DUNBAR HIGH SCHOOL
Creating a High-Performance, Sustainable Learning Environment for Washington DC
KEY STATS

Gross Area of Building: 280,000 gsf
Capacity: 1,100
Size of Site: 8.5 acres
Grades Served: 9-12
Cost of Construction: $101,750,000
Total Project Cost: $127,906,735
Date Completed: August 2013
Geothermal Wells: 362 wells, 460 ft deep
Cisterns: (2) 20,000 gallon cisterns
Photovoltaics: 480 KW
Sustainability Certification Level: LEED Platinum
HISTORY AND HERITAGE

DR. ANNA J. COOPER
Leadership Academy in Education and Information Technology
PRINCIPAL EDUCATOR - AUTHOR

CARTER G. WOODSON, PhD
FACULTY
FATHER OF BLACK HISTORY
“It was sort of a hang out... then of course, the students on their break from classes would stop there and talk a little bit before their next class would begin... so it was sort of an avenue of sorts with a lot of things going on.”

- Dr. Ralph Green, '52
PHASING DIAGRAMS
HIGH PERFORMANCE STRATEGIES: TEAM COLLABORATION
HIGH PERFORMANCE STRATEGIES: COMMUNITY ENGAGEMENT
**HIGH PERFORMANCE STRATEGIES: DESIGN INNOVATION**

**ENERGY**

A ground-source heat pump system (also known as a geothermal system) under the athletic field and radiant flooring in the Armory support Dunbar’s commitment to energy efficiency.

**SOLAR**

Solar panels, also known as photovoltaic (PV) panels, convert natural energy from the sun into clean, reliable electricity.

**DID YOU KNOW THAT...**

- 362 wells are buried under the track and field to a depth of 500 feet.
- $250,000 - $300,000 Estimated annual energy cost savings when compared to average DC schools.
- In all, the system has more than 68 miles of tubing, longer than the Capital Beltway!
HIGH PERFORMANCE STRATEGIES: DESIGN INNOVATION

EXTERIOR

The building exterior, or “envelope,” is like your skin—it protects you from sun, wind, rain, and snow. The envelope is designed to allow ample natural light into the building while keeping excess heat and cold out.

DID YOU KNOW THAT...

- East-west building orientation (65%) + passive solar design (10%) can produce up to 15% energy savings.
- The building’s facade is not only decorative, but also performs vital functions throughout the day.

INTERIOR

Low-emitting, recycled and regional materials, green housekeeping, and pervasive daylighting and views enhance the quality of the interior environment.

DID YOU KNOW THAT...

- Natural light is provided to over 90% of the classrooms.
- Natural daylighting has been directly linked to enhanced achievement in the classroom.
HIGH PERFORMANCE STRATEGIES: DESIGN INNOVATION

WATER

Rainwater collection and water efficient fixtures reduce demand for fresh water and help urban storm water runoff.

Where Does the Water Go?

Dumbarton High School is situated within the Anacostia River watershed. The Anacostia is one of the most polluted rivers in the country. To help improve the quality of the river, new developments in the city must capture and treat storm water so that it does not run into the river, carrying dirt and pollutants. By collecting and reusing rain water, the school will minimize the impact of runoff on the Anacostia and beyond.

DID YOU KNOW THAT...

- Water reduction measures decrease water usage by 50%.
- Saving 1,400,000 gallons per year compared to a typical high school.
- Approximately 486 million gallons of water is used daily in the Washington DC area. Each person uses about 80-100 gallons per day.

The “Green-O-vation” project demonstrates the multiple benefits of Low Impact Development (LID), including flood reduction and water quality improvements.

STREET

The 6,152 square feet of bioretention cells, or “rain gardens,” were provided along O Street.

- 39 new street trees and 900 shrubs were planted in these rain gardens.
- Stormwater runoff from the sidewalks and roadway collect in the cells and are filtered through the plant media before being reintroduced back into the storm system.
- By holding the water on site in a storm event and reintroducing it back into the system slowly, localized flooding is prevented.
- O Street is used as a teaching tool for both environmental science and sustainability.

DID YOU KNOW THAT...

- There are two 20,000 gallon cisterns adjacent to the building. Each cistern is equal to the size of a school bus!...

Ultra low-flow urinals, high-efficiency toilets, rainwater harvesting, and ultra low-flow showerhead help the school conserve water.
HIGH PERFORMANCE STRATEGIES:
CONSTRUCTION – EXISTING CONDITIONS
HIGH PERFORMANCE STRATEGIES:
CONSTRUCTION – SYSTEMS AND SCHEDULE
HIGH PERFORMANCE STRATEGIES: CONSTRUCTION - PHASING
HIGH PERFORMANCE STRATEGIES: TURNOVER AND OPTIMIZATION

Met with the stakeholders in a meeting that took place 2 weeks after the spring semester in June 2014. The summer consumption was reduced by 40% (see the graph to the right).

There was as indicated on the interval data a 20% reduction in the fall compared to the previous fall. (seen in the image on the below right.) **Saving $50,000** a year in energy related costs.
LESSONS LEARNED:
SUSTAINABILITY

6.39 MWh produced this month (21.7% of estimated 29.5 MWh)

January, 2016

This screen shows historical energy production. The red line indicates the predicted average output per day.


Predicted energy output for typical local weather conditions
LESSONS LEARNED: DESIGN AND CONSTRUCTION

SENSE OF SAFETY: WELL FOSTERED BY THE SCHOOL

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<tr>
<th></th>
<th>29%</th>
<th>63%</th>
<th>34%</th>
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<tbody>
<tr>
<td>hallways, stairs and elevators</td>
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<tr>
<td>bathroom and lockers</td>
<td>29%</td>
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DUNBAR ACHIEVEMENTS

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<tr>
<th></th>
<th>10% increase</th>
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<th>LARGEST GAINS of any city high school</th>
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<td>GRADUATION RATES</td>
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<td>TEST SCORES</td>
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STUDENTS’ SENSE OF COMMUNITY: WELL FOSTERED BY

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<th>0%</th>
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SURVEY SAYS...

“[We] moved hallway furniture into storage because it distracted students from getting to class. Similarly, students use the benches as an excuse to be late to class...widespread and decentralized lounges are difficult to manage. Perhaps a designated student lounge with large windows instead of lounges on each floor in future buildings?”
LESSONS LEARNED: COMMUNITY
FINAL THOUGHTS