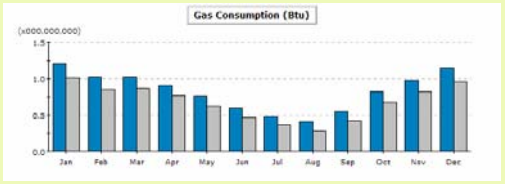
Glass	% Opacity of Building (Window to Wall Ratio)	Annual Cooling Load (kBtu/ hr-sf)	Annual Heating Load (kBtu/ hr-sf)	Annual Total Load (kBtu/ hr-sf)
Solarban 70	20%	0.2512	0.2666	0.5178
T24 Base	**n/a**	**0.2349**	**0.2597**	**0.4946**
VE2-2M	20%	0.2787	0.2860	0.5648
Solarban 80	**20%**	**0.2331**	**0.2510**	**0.4840**
VRE 2-67	20%	0.2412	0.3021	0.5432

Condominium



Electric (x 000 kWh)

ASHRAE	166	163.9	267.5	402	661.9	563.4	213.4	135.7	479.7	589.1	361.8	272.5	4,276.90
Proposed	168.8	114.2	162.5	182.2	279.3	483.2	169.6	125.9	394.8	387.7	239.3	202	2,909.50



Gas **(x 000,000,000 Btu)**

ASHRAE	1.21	1.02	1.02	0.91	0.76	0.59	0.48	0.41	0.55	0.82	0.98	1.14	9.90
Propposed	1.01	0.86	0.87	0.77	0.62	0.47	0.36	0.29	0.42	0.68	0.82	0.96	8.12

ECB – Elliot Center

ECB Table

Energy Summary by End Use

End Use	Energy Type	Proposed Building Energy MBTU/YR	Proposed Building Peak KBTU/HR	Budget Building Energy MBTU/YR	Budget Building Peak KBTU/HR	Optimized Energy Performance [%]
Lighting - Conditioned	Elec.	83.45		136.67		61%
Lighting - Task	Elec.	-		-		
Space Heating	Gas	0.44		0.46		96%
Space Cooling	Elec.	19.16		21.93		87%
Pumps	Elec.	0.68		0.68		100%
Heat Rejection		-		-		-
Fans - Interior Ve		$ 2,557	366	$ 5,712		
Fans - Interior Ex		Percent Savings = (ECB' $ -DEC'' $)/ECB' $ =				55.23%
Service Water He						
Service Water He						
Office Equipment	Elec.	194.01		197.76		98%
Elevators & Escalators		-		-		
Refrigeration (food, etc)		-		-		
Cooking (commercial)		-		-		
TOTAL BUILDING CONSUMPTION		347.0		561.6		62%

Regulated Energy and Cost Summary by Fuel Type

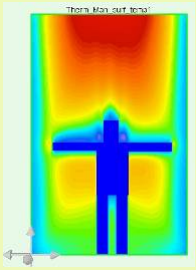
Type	DEC'' Use [MBTU/yr]	DEC'' Cost [$]	ECB' Use [MBtu/yr]	ECB' Cost [$]	DEC'' / ECB' Energy %	DEC'' / ECB' Cost %
Electricity	153	$ 2,254	364	$ 5,406	42%	42%
Natural Gas	2	$ 304	2	$ 306	99%	99%
Other						
Total Nonrenewable	155	2,557	366	5,712		
Renewable	-		-	$ -	-	-
Total including Renewable	155	$ 2,557	366	$ 5,712		
		Percent Savings = (ECB' $ -DEC'' $)/ECB' $ =				55.23%

CFD

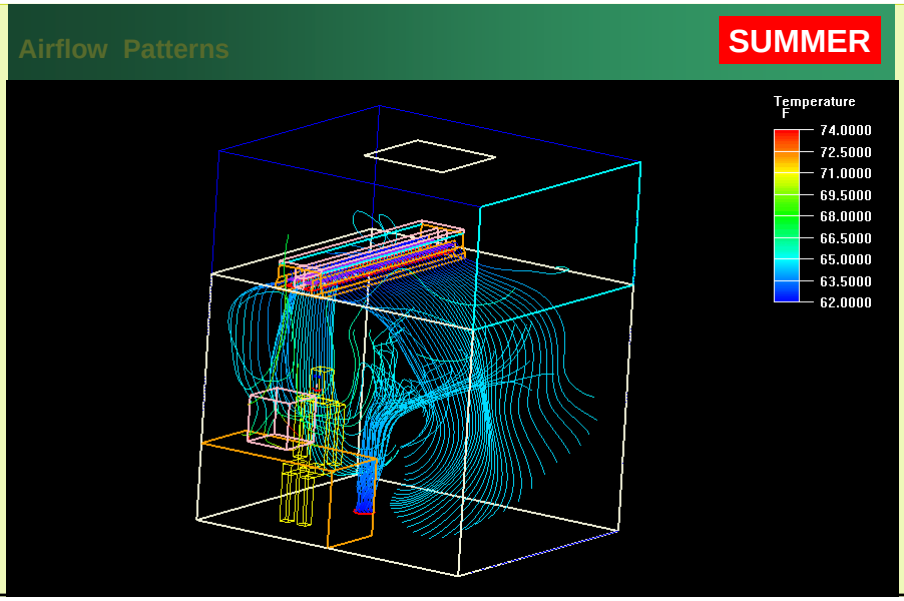
What can we use CFD for?

Architectural Applications –

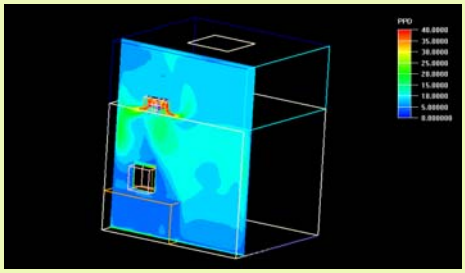
- Thermal Comfort
- Airflow in and around buildings
- Convective and radiation heat transfer among building components – effectiveness of radiant heating and cooling systems.
- Natural Ventilation Design
- Displacement Ventilation design
- Urban air pollution and contaminants analysis



CFD – Armory PSC



CFD – Armory PSC



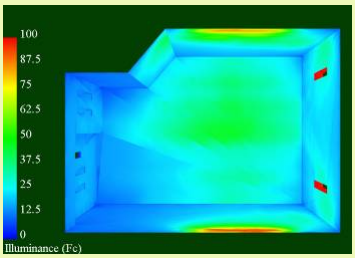
Daylighting and Energy

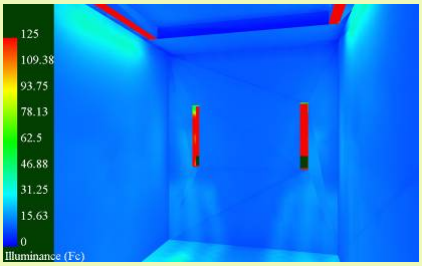
How does Daylight Analysis factor in the Energy Analysis?

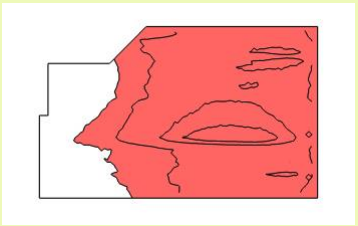
- Daylight modeling for good lighting design – generate required light levels (foot-candles)
- Provides data for most efficient lighting plan – W/sf

- W/sf plugged in to an energy model – impacts:
  - Lighting energy consumption
  - Heating and cooling loads
  - Peak demands and equipment sizing

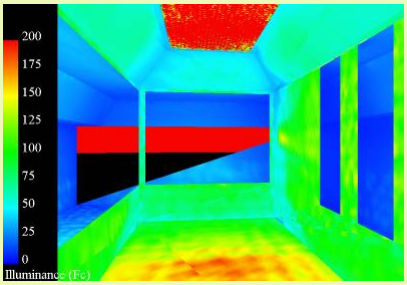
Daylighting and Energy

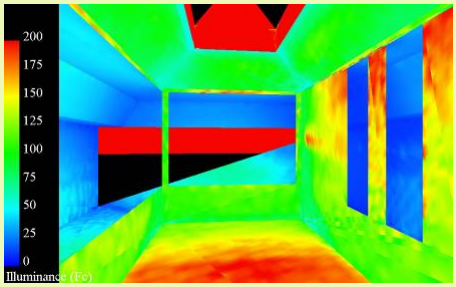




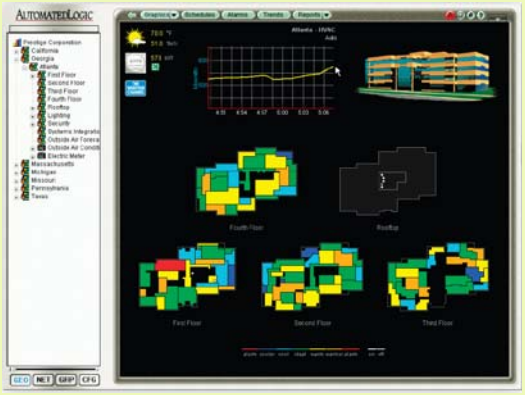


Daylighting and Energy





Measurement & Verification



- Define M&V scope
- Develop M&V Plan
- Include measurement devices in specifications
- Future building operator involvement is essential because they will be executing the M&V plan

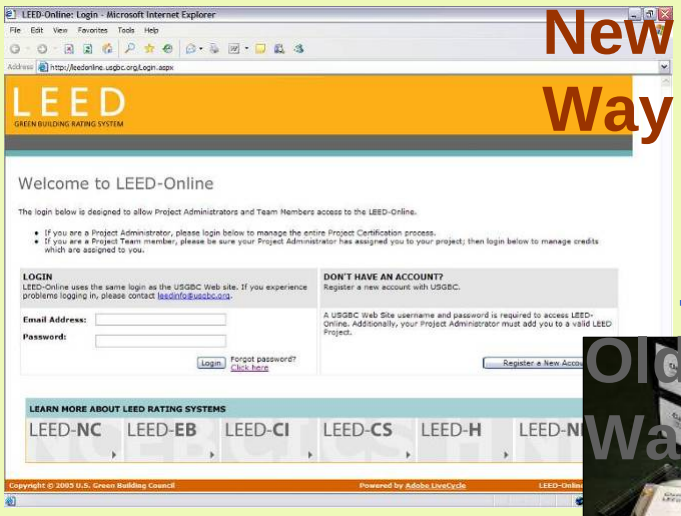
4. Documentation

Start early - pre-design to construction

Who is involved?

- Owner
- Architect, Interior Designer
- MEP Engineer, Energy Modeler, Cx Agent
- Civil Engineer, Landscape Architect
- General Contractor
- Etc…

LEED Online is live!



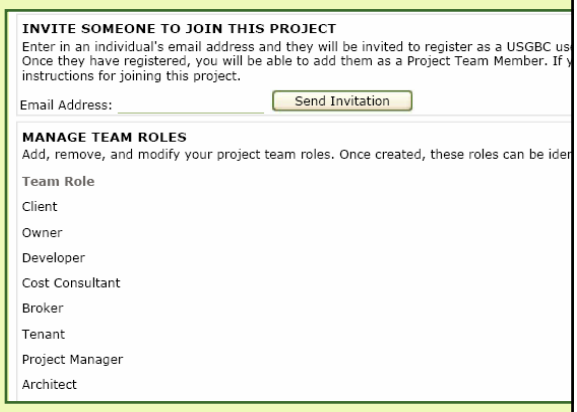
New Way

-VS-

Old Way

LEED Online

- The project Administrator registers project with the USGBC (www.usgbc.org)
- Administrator invites team members via email through the LEED-Online 'Team Member' page
- Team members register and accept invitation
- Administrator gives team members roles (architect, contractor, mechanical, plumbing, etc.)



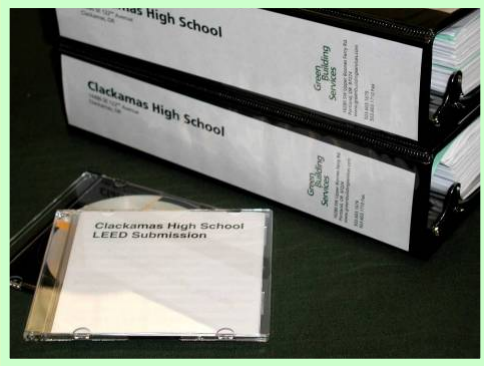
LEED Online

- Team members are assigned to credits and become the responsible party for those credits
- Team members download letter template from LEED-Online
- Once complete, the responsible team member uploads the Letter Template and documentation to LEED-Online.
- The Project Administrator can track the status of all attempted credits in "Credit Scorecard & Status" and submit the project for review at the appropriate time.

0	MR	Credit 4.1-4.2	Recycled Content	Contractor
0	MR	Credit 5.1-5.2	Regional Materials	Contractor
0	MR	Credit 6	Rapidly Renewable Materials	Contractor
0	MR	Credit 7	Certified Wood	Contractor

Documentation

Creating a good submission



The 4 C's

- Clear
- Consistent
- Concise
- Complete

Documentation

Creating a good submission

Certificate of Achievement

Scientific Certification Systems (SCS) does hereby certify that an independent evaluation has been conducted on behalf of:

SierraPine Limited

for the following product(s):

Medite® II, Medite® FR, Medex®

manufactured in Medford, Oregon.

This product(s) meets all of the necessary qualifications to be certified for the following claim(s):

100% RECOVERED AND RECYCLED WOOD FIBER

At least 25% of the fiber in these products is from post-industrial recycled sources, while the balance is certified as recovered fiber, consistent with U.S. EPA recovered fiber definitions. (Note: The recycled portion also meets the Forest Stewardship Council's "neutral" material definition.)

NO FORMALDEHYDE ADDED

These products are made without formaldehyde-containing additives, and were shown in lab testing to be free of formaldehyde down to a detection limit of 0.05 ppm.

SCIENTIFIC CERTIFICATION SYSTEMS ®

Signed

Dated

This certification is applicable for one year from the date of issuance.

Clear

- Legibility
- Highlight pertinent information
- Organize coherently

Documentation

Creating a good submission

Consistent

- Use the same information throughout
- Related prerequisites/credits data:
  - Project site area and site credits
  - Occupant numbers for SSc4 and WEc3
  - Impervious areas for SSc6 and SSc7.1
  - Dollar values for MRc3 - MRc7
  - Energy usage - EAp2, EAc1, EAc2, EAc6

Documentation

Consistent

Project Information			
Project Name	Bonneville Power Administration Ampere Annex		
Location	Ross Complex, Vancouver, Washington		
LEED™ Project Number	1166		
Site Characteristics			
Site Area [acres]	.55 acre	Unbuilt Site Area [acres]	.48 acre
Building Square Footage [SF]	3000 sf	Building Footprint [SF]	3000 sf
Building Occupancy		**Parking Characteristics**	
Estimated Male Occupants	1	Parking Area [acres]	.13 acres
Estimated Female Occupants	4	Parking Footprint [SF]	.13 acres
Annual Work Days	260		

Design Case Table

Flush Fixture	Daily Uses	Flowrate [GPF]	Duration [flush]	Auto Controls N/A	Occupants	Water Use [gal]
Dual Flush (Avg.)						
Male WC-1	3	1.1	1	--	1	3
Female WC-1	3	1.1	1	--	4	13

Documentation

Creating a good submission

Concise

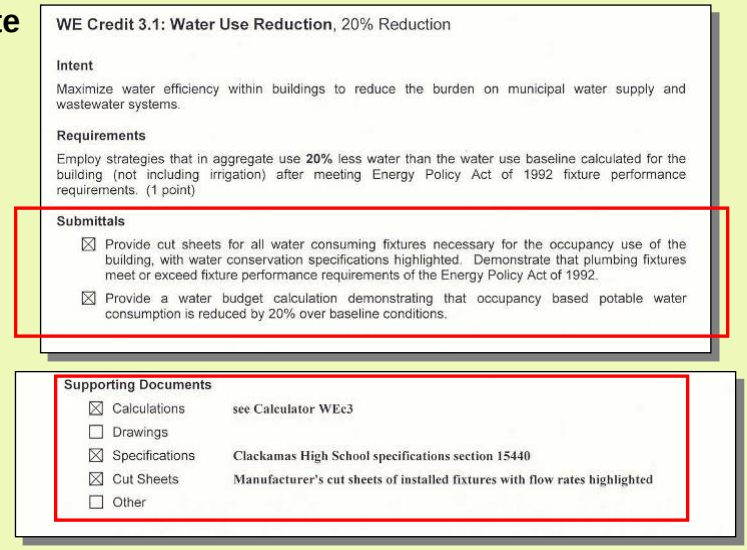
- Succinct and to the point narratives
- Minimize extraneous information

Complete

- Documentation as required or recommended
- Sufficient to demonstrate compliance

Documentation

Complete



WE Credit 3.1: Water Use Reduction, 20% Reduction

Intent

Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

Requirements

Employ strategies that in aggregate use **20%** less water than the water use baseline calculated for the building (not including irrigation) after meeting Energy Policy Act of 1992 fixture performance requirements. (1 point)

Submittals

- ☒ Provide cut sheets for all water consuming fixtures necessary for the occupancy use of the building, with water conservation specifications highlighted. Demonstrate that plumbing fixtures meet or exceed fixture performance requirements of the Energy Policy Act of 1992.
- ☒ Provide a water budget calculation demonstrating that occupancy based potable water consumption is reduced by 20% over baseline conditions.

Supporting Documents

☒	Calculations	see Calculator WEc3
☐	Drawings	
☒	Specifications	Clackamas High School specifications section 15440
☒	Cut Sheets	Manufacturer's cut sheets of installed fixtures with flow rates highlighted
☐	Other	

5. Operating & Maintaining a Green Building

- Post Occupancy Evaluations
- Operations & Maintenance
- Policies
- Purchasing
- Measurement & Verification
- Environmental Management Systems

Case Studies

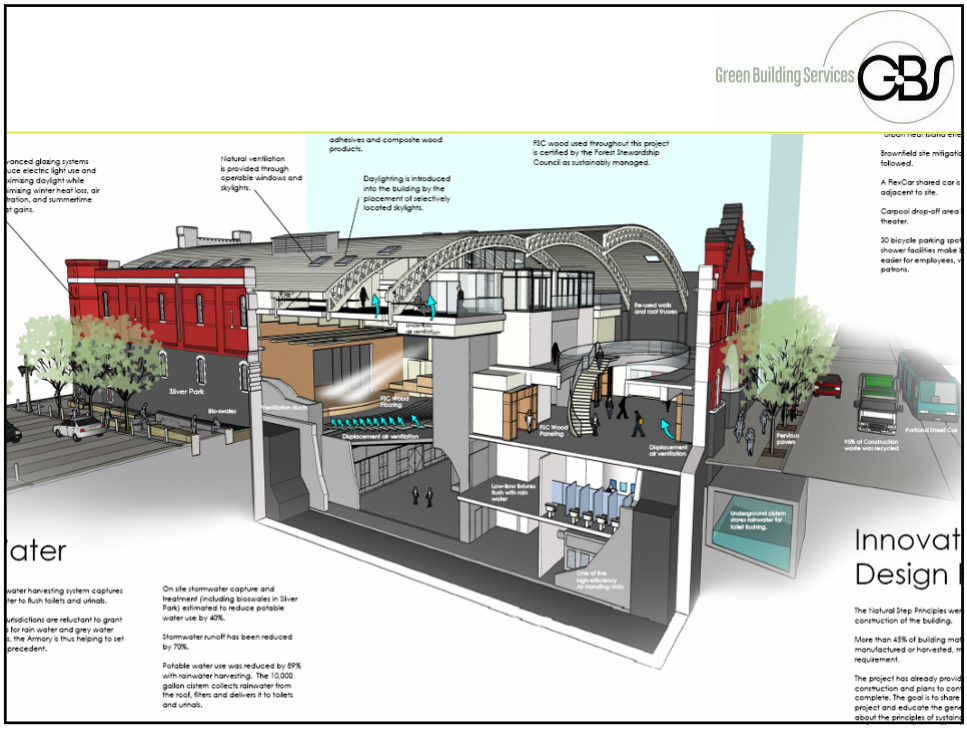
Case Studies

Gerding Theater

LEED Platinum 2006

PA: GBD Architects
Project Size: 55,000 Sq. Ft.
Project Cost: $ NA

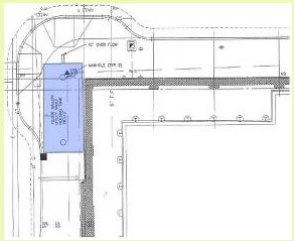
LEED Credit Category	Achieved
Sustainable Sites	11
Water Efficiency	5
Energy and Atmosphere	10
Material and Resources	8
Indoor Environmental Quality	14
Innovation in Design	5
Total	53



The Gerding Theater - Armory

Green Building Services

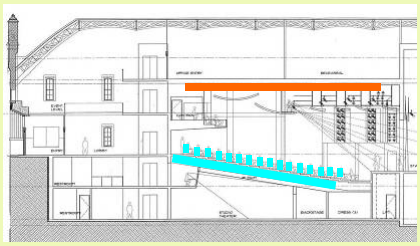
- Water Efficiency
  - Potable water use reduced by 89% with rainwater harvesting. 10,000 gallon cistern collects, filters and delivers rainwater to toilets and urinals
  - Stormwater flow to the sewer system was reduced more than 50%.
- Materials and Resources
  - 95% of construction waste was recycled or salvaged rather than going into landfills.

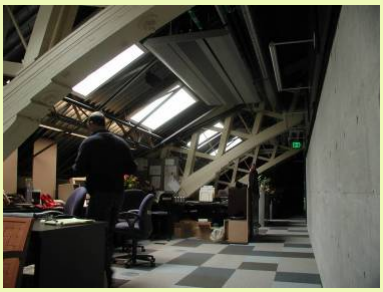


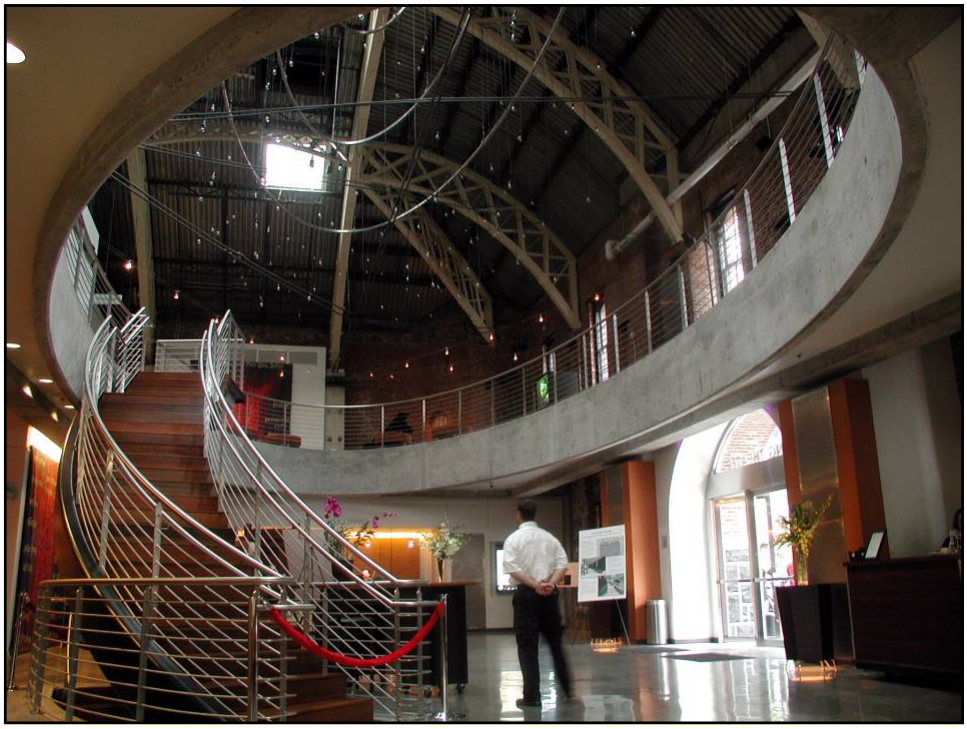
www.greenbuildingservices.com

The Gerding Theater - Armory

- Indoor Environmental Quality
  - Integrated daylight dimming of electrical lights in office spaces.
  - Efficient luminaries in office spaces.
  - Met LEED's minimum 2% daylight factor thresholds for 75% of spaces.
  - Displacement ventilation







Case Studies

Green Building Services GBS

Stoller Winery

Dayton, Oregon Ernest R. Munch Architect LLC

- 75% Energy Cost Savings
- PVs produce 40% of building energy
- Access to Daylight and Views
- Restoration of native meadow
- Recycled Content Materials
- Water Efficient fixtures
- Carbon dioxide monitoring

LEED Gold Certified

www.greenbuildingservices.com

Case Studies

Providence Newberg Medical Center

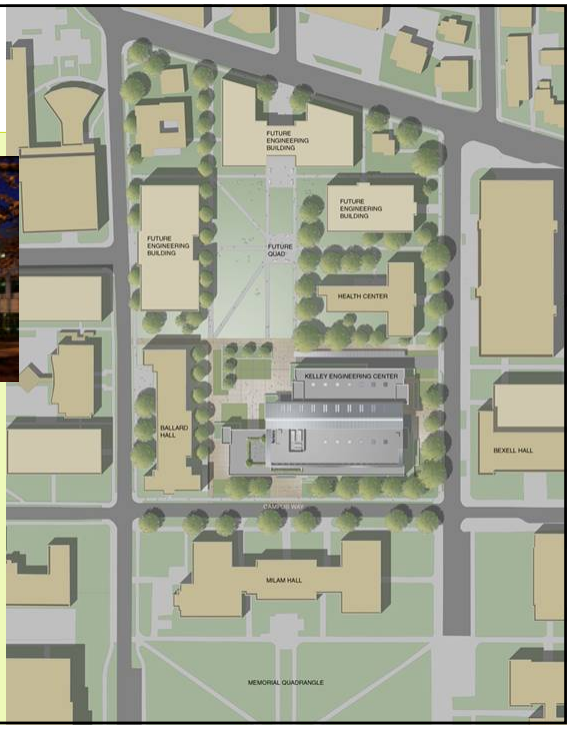
Newberg, Oregon Providence Health System

- 28% Energy Cost Savings
- 100% Green Power purchased
- Use of native and adapted vegetation
- Recycled Content Materials
- Stormwater management plan
- Carbon dioxide monitoring

LEED Gold Certified

KELLEY ENGINEERING

Oregon State University



Sustainable Site + Water

- Building orientation to maximize daylighting opportunities
- Stormwater planters and permeable pavers decrease runoff
- Rainwater capturing from roof drains used to flush toilets and urinals
- Challenge of preserving the trees

Daylighting

Green Building Services

Atrium

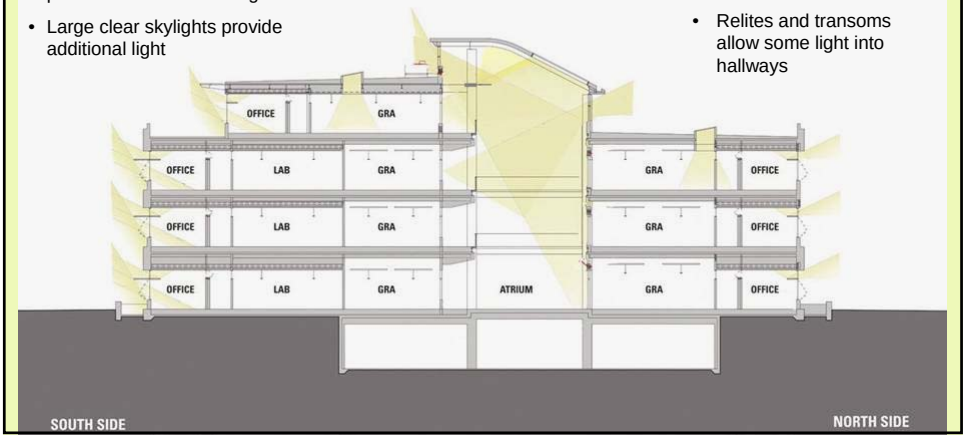
- Clerestory window and light shelf at south provides controlled south light
- Clerestory window at north provides more diffused light
- Large clear skylights provide additional light

Graduate Student Offices

- Receive light from the atrium
- Top floor has translucent skylights to bring light into the back of the space

Faculty Offices

- Sunscreens and light shelves at south
- Light shelves only at north
- Relites and transoms allow some light into hallways



Natural Ventilation

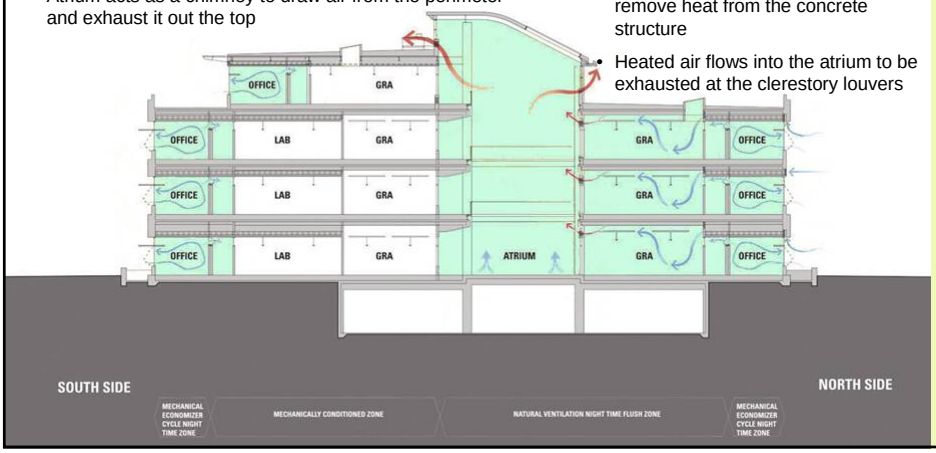
Green Building Services

Perimeter offices are ventilated with operable windows

- Operable windows are controlled by the HVAC system
- Graduate student offices on north are ventilated with transfer ducts routed over the perimeter offices
- Atrium acts as a chimney to draw air from the perimeter and exhaust it out the top

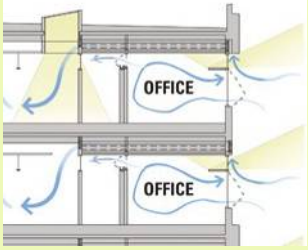
Night Flushing

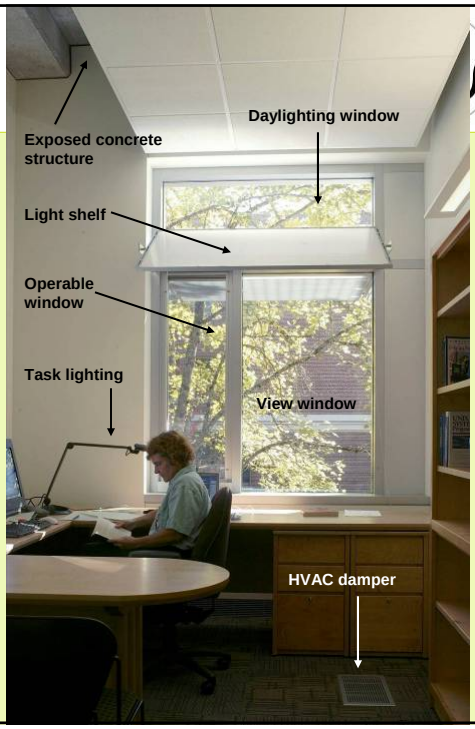
- Concrete structure soaks up heat during the day
- Windows and transfer ducts open at night to allow air into the building to remove heat from the concrete structure
- Heated air flows into the atrium to be exhausted at the clerestory louvers



Perimeter Offices + Hallways

- Operable windows at exterior are controlled by HVAC, but have a manual override function
- When windows are open, HVAC damper in access floor closes
- Operable transom windows allow air and light into the hallways
- Sunscreens at south provide shading from high angle sun
- Light shelves balance light levels in the space and rotate for ease of cleaning
- Photocell dimming and occupancy sensors
- Task lights supplement ambient lighting





Clackamas High School

Clackamas, OR

First LEED certified high school in Oregon - Silver rating.

Grades 9-12
Students 1,800
Area: 250,000 SF
Overall Cost: $30M

BOORA Architects

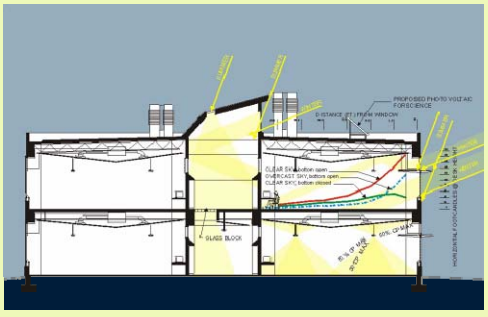
www.greenbuildingservices.com

Envelope Design

- Orientation
- Glazing
- Solar + Light Transmittance
- Shading Devices
- Reflectivity
- Insulation

Daylighting

- Old Concept
- Healthy Environment
- Connection to Outdoors
- Friend & Foe
- Controls
- Free Light
- Reduced Mechanical

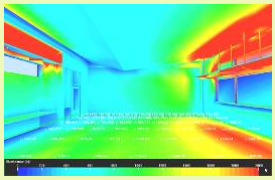


Daylighting Analysis

January 1 | 12:00pm | Clear Sky

March 1 | 12:00pm | Clear Sky

September 1 | 12:00pm | Clear Sky

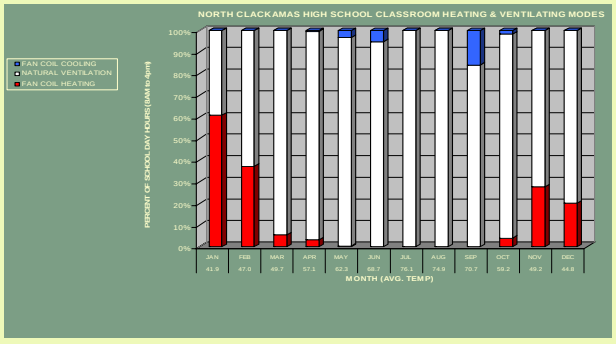


Daylighting Analysis

Lighting Lab

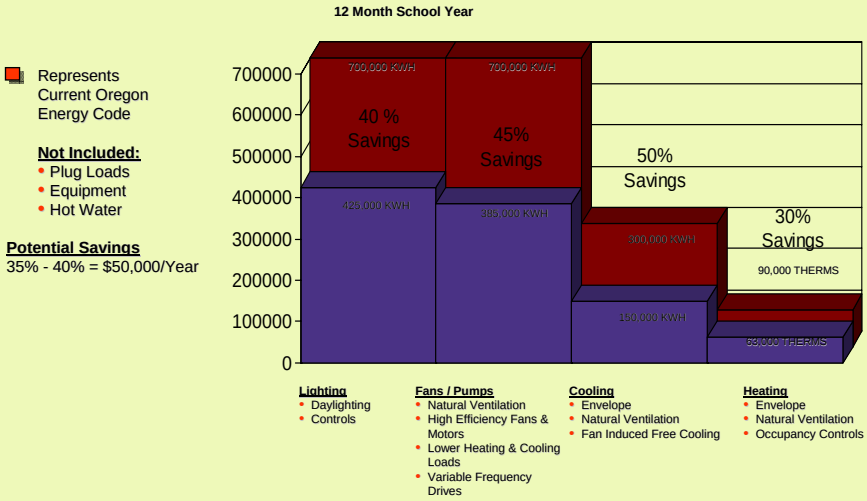
Classroom Heating + Ventilating Modes

- At 45 degrees full heating.
- Includes December, March and June Vacations.



Potential Energy Savings

Green Building Services GBS



Registered & Certified Schools

Green Building Services GBS

180+ schools registered under LEED-NC

30 K-12 schools certified under LEED-NC (as of Sept. 2006)

- Third Creek Elementary School
  Statesville, NC (Gold)
- Langston-Brown High School
  Continuation & Community Center
  Arlington, VA (Silver)
- Goodwillie Environmental School
  Grand Rapids, MI (Certified)
- Clackamas High School
  Clackamas, OR (Silver)
- Baca/Dlo'ay azhi Community School
  Prewitt, NM (Certified)

Langston-Brown HS

Kulamalu Town Center

Green Building Services

Reduction in potable water use for irrigation **100%**

Stormwater managed on-site **100%**

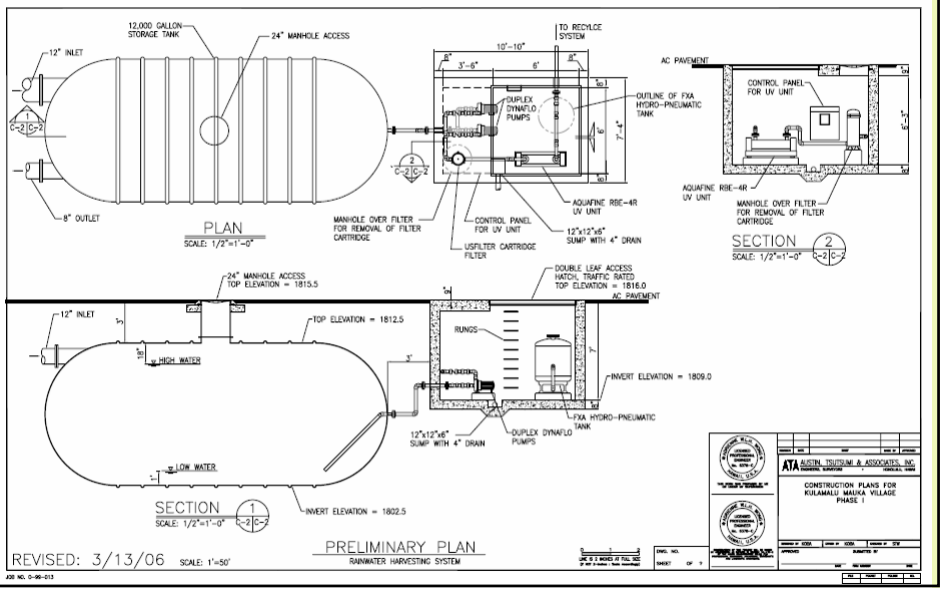
Water use reduction compared to EPAct 1992 **89%**

Energy cost reduction compared to ASHRAE 90.1-1999 **35%**

- Seeking LEED Silver to Gold

Kulamalu Town Center

Green Building Services



www.greenbuildingservices.com

Makena Resort

Makena Recreation Center

Energy cost reduction compared to Maui Energy Code **32%**

Water use reduction compared to 1992 EPAct **20%**

Reduction in potable water use for irrigation **50%**

Construction Waste Salvaged or recycled **50%**

Green Power from BP **100%**

- Seeking LEED Gold

www.greenbuildingservices.com

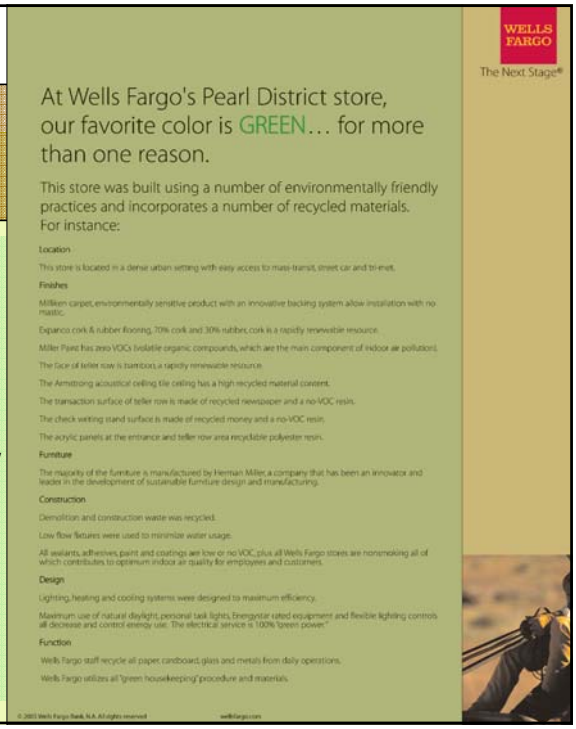
Wells Fargo Pearl District Achieved LEED Gold

Fast Track LEED-CI Gold

Eight weeks, integrated team effort

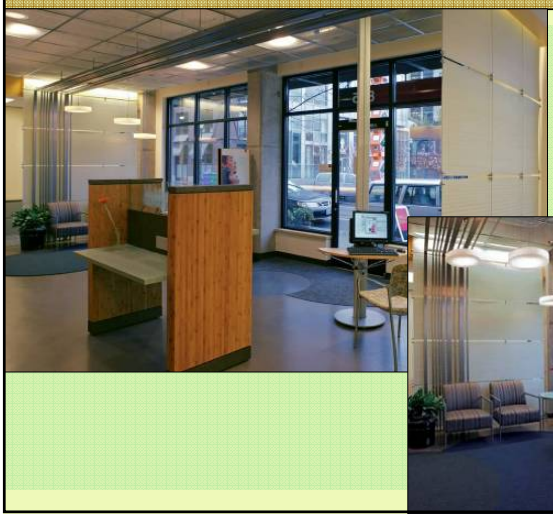
Wells Fargo Pearl District

- **Energy**: lighting is 25% better than code
- **Water**: 63% reduction over EPAC
- **IAQ**
  - 100% of materials are low emitting
  - 96% of employees have access to views



www.greenbuildingservices.com

Wells Fargo-Pearl Branch
LEED-CI Gold



Materials

- 100 % wood products FSC
- 57% construction waste recycling
- 23% of materials had recycled content

Dowling Co. TI, Maui, HI
LEED CI Certified

Existing project 5 years since last remodel

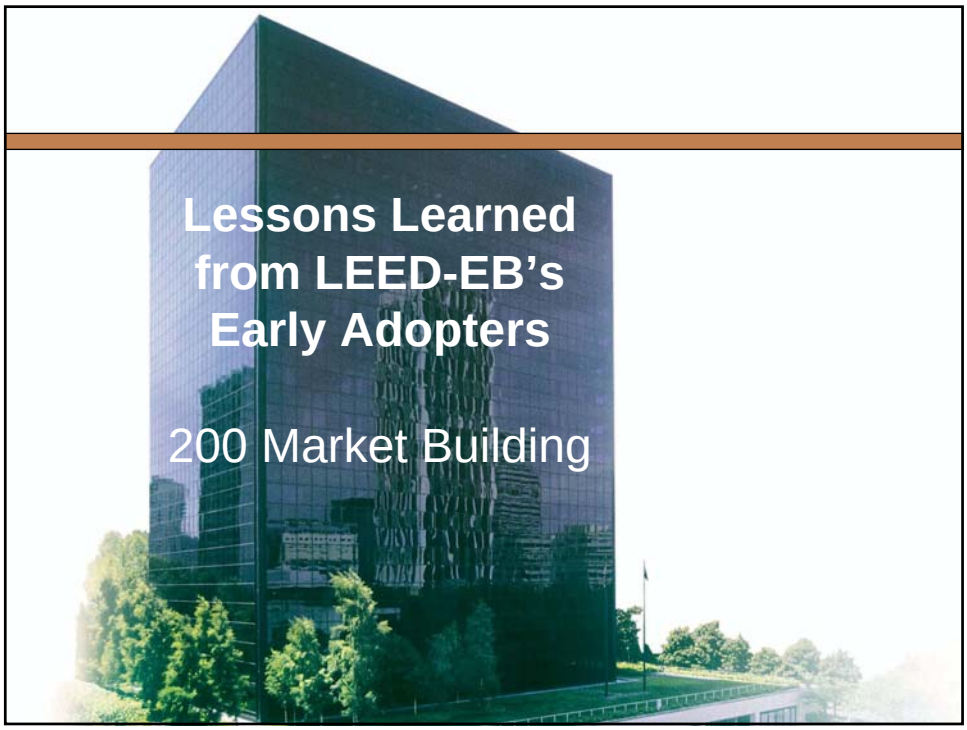
Lessons Learned:

•CFC's in refrigeration

•Lighting Power Density exceeded ASHRAE by 35%

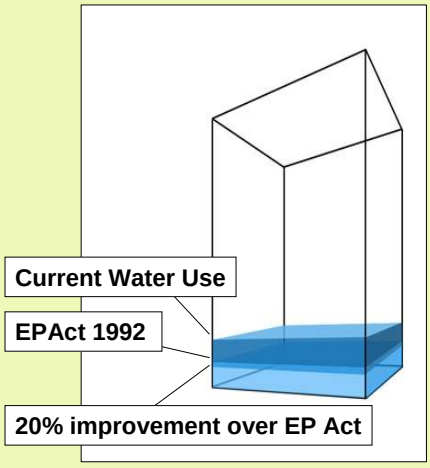
•Water fixtures did not meet Energy Policy Act of 1992


LEED-CI CERTIFIED 2009
U.S. GREEN BUILDING COUNCIL
LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN


Lessons Learned from LEED-EB's Early Adopters
200 Market Building

200 Market
Water Use Reduction

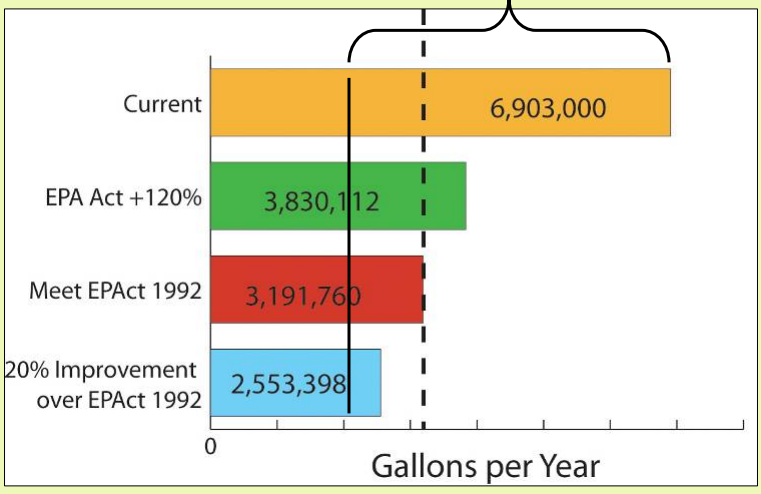
Annual Water Use



Russell Development Company, Inc Cushman & Wakefield

200 Market
Water Use Reduction

Actual reduction: 70% or 4.8 million gal./yr.



200 Market
Water Use Reduction

$53,000 Investment

1.5 Year Pay Back Period

67% Return on Investment

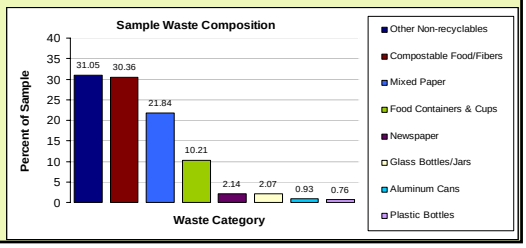
Fixtures	Current	EPAct 1992
Water Closets	4.6 gpf	1.6 gpf
Urinals	3.6 gpf	1.0 gpf
Faucets	2.5 gpm	0.5 gpm

Achieved 31.63% Water Use Reduction beyond EPAct

200 Market
Occupant Recycling

83% Waste Diverted from the Landfill

- Mixed paper
- Newspaper
- Food Containers and Cups
- Aluminum
- Plastic Bottles
- Glass Bottles and Jars
- Non-Recyclables
- Compostable Food/Fibers



200 Market
Achieved LEED EB Gold

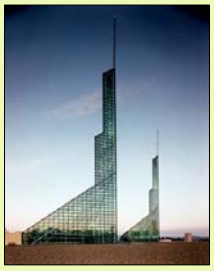
49 Points

Russell Development Company, Inc

Cushman & Wakefield

Oregon Convention Center
Implement Policy and Practices

- Achieved LEED Certified 2004
- Goals for 2007 LEED Gold
  - Major Chiller Retrofit
  - Replace water closets
  - Provide Salmon Safe Audit
  - Implemented Environmental Management System
  - Implemented a solid waste audit including food waste
  - Monthly team coordination
  - Extensive tracking of purchases
  - Estimated Energy Star Benchmarking of 70



Establish Monthly Meeting Schedule

1. Conducted a Comprehensive Sustainability Audit
2. Project kick off and employee LEED training
3. LEED EB and Management System Consulting
4. LEED-EB and Management System Implementation
5. LEED-EB Documentation and Quarterly Tracking
6. LEED-EB Submittal, Review and Recertification

Feedback-Communications-Feedback-Communications

Oregon Convention Center Water Efficiency

- 30% Water use reduction

Oregon Convention Center Water Usage

WEp1 Baseline Comparison

# of occupants[1]	Annual Water Usage[2,3]	EPAct Baseline	LEED-EB WEp1 Baseline[4]	Meets WEp1 (Y or N)
3794	9,581,277 gal.	8,404,892	10,085,870 gal.	Y

Notes:
1.) Occupant numbers were obtained from Oregon Convention Center's facility's department.
2.) Annual Water consumption calculate by multiplying daily water usage by 365 work days per year.
3.) Water Usage was calculated using USGBC's LEED-NC v2.0 WEc3 calculation methodology.
4.) WEp1 Baseline is calcuated by taken EPAct Baseline Usage and multiplying it by 120%.

Estimated Annual Water Cost Savings ($ US)

Convention Center	Estimated Annual Water Usage (gal.)	Monthly Usage	Annual Water & Sewer Cost
Existing Conditions	9,581,277	798,440	$88,216
After Upgrades for LEED-EB	6,668,608	55,717	$61,270
Annual Savings			**$26,946**

Alternative Transportation

Staff Members	Bus	MAX Light rail	Personal Vehicle	FlexCar	Hybrid Vehicle	Electric Vehicle	Carpool or Vanpool	Bicycle	Walk	TOTAL Miles
Jeff Blosser										0
Karen Totaro										0
Mike Brown										0
Mark Hunter										0
Matt Uchtman										0
Dennis Miller										0
Mike Wilson										0
										0
										0
										0
										0
										0
										0
										0
										0
										0
										0
TOTAL	0	0	0	0	0	0	0	0	0	0

Instructions:
Please enter the miles per week travelled by each staff member under the respective mode of transportation.

Staff Education and Training

	Universal CFC	Electrical (LME)	Boiler	OSHA 10-Hour	ANSI Z92 Aerial Platform	First Aid	Siemens Apogee	Siemens MVL	Locksmith	Leadership	Self Study and Other Training
Todd Murphy				Authorized Instructor		X	620			Frontline Leadership	Interviewing & Assessment Skills, Management Essentials
Bob Mansfield	X	X	Cole Class	X			620, 625	X		X	
Tim Klaver	Type I & III		Cole Class	X			620, 625, 630, 635			X	Power Transmission, Piping Systems, Three Phase Systems
Gary Ware				X			620, 625, 630	X			
Don Andrews	X	In process					620, 625				
Ed Pierce	Type II & III		Cole Class	X	X				PCC Program	X	
Jesus Gama				X	X				PCC Program		
Russell Solis											
2001 - 2005 (Hours)	32		24	92	2	4	384	64		44	64
Total Hours	700										
Hours per year	140										
Hours per year/empl.	17.5										

Tracking Cleaning Products

Date	Manufacture	Product Use	Trade Name	Green Seal GS-37	CACode of Regulations	CCR VOC Standard	Product's VOC	Unit Cost	Quantity	Total Cost
9/1/06		Gloves	Glove Disp Vinyl Exam Powderless					$9.66	6	$57.96
9/1/06		Liners	43x48 Liner 2.0 Mil 100/cs clear					$60.65	15	$909.75
6/1/06		Cleaner	Gum off remover					$3.87	24	$92.88
6/1/06		Cleaner	Clean sheen 4 gl/cs					$15.41	1	$15.41
6/1/06		Sealer	Hard rock sealer 4 gl/cs					$10.39	1	$10.39
6/1/06		Sealer	Hard rock sealer 5 gl					$43.95	5	$219.75
6/1/06		Cleaner	#61 SE QM Glass & Surface Clnr					$24.30	16	$388.80
6/1/06		Cleaner	#62 SE QM Carpet cleaner 4-1GL					$22.50	16	$360.00
6/1/06		Cleaner	#64 SE QM Neutral cleaner 4-1g					$25.50	16	$408.00
6/1/06		Cleaner	#66 SE QM Disinfectant Sanitiz					$20.50	16	$328.00
6/1/06		Cleaner	#71 SE QM Toilet and urinal clnr					$30.00	16	$480.00
6/1/06		Gloves	13" glove sml 7 nitrile gn					$1.92	24	$46.08
6/1/06		Gloves	13" glove xlg 10 nitrile gn					$1.92	24	$46.08
6/1/06		Gloves	Glose gp disp vinyl sml 100/bx					$5.24	24	$125.76

Low Environmental Impact Cleaning Policy

Monthly Reports	Tracking Period '06-'07			
	October	*November*	*December*	*January*
Low Environmental Impact Cleaning Policy				
Name of person currently responsible for making sure that the Low Environmental Impact Cleaning Policy is being effectively implemented.				
Date they were contacted for the quarterly report information / provided quarterly report information listed below.	Sept. 20, 2006	-	-	-
Questions to be answered monthly:				
Has the Low Environmental Impact Cleaning Policy program been maintained over the last quarter? (Y or N)				
Has the Low Environmental Impact Cleaning Policy continued to work well over the last quarter? (Y or N)				
What are the best available Low Environmental Impact Cleaning Policy quantities for the last quarter and the year to date?				
Are the Low Environmental Impact Cleaning Policy quantities for the last quarter and the year to date on track for achieving the annual irrigation water use reduction goals for the building?				
Are there any problems with the Cleaning Policy that need to be remedied? (Insert a numbered list of problems or insert "None")				
If any problems with this program were identified, how have these been remedied? (Insert a numbered list of remedies or insert "None")				
Are there any opportunities for improving the Cleaning Policy? (insert a numbered list of opportunities or insert "None")				
If any opportunities for improvements were identified, how have these been implemented? (List opportunities and how each has been implemented or "None")				

Vernier Software & Technology

- Built in 1960,
- 30,000 sq. ft. single story commercial office and manufacturing facility

Vernier Software & Technology

- Installed New Energy Star Roof
- New Photo Voltaic System
- 5 New High Efficient Rooftop Units
- Achieved Energy Star Rating of 86
- Purchasing
- Green Education

Vernier Software & Technology

Photovoltaic Panels

- 64 panels in three arrays
- 3 PV powered inverters in operation
  - 1 additional already installed for future PVs on front of building
- Predicted annual energy production = 14,267 kwh
- Percent of electrical energy produced by PVs = 4.8%
- Future Plan: Building integrated PVs on building front
  - Different type of PVs will be educational as a comparison

Vernier Software & Technology Achieved LEED Gold

Thank You!

Ralph DiNola
Principal
Green Building Services, Inc.

Elaine Aye
Principal
Green Building Services, Inc.

www.greenbuildingservices.com