SIDWELL FRIENDS SCHOOL

High Performance Middle School

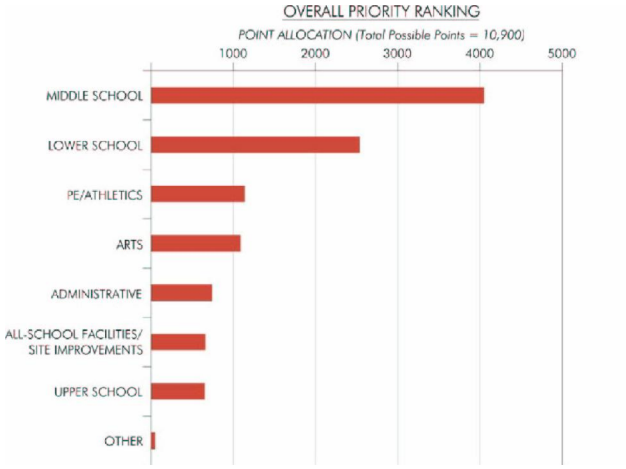
Metropolitan Washington Council of Governments High Performance Schools Symposium

24 April 2006

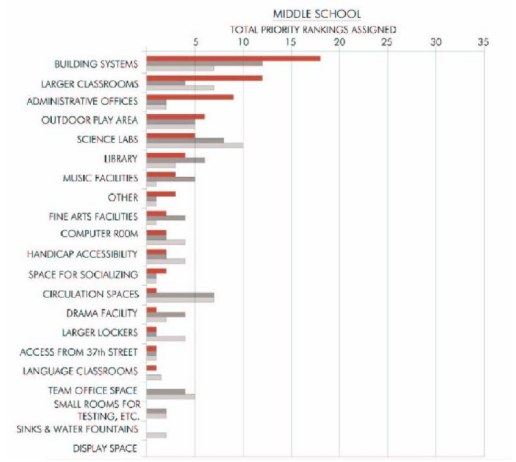
- Uncommon Academic Excellence
- Prizing of Diversity
- Friends Values and Testimonies
- Environmental Stewardship

Sidwell Friends School

- Two Year Master Planning Process Competed 2002
- Input from faculty, administrators, students, parents, alumni
- Middle School, followed by Lower School gym, emerged as clear priorities
- Foundation for current plans



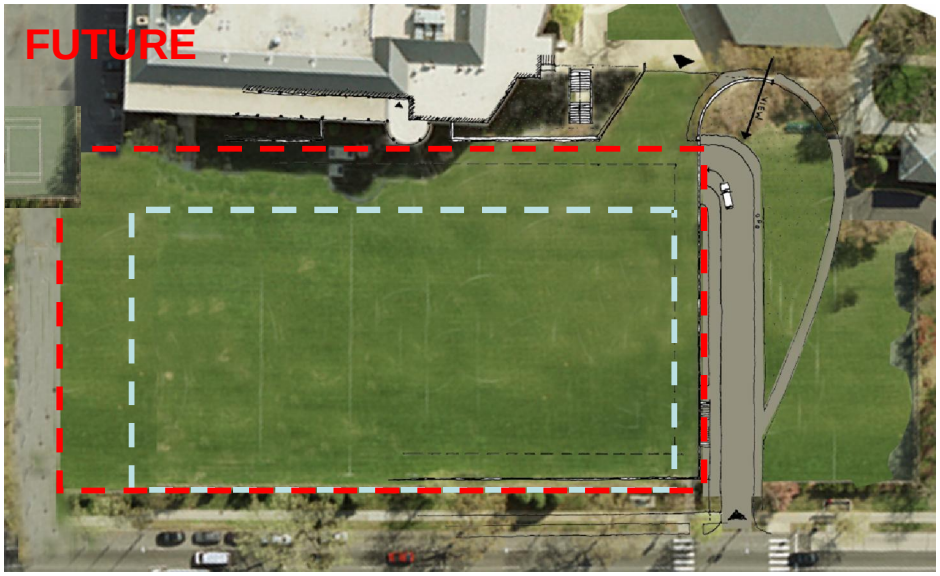
Recommended Plan



Context

- Preserves National Landmark historic building and school symbol
- All new mechanical and life-safety systems
- Increased useable administrative space
- Energy efficient heating (geothermal heat pump), cooling and lighting
- Improved air quality through low VOC (Volatile Organic Compounds) paint and carpet

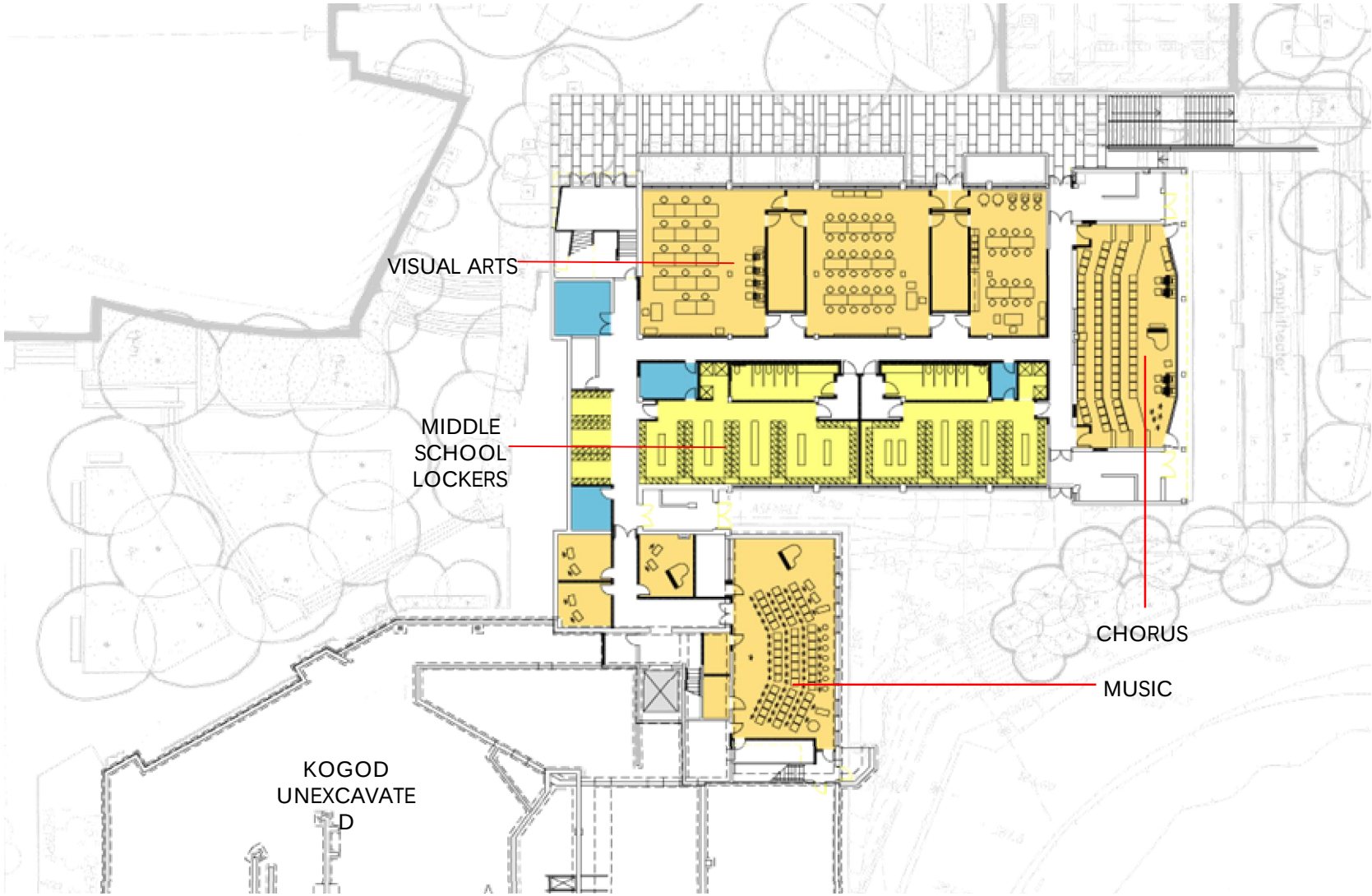
Renovation of Zartman House (Completed Summer/Fall 2004)



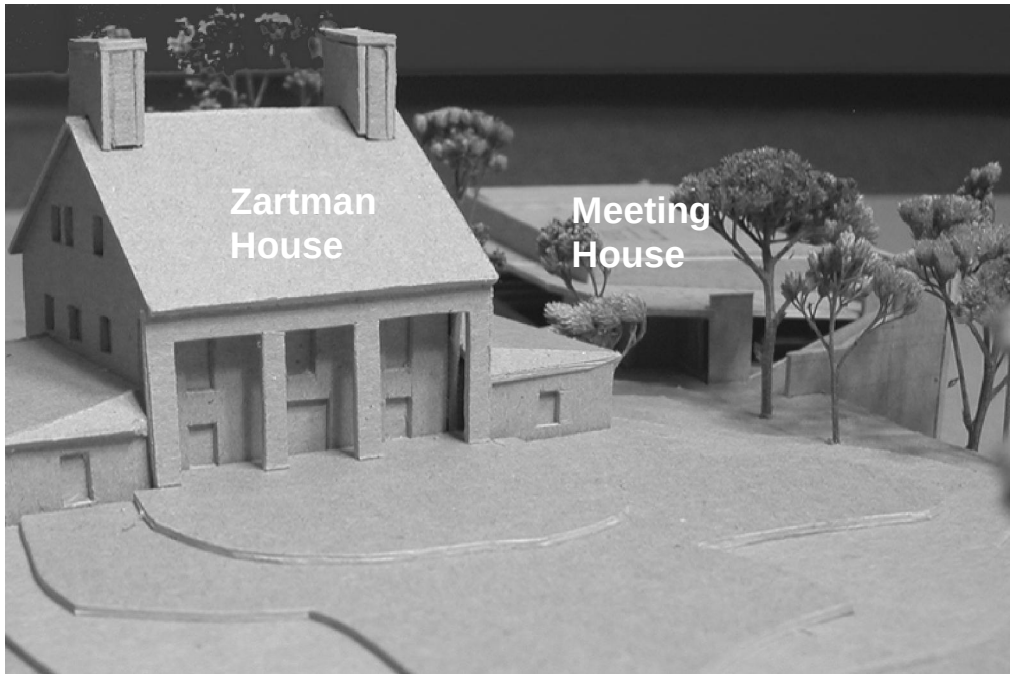
- Creates full-sized athletic field
- Houses Technology, Buildings & Grounds and Security
- Provides parking for faculty and students
- Essential for zoning approval
- Preserves future building sites
- Improves vehicular and pedestrian safety
- Resolves and isolates traffic flow to west side of campus
- Results in more pedestrian-oriented campus
- Enhances campus aesthetics

Below-Grade Structure on Wisconsin Avenue for Athletics, Plant, Security, IT, Parking and Traffic Management

New Athletic Center for DC Campus



Lower Level Kenworthy Gym Renovation for Kogod Arts Complex



MODEL PHOTO

- Defers to Zartman House
- 1 ½ Story New Construction
- Entrance from Zartman gardens
- Lower level at grade with athletic fields

ZARTMAN GARDEN FROM FIELDS

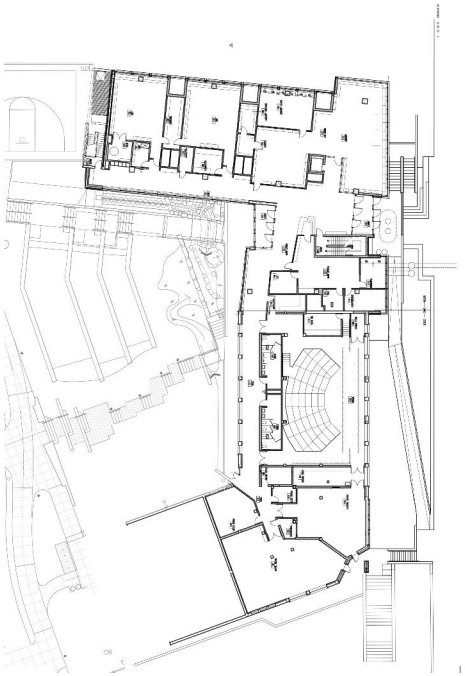
Meeting House (location yet to be finalized)

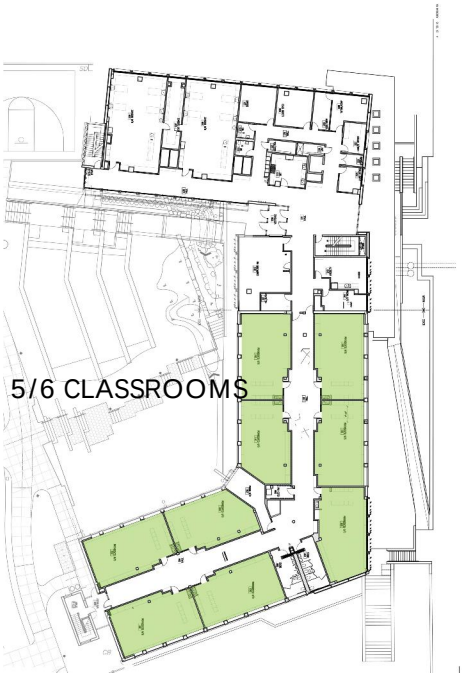
Classroom Renovation and Expansion

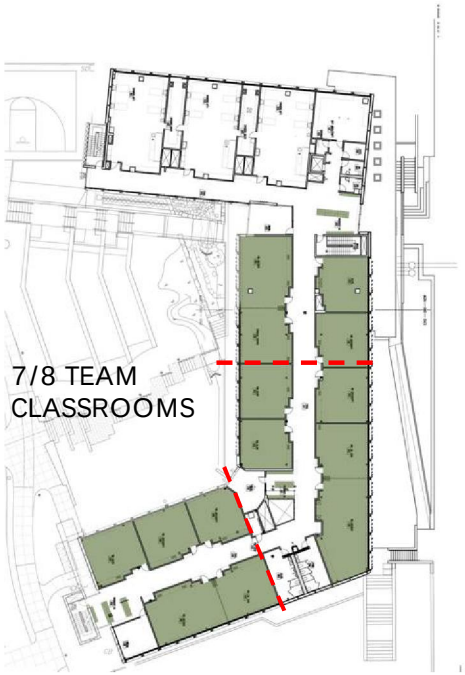
New Gym

Lower School Campus

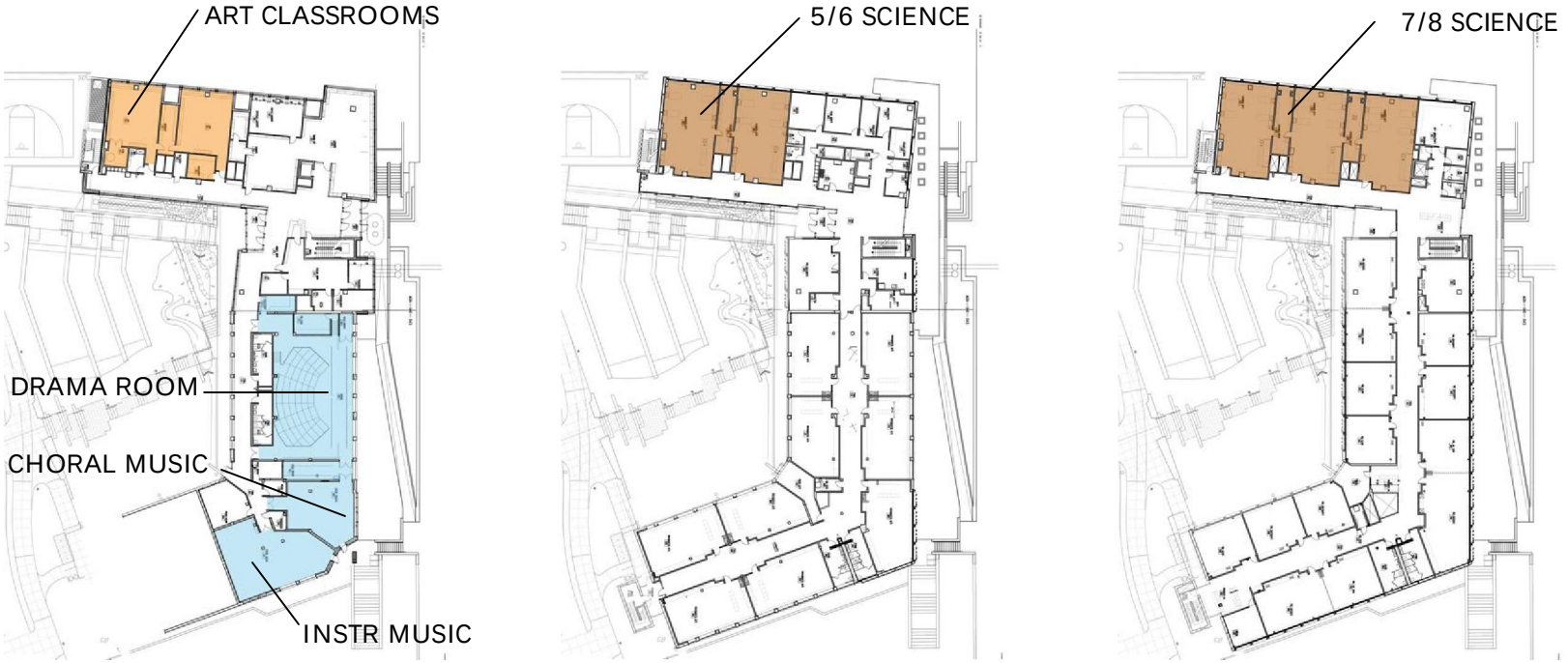
High Performance Middle School Building







Homeroom Classrooms



Specialty Classrooms

Academic Support

Buildings Consume

40% of society's total energy usage
30% of raw material
25% of water resources

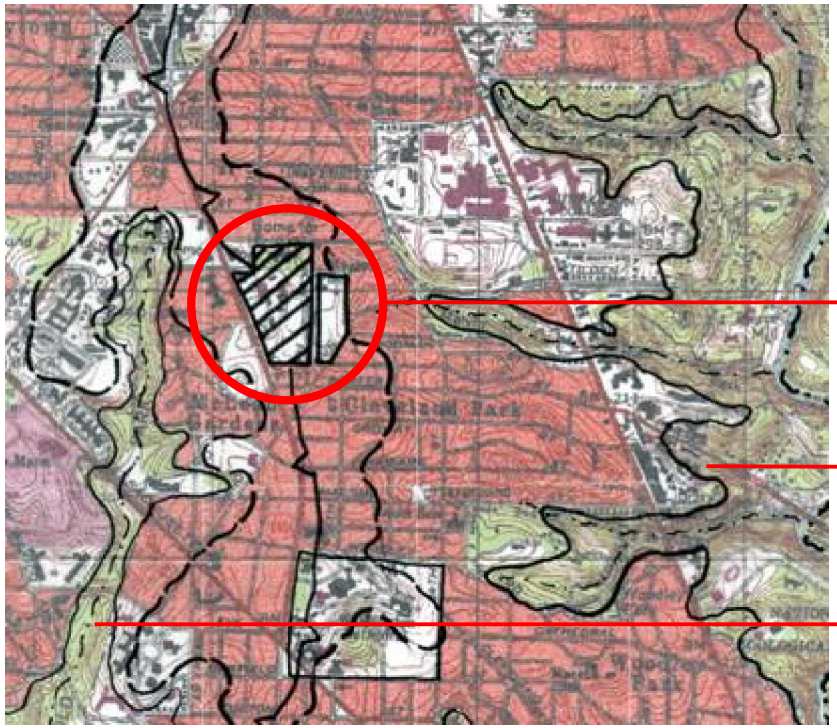
And Produce

40% of air emissions
20% of effluents
25% of solid waste

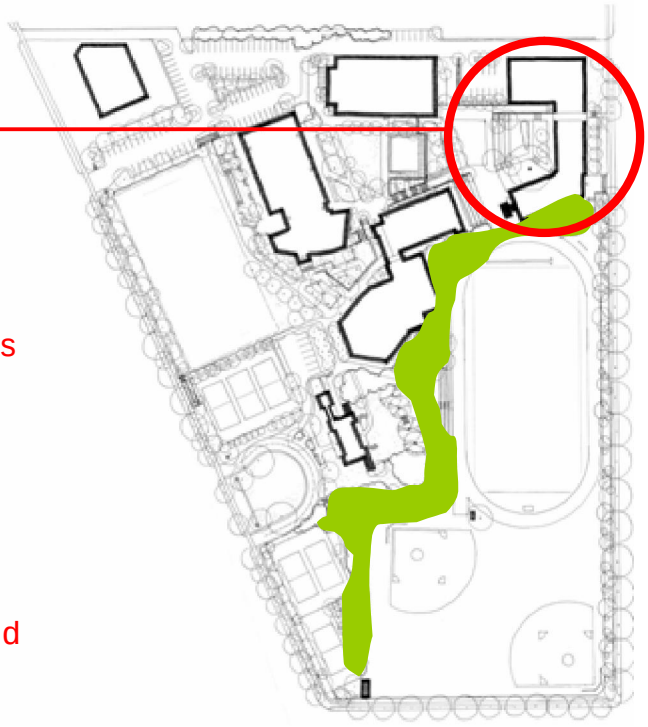
The Role of Buildings in our Environment

- Walk our talk
  - Reduce energy, water, materials use and emissions
- Provide healthy physical environment
- Create a laboratory for learning
- Serve as a beacon for others

Why Green?



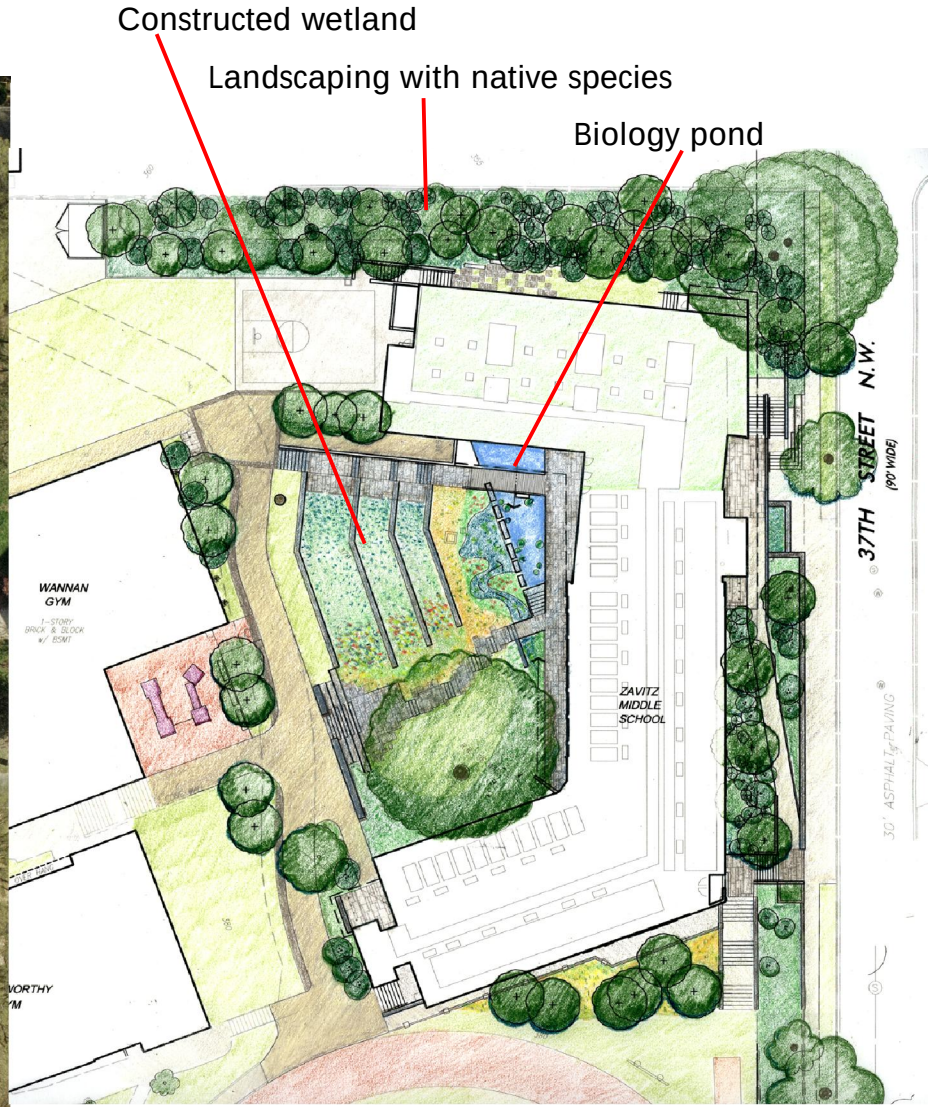
REGION



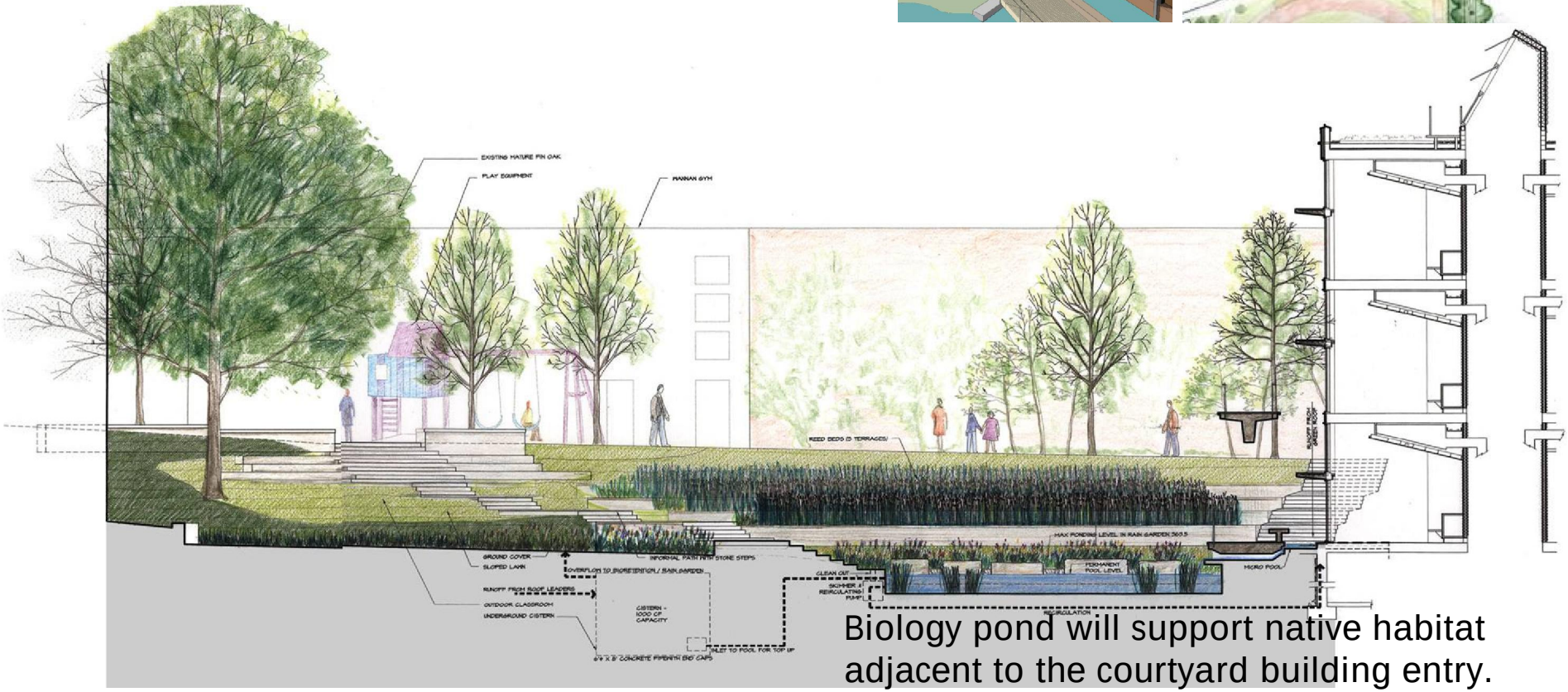
CAMPUS

Re-establish connections to local geography, watersheds, habitat and natural history.

Campus Land, Biodiversity and Water Resources



Water Management

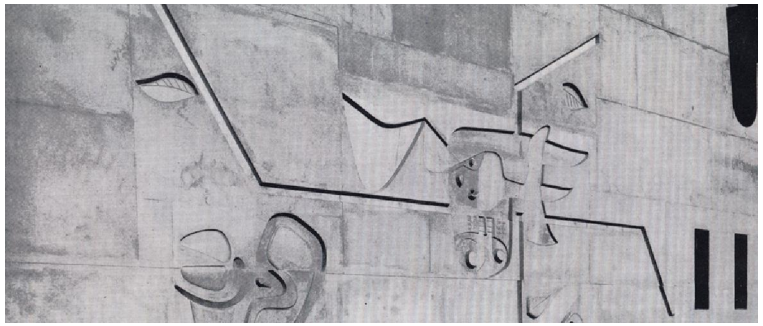


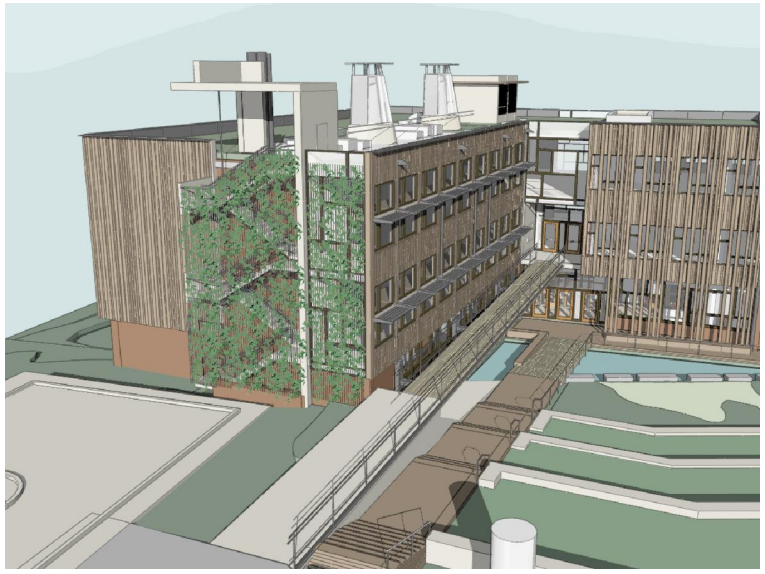
Biology pond will support native habitat adjacent to the courtyard building entry.

Rain Garden and Biology Pond

Wetland establishes connections between building and site systems.

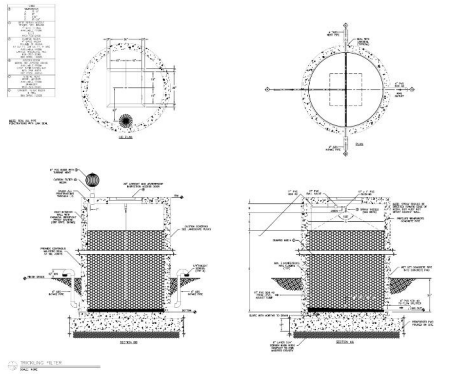
Constructed Wetland





Wastewater Resource

A



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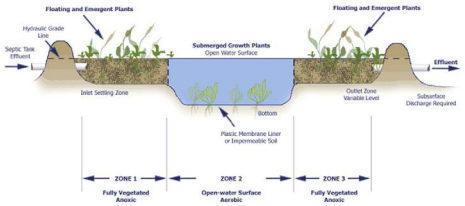
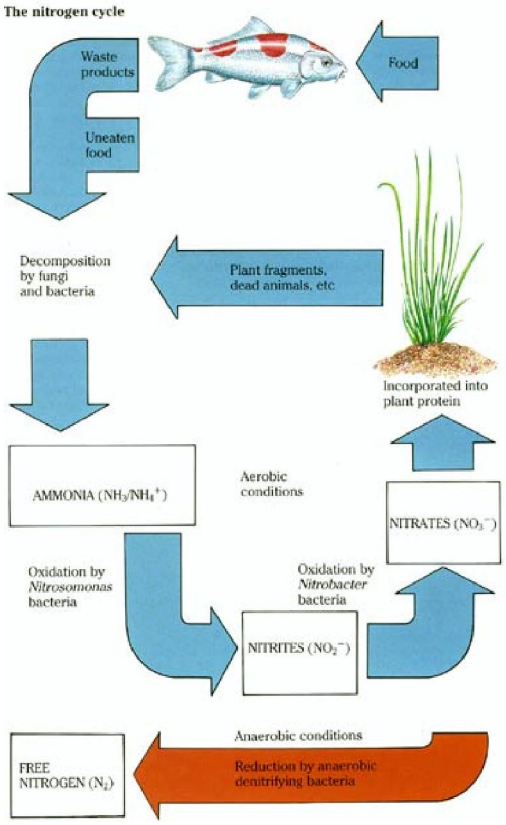


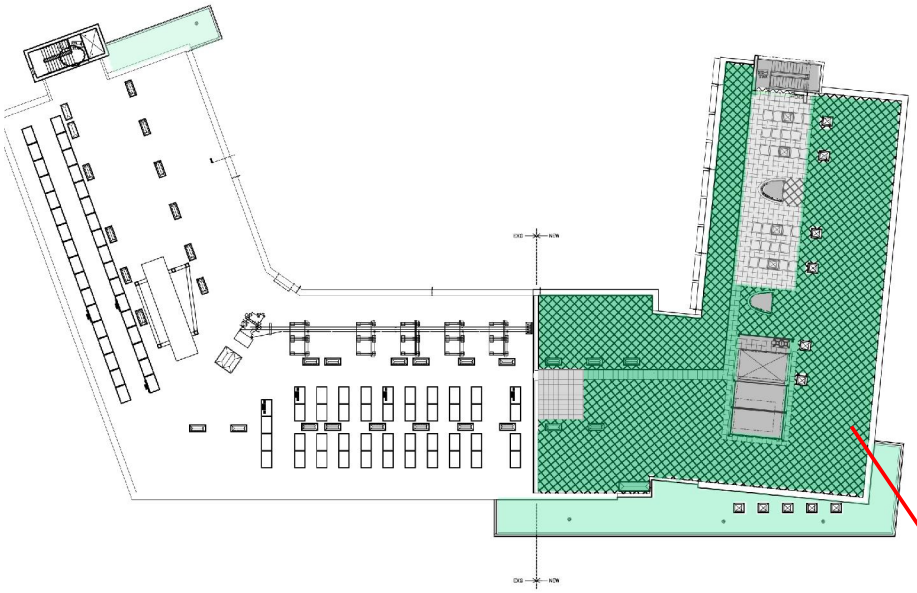
C

D

A



Wetland illustrates food-waste-food cycle.



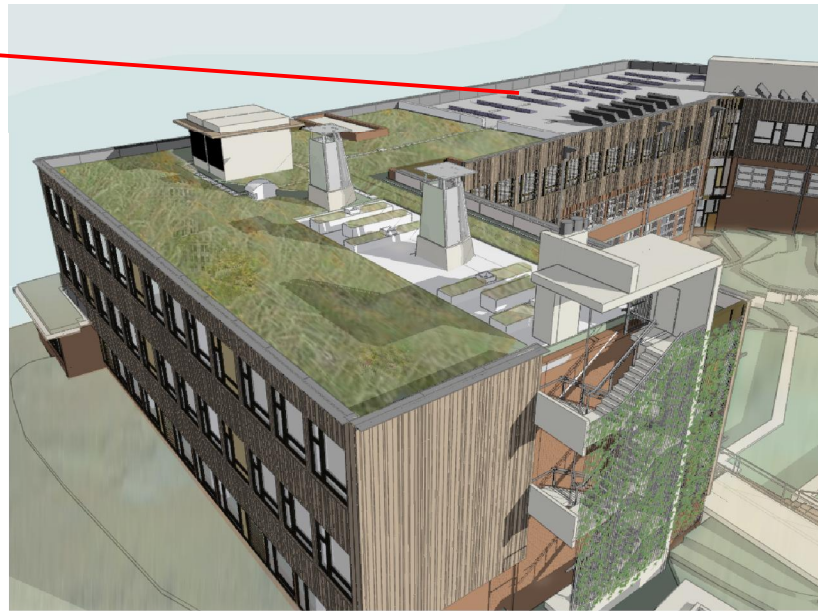
Green roof with organic herb garden supplies dining room

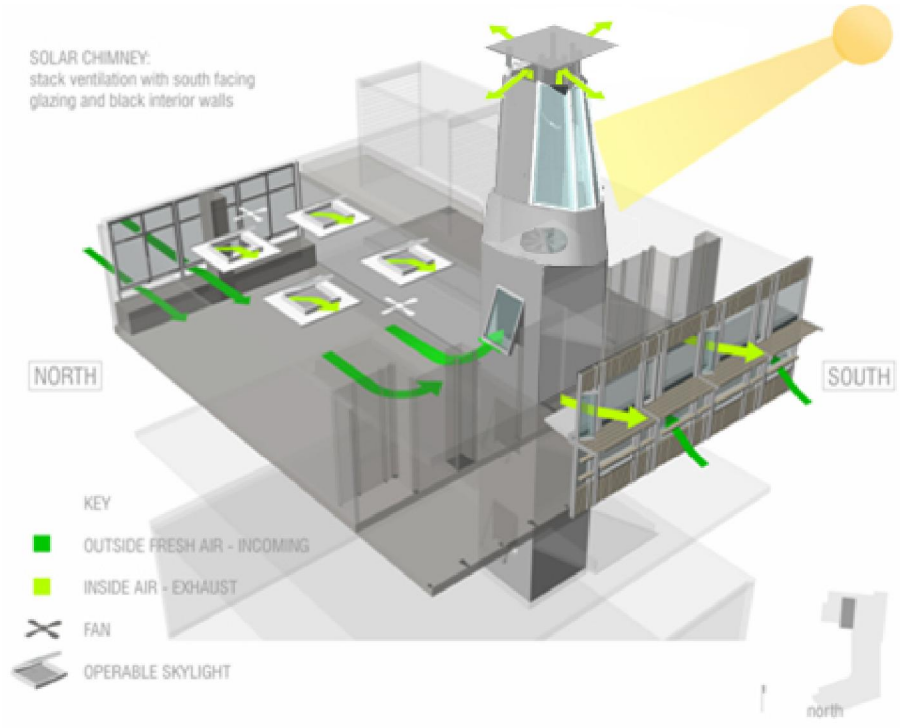
Norwegian Shed: green roofs are time-tested

Application of modern materials

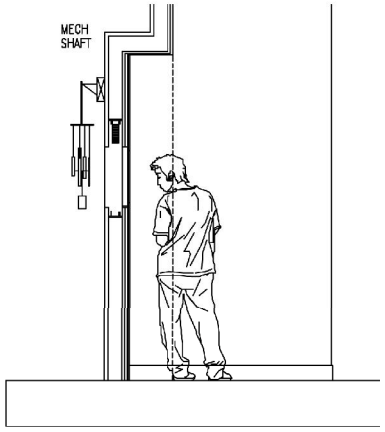
Green roofs insulate the building and mitigate storm water impacts

Photovoltaic arrays use the sun's energy to generate electricity



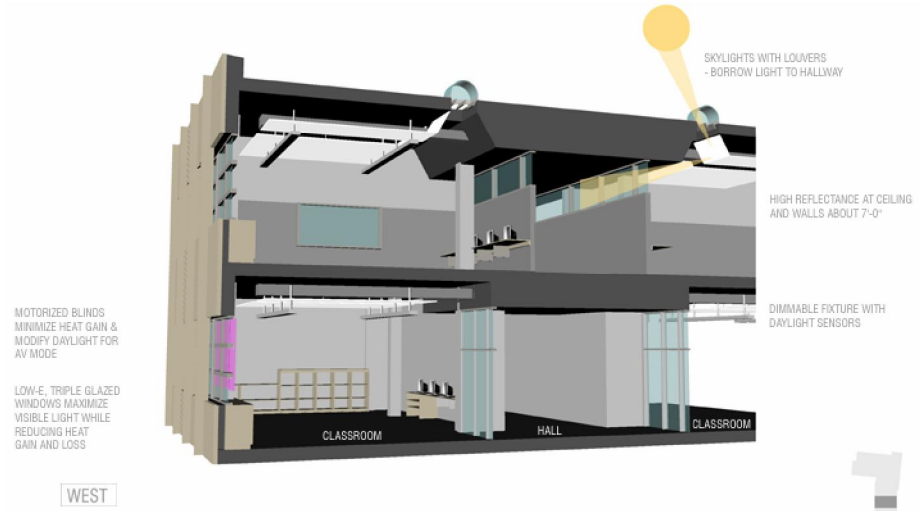


Natural and mechanically assisted ventilation reduce energy use for heating and cooling



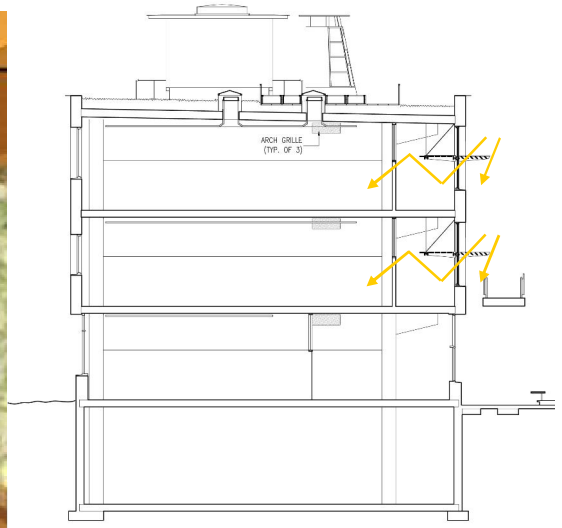
Wind chime in ventilation tower makes air flow visible

Dual Mode Heating and Cooling System



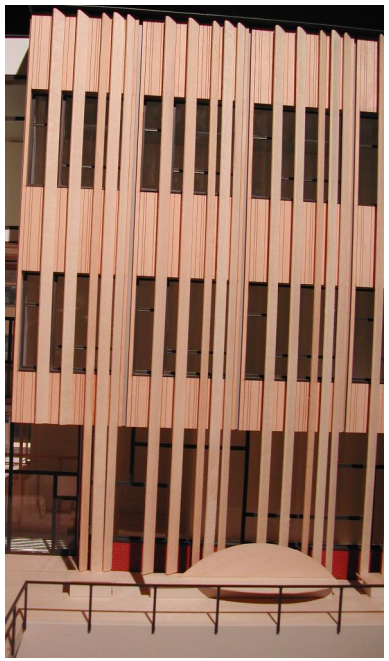
- North-facing windows are left uncovered (above left and right)
- Sunlight enters top floor classrooms through sky lights in renovated wing

Optimization of Day Light Illustrates How Revealed Building Systems Can Teach



- Optimizing day light in classrooms reduces energy for lighting and cooling while boosting productivity
- Sunlight entering through south facing windows bounces off light shelf and reflective hallway ceiling (above right) then enters through clerestory into new science lab (above left) equipped with automatic blinds and dual mode florescent lamps.

Optimization of Day Light Illustrates How Revealed Building Systems Can Teach



- On east and west exposures, the vertical fins covering the windows are angled 51.25 degrees N of W to maximize shading between Noon and 3:30pm

Optimization of Day Light Illustrates How Revealed Building Systems Can Teach

Energy Model for Addition

EA Prerequisite 2 / EA Credit 1 / EA Credit 2

ECB Table - MS New (Double glazed windows and no solar thermal)

Energy Summary by End Use

Regulated Energy Summary by End Use	Energy Type	Proposed Building Energy [10^3 Btu]	Proposed Building Peak [10^3 Btu]	Budget Building Energy [10^3 Btu]	Budget Building Peak [10^3 Btu]	Proposed / Budget Energy [%]
Lighting - Conditioned	Electricity	32,287		411,198		8%
Lighting - Unconditioned						
Space Heating	Gas	424,610		697,350		61%
Space Cooling	Electricity	96,417		210,650		46%
Pumps	Electricity	30,751		51,127		60%
Fans - Interior Ventilation	Electricity	41,570		47,884		87%
Fans - Interior Exhaust						
Service Water Heating	Gas	189,860		189,860		100%
TOTAL BUILDING CONSUMPTION		815,495.7		1,608,069.7		51%

Energy and Cost Summary by Fuel	DEC'' Use [10^3 Btu]	DEC'' Cost [$]	ECB' Use [10^3 Btu]	ECB' Cost [$]	DEC'' / ECB' Energy %	DEC'' / ECB' Cost %
Electricity	201,026	$ 4,182	720,860	$ 14,996	28%	28%
Natural Gas	614,470	$ 4,529	887,210	$ 6,539	69%	69%
Other Fossil Fuel	-	$ -	-		-	-
Subtotal Nonrenewable (DEC')	815,496	8,711	1,608,070	21,535		
Subtotal Renewable (REC')	(59,095)	(436)			-	-
Total	756,401	$ 8,275	1,608,070	$ 21,535		

Percent Savings = (ECB' $ -DEC'' $)/ECB' $ = 62%

Credit 1 Points Awarded = 10

Percent Renewable = 100 x (REC'$)/DEC'$ = 5%

Credit 2 Points Awarded = 1

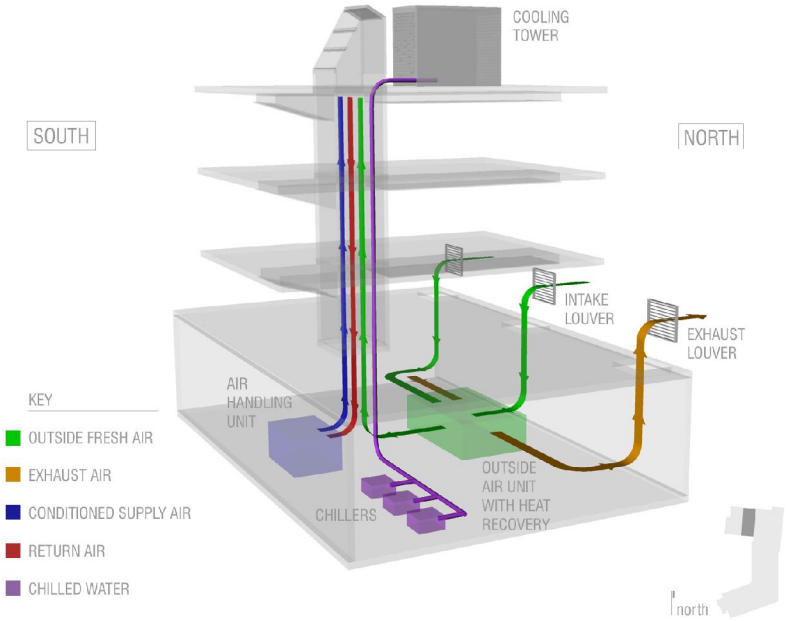
Impacts:

- HVAC loads
- Building controls
- AV systems
- Window shading systems
- Configuration of interior spaces
- Interior materials selection
- Roofscape
- Building cladding

$13,000 projected annual energy savings (north wing only)

Overall energy savings of 55% building-wide relative to code requirements

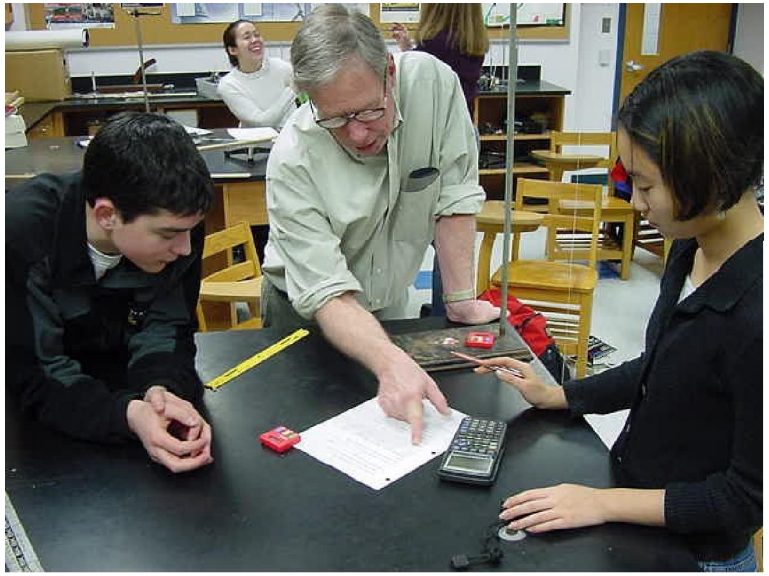
Efficient Lighting Design Reduced Energy Use Associated with Lighting by 92%

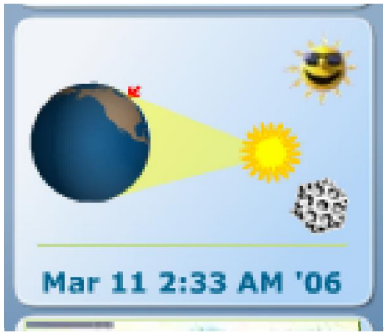


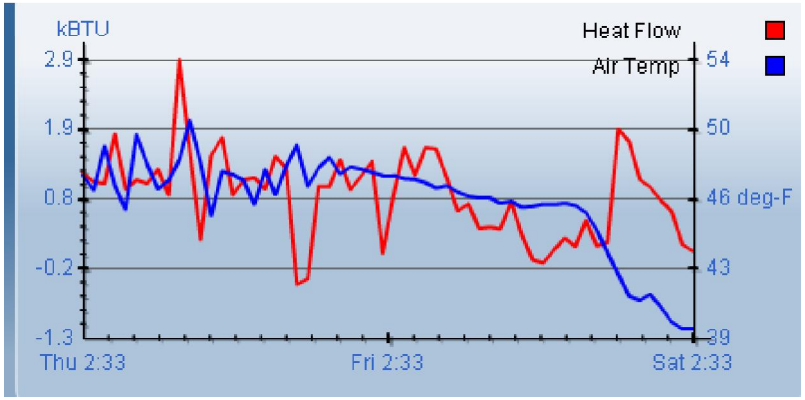
Central Plant Heating and Cooling Loop

- Use diversity permits smaller equipment
- More efficient centralized maintenance
- Natural redundancy (back-feed buildings)
- Increased program area in served buildings

Central Plant Will Reduce Energy Use Campus-Wide







Displays in Classrooms and on Internet will Allow Students to Monitor and Analyze Building Performance

recycling station

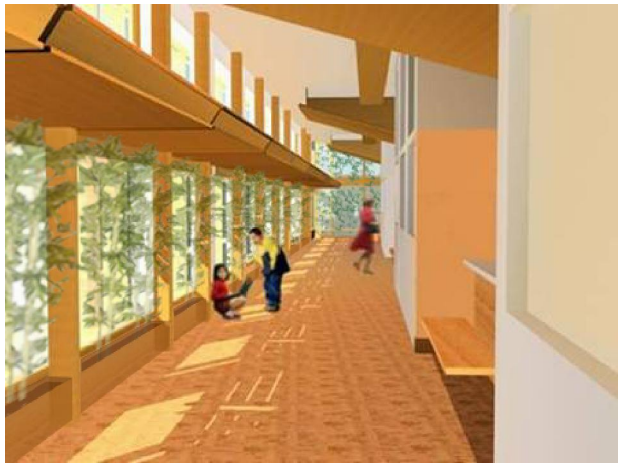
tackable wall surface

gypsum drywall

acoustic ceiling tile

CASEWORK
linoleum countertop
bamboo veneer
wheatboard substrate

cork flooring



KEY

RESOURCE REUSE

RECYCLED CONTENT

LOCAL & REGIONAL

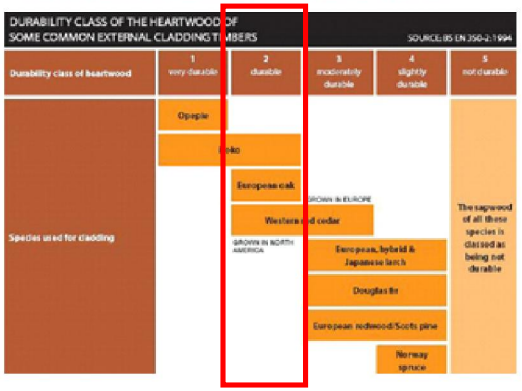
RAPIDLY RENEWABLE

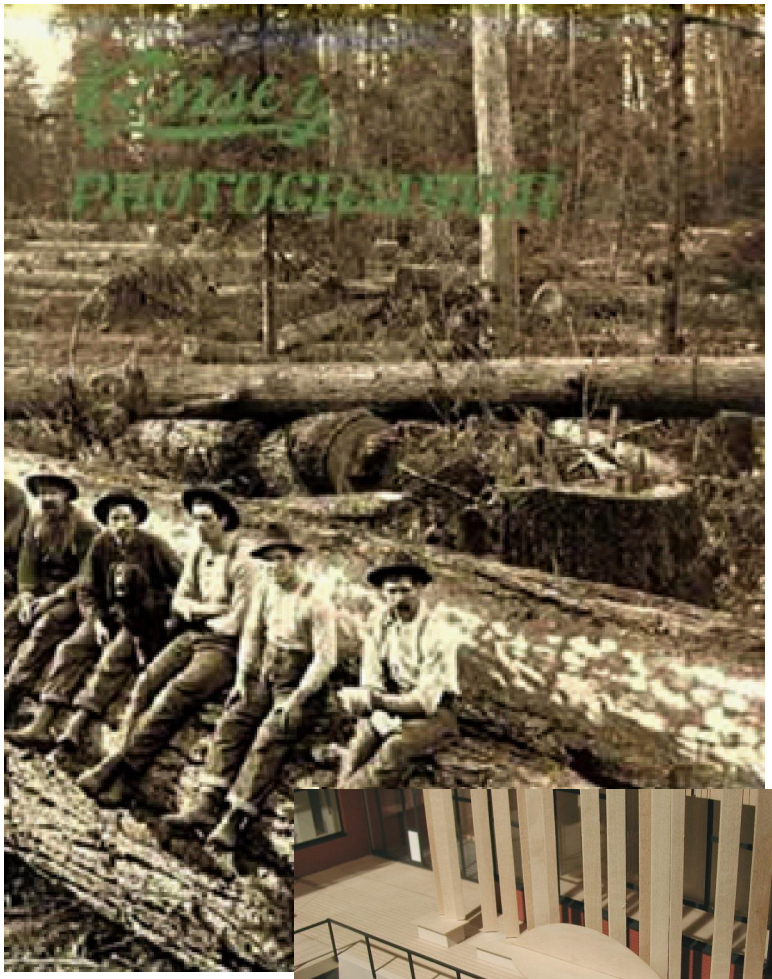
CERTIFIED WOOD

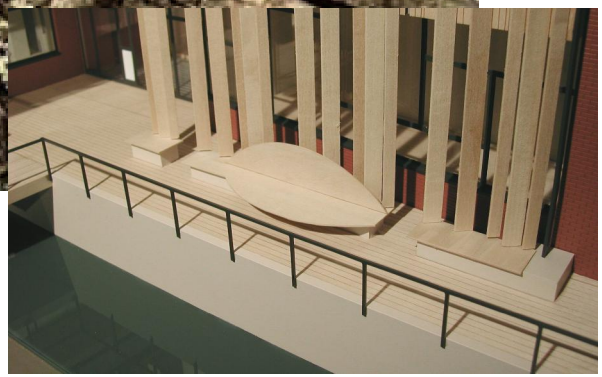
Materials are Selected for their Environmental Impact

Exhibits in Classrooms and Circulation Spaces Illustrate their Origins

WHY WOOD?
. LOW EMBODIED ENERGY
. RENEWABLE RESOURCE
. LOCALLY AVAILABLE
. CONTRIBUTES TO LEED POINTS (RECLAIMED & LOCAL)
. SUN SHADING INTEGRAL TO CLADDING SYSTEM







Building Clad in Durable, Reused Western Red Cedar

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Source Reference

New High Performance Middle School

New Middle School Integrated with the Landscape

- Curricular integration
- Sustainable Food Sources
- Green Operations and Building Maintenance
- Transportation policy
- Attention to Sustainability in all new Facilities

Focus on Sustainability has Moved Beyond Buildings

Category	20-year Net Present Value
Energy Savings	$5.80
Emissions Savings	$1.20
Water Savings	$0.50
Operations and Maintenance Savings	$8.50
Productivity and Health Value	$36.90 to $55.30
Subtotal	$52.90 to $71.30
Average Extra Cost of Building Green	(-3.00 to -$5.00)
Total 20-year Net Benefit	$50 to $65

- Extra investment pays for itself in energy savings.
- Overall benefits exceed costs by factor of ten
- Greatest benefits are to heath and productivity
- Not everything that can be counted counts, and not everything that counts can be counted.
  - Albert Einstein

Drawn from a report to California's Sustainable Building Task Force, a group of over 40 state agencies, with funding from seven. The study draws on cost data from 33 green building projects and benefits data from over 100 buildings nationwide. Developed in partnership with USGBC.

EXECUTIVE ORDER S-20-04
by the
Governor of the State of California

California Study Indicates Green Buildings Are a Good Investment

Source: Capital E Analysis

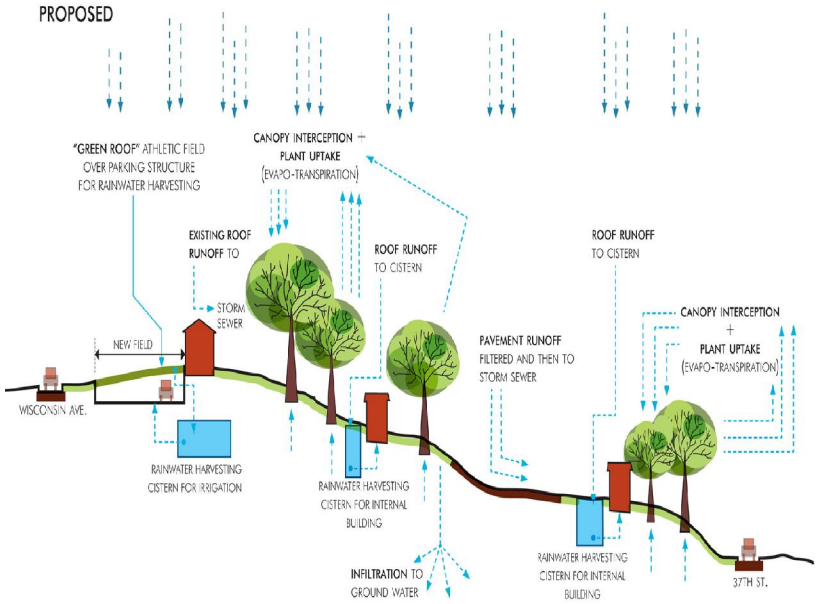
Research indicates high performance buildings can enhance

- Health
- Productivity
- Sense of well being

SFS research in collaboration with Yale School of Forestry and Environmental Studies

Sidwell will Contribute to Primary Research on High Performance Buildings

- Aid to fundraising
  - But we didn't count on it
  - School may not be oriented towards corporate or foundation grants
  - Development office already stretched launching capital campaign
- Aid to Zoning
- Adds a spark: from sufficiency to vision



Green Design Brings Collateral Benefits

– **Mindset** – Intent and commitment to succeed

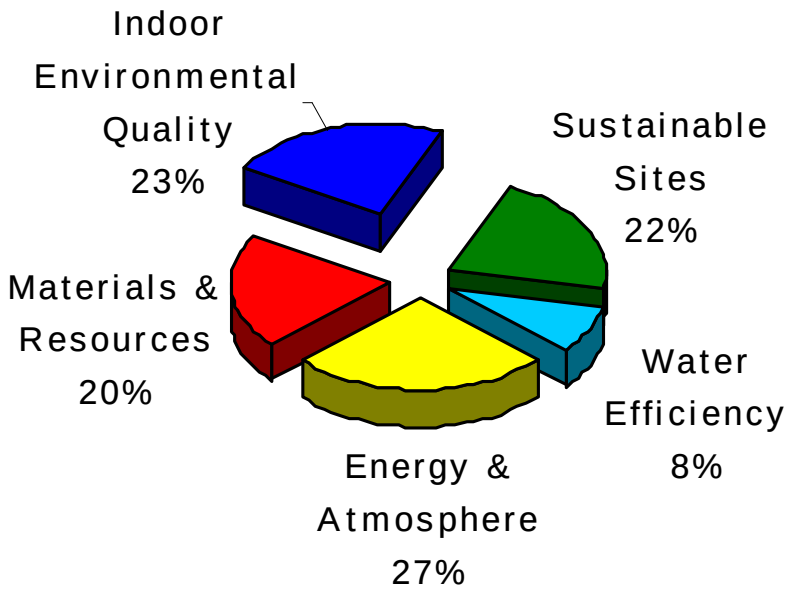
– **Process** – Integrated, all parties engaged

– **Tools** – Benchmarks (LEED), Modeling Programs (DOE2), Payback Analysis Framework

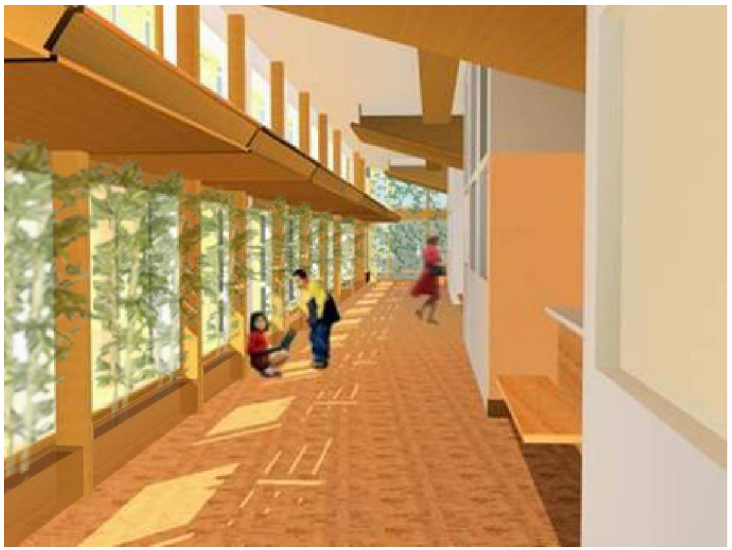
– **Outcomes** – Technology, Products, Techniques

Adapted from Bill Reed

- Pros
  - LEED provides nationally recognized framework
  - Third party validation
  - Focuses design choices
  - Supports mainstay of the movement
- Cons
  - Can distort choices
  - Additional cost



Decide whether to Seek Certification



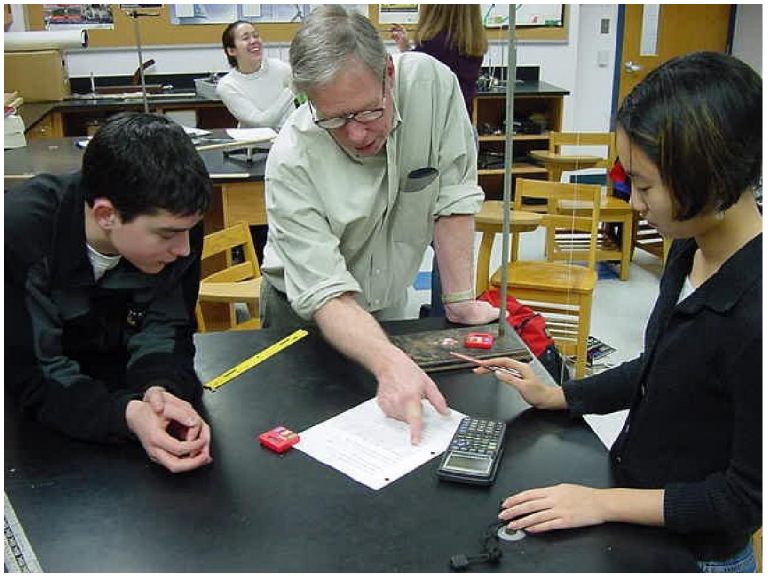
- Little or no additional cost
- Life cycle payback
- Pedagogically or ethically compelling
  - "Signature Strategies"

Establish Principles for High Performance Investment

- Recognize that the School will be here for the long run and that we have the capacity to borrow
- Lower operating costs may be realized if higher first cost is covered through capital campaign (payback)

Move Forward in the Face of Uncertainty

- Project champion
- Progressive Buy-In
  - There is a problem
  - The school can be part of the solution
  - We can afford to do it
  - The school will be improved if we do



Solidify Leadership

- Process repeats with each stakeholder group
- Started with the Board at Sidwell
  - Toehold in architect selection
  - B&G buy-in
  - Making the case to the full Board
- AC, Faculty, etc.

Solidify Leadership

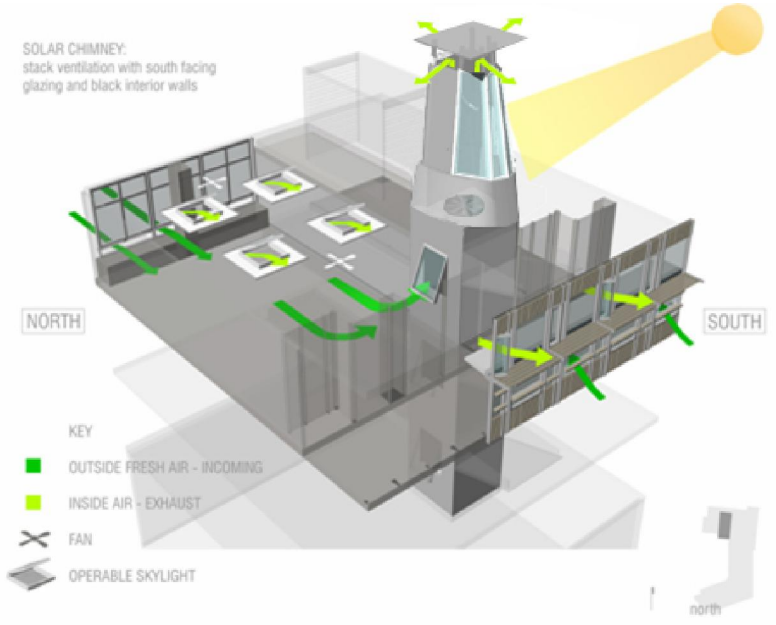
- Select for cultural fit as well as technical expertise
  - Like the School, the design team must internalize the green agenda
  - What is innate and what can be learned
- Be prepared to invest heavily in knowledge
  - Smart design pays for itself
- Start early—the best solutions will be holistic

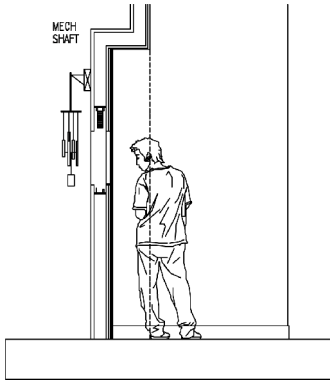
Assemble the right design team

Budget based on prioritizing all possible LEED™ points from least to most cost

Middle School LEED™ Certification Options Summary	
Points in Base Budget (Gold+1)	$
Minimum Target for Gold	$
Target for Gold with Cushion (Gold+3)	$
Minimum Target for Platinum	$
Maximum Rating (Platinum+3)	$

Understand the Costs of Achieving Goals





- Long range financial plan can demonstrate green design does not:
  - Come at the cost of faculty compensation
  - Drive tuition growth (in a private school context)
  - Conflict with other institutional objectives

Illustrate Financial Context

Contributions Used for Construction	$	30.0
Contributions Used for Endowment	$	10.0
Contributions Used for Anual Funds	$	8.0
Total Campaign	$	48.0
Constant tuition increase (1 or 2)	1	5.0%
No Enrollment Growth (1 or 2)		1
Construction Escalation after '05		7.5%
Academic Exp Escalation		5.5%
Other Non-FA Operating Expenses		5.0%

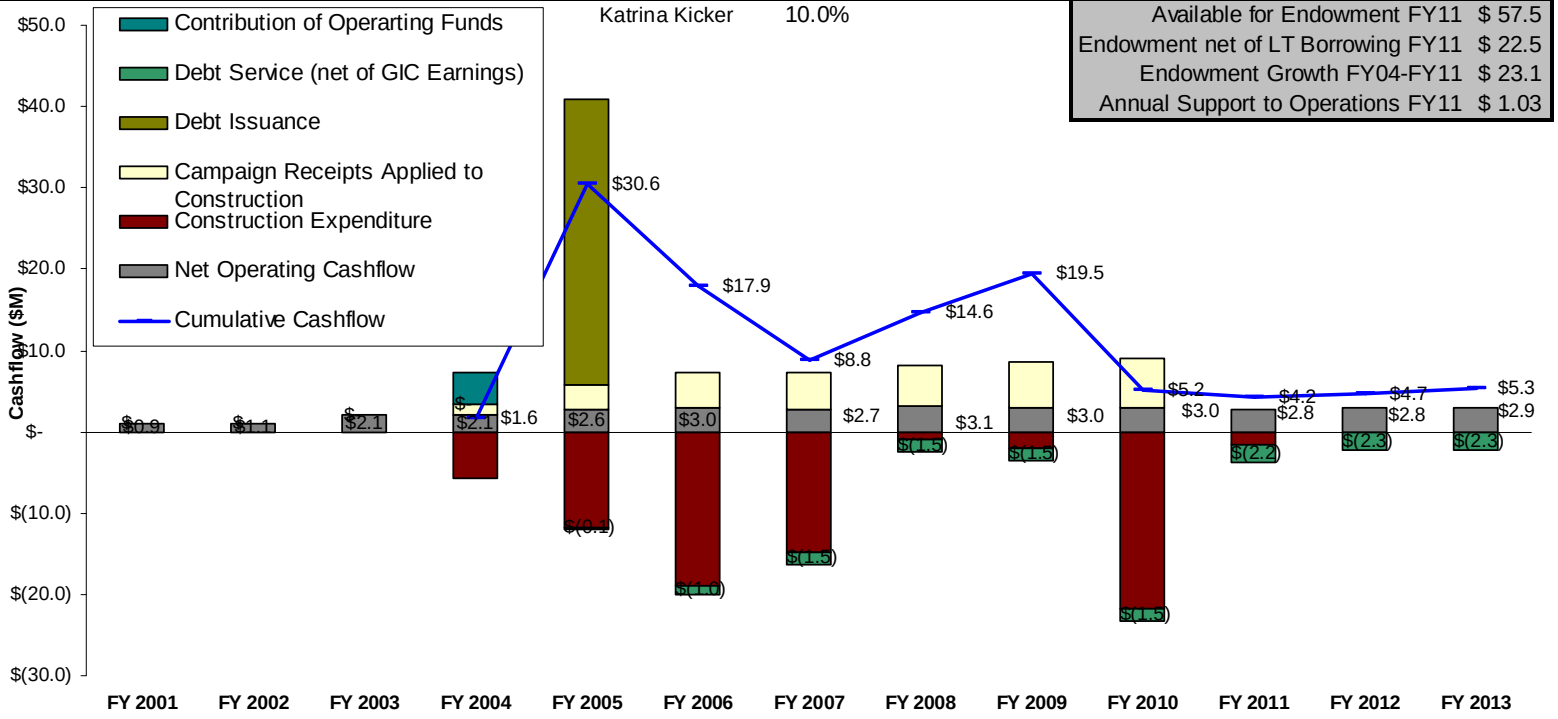
Structure	Cost 2005 $s	Build in Fiscal	Escalated Cost
Middle School	26,300	2006	$ 26,300
Wisconsin Ave Structure	9,800	2006	$ 9,800
Lower School Project	12,404	2007	$ 15,258
DC Arts & Athletics*	12,364	2010	$ 19,334
Quaker Meeting House*	4,477	2010	$ 6,942
	65,345		$ 77,634

*Phase II project timing, scope and cost TBD

Katrina Kicker 10.0%

Sources and Uses 2004-2011	
Contributions Used for Construction	30.0
Bond Proceeds	35.0
Accumulated Reserves	4.0
Cash from Operations	18.2
Total Sources	87.2
Construction Expenditure	77.6
Debt Service	9.5
Total Uses	87.2

Available for Endowment FY11	$ 57.5
Endowment net of LT Borrowing FY11	$ 22.5
Endowment Growth FY04-FY11	$ 23.1
Annual Support to Operations FY11	$ 1.03



Sidwell Friends School's Multi-Year Financing Model

All numbers shown are ficticious. They do not represent the finances of Sidwell Friends School

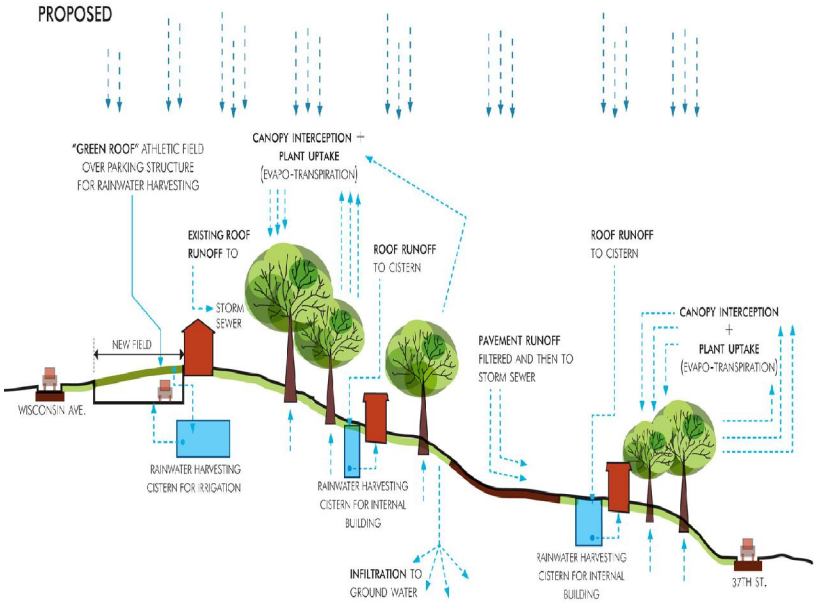
Prepared and presented by Mike Saxenian. saxenianm@sidwell.edu

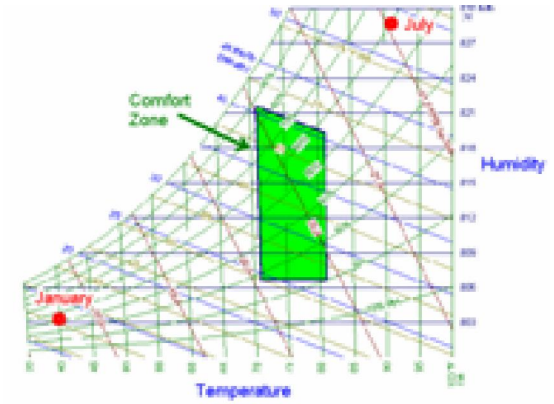
- Project serves as a catalyst for broader change
  - Operations
  - Transportation
  - Curriculum
- Faculty and staff serving on Environmental Stewardship Committee
- Trustees and experts serve on Green Advisory Board
- Develop a culture of sustainability

Leverage the Building Project

END

- Minimize the impact of development on the site.
- Responsibly manage and recycle storm water and building waste water.
- Save energy first – optimize building performance through siting, orientation and high quality building design. Use energy modeling.
- Select most efficient equipment and systems.
- Use renewable energy sources where feasible.
- Maximize natural ventilation and mechanical ventilation to minimize the use of air conditioning.
- Use only products and processes which optimize air quality.
- Renew existing buildings first, using recycled or rapidly renewable materials as well as local materials.
- Incorporate innovations such as buildings that teach by revealing systems and processes.





Incorporate Simple Sustainable Design Strategies Throughout

Some strategies incur a first cost which is paid back over a reasonable time through energy and maintenance savings.

- Natural and mechanically assisted ventilation
- Efficient building envelope
- Central utility plant (6-10 year payback)

Signature strategies incur larger first costs and longer, if not indefinite, payback, but may be considered critical to curriculum or stewardship

- Constructed wetland
- Solar panels

Invest in Signature Approaches