

**Mid-Atlantic Center for Children's
Health and the Environment**

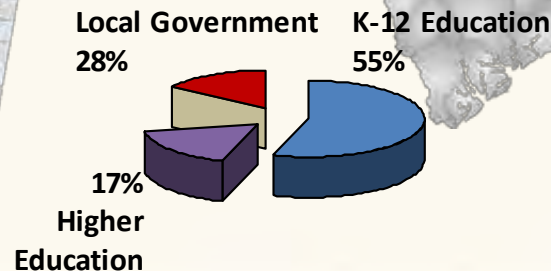
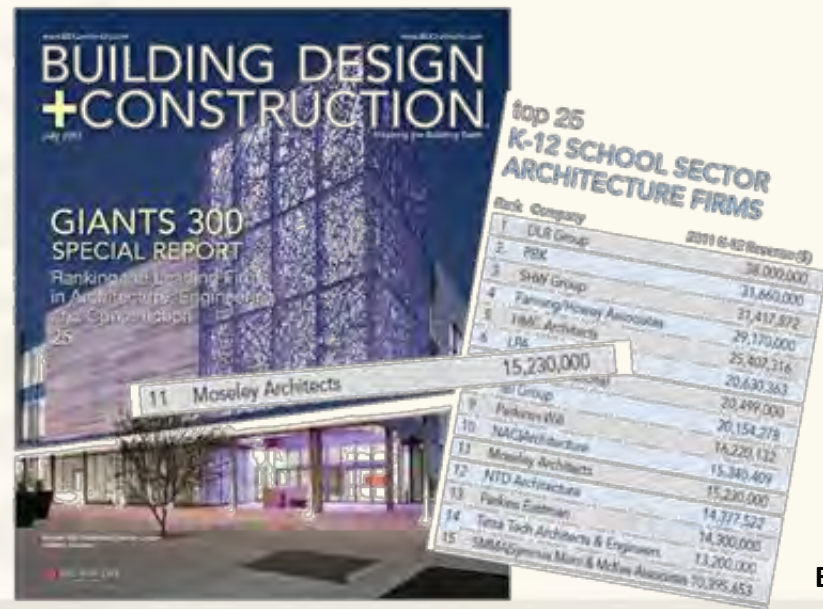
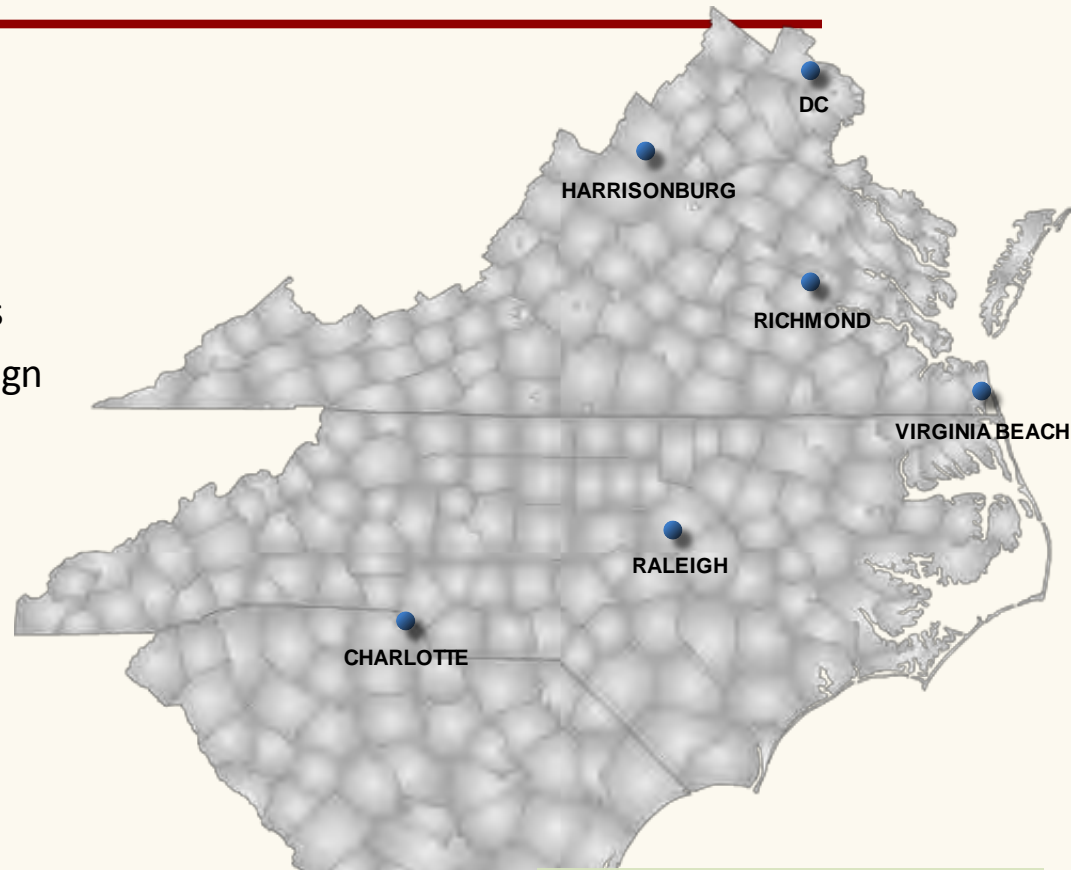
2014 Annual Conference

**GREENING OUR NATION'S K12
SCHOOLS**

Bryna Dunn, AICP, LEED Fellow
Vice President
Director of Sustainability Planning + Design

About Moseley Architects

- Established to serve public clients
- 179 employees
- 6 regional offices
- Ranked 28th nationwide for A/E Firms
- Ranked 11th nationwide for K-12 Design
- Focused on green design
 - ✓ 109 LEED Projects



In the last 15 years...

- **318 Elementary School Projects!**
 - 168 New School Projects
 - 150 Addition & Renovation Projects
- **151 Middle School Projects!**
 - 74 New School Projects
 - 77 Addition & Renovation Projects
- **171 High School Projects!**
 - 60 New School Projects
 - 111 Addition & Renovation Projects

Sustainable Design Approach

- Clearly articulate goals
- Focus on energy efficiency
- Focus on water efficiency
- Understand life cycle cost
- Enhance the quality of the learning environment





56,649,804 *gallons*

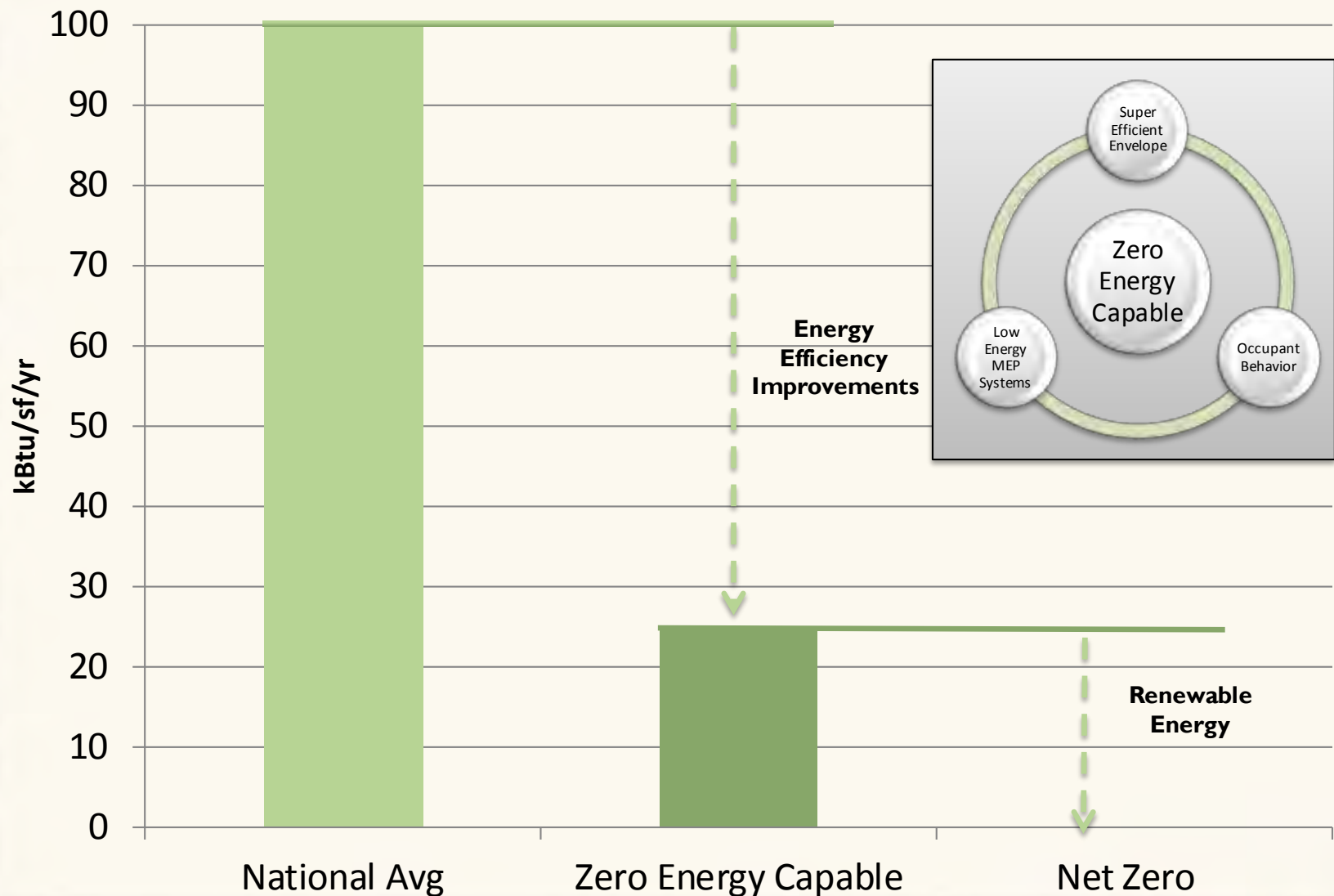


234,000 *mBtu*



80,570 *tons*

Setting Energy Performance Targets



Energy vs. Indoor Air Quality



Can We Set Health Performance Targets, Too?



Material Selection



Adhesives
&
Sealants



Paints
&
Coatings



Carpet



Composite
Wood



Furnishings



Health Product
DECLARATION

Construction Indoor Air Quality Management

Construction Indoor Air Quality Management Plan

[Contractor Name]
[Project Name and Location]
Updated: [Date]

[Replace all bracketed and highlighted information with project-specific details]

This Construction Indoor Air Quality Management (CIAQM) Plan is applicable to all subcontractors working within the interior of the building. It is based on the Sheet Metal and Air Conditioning National Contractor's Association (SMACNA) IAQ Guideline for Occupied Buildings Under Construction, 2nd Edition 2007.

COMMUNICATION & ENFORCEMENT

1. The individual responsible for coordinating and enforcing the Construction Indoor Air Quality Management (CIAQM) Plan is [name].
2. All questions or concerns regarding CIAQM should be directed to the CIAQM coordinator at [email address] or [telephone number].
3. Disregard for the requirements of this Plan will result in a fine of [\$] to the offending subcontractor [or describe other disciplinary action].

RECORD KEEPING

1. The CIAQM Coordinator will collect the Material Safety Data Sheets (MSDS) or Technical Data Sheets (TDS) that reflect the VOC content of adhesives, sealants, and paints used inside the building. All subcontractors must provide documentation for adhesives, sealants, and paints used inside the building for their compliance with SMACNA Category 2 below.
2. The CIAQM Coordinator will collect the MSDS or TDS that reflect compliance with the Carpet and Rug Institute's Green Label Plus IAQ program for any carpet systems installed inside the building.
3. The CIAQM Coordinator will collect the MSDS or TDS that reflect compliance with the prohibition on urea-formaldehyde in any composite wood material installed inside the building (this includes, but is not limited to, particleboard, plywood, and other engineered wood products). All subcontractors must provide documentation for composite wood materials installed inside the building including doors, workstations & casework.
4. MSDS and TDS must be legible, and must include the name and contact information of the product manufacturer of the material in question.
5. The details of each targeted material will be logged into the Leadership in Energy and Environmental Design (LEED) Online templates for their corresponding credit.
6. A copy of the LEED Online Credit Template will be forwarded to the Architect's LEED Coordinator no later than the 5th day of each month, updated to show all adhesives,

Material Protection

- ☐ Describe how materials and equipment will be stored on site
- ☐ Identify significant at-risk materials and articulate specific measures to protect
- ☐ Plan for filtration to be used on return air grilles used during construction

Source Control

- ☐ Describe how off-gassing from construction materials will be controlled on site
- ☐ Identify specific materials that could contaminate indoor air
- ☐ Establish a smoking policy for construction personnel

Pathway Interruption

- ☐ Plan to confine dust and odors to specific areas of building during construction

Housekeeping

- ☐ Control dust and moisture
- ☐ Weekly visual inspections

Scheduling

- ☐ Wet before fuzzy

Acoustics

Background Noise

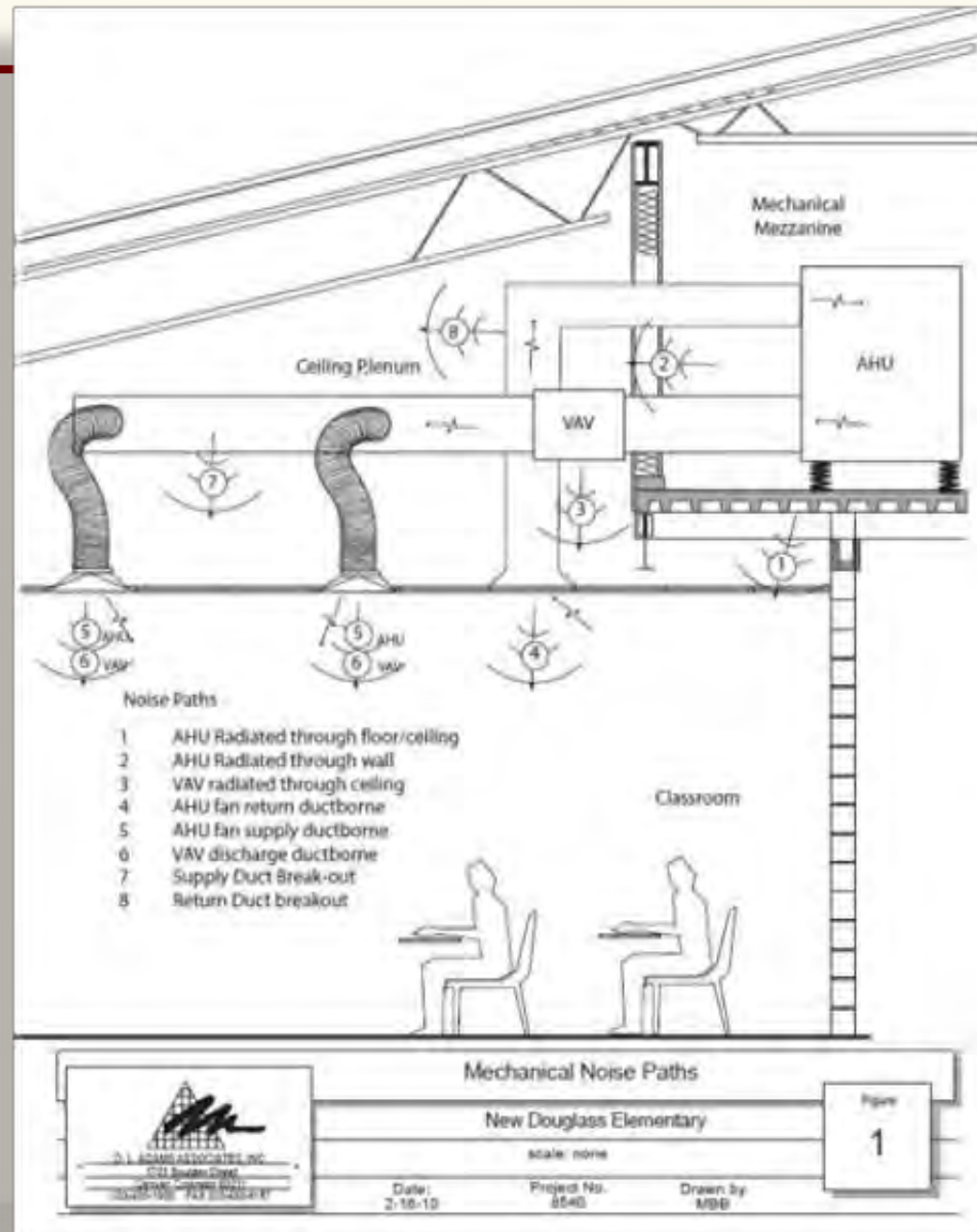
- ❑ HVAC equipment – limit to between 40 - 45 dBA

Reverberation Time

- ❑ For regular rooms, ceiling to be finished with material rated at NRC 0.70 or better
- ❑ For large volume rooms, demonstrate reverberation time of <1.5 seconds

Sound Transmission

- ❑ STC35: windows
- ❑ STC45: classroom to corridor
classroom to staircase
classroom to office
classroom to conference room
- ❑ STC 50: classroom to classroom
classroom to speech clinic
classroom to health care
classroom to outdoors
- ❑ STC53: classroom to restroom
- ❑ STC60: classroom to music room
classroom to mechanical room
classroom to cafeteria
classroom to gymnasium
classroom to natatorium



Daylight and Views



Interior Pollutant Source Control



Entryway Systems



Isolation and Exhaust



MERV 13+ Filters

Exterior Pollutant Source Control



Integrated Pest Management

Before you have a pest problem:

- ☐ Identify an IPM coordinator
- ☐ Train all potentially affected personnel
- ☐ Monitor for potential pest problems
- ☐ Don't make food/water available to pests
- ☐ Keep non-vegetated zone at exterior walls
- ☐ Install physical barriers (screens, caulk)

If you have a pest problem:

- ☐ Physical removal
- ☐ Mechanical trap removal
- ☐ Use of least toxic pesticide products
- ☐ Apply pesticides when building is unoccupied

If pest problem is persistent:

- ☐ Notify all building occupants 72 hours prior to use of stronger pesticide (with provisions for emergencies)



Resort to use of chemical solutions to pest problems only when necessary



Green Housekeeping



Product Standards

- ☐ Cleaning, hard floor care, carpet care
- ☐ Disinfectants, metal polish, floor finishes
- ☐ Disposable janitorial paper products
- ☐ Hand soaps

Equipment Standards

- ☐ Vacuum cleaners
- ☐ Carpet extraction equipment
- ☐ Floor buggers and burnishers
- ☐ Microfiber cleaning cloths

Cleaning Procedures

- ☐ Develop a training program for housekeeping personnel
- ☐ Identify occupants with chemical sensitivities
- ☐ Articulate storage protocols
- ☐ Understand manufacturer recommendations for concentrate dilution
- ☐ Establish a disinfecting schedule for various space types
- ☐ Keep a cleaning and disinfecting log
- ☐ Communicate good hand-hygiene to all building occupants



Mold Prevention

Building Air Quality

A Guide for Building Owners and Facility Managers



U.S. Environmental Protection Agency

Office of Air and Radiation

Office of Atmospheric and Indoor Air Programs

Indoor Air Division

U.S. Department of Health and Human Services

Public Health Service

Centers for Disease Control

National Institute for Occupational Safety and Health



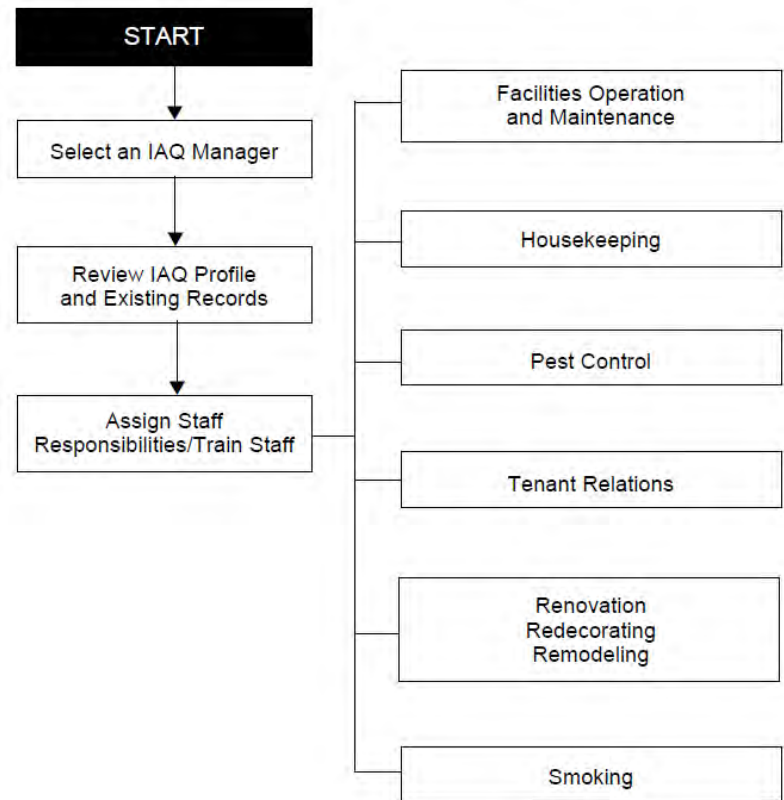
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FIGURE 5-1: Developing an IAQ Management Plan



Design for Active Occupants



Embracing the Project-Based Learning Potential



- ① 2 HYBRID WIND / SOLAR SITE LIGHTS
- ② BIKE RACKS
- ③ OVERSIZED PIPING FOR RAINWATER HARVESTING
- ④ SOLAR HOT WATER PANELS
- ⑤ GREEN ROOF
- ⑥ RAIN BARRELS
- ⑦ PERMEABLE PAVEMENT
- ⑧ DROP OFF FOR LOW-EMITTING & FUEL EFFICIENT VEHICLES
- ⑨ PARKING FOR LOW-EMITTING & FUEL EFFICIENT VEHICLES
- ⑩ IRRIGATION BY RAINWATER
- ⑪ SCHOOL GARDEN
- ⑫ RECYCLING STORAGE

Math
Science
Government
Computer Skills
Public Speaking

LEED Activities and Related SOCs

GRADE 7 Unit Science
*US 7.1 will be reinforced throughout the curriculum

SOC	Objectives	Essential Questions	Activity	Time
7.2	The student will investigate and understand that all living things are composed of cells. Key concepts include: a) cell structure and organelles b) similarities and differences between plant and animal cells c) development of cell theory d) cell division	Why the cell is called the building block of life?	1) Students will take samples from the garden (plants) and water (pond) to examine through a microscope for the presence of cells and analyze the cell structure and characteristics of all cells according to the cell theory.	1) 1.5 hours
7.4	The student will investigate and understand how organisms can be classified. Key concepts include: a) the distinguishing characteristics of domains of organisms b) the distinguishing characteristics of kingdoms c) the distinguishing characteristics of major animal phyla and plant divisions d) the characteristics that define a species	What is the importance of a classification system in science?	1) Classify Chesapeake Bay animals - Students will create their own classification scheme for organisms found in the Chesapeake Bay according to common characteristics.	1) 1.5 hours

Post Occupancy Surveys

7. Are you satisfied with the thermal comfort of the building (temperature, humidity, air flow, etc.)?

☐ +3 (Very much) ☐ +2 ☐ +1 ☐ 0 (Neutral) ☐ -1 ☐ -2 ☐ -3 (Not at all)

Explain: _____

8. Describe rooms or areas of the building in which you have consistently experienced thermal discomfort. Please be specific about the nature of the thermal discomfort in each area.

9. If you consistently experience thermal discomfort, when does this generally occur? (check all that apply)

- ☐ Mornings
- ☐ Around noon
- ☐ Afternoons
- ☐ Evenings
- ☐ Weekends/Holidays

10. What do you think may be the source(s) of any thermal discomfort?

Explain: _____

16. Do you feel you usually have access to natural daylight in offices and regularly occupied spaces?

☐ +3 (Very much) ☐ +2 ☐ +1 ☐ 0 (Neutral) ☐ -1 ☐ -2 ☐ -3 (Not at all)

Explain: _____

17. Do you feel there are sufficient views to the outside?

☐ +3 (Very much) ☐ +2 ☐ +1 ☐ 0 (Neutral) ☐ -1 ☐ -2 ☐ -3 (Not at all)

Explain: _____

18. Are you satisfied with the acoustics (noise from other rooms, echo, background noise) of the regularly occupied spaces?

☐ +3 (Very much) ☐ +2 ☐ +1 ☐ 0 (Neutral) ☐ -1 ☐ -2 ☐ -3 (Not at all)

Explain: _____

- ☐ “Most beautiful building ever - hardly use the lights because of the **fabulous windows and glass.**”
- ☐ “The **light available improves on the mood** of students and teachers.”
- ☐ “I have been **healthier since teaching in this building** than I have ever been in my life.”
- ☐ “I **haven't had to take Zyrtec** all last year.”
- ☐ “My **sinus problems have really improved** since moving into the new space.”
- ☐ “It doesn't **smell like teens** yet.”
- ☐ “I **can't listen to anything** else besides my teacher talking. It's suffocating”



Post Occupancy Feedback

TUESDAY
NOVEMBER 29, 2005
141ST YEAR • NO. 9
50 CENTS

The Virginian-Pilot

"They have more trees and more space. It's a better place. It gives you more oxygen." — FIFTH-GRADER MARCEL HOKE

Beach elementary school earns a "green" distinction

Structure built to be safe for environment obtains certification

BY LAUREN ROTH
THE VIRGINIAN-PILOT

VIRGINIA BEACH — The roof isn't the only thing "green" about the rebuilt Hermitage Elementary.

The school, at 1701 Pleasure House Road, is the first elementary school in the state to attain a voluntary environmental certification called Leadership in Energy and Environmental Design.

With waterless urinals, natural landscaping, recycled materials and energy-saving fixtures, the school qualified for the national certification in October.

The new building replaced the old Hermitage Elementary, a smaller 1964 structure that was demolished. About 560 students had returned to the new school, which opened in April after two years of construction.

To qualify for certification, a new building must document at least 27 of 69 conditions on a checklist overseen by the U.S. Green Building Council, a building-industry group that encourages sustainable construction. Hermitage Elementary earned 27 points. Last year, Old Dominion

University's Engineering & Computational Sciences Building was the first area structure to be LEED certified.

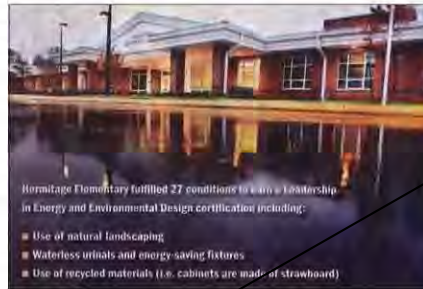
Fifth-grader Marcel Hoke, 10, said the new school is different. "They have more trees and more space," he said. "It's a better place. It gives you more oxygen."

In the computer lab, cabinets are made of strawboard, a substitute for particleboard, made from straw left after wheat is harvested. In the library, wood in bookshelves, the checkout desk and doors come from forests where every tree cut is replanted.

Principal Kathleen Starr, who suffers from allergies and asthma, said she has been breathing easier in the new school.

Air quality was considered during construction. The carpets, paints and floor adhesives used to build the school give off low emissions, explained Marshall Everett Jr., a construction inspector with the school division. Sanding and painting also were halted for the last two weeks before the school opened.

Hermitage Elementary earned points for recycling its old bricks and



Hermitage Elementary fulfilled 27 conditions to earn a Leadership in Energy and Environmental Design certification including:

- Use of natural landscaping
- Waterless urinals and energy-saving fixtures
- Use of recycled materials (i.e. cabinets are made of strawboard)

steel, planning a recycling program (set to start in January) and posting informative signs about the building's "green" features around the school.

Third-grade teacher Maria Ash has been taking advantage of the bike racks, two wavy metal tubes painted blue. At the former Hermitage Elementary, "I chained the bike to a drain spout or took it into the classroom." The new building, constructed on the site of the former school, also includes showers for the staff.

Project manager Tim Cole pushed the division to build the school with environmental effects in mind, said Anthony L. Arnold, the division's facilities planning and construction director. Cole, a former private-sector architect, is a Navy SEAL who was deployed early this

year. Arnold said Virginia Beach will incorporate some of the same techniques in future construction.

Moseley Architects of Virginia Beach designed the school. John Dunn, who does environmental research and planning for the firm, said the environmentally friendly features were added at little cost to taxpayers. Less than 1 percent of the \$11.1 million project was dedicated to making the building more "green" he said. And over the life of the building, the changes are likely to save at least 20 percent on energy costs, Dunn said.

Ash said the building provides a good lesson for her students. "It's the right thing, not just for this school, but for anybody living on Earth."

■ Beach: Lauren Roth, ed. (757) 222-5133 or lauren.roth@pilotonline.com.

It's a better place. It gives you more oxygen.

Principal Kathleen Starr, who suffers from allergies and asthma, said she has been breathing easier in the new school.

Third-grade teacher Maria Ash has been taking advantage of the bike racks...The new building, constructed on the site of the former school, also includes showers for the staff.

Post Occupancy Feedback

The Washington Post

METRO

TUESDAY, SEPTEMBER 11, 2007

“Some of my classes didn’t have windows at all last year. This year, it’s easier for me to focus.”

— Mary Ball, student at Alexandria’s T.C. Williams High

Titans of Ecology

T.C. Williams Among Rising Number of ‘Green’ Schools

By IAN SHAPIRA
Washington Post Staff Writer

At the brand-new T.C. Williams High in Alexandria, a modern “green” school, students say the environmentally friendly design has led to a serious lifestyle change: They can’t doze in class anymore because sunlight pours in from practically every angle.

And in another tectonic shift in student mentality, the urge to scrawl graffiti appears to have vanished.

“It’s so nice right now that everyone

would feel guilty making a mark on the desks,” said Grace Goodwin, 16, a junior, while eating lunch last week in a cafeteria with four skylights and exposed ductwork. “Everyone in Alexandria, even people who don’t have kids in school, paid for this.”

In the Washington region and elsewhere, local governments are spending big money on a new generation of schools designed to be sensitive to the environment. The campuses — often equipped with the trappings of an upscale hotel, such as waterless urinals and motion-

sensing light systems — stand in sharp contrast to schools with mold, chipped ceilings and more fluorescent light than natural light.

At T.C. Williams, classroom ceilings are sloped to disperse light more efficiently, giving the space a futuristic feel. A rooftop garden over the cafeteria reduces the amount of heat the building absorbs. And then there are the seemingly nuclear-powered hand driers in the bathrooms, which can be heard from class-

See GREEN, B2, Col. 1

*Students say the environmentally friendly design has led to a serious lifestyle change: **They can’t doze in class anymore because sunlight pours in from practically every angle.***

***The bright lights keep you awake.** In my old classrooms last year, they had these yellow type of lights that were dim.*

*Many said they are resisting the impulse to mark up desks with doodles or bubble-lettered pronouncements of love. **The greenness of the campus, they say, heightens the shame over vandalizing an expensive school,** especially one whose main purpose is to be “sustainable” and last for a long time.*

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