

PROJECT OPPORTUNITIES TO ACHIEVE LEED GOLD CERTIFICATION, A GEOTHERMAL HVAC SYSTEM AND A NET ZERO ENERGY BUILDING

LEED GOLD

With dozens of LEED Gold-certified K-12 school projects, the Architecture Incorporated, Fanning Howey and CMTA design team gives Falls Church a clear pathway toward achieving your goal of certification for George Mason High School. Because of our thorough understanding of the LEED process we identify LEED points that provide the best long-term return on investment for building owners.

- We typically obtain most, if not all of the Energy and Atmosphere points on our projects.
- We always design with students in mind, so we typically target LEED credits related to daylighting and views, indoor air quality and acoustics - elements which are proven to positively impact student performance.
- We carefully examine all potential site and building envelope-related credits, including paving and roof systems.

Each of these strategies will be evaluated within the context of your vision for the new George Mason High School. Given our experience with LEED Gold-certified schools in the area, we are confident that your goals are realistic and attainable.

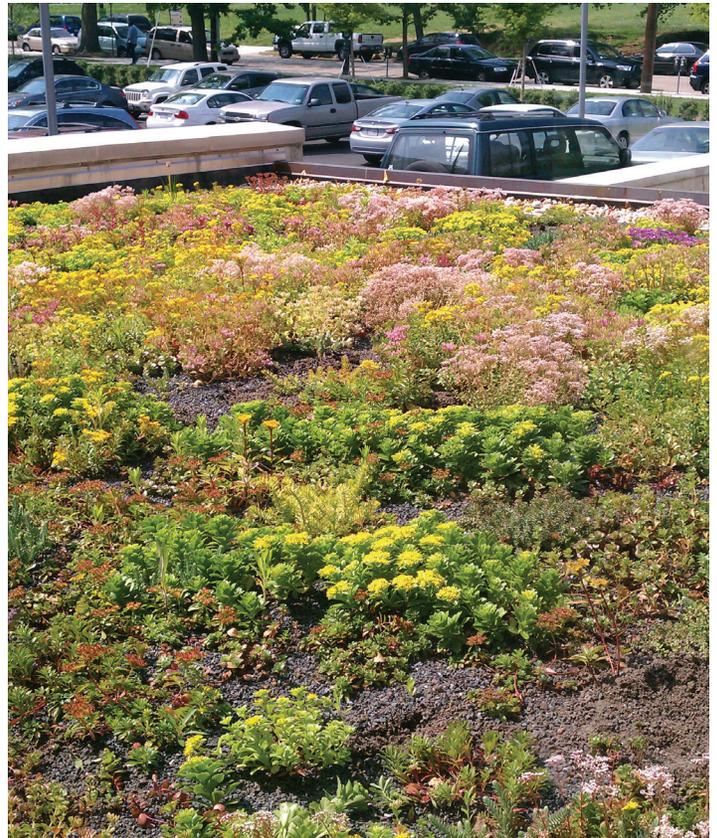
Our team has designed and engineered 139 LEED Projects:

6 Platinum, 56 Gold, 48 Silver, 6 Certified and 12 Registered projects. Our K-12 LEED Gold and Platinum projects are listed below:

- Discovery Elementary School
Arlington, Virginia
LEED Target – Gold
- Eastern High School Modernization
Washington, DC
LEED Gold
- Wilson High School Modernization
Washington, DC
LEED Gold
- Takoma Education Campus
Washington, DC
LEED Gold
- River Terrace Education Campus
Washington, DC
LEED Gold
- Lenawee Center for a Sustainable Future
Adrian, Michigan
LEED Platinum
(Zero Energy School)
- Franklin Monroe K – 12 School
Pittsburg, Ohio
LEED Gold
- Gloria Marshall Elementary School
Houston, Texas
LEED Gold
- Richard J. Lee Elementary School
Dallas, Texas
LEED Gold
(Zero Energy School)
- Richardsville Elementary School
Bowling Green, Kentucky
LEED Target - Gold
(Zero Energy School)
- Botkins K-12 School
Botkins, OH
LEED Gold
- McPherson Middle School
Clyde, OH
LEED Gold
- Additions and Renovations to Clyde Elementary School
Clyde, OH
LEED Gold
- Columbus Grove PK-12 Additions & Renovations
Columbus Grove, OH
LEED Gold
- Meadowdale High School
Dayton, OH
LEED Gold
- Edison PK-8 School
Dayton, OH
LEED Gold
- World of Wonder PK-8 @ Residence Park School
Dayton, OH
LEED Gold
- Eastmont PK-8 School
Dayton, OH
LEED Gold
- William Bruce Elementary School
Eaton, OH
LEED Gold
- Fremont Middle School
Fremont, OH
LEED Gold

LEED GOLD SCHOOL PROJECTS (CONTINUED)

- Wayne High School
Huber Heights, OH
LEED Gold
- Weisenborn Junior High School
Huber Heights, OH
LEED Gold
- Wright Brothers Elementary School
Huber Heights, OH
LEED Gold
- Monticello Elementary School
Huber Heights, OH
LEED Gold
- Rushmore Elementary School
Huber Heights, OH
LEED Gold
- Huber Elementary School
Huber Heights, OH
LEED Gold
- Valley Forge Elementary School
Huber Heights, OH
LEED Gold
- Louisville Elementary School
Louisville, OH
LEED Gold
- Maple Heights High School
Maple Heights, OH
LEED Gold
- Milkovich Middle School
Maple Heights, OH
LEED Gold
- Abraham Lincoln Elementary School
Maple Heights, OH
LEED Gold
- John F. Kennedy Elementary School and Barack Obama Elementary School
Maple Heights, OH
LEED Gold
- Powell Elementary School Renovations
North Baltimore, OH
LEED Gold
- Piqua Central Intermediate School
Piqua, OH
LEED Gold
- Washington Primary School
Piqua, OH
LEED Gold
- Springcreek Primary School
Piqua, OH
LEED Gold
- Bataan Memorial Elementary School
Port Clinton, OH
LEED Gold
- Port Clinton Middle School
Port Clinton, OH
LEED Gold
- Fannie C. Williams Elementary School
New Orleans, LA
LEED Gold
- Western Reserve K-12 School
Berlin Center, OH
LEED Gold
- McKinley Elementary School
Xenia, OH
LEED Gold
- Cox Elementary School
Xenia, OH
LEED Gold



GEOTHERMAL

Our design team has been using geothermal HVAC systems in schools for over 15 years. We feel it is the best solution for both new construction and renovations for the following reasons:

- Schools usually have available space for geothermal systems, locating the systems in either adjacent athletic fields or parking lots.
- We use a distributed pumping system which is more energy efficient.
- Our 15-year benchmarking provides accurate modeling data to “right size” well fields.
- Heat pumps can be located in easily accessible closets or mezzanines so when repairs are needed classroom instruction is not disrupted for repairs.
- The pumping systems are quiet and do not interfere with instruction.
- The heat pumps are easy to repair and maintain.
- Our experience and database allows us to provide “real-world” return on investment information for HVAC systems so owners can fully evaluate what systems meet their current and future needs.

The Architecture Incorporated, Fanning Howey and CMTA design team is uniquely qualified to provide the best value for the new George Mason High School by achieving the lowest energy consumption within budget and saving millions of dollars in the Renewables to achieve Zero Energy. Taking advantage of the years of lessons learned and following the proven process for Zero Energy design will lead Falls Church in maintaining budget and achieving Zero Energy success for the new George Mason High School.



NET ZERO ENERGY READY STRATEGIES

To meet the sustainability goals of Falls Church City Public Schools, Architecture, Incorporated and Fanning Howey have teamed with CMTA for MEPT engineering and Net Zero Energy Ready design.

For the past 10 years, CMTA has led the national trend of Net Zero Energy schools by accomplishing the 1st Net Zero Energy School in the United States and by designing 1.6 million square feet of additional Net Zero Energy Ready projects. The process of designing, constructing and optimizing the performance of a Net Zero Energy building is a tedious, detail-oriented effort. Many teams set out to accomplish the performance goal of achieving Net Zero Energy Ready, yet rarely is this accomplished due to the challenges of getting a building to perform as designed. CMTA utilizes a data-driven design process and pulls from years of lessons learned to feed performance data and into the design process of every new CMTA Net Zero Energy Ready project.

Zero Energy Project	Square Feet
Richardsville Elementary School	72,285
Turkey Foot Middle School	133,359
Locust Trace AgriScience High School	70,100
Lenawee High School – Center for Sustainable Futures	8,743
Lee Elementary	95,633
Discovery Elementary	98,500
Corvallis Toyota Dealership	34,868
Cincinnati Police Station	38,500
Wilde Lake Middle School	106,221
Graceland Elementary School	78,250
Holabird Elementary School	78,250
Alice Fleet Elem School	104,500
Lubber Run Community Center	52,000
Thaden High School Campus	125,000
Botanica Community Center	10,500
Raleigh Co Elem School	61,405
Martin County High School	124,000
NeoCity Academy STEM High School	45,000
Frederick Douglass High School	285,790

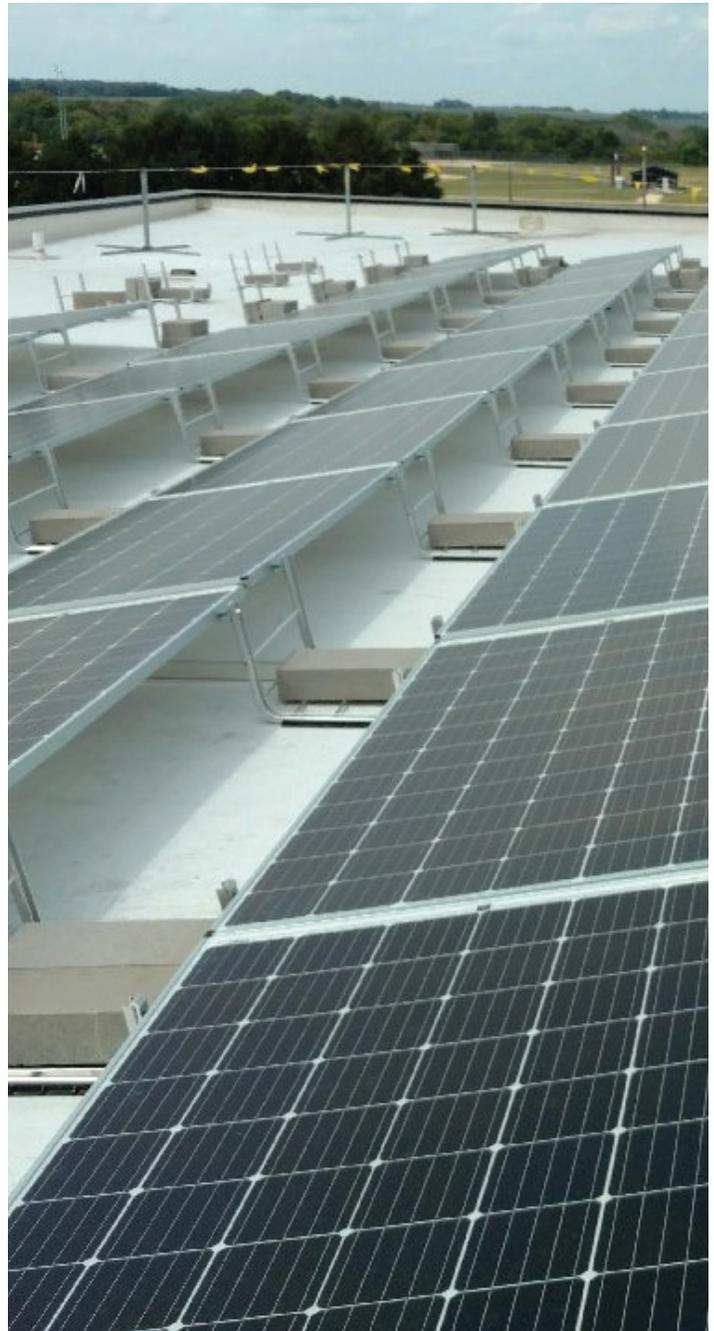
In this way, every new Net Zero Energy Ready project benefits from the previous one and increases the opportunity to achieve Net Zero Energy within budget. To successfully achieve this goal, CMTA leads a separate but parallel design process entitled “Net Zero Energy Design” focused on major stages of design, owner / operator strategies needed and drastic energy reduction in budget. This process focuses on achieving a performance goal of drastically lowering energy consumption while maintaining budget. The key to successful Net Zero Energy Ready buildings is to focus on the energy efficiency before applying renewable energy.

Interwoven in the process are opportunities for ties to learning and improvements on high performance learning environments as affected by Indoor Air Quality, CO2 and VOC Levels, lighting and noise reduction. The process focuses on these main stages:

1. **Conceptual Zero Energy Design** – CMTA utilizes their First 30 Goals Meeting to create the opportunities to make the project great. This meeting gathers thought leaders across numerous offices with 15 to 25 years of experience and generates solutions to challenges expected to achieve Net Zero Energy Ready. This is followed by secondary goals meetings with the design team and owner’s group to facilitate action. Meetings with the design team focus on metrics of building envelope and massing, building orientation and good passive solar design. Finally, a preliminary Energy Use Intensity goal is set utilizing benchmarking. Key data is pulled from national examples and comparisons of existing energy use intensities of previous facilities as well as previous design team facilities. Massing and solar roof design concepts are also a focus.
2. **Energy Breakdown Reductions** – Drastic energy reduction is achieved by attacking all aspects of energy use throughout the facility. CMTA first pulls from benchmarking data from numerous past Net Zero Energy Ready projects to better understand opportunities for energy reduction. Priorities are set from the pie chart of energy use breakdown and operational strategy meetings are scheduled to challenge facility and staff members to look for a fundamental change in practices.

Energy targets include:

- a. **Telecommunications** – Wireless and wired systems including education technologies, staff computer systems, digital surveillance, access control and TV Systems.
 - b. **Kitchen** – Complete kitchen redesign with a secondary priority set on energy reduction helps identify equipment, layout and kitchen usage habits by staff.
 - c. **Envelope** – R Value and Solar Heat Coefficients are important but take a back seat to air infiltration goals. Building pressurization and passive solar design minimizing east and west fenestration are key.
 - d. **HVAC** – System selection is a process focusing on drastic energy reduction as well as simplified maintenance, first costs, Life Cycle Cost Analysis and durability/longevity. The Dedicated Outside Air System central location and distribution focuses on IAQ goals and right sizing of equipment.
 - e. **Lighting** – Advanced lighting goals are met along with drastic power density reductions while minimizing complication and first costs. Natural daylighting is increased while minimizing over lighting.
 - f. **Plug Loads** – Centralized equipment and phantom load reductions are implemented while staying within budget. The temptation to add complication and costly systems is avoided.
 - g. **Renewable Energy** – Solar photovoltaic arrays continue to lead the industry in lowest cost per energy generated. Designing for a solar ready roof along with electrical utility connection is coordinated at every phase of design.
3. **Construction Verification** – Typical construction administration is augmented with verification of metrics to reach Net Zero Energy Ready status. Envelope construction and reduction of air infiltration is verified. A full building pressurization test is a key focus and implemented during construction.
 4. **System Optimizations** – Standard commissioning of systems can fall short and is expanded to include high performance system optimization. Energy metering and full system effectiveness is insured.



TRANSITION BETWEEN PUBLIC AND COMMERCIAL SITES

The feasibility study for George Mason High School provides a thorough explanation of your vision for the connection between the educational and commercial portions of the campus. Our team's experience with public and commercial sites supports the notion that there is no need to build a wall between George Mason High School and future development to the southeast. In fact, it is beneficial to establish a campus where public and commercial spaces complement each other and form a seamless experience for students, pedestrians, professionals and visitors.

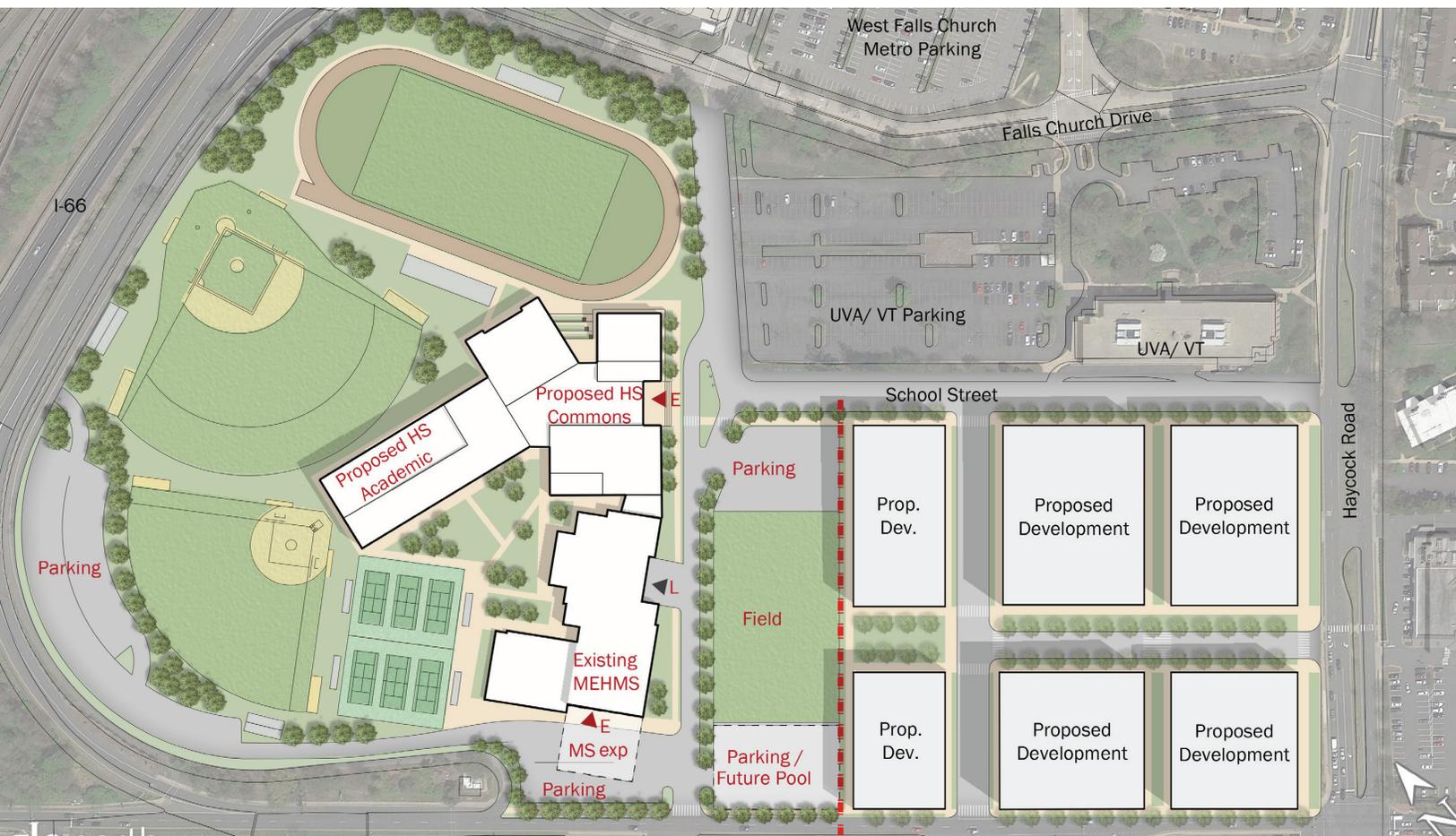
After a careful review of your feasibility study, we believe that the creation of a "pedestrian-friendly gateway" hinges upon careful adherence to many of your design principles. Particularly, the following two principles are important for addressing the transition between public and commercial sites:

1. **Heart of the Development & Community –** Establish the School as a walkable Heart of the development and community.

2. **Continuum of Education –** Extend program and establish learning opportunities beyond the traditional campus boundaries.

Our team has extensive experience with creative design solutions for public school clients with similar goals, and we believe that achieving your design principles requires a strong and dynamic connection between public and commercial enterprises on site.

As shown in your feasibility study, key design strategies include the proper orientation of the front door of the Commons building and the use of the multipurpose field to simultaneously serve as a buffer and unifying element. Each of these design elements is very appropriate, based on your stated vision, and we look forward to collaborating with you to find ways to strengthen and improve the concepts laid out in your initial facility study.



Site plan shown as preferred option in Perkins Eastman Feasibility Study credit to Perkins Eastman and dariushWATERCOLORS