Occoquan Elementary School Replacement

Community Meeting

Building Design and Net-Zero Update
October 10, 2023

PWCS
PRINCE WILLIAM COUNTY PUBLIC SCHOOLS
LAUNCHING THRIVING FUTURES

Project Team

- Prince William County Public Schools
- Architect: Perkins Eastman
- MEP: CMTA
- Civil Engineer: IMEG
- Foodservice Design: Nyikos Garcia

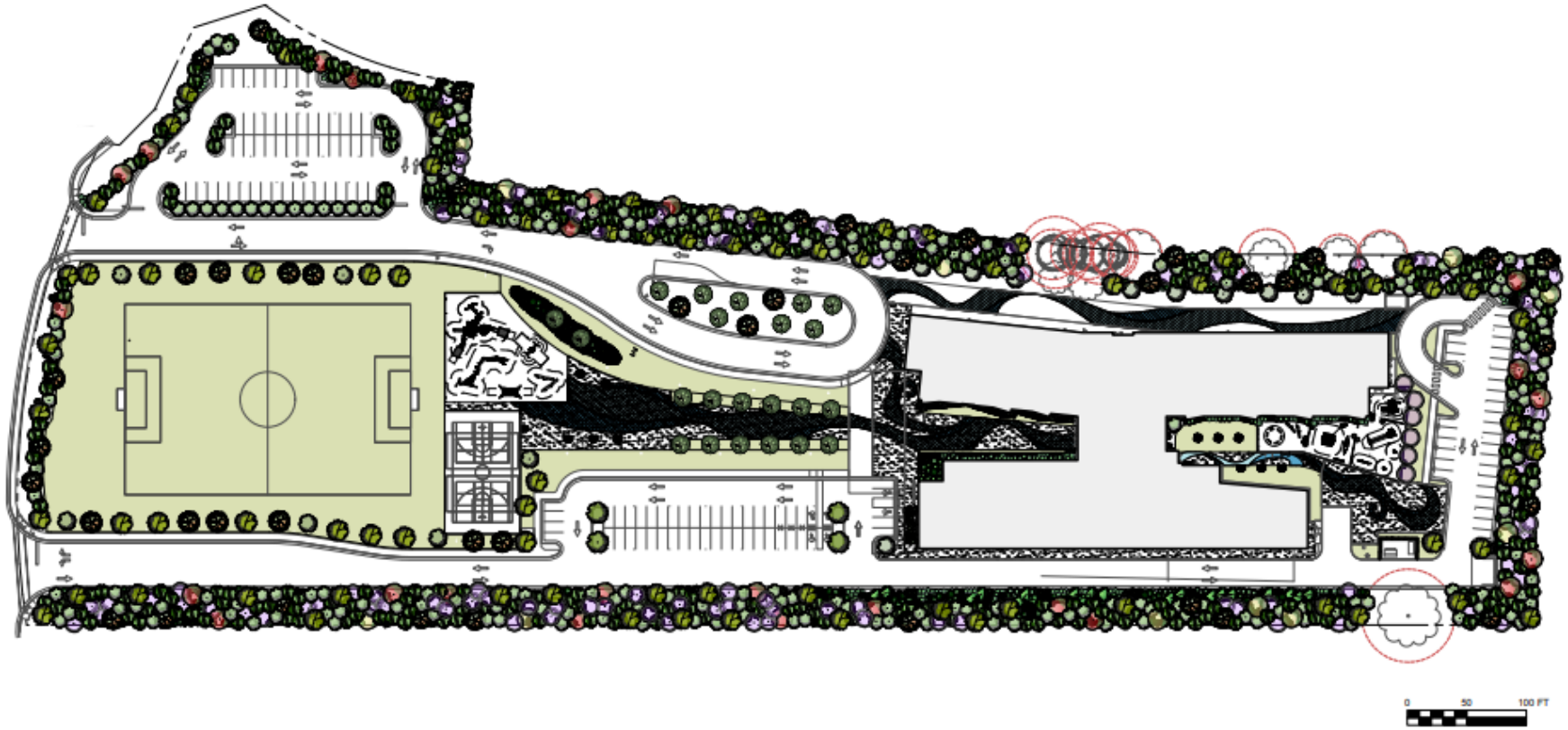
Project Timeline

- Summer 2022: Design start
- Summer 2023: Permitting
- Winter 2023-24: Advertise project for construction bids
- Spring 2024: Start construction
- Winter 2025-26: School facility construction complete
- Summer 2026: Site construction complete

School Aerial

Site Plan Overlay

Site Plan



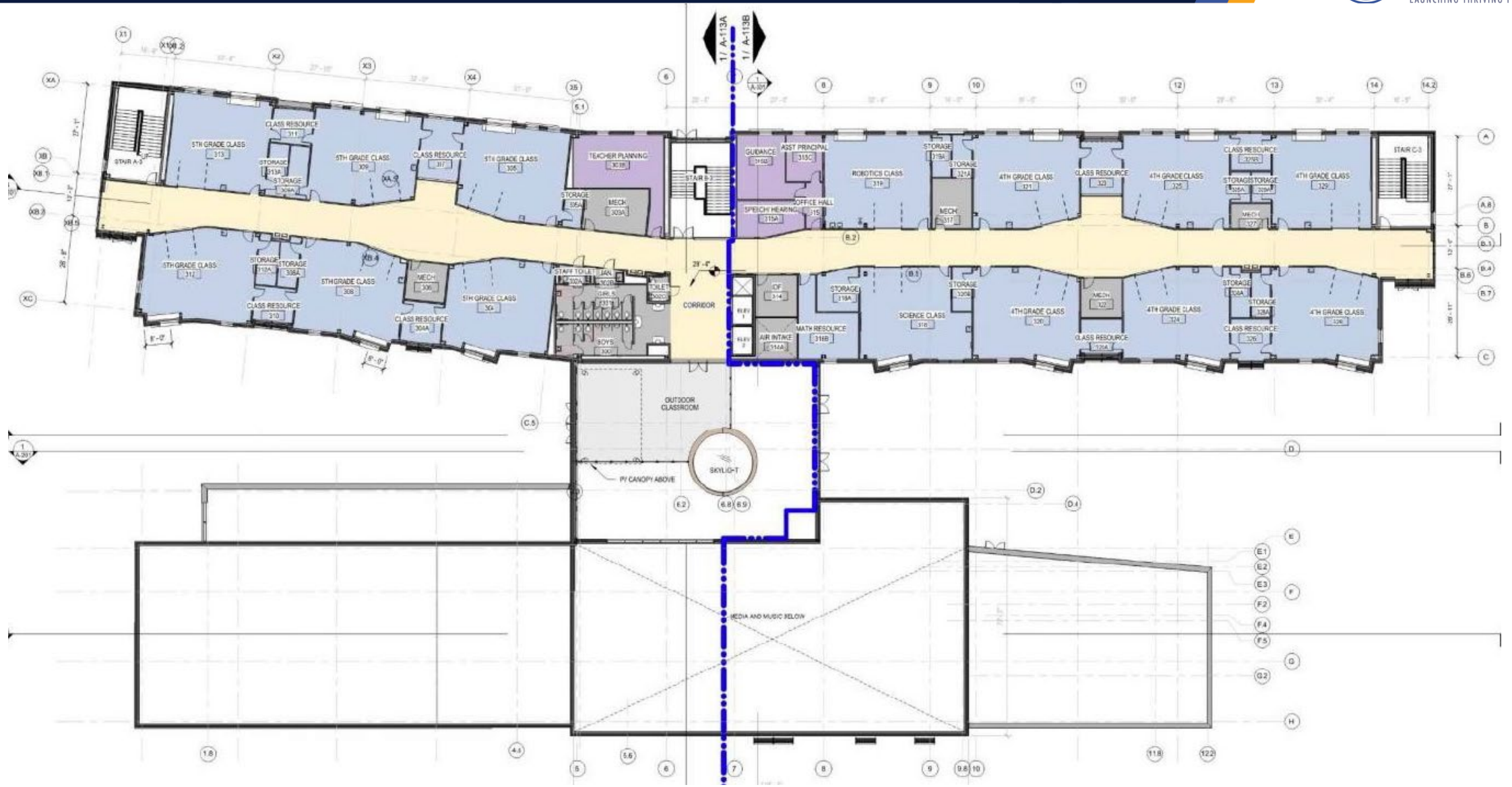
Front Perspective

Site Perspective

First Floor Plan

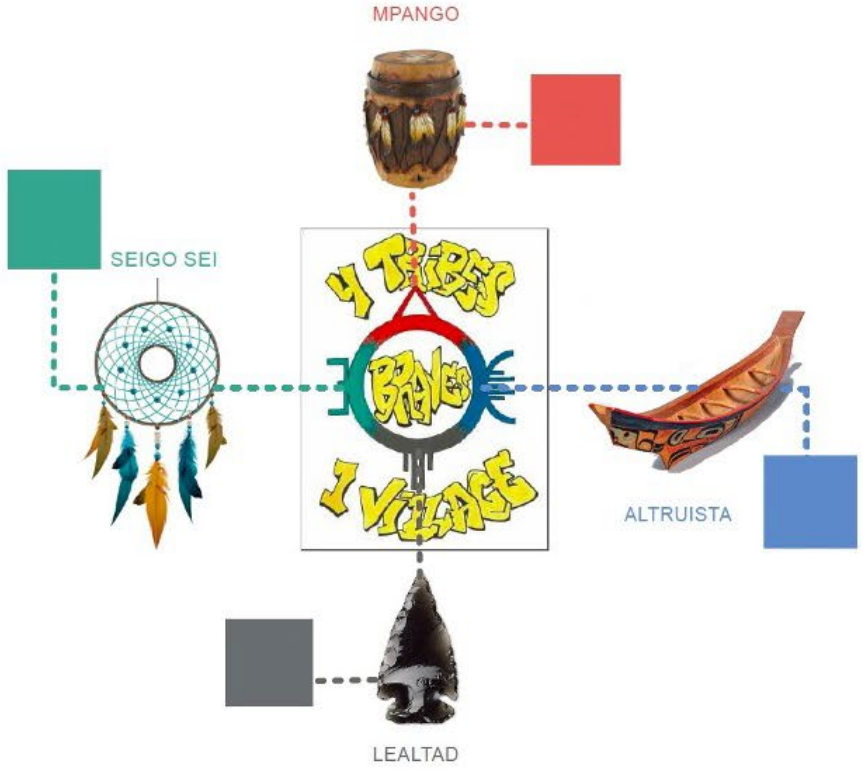
Second Floor Plan

Third Floor Plan

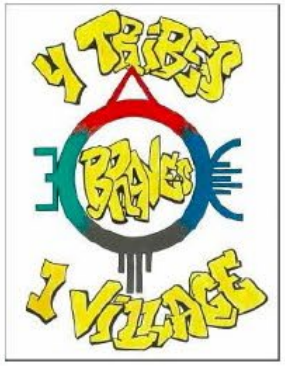


Interior Concept

COMMON AREAS



TRIBES

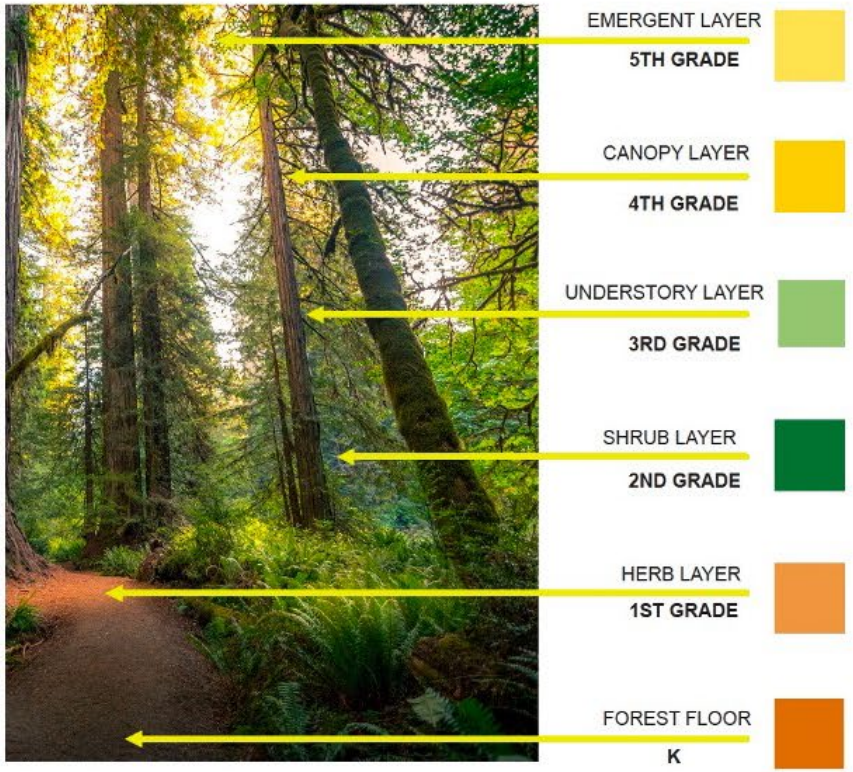


4 Tribes, 1 Village

Every culture can share in the enjoyment of nature as equals.

NATURE

EDUCATION WINGS

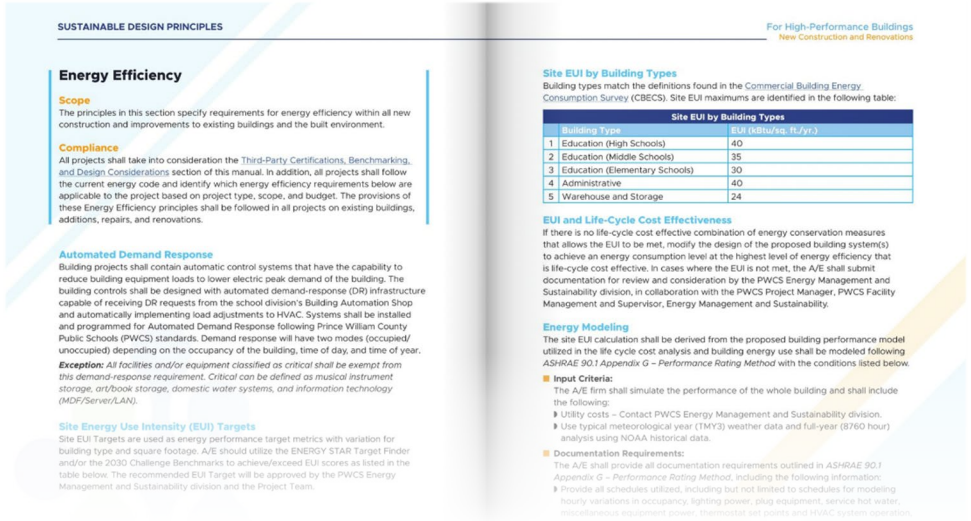


Building Perspectives

Building Perspectives

Sustainable School Stats

- Energy projections
  - ✓ Energy use avoidance: 50% compared to typical ES
  - ✓ Target EUI: 24
- Green building aspects
  - ✓ Pursuing minimum LEED Silver
  - ✓ Utilizing PWCS' "Sustainable Design Principles for High-Performance Buildings"



SUSTAINABLE DESIGN PRINCIPLES

For High-Performance Buildings
New Construction and Renovations

Energy Efficiency

Scope

The principles in this section specify requirements for energy efficiency within all new construction and improvements to existing buildings and the built environment.

Compliance

All projects shall take into consideration the Third-Party Certifications, Benchmarking, and Design Considerations section of this manual. In addition, all projects shall follow the current energy code and identify which energy efficiency requirements below are applicable to the project based on project type, scope, and budget. The provisions of these Energy Efficiency principles shall be followed in all projects on existing buildings, additions, repairs, and renovations.

Automated Demand Response

Building projects shall contain automatic control systems that have the capability to reduce building equipment loads to lower electric peak demand of the building. The building controls shall be designed with automated demand-response (DR) infrastructure capable of receiving DR requests from the school division's Building Automation Shop and automatically implementing load adjustments to HVAC. Systems shall be installed and programmed for Automated Demand Response following Prince William County Public Schools (PWCS) standards. Demand response will have two modes (occupied/unoccupied) depending on the occupancy of the building, time of day, and time of year.

Exception: *All facilities and/or equipment classified as critical shall be exempt from this demand-response requirement. Critical can be defined as musical instrument storage, art/book storage, domestic water systems, and information technology (MDF/Server/LAN).*

Site Energy Use Intensity (EUI) Targets

Site EUI Targets are used as energy performance target metrics with variation for building type and square footage. A/E should utilize the ENERGY STAR Target Finder and/or the 2030 Challenge Benchmarks to achieve/exceed EUI scores as listed in the table below. The recommended EUI Target will be approved by the PWCS Energy Management and Sustainability division and the Project Team.

Site EUI by Building Types

Building types match the definitions found in the Commercial Building Energy Consumption Survey (CBECS). Site EUI maximums are identified in the following table:

Site EUI by Building Types		
	Building Type	EUI (kBtu/sq. ft./yr.)
1	Education (High Schools)	40
2	Education (Middle Schools)	35
3	Education (Elementary Schools)	30
4	Administrative	40
5	Warehouse and Storage	24

EUI and Life-Cycle Cost Effectiveness

If there is no life-cycle cost effective combination of energy conservation measures that allows the EUI to be met, modify the design of the proposed building system(s) to achieve an energy consumption level at the highest level of energy efficiency that is life-cycle cost effective. In cases where the EUI is not met, the A/E shall submit documentation for review and consideration by the PWCS Energy Management and Sustainability division, in collaboration with the PWCS Project Manager, PWCS Facility Management and Supervisor, Energy Management and Sustainability.

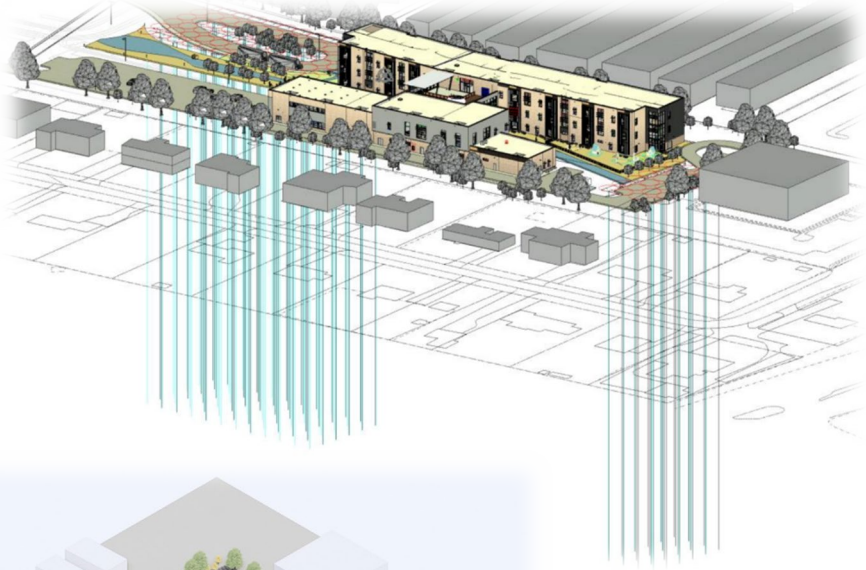
Energy Modeling

The site EUI calculation shall be derived from the proposed building performance model utilized in the life cycle cost analysis and building energy use shall be modeled following *ASHRAE 90.1 Appendix G – Performance Rating Method* with the conditions listed below.

- **Input Criteria:**
  The A/E firm shall simulate the performance of the whole building and shall include the following:
  - Utility costs – Contact PWCS Energy Management and Sustainability division.
  - Use typical meteorological year (TMY3) weather data and full-year (8760 hour) analysis using NOAA historical data.
- **Documentation Requirements:**
  The A/E shall provide all documentation requirements outlined in *ASHRAE 90.1 Appendix G – Performance Rating Method*, including the following information:
  - Provide all schedules utilized, including but not limited to schedules for modeling hourly variations in occupancy, lighting power, plug equipment, service hot water, miscellaneous equipment power, thermostat set points and HVAC system operation.

Net-Zero Design Elements

- Building solar orientation on site
- Daylighting
- Indoor Environmental Quality (IEQ)
- HVAC mechanical – 96 geothermal wells
- Solar array
  - ✓ 680 kW system
  - ✓ 900 MWh per year projected output
- Estimated emissions reduction is 306 metric tons of CO_2; 0.53% of division's emissions



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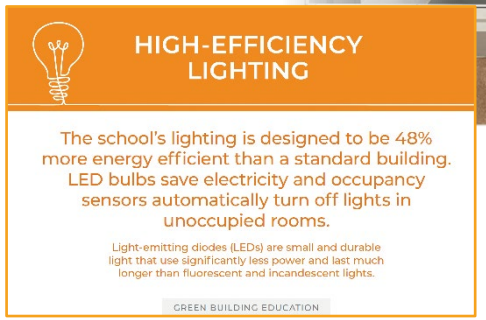
Using the Building as a Teaching Tool

- Interactive dashboards
  - ✓ Accessible in classrooms via website
- Visible mechanical systems with educational signage
- Energy usage/generation indicators
- Indoor/outdoor learning spaces with educational signage



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