Chesapeake Bay Foundation

Annapolis, Maryland

Case Study #3
"A Sustainable Site & Building"

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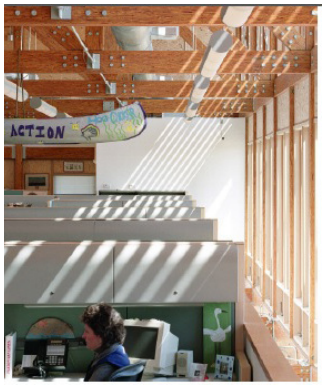
Building Description | Location

Annapolis is the capital of the U.S. state of Maryland. Annapolis is situated on the Chesapeake Bay at the mouth of the Severn River, 26 miles south of Baltimore and about 29 miles east of Washington, D.C. IT is also home of St. John's College.

Lat/Lon: 38 degrees N - 76 degrees W
Elevation: 39 feet
Land Area: 7.18 square miles
Population: 38,880
Rainfall: 47.3" per year.

Building Description:



-Owned and occupied by the Chesapeake Bay Foundation Inc and is a non-profit organization designed by SmithGroup Inc.

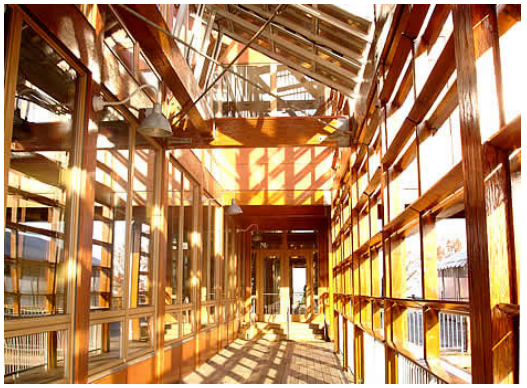
-Recognized as one of the "greenest" buildings ever constructed on has received a rating of Platinum from the USGreen Building Council.

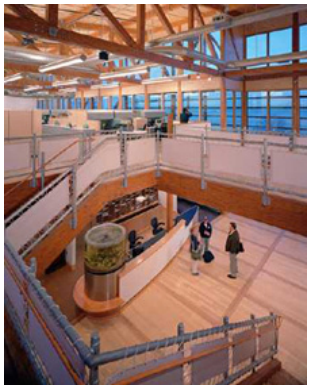
Building Statistics:
Completion Date: November, 2000
Cost: $6.36 M
Size: 30,600 gross square feet
Construction Type: 3B, Two Stories over Open Parking
Use Group: Business(B), Assembly(A-3), Storage(S-2)
Lot Size: 33 acres
Annual Energy Use: 23 kBtu/sf/year

-Typically occupied by 80 people, 40 hours per person per week

- This conventional office environment is open 8:30 AM to 5:30 PM. Weekend and evening functions are occasionally held at the Center.

Building Description:





Building Program:

Indoor Spaces:

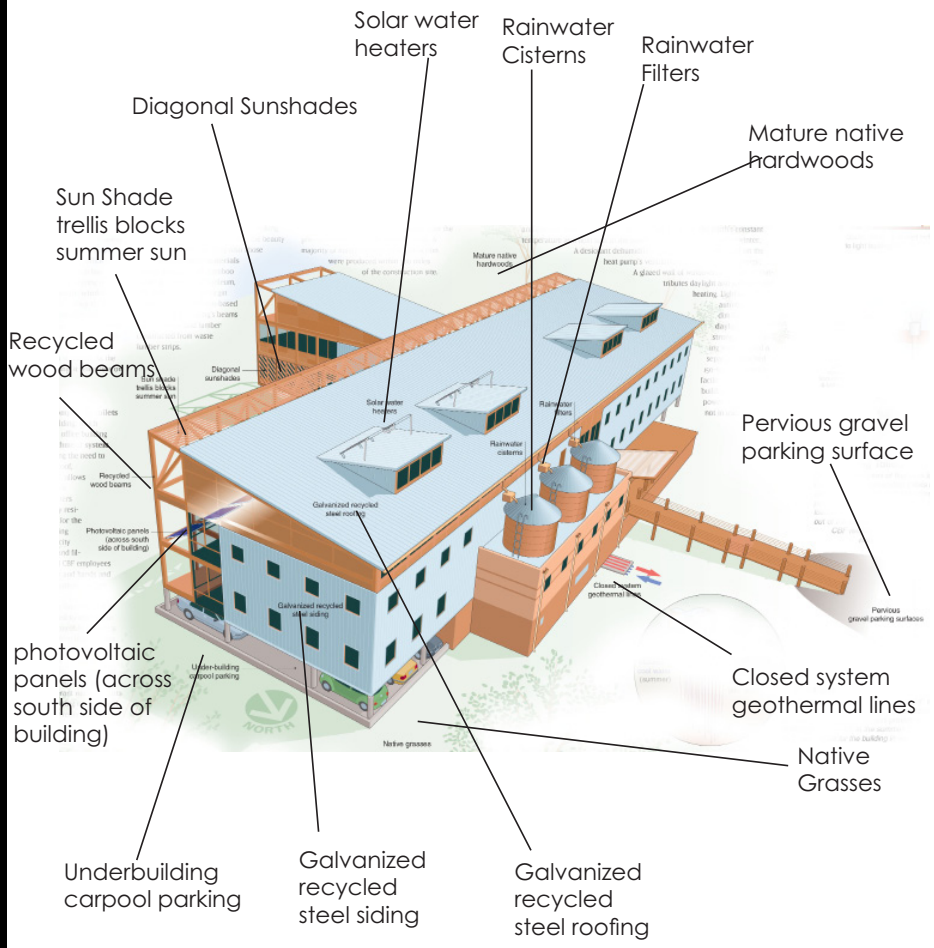
Office: 65 percent
Conference: 10 percent
Mechanical Systems: 9 percent
Lobby/ Reception: 4 percent
Circulation: 4 percent
Restroom: 3 percent
Electrical Systems: 3 percent
Dining: 2 percent

Exterior Spaces:

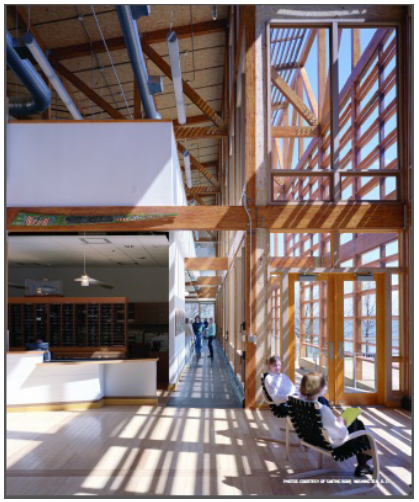
Restored Landscape: 48 percent
Wildlife Habitat: 40 percent
Parking: 5 percent
Interpretive Landscape: 2 percent
Drives/Roadway: 2 percent
Pedestrian Path: 2 perccent
Patio/Hardscape: 1 percent

Sustainable Features:

The staff enjoys an inspirational open-plan workplace full of day-light and natural ventilation. Outside, the building systems cap-ture solar power, geothermal energy and even rainwater for use by the client.



Sustainable Features:



A "Less Is More" Interior
- Natural/renewable materials

A Simple, Healthy Design
- operable windows = natural ventilation
- Shed Roof- recycle water
- Passive-solar principles and outdoor-air ventilation and annual lighting and HVAC needs.
- The site has fewer parking spaces than usual, as the client's trans-portation management strategy meant more commuting by foot and bike - even by boat.

Sustainable Features:

Recycled Materials:

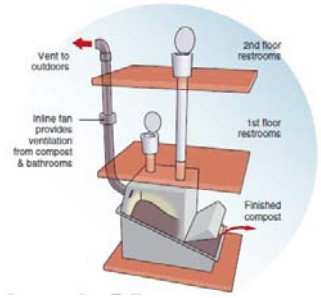
-The galvanized siding made from cans, cars and other recycled metal objects, the building was designed to use 10 percent of the potable water and 30 percent of the energy of the typical office building.
- Parallel strand lumber
-Natural resources are harvested daily, including rainwater, solar energy, and the earth's constant ground temperature.

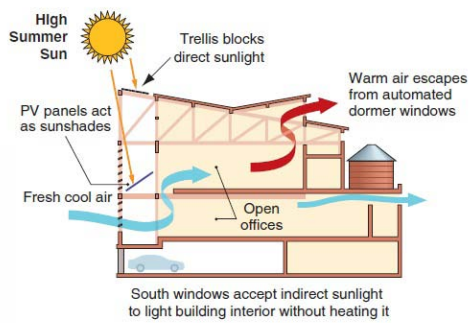
Energy:

- Structurally insulated panels (SIPs) form the building envelope, using less wood than conventional framing and resulting in a higher R-value.
- Solar hot water heating
- ground source heat pump system for heating and cooling.

Water:

- composting toilets
- rainwater catchment system captures water, also reducing the need to draw from wells.
- bioretention storm water treatment system
- native plants





SBSE'S Updated Malcolm Well's Checklist

Regeneration-Based Checklist for Design and Construction
Chesapeake Bay Foundation © SBSE @ Tadoussac 1999

Project: Headquarters

		degeneration				sustainability				regeneration		
		-100 always	-75 usually	-50 sometimes	-25 a bit	0 balances	25 a bit	50 sometimes	75 usually	100 always	
the site	pollutes air								●		cleans air
	pollutes water									●	cleans water
	wastes rainwater									●	stores rainwater
	consumes food		●								produces food
	destroys rich soil								●		creates rich soil
	dumps wastes unused							●			consumes wastes
	destroys wildlife habitat									●	provides wildlife habitat
	imports energy								●		exports energy
	requires fuel-powered transportation					●					requires human-powered transportation
	intensifies local weather								●		moderates local weather
the building	excludes daylight								●		uses daylight
	uses mechanical heating									●	uses passive heating
	uses mechanical cooling									●	uses passive cooling
	needs cleaning and repair								●		maintains itself
	produces human discomfort									●	provides human comfort
	uses fuel-powered circulation								●		uses human-powered circulation
	pollutes indoor air								●		creates pure indoor air
	is built of virgin materials									●	is built of recycled materials
	cannot be recycled								●		can be recycled
	serves as an icon for the apocalypse									●	serves as an icon for regeneration
	is a bad neighbor								●		is a good neighbor
	is ugly								●		is beautiful

negative score	positive score
2200 possible	2200 possible
-75	1,675

final score: 1,600

LEED Checklist:

LEED-NC

LEED-NC Version 2.2 Registered Project Checklist

Yes	?	No			
10			**Sustainable Sites**	**14** Points	
Y			Prereq 1	**Construction Activity Pollution Prevention**	Required
●			Credit 1	**Site Selection**	1
●			Credit 2	**Development Density & Community Connectivity**	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**, Low-Emitting and Fuel-Efficient Vehicles	1
●			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
●			Credit 5.1	**Site Development,** Protect of Restore Habitat	1
	●		Credit 5.2	**Site Development,** Maximize Open Space	1
●			Credit 6.1	**Stormwater Design,** Quantity Control	1
●			Credit 6.2	**Stormwater Design,** Quality Control	1
	●		Credit 7.1	**Heat Island Effect,** Non-Roof	1
	●		Credit 7.2	**Heat Island Effect,** Roof	1
●			Credit 8	**Light Pollution Reduction**	1
Yes	?	No			
	5		**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
Yes	?	No			
	16		**Energy & Atmosphere**	**17** Points	
Y			Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**Fundamental Refrigerant Management**	Required
●			Credit 1	**Optimize Energy Performance**	1 to 10
●			Credit 2	**On-Site Renewable Energy**	1 to 3
●			Credit 3	**Enhanced Commissioning**	1
	●		Credit 4	**Enhanced Refrigerant Management**	1
●			Credit 5	**Measurement & Verification**	1
●			Credit 6	**Green Power**	1

continued...

Overall, the Chesapeake Bay Foundation scored high on the LEED checklist. From our analysis of LEED criteria, this building would be considered LEED Platinum.

LEED Checklist:

Yes	?	No			
10			**Materials & Resources**	**13** Points	
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
	●		Credit 1.1	**Building Reuse**, Maintain 75% of Existing Walls, Floors & Roof	1
	●		Credit 1.2	**Building Reuse**, Maintain 100% of Existing Walls, Floors & Roof	1
	●		Credit 1.3	**Building Reuse**, Maintain 50% of Interior Non-Structural Elements	1
●			Credit 2.1	**Construction Waste Management**, Divert 50% from Disposal	1
●			Credit 2.2	**Construction Waste Management**, Divert 75% from Disposal	1
●			Credit 3.1	**Materials Reuse**, 5%	1
●			Credit 3.2	**Materials Reuse**,10%	1
●			Credit 4.1	**Recycled Content**, 10% (post-consumer + ½ pre-consumer)	1
●			Credit 4.2	**Recycled Content**, 20% (post-consumer + ½ pre-consumer)	1
●			Credit 5.1	**Regional Materials**, 10% Extracted, Processed & Manufactured Regio	1
●			Credit 5.2	**Regional Materials**, 20% Extracted, Processed & Manufactured Regio	1
●			Credit 6	**Rapidly Renewable Materials**	1
●			Credit 7	**Certified Wood**	1
Yes	?	No			
	11		**Indoor Environmental Quality**	**15** Points	
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
●			Credit 1	**Outdoor Air Delivery Monitoring**	1
●			Credit 2	**Increased Ventilation**	1
	●		Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
	●		Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1
●			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
●			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
●			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
●			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
	●		Credit 5	**Indoor Chemical & Pollutant Source Control**	1
●			Credit 6.1	**Controllability of Systems**, Lighting	1
●			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
●			Credit 7.1	**Thermal Comfort**, Design	1
	●		Credit 7.2	**Thermal Comfort**, Verification	1
●			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
●			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1
Yes	?	No			
	3		**Innovation & Design Process**	**5** Points	
●			Credit 1.1	**Innovation in Design**: Provide Specific Title	1
●			Credit 1.2	**Innovation in Design**: Provide Specific Title	1
●			Credit 1.3	**Innovation in Design**: Provide Specific Title	1
	●		Credit 1.4	**Innovation in Design**: Provide Specific Title	1
	●		Credit 2	**LEED® Accredited Professional**	1
Yes	?	No			
	55		**Project Totals** (pre-certification estimates)	**69** Points	

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

Building Redesign

Building Redesign

The Chesapeake Bay Foundation Headquarters is not a net zero building. It currently imports more electricity than it generates with it's existing PVs. Being on the coast the site experiences average wind speeds of 19.74 mph. This makes this large site perfectly suited for wind generation.

Building Redesign

The Chesapeake Bay Foundation Headquarters re-cieved high scores for efficiency and use of recycled materials but recieved lower scores for not reducing the heat island effect. While the main food is collecting grey water the secondary building attatched does not.

Building Redesign

The Chesapeake Bay Foundation Headquarters could continue to improve its score for reducing the heat island effect by replacing its paved surfaces with more permeable surfaces or drivable grass. While the main parking lot is gravel it could be improved to drivable grass and the access road and loading could be permeable as well.

SBSE'S Updated Malcolm Well's Checklist

Regeneration-Based Checklist for Design and Construction

Chesapeake Bay Foundation © SBSE @ Tadoussac 1999

Project: **Headquarters**

	degeneration				sustainability				regeneration	
	-100 always	-75 usually	-50 sometimes	-25 a bit	0 balances	25 a bit	50 sometimes	75 usually	100 always	
the site								●		cleans air
									●	cleans water
									●	stores rainwater
		●								produces food
								●		creates rich soil
							●			consumes wastes
									●	provides wildlife habitat
								○	●	exports energy
					●					requires human-powered transportation
								○	●	moderates local weather
the building								●		uses daylight
									●	uses passive heating
									●	uses passive cooling
								●		maintains itself
									●	provides human comfort
								●		uses human-powered circulation
								●		creates pure indoor air
									●	is built of recycled materials
								●		can be recycled
									●	serves as an icon for regeneration
								●		is a good neighbor
								●		is beautiful

negative score	positive score
2200 possible	2200 possible
-75	1725

final score: **1650**

Redesign LEED Checklist

LEED-NC

LEED-NC Version 2.2 Registered Project Checklist

Yes ? No

13 **Sustainable Sites** **14 Points**

Y	Prereq 1	**Construction Activity Pollution Prevention**	Required
●	Credit 1	**Site Selection**	1
●	Credit 2	**Development Density & Community Connectivity**	1
●	Credit 3	**Brownfield Redevelopment**	1
●	Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
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●	Credit 6.2	**Stormwater Design,** Quality Control	1
○	Credit 7.1	**Heat Island Effect,** Non-Roof	1
○	Credit 7.2	**Heat Island Effect,** Roof	1
●	Credit 8	**Light Pollution Reduction**	1

Yes ? No

5 **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

Yes ? No

16 **Energy & Atmosphere** **17 Points**

Y	Prereq 1	**Fundamental Commissioning of the Building Energy Systems**	Required
Y	Prereq 2	**Minimum Energy Performance**	Required
Y	Prereq 3	**Fundamental Refrigerant Management**	Required
●	Credit 1	**Optimize Energy Performance**	1 to 10
●	Credit 2	**On-Site Renewable Energy**	1 to 3
●	Credit 3	**Enhanced Commissioning**	1
●	Credit 4	**Enhanced Refrigerant Management**	1
●	Credit 5	**Measurement & Verification**	1
●	Credit 6	**Green Power**	1

continued...

Redesign LEED Checklist

Yes	?	No			
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●			Credit 6	**Rapidly Renewable Materials**	1
●			Credit 7	**Certified Wood**	1
Yes	?	No			
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Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke** (ETS) **Control**	Required
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●			Credit 2	**Increased Ventilation**	1
	●		Credit 3.1	**Construction IAQ Management Plan**, During Construction	1
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●			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1
●			Credit 4.2	**Low-Emitting Materials**, Paints & Coatings	1
●			Credit 4.3	**Low-Emitting Materials**, Carpet Systems	1
●			Credit 4.4	**Low-Emitting Materials**, Composite Wood & Agrifiber Products	1
	●		Credit 5	**Indoor Chemical & Pollutant Source Control**	1
●			Credit 6.1	**Controllability of Systems**, Lighting	1
●			Credit 6.2	**Controllability of Systems**, Thermal Comfort	1
●			Credit 7.1	**Thermal Comfort**, Design	1
	●		Credit 7.2	**Thermal Comfort**, Verification	1
●			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1
●			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces	1
Yes	?	No			
	3		**Innovation & Design Process**		**5 Points**
●			Credit 1.1	**Innovation in Design**: Provide Specific Title	1
●			Credit 1.2	**Innovation in Design**: Provide Specific Title	1
●			Credit 1.3	**Innovation in Design**: Provide Specific Title	1
	●		Credit 1.4	**Innovation in Design**: Provide Specific Title	1
	●		Credit 2	**LEED® Accredited Professional**	1
Yes	?	No			
	58		**Project Totals** (pre-certification estimates)		**69 Points**

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

Conclusion

While the Chesapeake Bay Foundation Headquarters is a LEED platinum building it still consumes more energy than it produces. Efforts through the installation of wind turbines, battery arrays, and LED lighting can help this building come closer to achieving Net Zero.

In addition, the Chesapeake Bay Foundation Headquarters can improve upon its existing LEED points by reducing the heat island effect through the implementation of a green roof, permeable pathways, and drivable grass.