Green Leasing to a Government Tenant: Delivering High Performance Buildings at Potomac Yard

Elizabeth W. Adams

CRESCENT RESOURCES LLC

Sandra Leibowitz Earley

Sustainable Design Consulting

Fulya Kocak

DAVIS CONSTRUCTION

Architecture Exchange East

November 3, 2006

Potomac Yard: Introduction

- Three Perspectives:
  - The Developer, who made business decisions to provide high performance buildings, and to draw lines in order to keep the construction process on track
  - The LEED / Green Building Consultant who found her place in the middle of the process
  - The General Contractor, whose dedicated efforts and attention to detail have made this project a success

- Through effective business relationships and management, the fast-track project achieved a level of environmental performance that is ultimately available to all speculative buildings.

Potomac Yard Master Plan

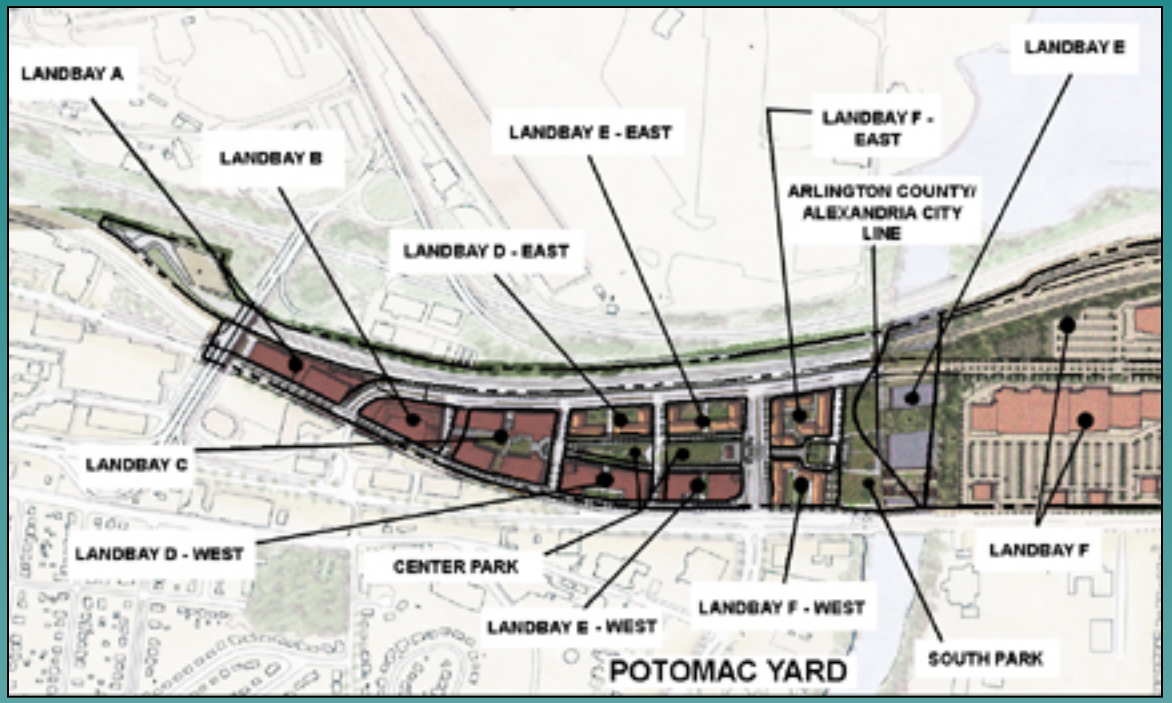
North Tract

Reagan National Airport

Arlington

Alexandria

Land Bays at Potomac Yard Arlington



Aerial of Potomac Yard Arlington Before Construction

Aerial of One and Two Potomac Yard

One and Two Potomac Yard Completed

One & Two Potomac Yard Project Information

- Two towers, each 12 stories tall
- 9 floors of office, 650,000 sf total
- 6 levels of garage
  (3 above grade, 3 below)
- EPA is lead tenant with
  more than 405,000 sf
- Construction start May 2004
- Completed March 2006

Potomac Yard: The Story

- Originally conceived as a pair of conventionally designed, speculative office buildings, had already gone out to bid.
- GSA released a Solicitation for Offers (SFO) for 400,000+ square feet for the U.S. EPA. This incentive effectively changed “everything” and threw everyone into the mixing bowl of delivering green buildings.
- The GSA/EPA SFO required LEED Silver certification, but it also required Federal green building standards.
- The team embarked upon a lengthy process of building trust and building team expertise.

Project Goals and Objectives

- Goals:
  - Sustainable Development: Meet needs of the present without compromising ability of future generations to meet their needs
  - Crescent Resources Mission Statement: Care for the environment and the communities we serve
- Objectives:
  - EPA: Meet lease requirements
  - LEED: Earn at least Silver Rating for each building

EPA Lease Requirements

- Indoor Air Quality (IAQ) Testing – during construction and before occupancy
- Low-VOC materials
- Energy savings of 20% and ENERGY STAR® building label
- Recycled-content products according to EPA's Comprehensive Procurement Guidelines (CPG)
- Construction-waste management program
- HVAC-system performance standards, including airflow and filter requirements
- Bicycle storage and changing and shower facilities
- Recycling rooms

LEED for New Construction and Major Renovations (LEED–NC)

CERTIFICATION LEVEL	POINTS REQUIRED
Certified	26 – 32
Silver	33 – 38
Gold	39 – 51
Platinum	52 or more

LEED-NC Prerequisites and Credits

GREEN-BUILDING CATEGORY	PREREQUISITES	CREDITS	POINTS POSSIBLE
Sustainable Sites (SS)	1	8	14
Water Efficiency (WE)	–	3	5
Energy & Atmosphere (EA)	3	6	17
Materials & Resources (MR)	1	7	13
Indoor Environmental Quality (EQ)	2	8	15
Innovation & Design Process (ID)	–	2	5
TOTAL	7	34	69

LEED Certification Process

- **Registration** – early in design process
- **Documentation** – throughout design and construction periods
- **Application** – at end of construction period
- **Administrative Approval** – after submission of complete application
- **Preliminary LEED Review** – 30 days after administrative approval
- **Supplementary Submittal** – 30 days after receiving preliminary review
- **Second Preliminary LEED Review (Optional)** – if two or more audited credits are denied
- **Second Supplementary Submittal (Optional)** – 30 days after receiving second preliminary review
- **Final LEED Review** –3 weeks after receiving supplementary submittal

One and Two Potomac Yard Project Team

- **Developer/Owner**: Crescent Resources LLC
- **Architect and Interior Design**: Davis Carter Scott
- **Structural Engineer**: Fernandez & Associates Structural Engineers, P.C.
- **Mechanical & Electrical Engineer**: Girard Engineering
- **Civil Engineer**: christopher consultants, ltd.
- **Landscape Architect**: Oculus
- **Lighting Design**: Moran Coventry Lighting Associates
- **Energy Modeler**: Econergy International Corporation
- **General Contractor**: James G. Davis Construction Corporation
- **Site Contractor**: Metro Earthworks
- **Commissioning Agent**: Advanced Building Performance, Inc.
- **IAQ Testing**: Healthy Buildings International
- **LEED / Green Building Consultant**: Sustainable Design Consulting, LLC
- **Attorney**: Edward V. Gregorowicz
- **Leasing**: Millenium Realty Advisors
- **Property Manager**: Woodmark Real Estate Services
- **Primary Tenant**: U.S. Environmental Protection Agency
- **Tenant Representative**: U.S. General Services Representative
- **Tenant Coordinator**: Kramer Consulting

One Potomac Yard: LEED Scorecard

43		26	**Total Project Score**	Possible Points 69

Certified 26 to 32 points Silver 33 to 38 points Gold 39 to 51 points Platinum 52 or more points

Y	?	N			
10		**4**	**Sustainable Sites**	Possible Points	14
Y			Prereq 1	**Erosion & Sedimentation Control**	
1			Credit 1	**Site Selection**	1
1			Credit 2	**Urban Redevelopment**	1
1			Credit 3	**Brownfield Redevelopment**	1
1			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Room	1
1			Credit 4.3	**Alternative Transportation**, Alternative Fuel Refueling Station	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
		1	Credit 5.1	**Reduced Site Disturbance**, Protect or Restore Open Space	1
		1	Credit 5.2	**Reduced Site Disturbance**, Development Footprint	1
		1	Credit 6.1	**Stormwater Management**, Rate and Quantity	1
1			Credit 6.2	**Stormwater Management**, Treatment	1
1			Credit 7.1	**Heat Island Reduction**, Non-Roof	1
1			Credit 7.2	**Heat Island Reduction**, Roof	1
		1	Credit 8	**Light Pollution Reduction**	1
4		**1**	**Water Efficiency**	Possible Points	5
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
1			Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
		1	Credit 2	**Innovative Wastewater Technologies**	1
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1			Credit 3.2	**Water Use Reduction**, 30% Reduction	1
7		**10**	**Energy & Atmosphere**	Possible Points	17
Y			Prereq 1	**Fundamental Building Systems Commissioning**	
Y			Prereq 2	**Minimum Energy Performance**	
Y			Prereq 3	**CFC Reduction in HVAC&R Equipment**	
2			Credit 1.1	**Optimize Energy Performance**, 20% New / 10% Existing	2
1		1	Credit 1.2	**Optimize Energy Performance**, 30% New / 20% Existing	2
		2	Credit 1.3	**Optimize Energy Performance**, 40% New / 30% Existing	2
		2	Credit 1.4	**Optimize Energy Performance**, 50% New / 40% Existing	2
		2	Credit 1.5	**Optimize Energy Performance**, 60% New / 50% Existing	2
		1	Credit 2.1	**Renewable Energy**, 5%	1
		1	Credit 2.2	**Renewable Energy**, 10%	1
		1	Credit 2.3	**Renewable Energy**, 20%	1
1			Credit 3	**Additional Commissioning**	1
1			Credit 4	**Ozone Protection**	1
1			Credit 5	**Measurement & Verification**	1
1			Credit 6	**Green Power**	1
6		**7**	**Materials & Resources**	Possible Points	13
Y			Prereq 1	**Storage & Collection of Recyclables**	
		1	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Shell	1
		1	Credit 1.2	**Building Reuse**, Maintain 100% of Existing Shell	1
		1	Credit 1.3	**Building Reuse**, Maintain 100% Shell & 50% Non-Shell	1
1			Credit 2.1	**Construction Waste Management**, Divert 50%	1
		1	Credit 2.2	**Construction Waste Management**, Divert 75%	1
		1	Credit 3.1	**Resource Reuse**, Specify 5%	1
		1	Credit 3.2	**Resource Reuse**, Specify 10%	1
1			Credit 4.1	**Recycled Content**, Specify 5%	1
1			Credit 4.2	**Recycled Content**, Specify 10%	1
1			Credit 5.1	**Local/Regional Materials**, 20% Manufactured Locally	1
1			Credit 5.2	**Local/Regional Materials**, of 20% Above, 50% Harvested	1
		1	Credit 6	**Rapidly Renewable Materials**	1
1			Credit 7	**Certified Wood**	1
11		**4**	**Indoor Environmental Quality**	Possible Points	15
Y			Prereq 1	**Minimum IAQ Performance**	
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Contro**	
1			Credit 1	**Carbon Dioxide** (CO_2) **Monitoring**	1
		1	Credit 2	**Ventilation Effectiveness**	1
1			Credit 3.1	**Construction IAQ Management Plan**, During Const	1
1			Credit 3.2	**Construction IAQ Management Plan**, Before Occ	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints	1
1			Credit 4.3	**Low-Emitting Materials**, Carpet	1
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood	1
1			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
		1	Credit 6.1	**Controllability of Systems**, Perimeter	1
		1	Credit 6.2	**Controllability of Systems**, Non-Perimeter	1
1			Credit 7.1	**Thermal Comfort**, Comply with ASHRAE 55-1992	1
1			Credit 7.2	**Thermal Comfort**, Permanent Monitoring System	1
		1	Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
1			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1
5			**Innovation & Design Process**	Possible Points	5
1			Credit 1.1	**Innovation in Design:** 40% Local Mat'ls or Add'l Recycled	1
1			Credit 1.2	**Innovation in Design:** Green Housekeeping Plan	1
1			Credit 1.3	**Innovation in Design:** User Education Program	1
1			Credit 1.4	**Innovation in Design:** 40% Water Efficiency	1
1			Credit 2	**LEED™ Accredited Professional**	1

Two Potomac Yard: LEED Scorecard

42		27	**Total Project Score**	Possible Points 69

Certified 26 to 32 points Silver 33 to 38 points Gold 39 to 51 points Platinum 52 or more points

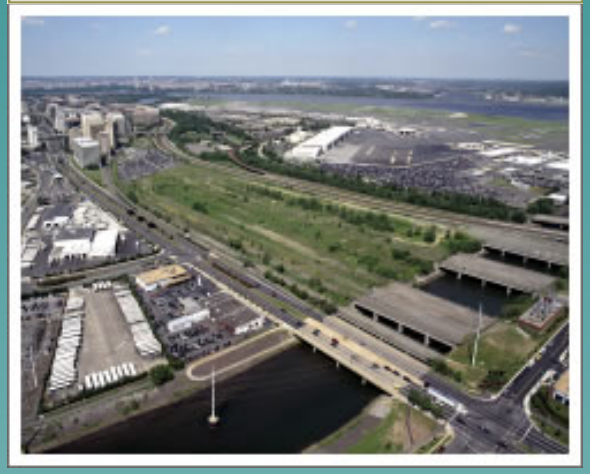
Y	?	N			
11		**3**	**Sustainable Sites**	Possible Points	**14**
Y			Prereq 1	**Erosion & Sedimentation Control**	
1			Credit 1	**Site Selection**	1
1			Credit 2	**Urban Redevelopment**	1
1			Credit 3	**Brownfield Redevelopment**	1
1			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Room	1
1			Credit 4.3	**Alternative Transportation**, Alternative Fuel Refueling Station	1
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
1			Credit 5.1	**Reduced Site Disturbance**, Protect or Restore Open Space	1
		1	Credit 5.2	**Reduced Site Disturbance**, Development Footprint	1
		1	Credit 6.1	**Stormwater Management**, Rate and Quantity	1
1			Credit 6.2	**Stormwater Management**, Treatment	1
1			Credit 7.1	**Heat Island Reduction**, Non-Roof	1
1			Credit 7.2	**Heat Island Reduction**, Roof	1
		1	Credit 8	**Light Pollution Reduction**	1
4		**1**	**Water Efficiency**	Possible Points	**5**
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
1			Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
		1	Credit 2	**Innovative Wastewater Technologies**	1
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
1			Credit 3.2	**Water Use Reduction**, 30% Reduction	1
5		**12**	**Energy & Atmosphere**	Possible Points	**17**
Y			Prereq 1	**Fundamental Building Systems Commissioning**	
Y			Prereq 2	**Minimum Energy Performance**	
Y			Prereq 3	**CFC Reduction in HVAC&R Equipment**	
2			Credit 1.1	**Optimize Energy Performance**, 20% New / 10% Existing	2
		2	Credit 1.2	**Optimize Energy Performance**, 30% New / 20% Existing	2
		2	Credit 1.3	**Optimize Energy Performance**, 40% New / 30% Existing	2
		2	Credit 1.4	**Optimize Energy Performance**, 50% New / 40% Existing	2
		2	Credit 1.5	**Optimize Energy Performance**, 60% New / 50% Existing	2
		1	Credit 2.1	**Renewable Energy**, 5%	1
		1	Credit 2.2	**Renewable Energy**, 10%	1
		1	Credit 2.3	**Renewable Energy**, 20%	1
1			Credit 3	**Additional Commissioning**	1
1			Credit 4	**Ozone Protection**	1
		1	Credit 5	**Measurement & Verification**	1
1			Credit 6	**Green Power**	1

Y	?	N			
6		**7**	**Materials & Resources**	Possible Points	**13**
Y			Prereq 1	**Storage & Collection of Recyclables**	
		1	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Shell	1
		1	Credit 1.2	**Building Reuse**, Maintain 100% of Existing Shell	1
		1	Credit 1.3	**Building Reuse**, Maintain 100% Shell & 50% Non-Shell	1
1			Credit 2.1	**Construction Waste Management**, Divert 50%	1
		1	Credit 2.2	**Construction Waste Management**, Divert 75%	1
		1	Credit 3.1	**Resource Reuse**, Specify 5%	1
		1	Credit 3.2	**Resource Reuse**, Specify 10%	1
1			Credit 4.1	**Recycled Content**, Specify 25%	1
1			Credit 4.2	**Recycled Content**, Specify 50%	1
1			Credit 5.1	**Local/Regional Materials**, 20% Manufactured Locally	1
1			Credit 5.2	**Local/Regional Materials**, of 20% Above, 50% Harvested	1
		1	Credit 6	**Rapidly Renewable Materials**	1
1			Credit 7	**Certified Wood**	1
11		**4**	**Indoor Environmental Quality**	Possible Points	**15**
Y			Prereq 1	**Minimum IAQ Performance**	
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Contro**	
1			Credit 1	**Carbon Dioxide** (CO_2) **Monitoring**	1
		1	Credit 2	**Ventilation Effectiveness**	1
1			Credit 3.1	**Construction IAQ Management Plan**, During Cons	1
1			Credit 3.2	**Construction IAQ Management Plan**, Before Occ	1
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
1			Credit 4.2	**Low-Emitting Materials**, Paints	1
1			Credit 4.3	**Low-Emitting Materials**, Carpet	1
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood	1
1			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
		1	Credit 6.1	**Controllability of Systems**, Perimeter	1
		1	Credit 6.2	**Controllability of Systems**, Non-Perimeter	1
1			Credit 7.1	**Thermal Comfort**, Comply with ASHRAE 55-1992	1
1			Credit 7.2	**Thermal Comfort**, Permanent Monitoring System	1
		1	Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
1			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1
5			**Innovation & Design Process**	Possible Points	**5**
1			Credit 1.1	**Innovation in Design:** 40% Local Mat'l or Add'l Recycled	1
1			Credit 1.2	**Innovation in Design:** Green Housekeeping	1
1			Credit 1.3	**Innovation in Design:** User education plan	1
1			Credit 1.4	**Innovation in Design:** 40% Water Efficiency	1
1			Credit 2	**LEED™ Accredited Professional**	1

Sustainable Sites: Land Use Strategies

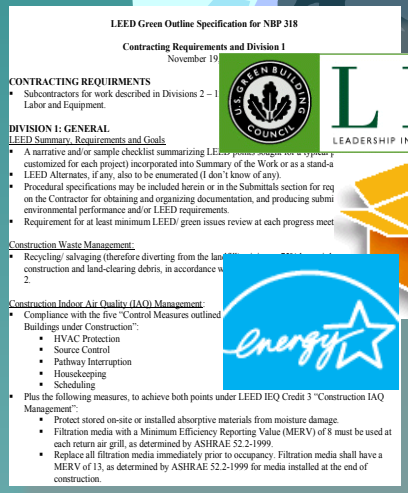
- Prereq 1: Erosion & Sedimentation Control
  - Plan per Arlington County & VA regulations
- Credit 1: Site Selection
  - Site without sensitive elements or restricted land types
- Credit 2: Development Density
  - Site surrounded by dense development
- Credit 3: Brownfield Redevelopment
  - Former rail yard
- Credit 4: Alternative Transportation
  - 2 WMATA bus lines, Metro, & VRE
  - Bicycle storage & changing & shower facilities
  - Electric-vehicle fueling stations
  - Parking at 50% of market; car & van pool spaces

POTOMAC YARD
THE GREEN CITY



Site and Building Design: Challenges and Opportunities

- Multi-faceted design and specification revisions prior to construction start
- Overlay of LEED and EPA criteria, along with County requirements, etc.
- Role of LEED Consultant as guide through the maze of LEED options and nuances



LEED Green Outline Specification for NBP 318

Contracting Requirements and Division 1

November 19

CONTRACTING REQUIREMENTS

- Subcontractors for work described in Divisions 2 – 1
  Labor and Equipment.

DIVISION 1: GENERAL

LEED Summary, Requirements and Goals

- A narrative and/or sample checklist summarizing LEE
  customized for each project) incorporated into Summary of the Work or as a stand-a
- LEED Alternates, if any, also to be enumerated (I don't know of any).
- Procedural specifications may be included herein or in the Submittals section for req
  on the Contractor for obtaining and organizing documentation, and producing submi
  environmental performance and/or LEED requirements.
- Requirement for at least minimum LEED/ green issues review at each progress meet

Construction Waste Management:

- Recycling/ salvaging (therefore diverting from the lan
  construction and land-clearing debris, in accordance w
  2.

Construction Indoor Air Quality (IAQ) Management:

- Compliance with the five "Control Measures outlined
  Buildings under Construction":
  - HVAC Protection
  - Source Control
  - Pathway Interruption
  - Housekeeping
  - Scheduling
- Plus the following measures, to achieve both points under LEED IEQ Credit 3 "Construction IAQ Management":
  - Protect stored on-site or installed absorptive materials from moisture damage
  - Filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grill, as determined by ASHRAE 52.2-1999.
  - Replace all filtration media immediately prior to occupancy. Filtration media shall have a MERV of 13, as determined by ASHRAE 52.2-1999 for media installed at the end of construction.

Sustainable Sites: Site Design Strategies

- Credit 5: Reduced Site Disturbance (Two Potomac Yard Only)
  - Restore land adjacent to development
- Credit 6: Stormwater Management
  - Followed Arlington County / Chesapeake Bay requirements
  - Stormwater treated by sand filtration system
- Credit 7: Heat Island Effect
  - Design of non-roof and roof areas mitigate negative effects on microclimate
  - Roof canopy required by Arlington – complicated achievement of this credit
- Credit 8: Light Pollution Reduction
  - Minimized “light trespass”, but not enough for the LEED point

Water Efficiency: Site and Building

- Credit 1: Water-Efficient Landscaping
  - Drought-resistant plants eliminate need for irrigation systems

- Credit 3: Water Use Reduction
  - Occupied buildings use over 40% less water than building baselines
  - Reconfirmation of dual-flush toilet permissibility with Arlington County

Energy and Atmosphere

- Prereq 1: Fundamental Building Systems Commissioning
  - Independent commissioning agent
- Prereq 2: Minimum Energy Performance
  - ASHRAE/IESNA Standard 90.1-1999
- Prereq 3: CFC Reduction in HVAC&R Equipment
  - CFC-free HVAC & refrigeration systems
- Credit 1: Optimize Energy Performance
  - Energy over 20% costs below ASHRAE/IESNA Standard 90.1-1999 baseline
- Credit 3: Additional Commissioning
  - Additional review of construction documents, commissioning manual, O&M staff training

Energy Star Certification also required for both buildings

Energy and Atmosphere (cont.)

- Credit 4: Ozone Protection
  - HCFC- & Halon-free HVAC & refrigeration systems

- Credit 5: Measurement and Verification
  (One Potomac Yard only)
  - Continuous metering equipment
  - Meeting EPA requirements in Two Potomac Yard, but not enough for the LEED point

- Credit 6: Green Power
  - EPA elected to pay for more than the total amount required of Green-E-certified power

Materials and Resources: Design, Selection and Specifications

- Prerequisite: Storage & Collection of Recyclables
- Credit 2: Construction-Waste Management
  - Almost 75% of construction debris diverted from landfills
- Credit 4: Recycled Content
  - Value of post-consumer recycled content + ½ post-industrial recycled content = 10% of value of all materials
  - Very important to the OSWER!
- Credit 5: Regional Materials
  - Over 40% regionally manufactured
  - Over 10% regionally extracted/harvested/recovered
- Credit 6: Certified Wood
  - More than 50% of wood products in buildings use wood from FSC-certified forests

Source: FSC

Indoor Environmental Quality

- Prereq 1: Minimum IAQ Performance
  - Comply with ASHRAE 62-1999
- Prereq 2: Environmental Tobacco Smoke (ETS) Control
  - No smoking in building, designated outside smoking areas away from entryways
- Credit 1: Carbon Dioxide Monitoring
  - Building-management control systems
- Credit 3: Construction IAQ Management
  - Comply with SMACNA guidelines
  - Protect absorptive materials
  - Install air filters during construction
  - Replace air filters before occupancy

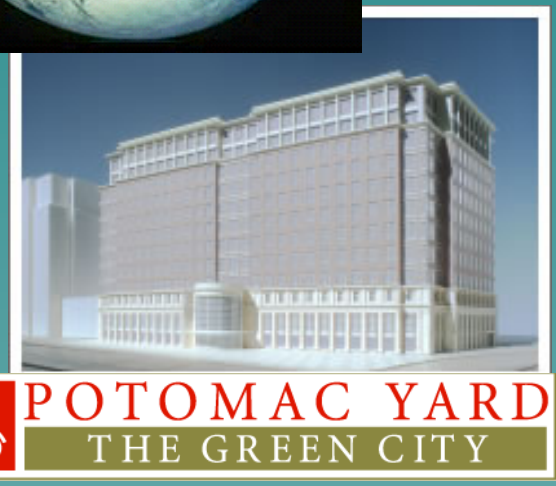
Source: JHU Bloomberg School of Public Health

Indoor Environmental Quality (cont.)

- Credit 4: Low-Emitting Materials
  - Low-VOC adhesives & sealants
  - Low-VOC paints & coatings
  - Green Label carpet systems
  - No added urea-formaldehyde resins in composite wood products
- Credit 5: Indoor Chemical & Pollutant Source Control
  - Permanent entryway systems to capture particulates
  - Segregation & ventilation of chemical-use areas
- Credit 7: Thermal Comfort
  - Comply with ASHRAE 55-1992
  - Permanent monitoring of temperature & humidity, and allow operator control
- Credit 8: Daylight & Views
  - Allow direct line of sight to outdoors from 90% of occupied spaces

Innovation and Design Process

- Credit 1: Innovation in Design
  - 40% regionally manufactured materials
  - Green Housekeeping
  - User Education Plan
  - 40% water use reduction
- Credit 2: LEED-Accredited Professional
  - At least 8 LEED-Accredited Professionals on project team



The General Contractor's Role

Set goals

- Decide certification level
- Choose credits, analyze scorecard

Design

-Incorporate credits to drawings and specs

Preconstruction/Bid

- Involve general contractor
- Give clear direction to subcontractors to reduce cost
- Receive feedback from subcontractors
- Study possibilities of value engineering
- Incorporate green in schedule

Construction

- Prepare IAQ management plan
- Prepare waste management plans
- Incorporate LEED credits to subcontracts
- Bid subcontractors
- Review submittals
- Conduct field inspections
- Gather documents
- Submit documents
- Continue commissioning
- Maintain schedule

End Product/ Occupancy

-Submit USGBC requirements

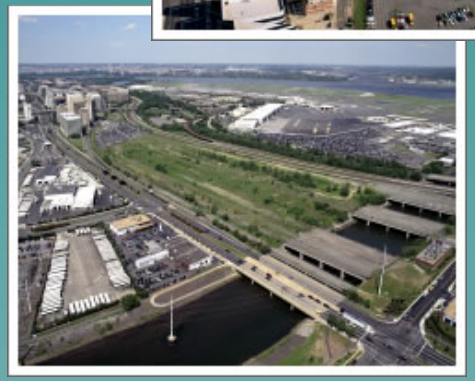
The General Contractor's Role

SUSTAINABLE SITES 14 POINTS

Yes	?	No	Sustainable Sites	14 Points
Y			Prereq 1 **Erosion & Sedimentation Control**	Required
			Credit 1 **Site Selection**	1
			Credit 2 **Urban Redevelopment**	1
			Credit 3 **Brownfield Redevelopment**	1
			Credit 4.1 **Alternative Transportation**, Public Transportation Access	1
			Credit 4.2 **Alternative Transportation**, Bicycle Storage & Changing Rooms	1
			Credit 4.3 **Alternative Transportation**, Alternative Fuel Refueling Stations	1
			Credit 4.4 **Alternative Transportation**, Parking Capacity	1
			Credit 5.1 **Reduced Site Disturbance**, Protect or Restore Open Space	1
			Credit 5.2 **Reduced Site Disturbance**, Development Footprint	1
			Credit 6.1 **Stormwater Management**, Rate and Quantity	1
			Credit 6.2 **Stormwater Management**, Treatment	1
			Credit 7.1 **Landscape & Exterior Design to Reduce Heat Islands**, Non-Roof	1
			Credit 7.2 **Landscape & Exterior Design to Reduce Heat Islands**, Roof	1
			Credit 8 **Light Pollution Reduction**	1

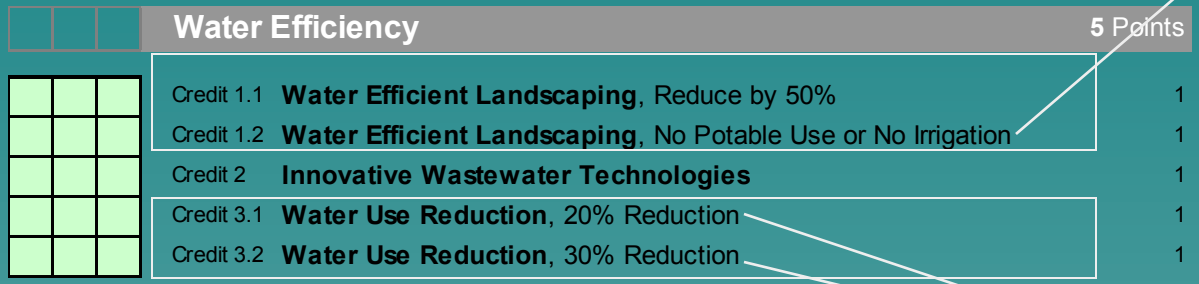
Follow Local or EPA Standards-**provide daily reports and pictures**

Green Roof OR Energy Star Roof-**Provide submittals**



The General Contractor's Role

WATER EFFICIENCY — 5 POINTS



Water Efficiency		5 Points
Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
Credit 2	**Innovative Wastewater Technologies**	1
Credit 3.1	**Water Use Reduction**, 20% Reduction	1
Credit 3.2	**Water Use Reduction**, 30% Reduction	1

No potable H2O OR
Harvest rainwater- **submittals**

Use low-flow fixtures and
Auto controls at Lavs-**submittals**

The General Contractor's Role

ENERGY & ATMOSPHERE 17 POINTS

		Energy & Atmosphere	17 Points
Y	Prereq 1	**Fundamental Building Systems Commissioning**	Required
Y	Prereq 2	**Minimum Energy Performance**	Required
Y	Prereq 3	**CFC Reduction in HVAC&R Equipment**	Required
	Credit 1	**Optimize Energy Performance**	1-10
	Credit 2	**Renewable Energy**, 5%-20%	1-3
	Credit 3	**Additional Commissioning**	1
	Credit 4	**Ozone Depletion**	1
	Credit 5	**Measurement & Verification**	1
	Credit 6	**Green Power**	1

No CFC's-**submittals**

3rd party Commissioning
-team effort with
MEP contractors
Documentation, coordination

Continuous metering for:
Lighting and controls
Constant and variable motor loads
VFD's
Chiller efficiency
Air/H20 Economizers
Static Pressure
Boiler efficiencies
Process energy systems
Indoor H2O risers & irrigation **submittals**

No HCFC's or Halon
In equip. and life safety
submittals

The General Contractor's Role

MATERIALS & RESOURCES 13 POINTS

Y		Materials & Resources	13 Points
	Prereq 1	**Storage & Collection of Recyclables**	Required
	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Shell	1
	Credit 1.2	**Building Reuse**, Maintain 100% of Shell	1
	Credit 1.3	**Building Reuse**, Maintain 100% Shell & 50% Non-Shell	1
	Credit 2	**Construction Waste Management**, Divert 50%/Divert 75%	1-2
	Credit 3	**Resource Reuse**, Specify 5%/Specify 10%	1-2
	Credit 4	**Recycled Content,** Specify 5%/Specify 10%	1-2
	Credit 5.1	**Local/Regional Materials**, 20% Manufactured Locally	1
	Credit 5.2	**Local/Regional Materials**, of 20% Above, 50% Harvested Locally	1
	Credit 6	**Rapidly Renewable Materials**	1
	Credit 7	**Certified Wood**	1

Job-site recycling, **Weekly waste tracking, field inspections, documentation**

Procure recycled content materials- **submittals & documentation**

Use FSC certified wood For 50% of wood-based materials **Submittals & documentation**

Specify agriboard, Wool, cotton, bamboo, poplar **Submittals & documentation**

Use materials from Within a 500 mile radius **documentation**

The General Contractor's Role

INDOOR ENV. QUALITY — 15 POINTS

		Indoor Environmental Quality	15 Points
Y	Prereq 1	**Minimum IAQ Performance**	Required
Y	Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
	Credit 1	**Carbon Dioxide** (CO_2) **Monitoring**	1
	Credit 2	**Increase Ventilation Effectiveness**	1
	Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
	Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy/Testing	1
	Credit 4	**Low-Emitting Materials**	1-4
	Credit 5	**Indoor Chemical & Pollutant Source Control**	1
	Credit 6	**Controllability of Systems**, Perimeter/Non-perimeter	1-2
	Credit 7	**Thermal Comfort**, Comply with ASHRAE 55-1992/Monitoring	1-2
	Credit 8	**Daylight & Views**, Daylight 75% of Spaces/90%	1-2

Implement IAQ Plan
During construction and
Perform flush or testing
Prior to occupancy
IAQ management plan, documentation, schedule, field inspections

Specify and use
Low-VOC materials-
Submittals, documentation, field inspections

LEED GOLD

- 72% of our waste which equals to 2143 tons recycled

Construction Waste Management

Construction Waste Management

Material	Quantity (in Tons)	% waste	Re-use & Recycling	
			On-Site (re-use or recycle method)	Off-Site (contractor/recycle outlet)
Landfill	18.0137	7.71%		Ritchie Rubble Landfill
Wood	111.81	47.85%	Separated at Landfill	Potomac Landfill
Steel	82.64	35.37 %	Separated on Site	Clark Foundation
Concrete	17.91	7.67%	Separated at Landfill	Potomac Landfill
Paper	0	0.00%	Separated on Site	Recycle America Alliance
Cardboard	3.28	1.40%	Separated at Landfill	Potomac Landfill

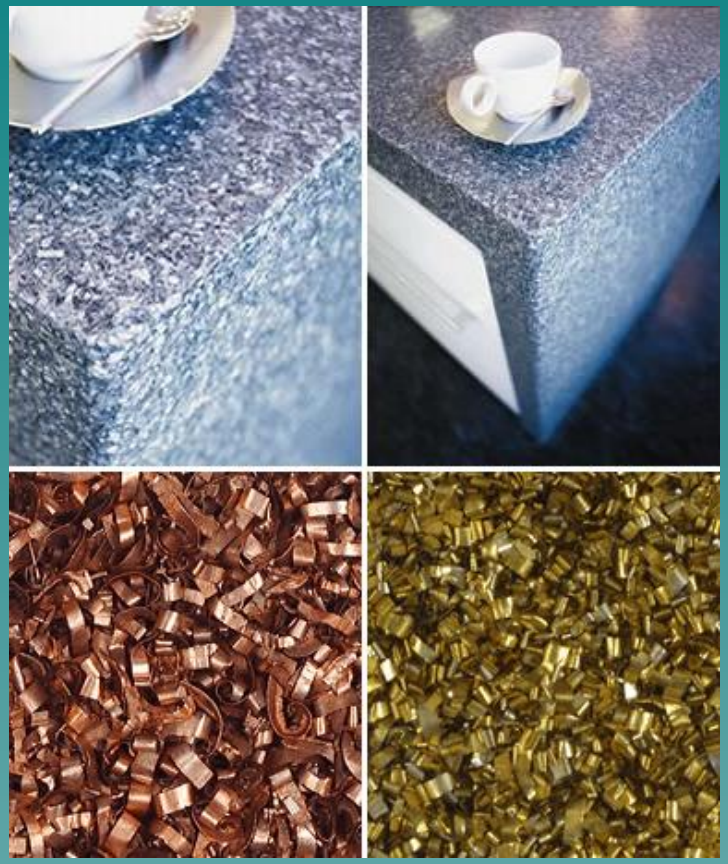
LEED GOLD

- 72% of our waste which equals to 2143 tons recycled

Recycled Content

Recycled Content in:

- Reinforcement steel in concrete
- Slag in concrete for below grade structure, fly ash in CMU blocks
- Acoustical ceiling tile
- Drywall
- Carpet
- Wall Paper
- Countertops
- Insulation
- VCT flooring
- Ceramic tile
- Misc. Metals
- Fire Proofing



No recycled content in:

- White EPDM Roof
- Precast
- Window extrusions
- Paint
- Above grade concrete structure

LEED GOLD

- 72% of our waste which equals to 2143 tons recycled
- 27% of materials used on this project had recycled content
- 62% of materials used on this project were locally manufactured, 60% locally harvested

Locally Manufactured & Harvested Materials

Locally Manufactured & Harvested Materials:

- Concrete
- Precast
- Drywall
- Acoustical Ceiling Tile

Not Possible

- Stone
- Certified Wood
- Window Systems
- Carpet with specified recycled content
- Ceramic Tile

LEED GOLD

- 72% of our waste which equals to 2143 tons recycled
- 27% of materials used on this project had recycled content
- 62% of materials used on this project were locally manufactured, 60% locally harvested
- 82% of wood used on the job was FSC certified

Certified Wood

Had Certified Wood:

- All Millwork
- Wood Doors
- Concrete Formwork
- Misc. Safety Carpentry
- All Blocking
- Wood Flooring

Not possible

- Lagging for Sheeting & Shoring

LEED GOLD

- 72% of our waste which equals to 2143 tons recycled
- 27% of materials used on this project had recycled content
- 62% of materials used on this project were locally manufactured, 60% locally harvested
- 82% of wood used on the job was FSC certified
- All floors passed IAQ test successfully
- Low emitting (low VOC) paints, caulks, adhesives, carpet, plywood used on this project.

Construction Indoor Air Quality

Green Leasing to a Government Tenant:
Delivering High Performance Buildings at Potomac Yard

LEED GOLD

- 72% of our waste which equals to 2143 tons recycled
- 27% of materials used on this project had recycled content
- 62% of materials used on this project were locally manufactured, 60% locally harvested
- 82% of wood used on the job was FSC certified
- All floors passed IAQ test successfully
- Low emitting (low VOC) paints, caulks, adhesives, carpet, plywood used on this project.
- Additional Commissioning was Achieved per USGBC Requirements

Additional Commissioning

KEYS TO OUR SUCCESS

- Have experienced LEED AP personnel on board
- Receive contract documents that clearly incorporates LEED requirements, understand expectations (will reduce increased bids from subs, no unknowns, no risks, no increased cost)
- Provide input to design team and client for any possible ways of achieving set goals cost effectively and timely
- Start Documentation as soon as construction starts
- Train subcontractors, provide clear direction. Include LEED requirements in subcontracts and scopes of work clearly.
- Have good and applicable construction waste management and IAQ plans. Have subcontractor input

Integration of Sustainability and LEED Construction Processes

- Scopes of Work
- Subcontractor Education
- Submittal Review
- Material Tracking & Calculations supported w/ documentation
- Field Compliance Monitoring
- Photo Documentation

Scope Management Tool

JAMES G. DAVIS CONSTRUCTION CORPORATION				
LEED Impacts Matrix				
Description of Material	Total Construction Cost	LEED Credit(s)	Subcontractor Requirement	Scope Review 1/28/2003
DAVIS REQUIREMENTS			General responsibilities include:	
			Writing and implementation of construction waste management plan and construction indoor air quality plans; materials required to lower dust levels and prevent dust infiltration into finished areas; meeting FSC requirements with general carpentry goods if	
SITEWORK				
02100 Demolition	#######	MR 2.1&2.2	Recycle/Salvage 75% material by weight from demolished structures; this does not include hazardous abatement materials (i.e. asbestos, lead paint and/or materials made unsalvageable by contamination); provide necessary manifests from material destination	

Documentation: Subcontractor Inventory

JAMES G. DAVIS CONSTRUCTION CORPORATION

Cost Breakdown & Inventory Analysis
Trade: Cast In Place Concrete
Potomac Yard

Special Instructions:
1) Please provide detailed cost breakdown.
2) FSC/Certified Wood information, if applicable.
3) Please provide information on recycled content, if applicable.
4) Please provide location of manufacture and harvesting for materials.
5) Make copies of this sheet if you need more space.
6) Return no later than
Questions? Contact: Fulya Kocak 703.413.5091 ext 206

Itemized Breakdown	Material Cost	Certified Wood		Recycled Content		Manufacturer Name Location City, State	Where material is Harvested or milled City, State
		Yes	No	Yes	No		
Wood Based Materials: FSC Certified Form work materials		X					
Reused wood from other job sites							
Steel Materials: Epoxy coated Rebar				X			
Steel Formwork if any				X			
Rebar				X			
Misc. Accessories				X			
Concrete (also provide weight information for components)							
Other Plastic Reinforcing bar supports				X			
TOTAL:							

Documentation: General Contractor's Form

Description of Material	Total Construction Cost	Material	Wood Materials		Regional Materials		Recycled Content	
			Wood Based Materials	Certified Wood	Manufactured Miles	Harvested Miles	% Post Consumer	% Post Industrial
03300 CONCRETE								
Cast in Place Concrete	$23,700,000	$6,229,300	$0.00	$0.00	15	148	0.00%	0.90%
Cast in place concrete (metal forms-rented)	$100,000	$0.00	$0.00	$0.00	0	0	0.00%	0.00%
Formwork (certified wood)	$500,000	$631,000	$631,000	$543,000	40	>500	0.00%	0.00%
Cast in Place Rebar	$4,320,000	$4,320,000	$0.00	$0.00	203	203	85.00%	15.00%
Plastic bar supports		$255,000	$0.00	$0.00	>500	>500	0.00%	20.00%

Challenges and Lessons Learned

- Various stakeholders have conflicting requirements.
  - Realistically assess requirements and address requirements accordingly.
  - Example: Street lighting
- LEED certification requires teamwork.
  - Readily disclose information to build cooperative relationships.
  - Example: EPA to pay costs of Measurement & Verification and Green Power

Challenges and Lessons Learned

- Various credits have conflicting requirements.
  - Coordinate credit requirements – a reasonable strategy for one credit might conflict another.
  - Example: Recycled, consolidated latex paint
- Fulfilling credit requirements can lead to seemingly illogical decisions.
  - Credits are imperfect methods for achieving goals.
  - Example: MR Credit 5 intends to support regional economies, but leads to importing goods from Canada.

Challenges and Lessons Learned

- LEED certification adds time to the construction process.
  - Hire LEED experience to minimize the time needed for research and education.
  - Examples: Material selection; IAQ requirements for carpet aging
- Enforcing the implementation of LEED requirements during construction is difficult.
  - Institute a quality control program, including frequent field inspections.
  - Example: Enforcing carpet aging

Challenges and Lessons Learned

- Efficient construction practices are at odds with recycling requirements.
  - Dumpster management is critical.
  - Example: Piles of recyclables on the project
- The design and engineering for LEED improvements is costly.
  - LEED-related design costs are about 33% of the corresponding LEED-related construction costs.
  - Example: Building commissioning

Challenges and Lessons Learned

- Pursuing LEED certification requires careful planning.
  - Set the goal of certification at project inception and meet early and often to achieve this goal.
  - Example: Zoning approval obtained before LEED registration
- Credit requirements are often obscure.
  - Clearly define questions posed to USGBC to avoid getting responses based on what USGBC would "like to see" instead of on what is required for certification.
  - Example: Evolving UGBC policies
- The LEED certification process is filled with uncertainty.
  - "Point management" is essential; go for the low-lying fruit, pursue points that add to costs without complicating the process, and bank "insurance points."
  - Example: Certification determined after completion

Closing Thoughts

"I'm glad Crescent decided to make LEED a priority on this project. While I think the LEED points system is [a] long way from perfect, it is definitely a step in the right direction. Building green is fairly easy to accomplish and it significantly improves our world. I wish more clients were willing to endure a little headache to bring their buildings to the next level in intelligent and high-performance design."

— Kathy Barcus, Davis Carter Scott

TREAT THE EARTH WELL.
IT WAS NOT GIVEN TO YOU BY YOUR PARENTS.
IT WAS LOANED TO YOU BY YOUR CHILDREN.

— Kenyan Proverb

For More Information

- http://leedcasestudies.usgbc.org/overview.cfm?ProjectID=654
- http://www.wbdg.org/references/cs_potomac.php

Elizabeth W. Adams

CRESCENT RESOURCES LLC

Mooresville, NC
704-799-6135
ewadams@crescent-resources.com

Sandra Leibowitz Earley

Sustainable Design Consulting

Richmond, VA
804-254-3880
sandra@sustaindesign.net

Fulya Kocak

DAVIS CONSTRUCTION

Rockville, MD
301-881-2990
fkocak@daviscons truction.com