

A photograph of Dunbar High School at dusk. The building features a modern design with a large glass entrance and a prominent stone facade. The entrance is illuminated from within, and the steps leading up to it are lit. The sky is a deep blue, and the building's lights are on, creating a warm glow. The word "DUNBAR" is visible in large letters above the entrance.

DUNBAR HIGH SCHOOL

Creating a High-Performance, Sustainable
Learning Environment for Washington DC

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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





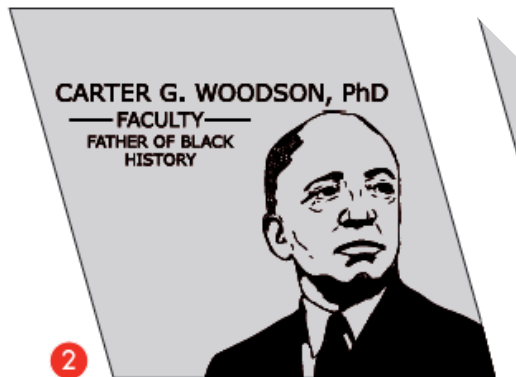
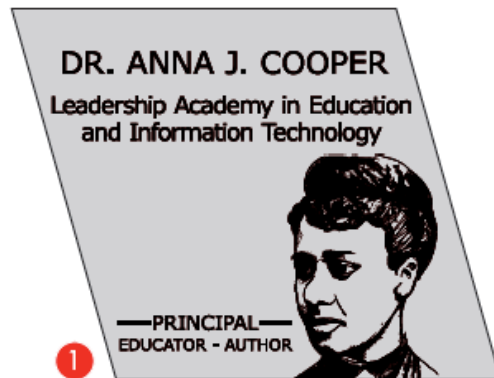
THE FIELD

O STREET

ARMSTRONG
TECHNICAL HS

DUNBAR HIGH SCHOOL , CIRCA 1965

HISTORY AND HERITAGE

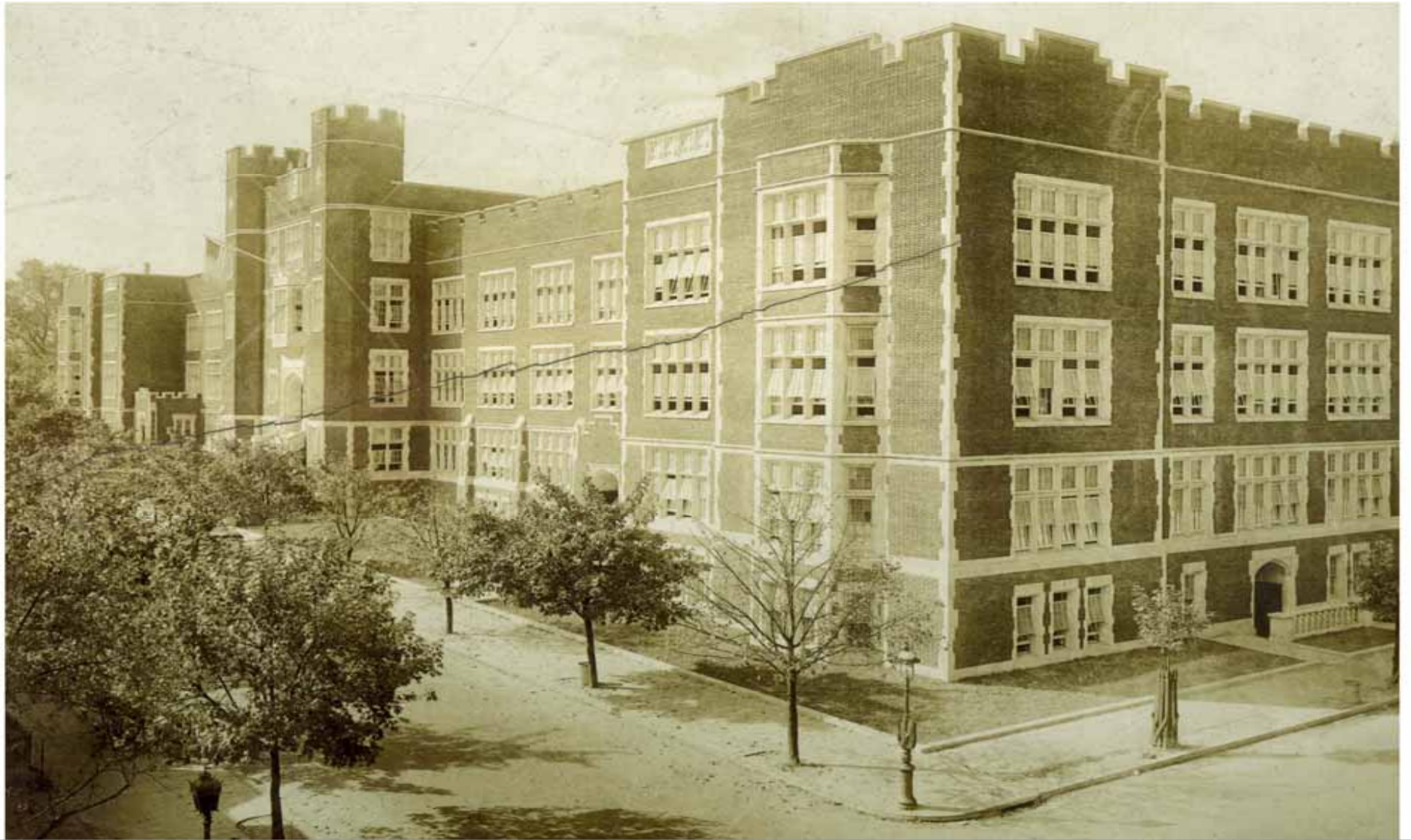




"It was sort of a hang out... then of course, the students on their break from classes would stop there and talk a little bit before their next class would begin... so it was sort of an avenue of sorts with a lot of things going on"

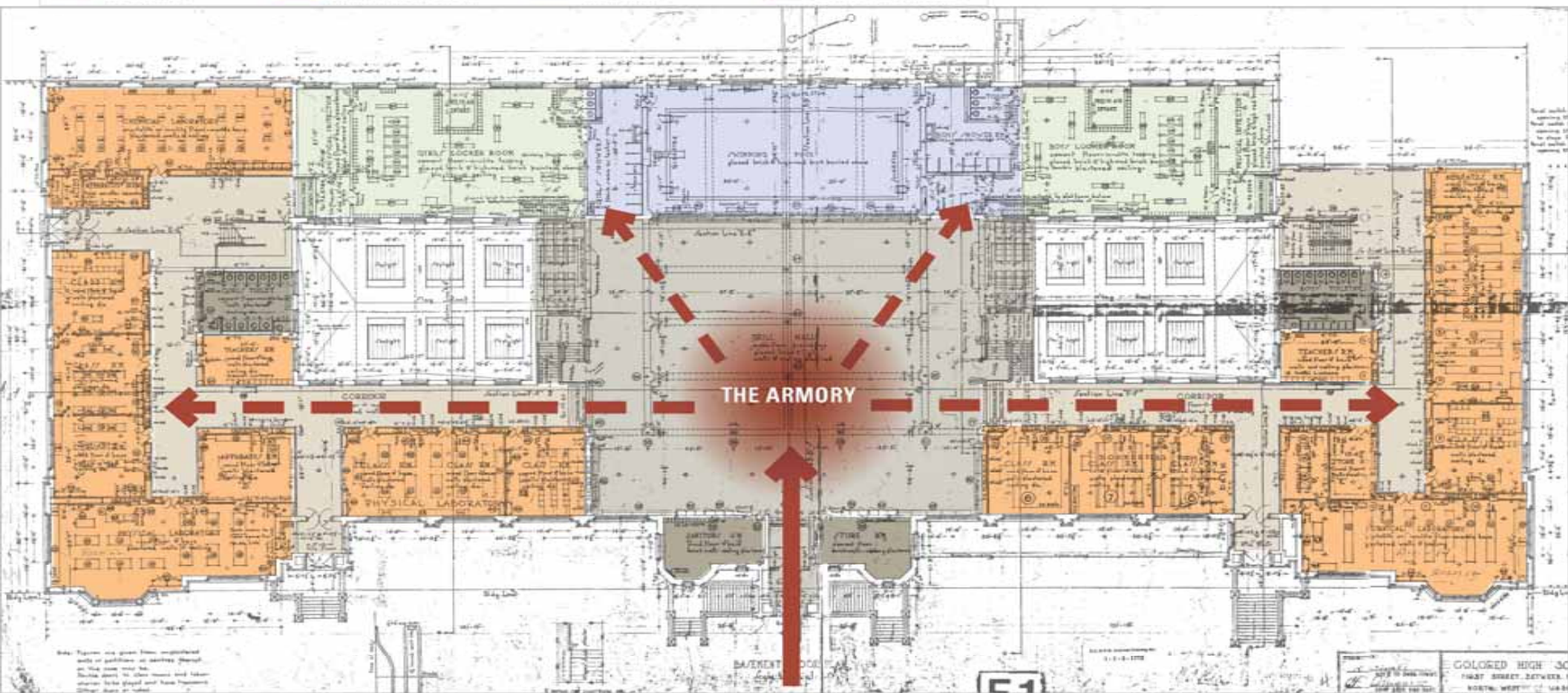
-Dr. Ralph Green, '52

THE HISTORIC ARMORY - CENTER OF THE SCHOOL



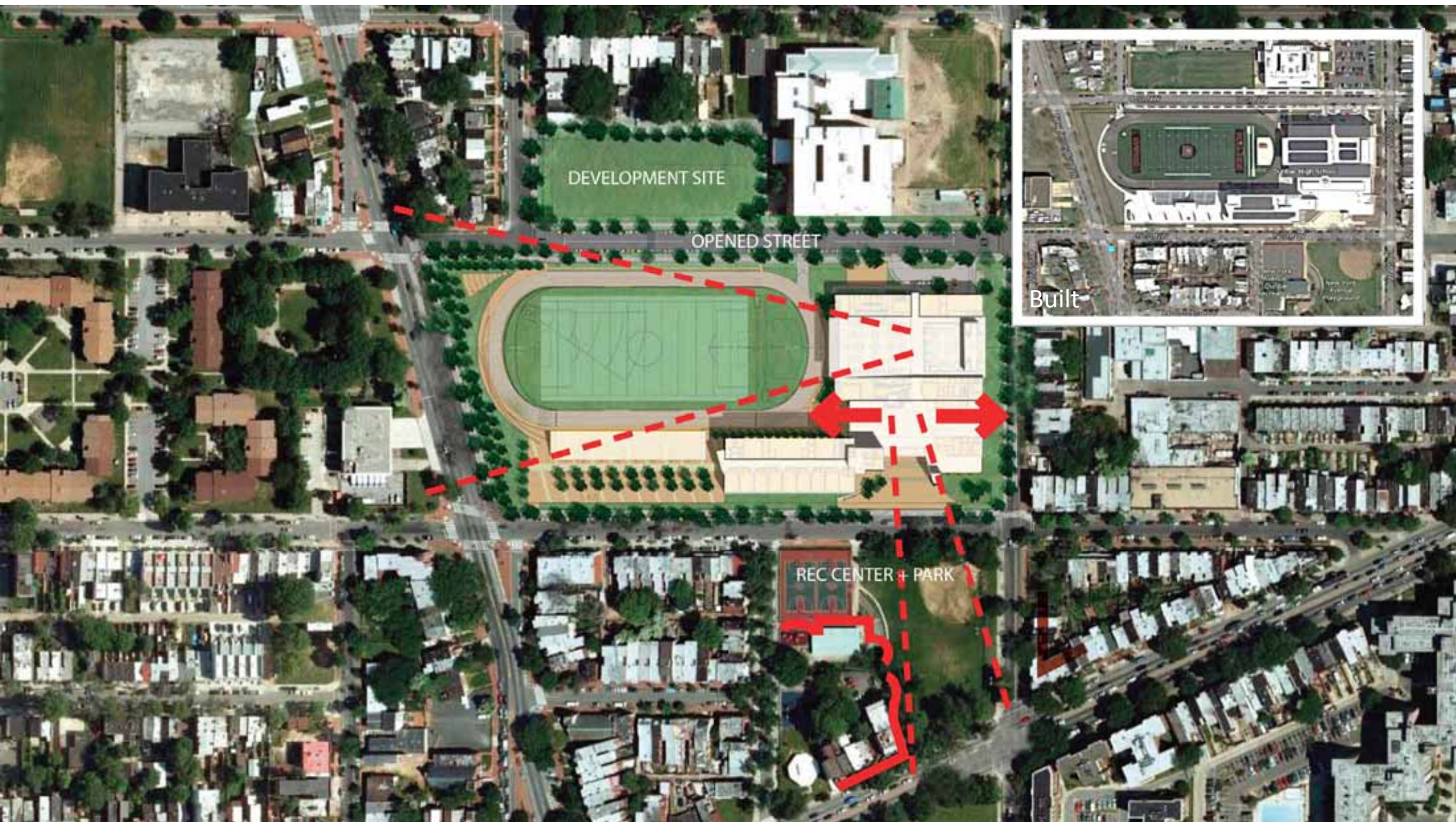
HISTORIC DUNBAR CA 1920

KEY



ENTRY FROM FIRST STREET

THE HISTORIC ARMORY - CENTER OF THE SCHOOL











Section



Section A-A
Entry Plaza (Academic Wing Section)
Entry Vestibule
Auditorium
Cafeteria
Media Center
Academic Neighborhood
Gym

0 10 50 100 FEET



GYM

AUDITORIUM
BELOW

CAFETERIA
BELOW

MEDIA CENTER

ACADEMIC NEIGHBORHOOD

"ARMORY"

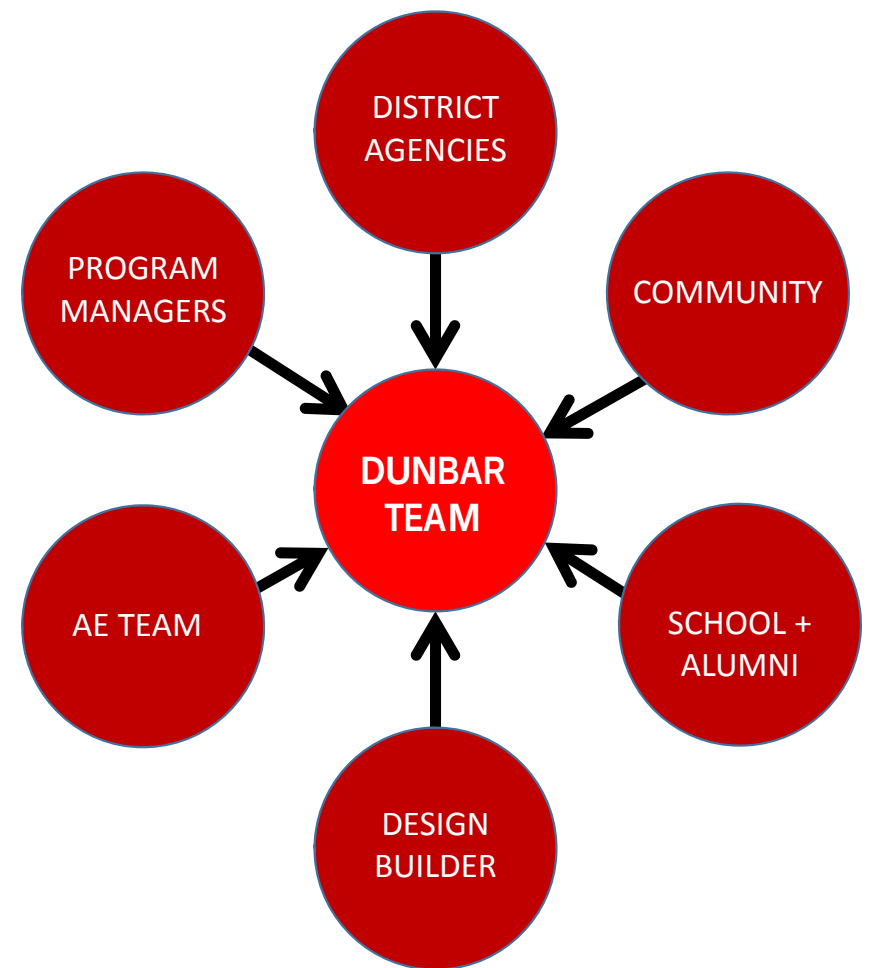
SECOND FLOOR PLAN







HIGH PERFORMANCE STRATEGIES: TEAM COLLABORATION



HIGH PERFORMANCE STRATEGIES: COMMUNITY ENGAGEMENT

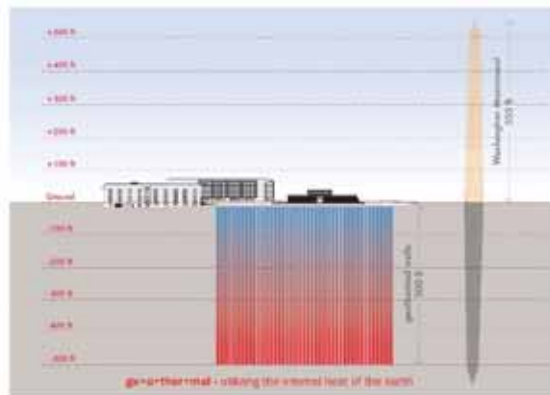


HIGH PERFORMANCE STRATEGIES: DESIGN INNOVATION

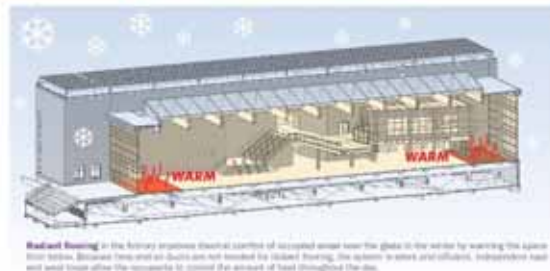
ENERGY

Ground Source Design by **Parkins Eastman**

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.



Geothermal wells take advantage of the earth's constant year-round temperature of 59° F. Water is pumped through pipes that are buried underground. In the summer, the water absorbs excess heat from the building's mechanical system, then transfers that heat into the ground. In the winter, the opposite happens: the water draws heat from the ground to provide pre-warmed air and water to the heating system of the building. This system reduces the building's demand for energy from fossil fuels.



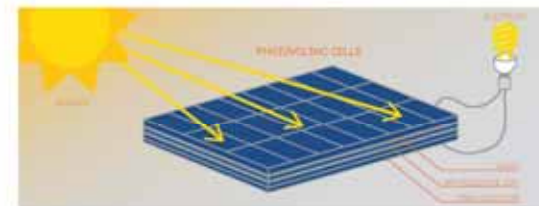
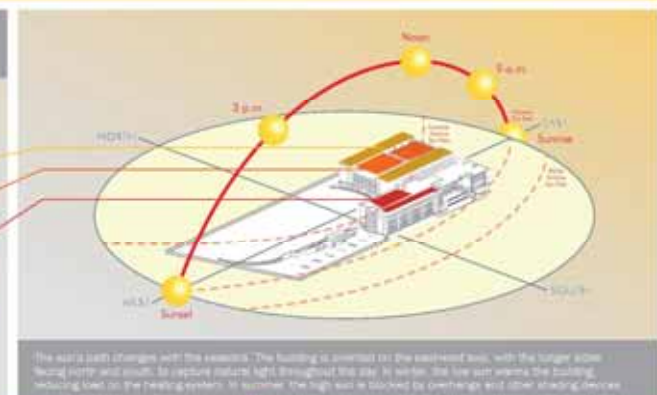
DID YOU KNOW THAT...

- 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!



SOLAR

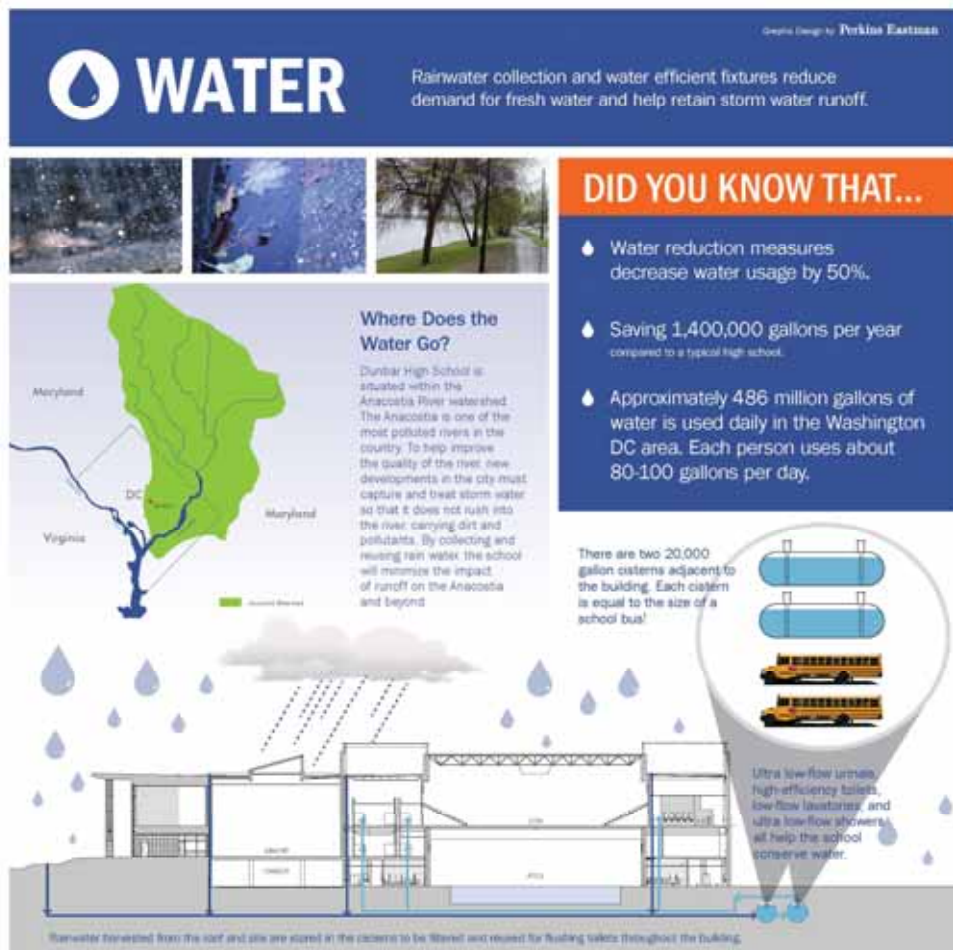
Solar panels, also known as photovoltaic (PV) panels, convert natural energy from the sun into clean, reliable electricity.



DID YOU KNOW THAT...

- On-site power generation accounts for 14% electricity savings.
- On average, DC has 202 sunny days per year, 4.2 hours of sun per day.
- Solar power gathered on a sunny summer day is strong enough to light all 56 classrooms and a surplus of 4 classrooms for 8 hours!

HIGH PERFORMANCE STRATEGIES: DESIGN INNOVATION



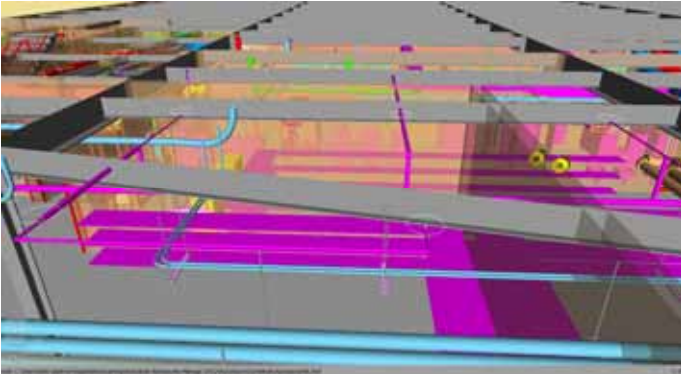
HIGH PERFORMANCE STRATEGIES: CONSTRUCTION – EXISTING CONDITIONS



HIGH PERFORMANCE STRATEGIES: CONSTRUCTION – SITE AND GEOTHERMAL



HIGH PERFORMANCE STRATEGIES: CONSTRUCTION - SYSTEMS AND SCHEDULE



PHASING DIAGRAMS



HIGH PERFORMANCE STRATEGIES: CONSTRUCTION - PHASING



LESSONS LEARNED: SUSTAINABILITY

 **Constellation**
An Exelon Company

Dunbar
Washington, DC

Power Output

—

System size: 400 kW

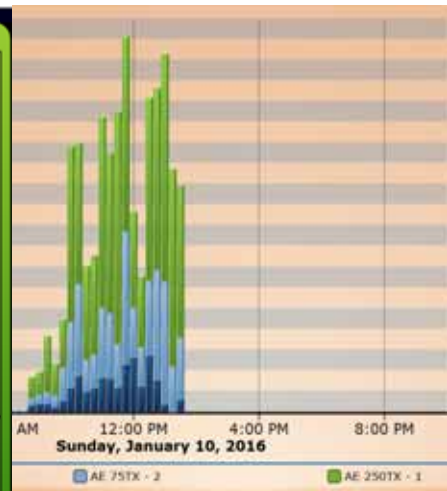
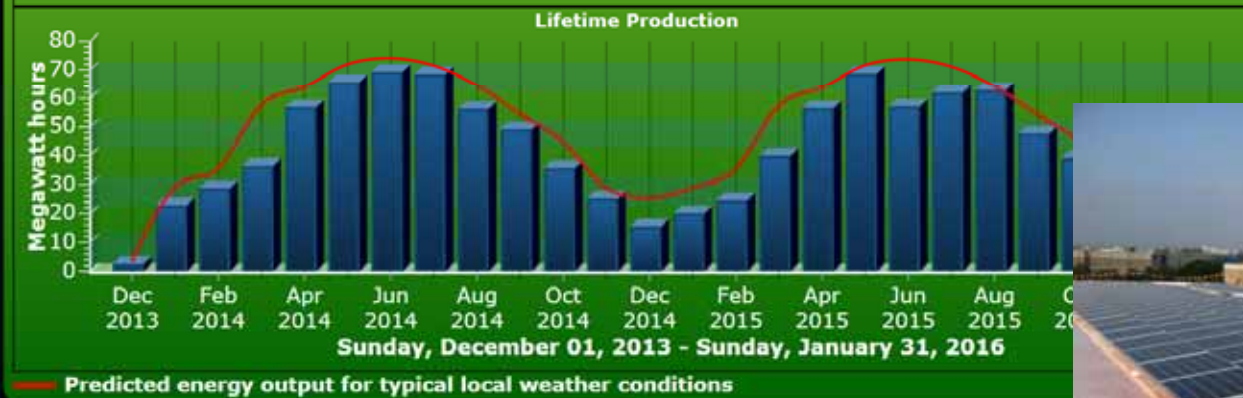
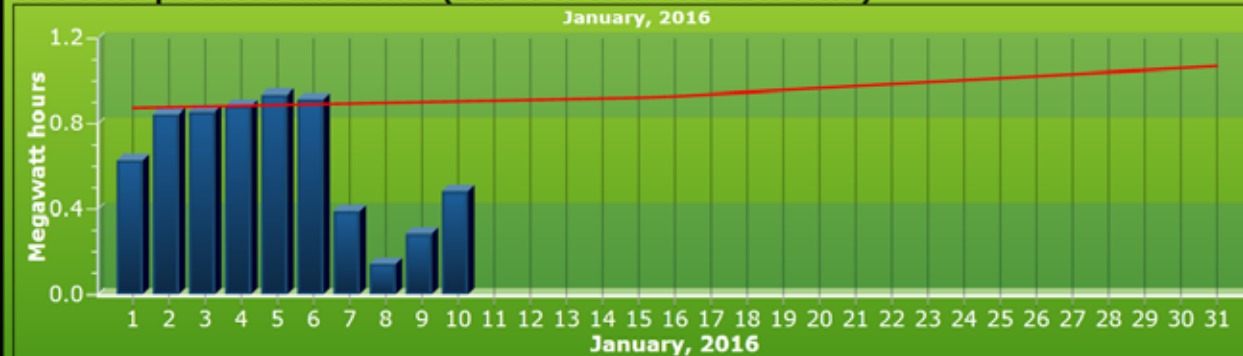
0 kW
AC Power

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

 **AlsoEnergy**

Settings

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

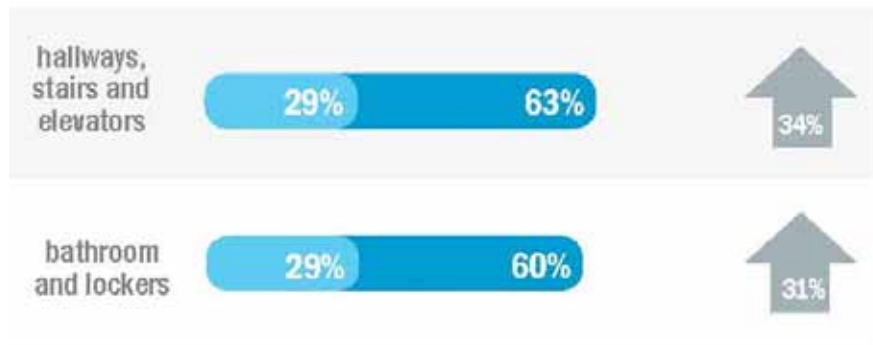


LESSONS LEARNED: COMMUNITY

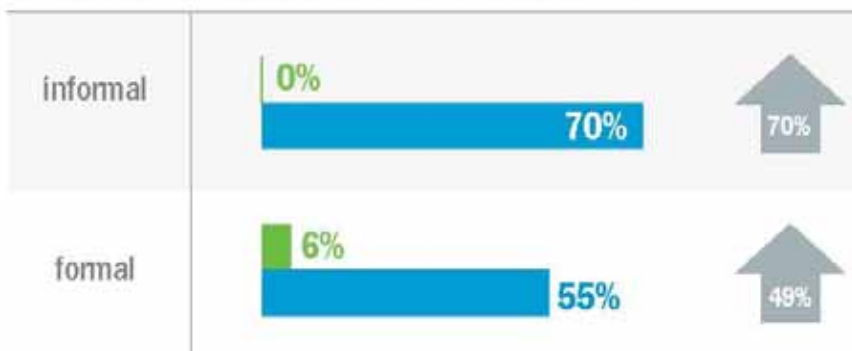


LESSONS LEARNED: DESIGN AND CONSTRUCTION

SENSE OF SAFETY: WELL FOSTERED BY THE SCHOOL



STUDENTS' SENSE OF COMMUNITY: WELL FOSTERED BY



DUNBAR ACHIEVEMENTS

GRADUATION RATES



ENROLLMENT RATES



TEST SCORES



LARGEST GAINS of any city high school



reading scores ↑ 24 points



math scores ↑ 7 points

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?"



91 Credits, LEED Platinum

The highest scoring new school in the world

"A masterpiece of a green learning environment..."

- USGBC Center for Green Schools

After moving into their new building, the school posted the highest test score gains of any high school in the city.