



VISTA PEAK

VISTA PEAK PREPARATORY SCHOOL EDUCATIONAL GREEN BUILDING GUIDE

Aurora, Colorado

Welcome

Welcome to Vista Peak Campus.

MOA ARCHITECTURE in partnership with RTA Architects designed the new high school to serve 2,400 students divided among small learning communities of 400 students each.

The first phase 223,000 square feet on a 94.5 acre site, entails three (of five planned) learning pods, cafeteria, art room and media center, as well as public areas such as the gymnasium, auditorium, and administration.

The building's design includes planning details that allow for joint function and use of the facility. Public areas are separated from classrooms and other restricted areas so that the latter can be secured during community events.



Outdoor amenities include soccer and ball fields, as well as a teaching green roof located outside the science classroom.

Located on the plains of Colorado, east of Denver, the architecture recalls the Prairie style and the colors and materials reflect the surrounding landscape.





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GREEN INFO

To capture and quantify the sustainable design, construction, and operational best practices applied to the new campus building, the Vista Peak Preparatory School used a metric developed by the United States Green Building Council to help demonstrate how the Team and project achieved sustainability success.

USGBC

The U.S. Green Building Council (USGBC) is a non-profit organization committed to expanding sustainable building practices. USGBC is composed of more than 13,500 organizations from across the building industry that are working to advance structures that are environmentally responsible, profitable and healthy places to live and work.

LEED Information

The Leadership in Energy and Environmental Design (LEED) Green Building Rating system is the nationally accepted benchmark for the design, construction and operation of high-performance green buildings. LEED provides building owners and operators with the tools they need to have an immediate and measurable impact on their buildings' performance.

LEED certification provides independent, third-party verification that a building project meets the highest green building and performance measures. All certified projects receive a LEED plaque, which is the nationally recognized symbol demonstrating that a building is environmentally responsible, profitable and a healthy place to live and work.

There are both environmental and financial benefits to earning LEED certification.

LEED Certified buildings

- Lower operating cost and increased asset value
- Reduce waste sent to landfills
- Conserve energy and water
- Healthier and safer for occupants
- Reduce harmful greenhouse gas emissions
- Qualify for tax rebates, zoning allowances and other incentives in hundreds of cities.
- Demonstrate an owner's commitment to environmental stewardship and social responsibility.



(replace logo upon reward)



Green Touchscreen

The project promotes future education of sustainability and other environmentally responsible building operational procedures. This is promoted through an Educational Outreach program which includes two elements. For site visitors, users, students, and staff, a Green Touch Screen includes specific green building practices and live updated operational data. In addition, this Sustainability Case Study is available for anyone interested in reading about the project or environmental practices implemented on the project. The Case Study will be available in hard copy format at the school, as well as electronically available on both the Green Touch Screen and through the school system's website. In addition, the case study will be offered for use by the GBCI to include in the LEED-Schools case study project features or supporting information to the LEED Certified Projects database.

The Green Touchscreen is conveniently located near the main entry and reception desk where it is visible and easily accessible by all building users. It is a unique feature of the campus and it allows you to view real time energy usage data throughout the building at any time.

Green Features Map

The Green Touchscreen includes a base photograph with 10 Green Features individually marked. Every feature displays a name, a short description and a photograph. Building occupants can select an area or icon, which displays more information about the features.

1. Green Roof

Located on the second level of the school, a vegetated "green" roof reduces storm water runoff, provides insulation to reduce heating and cooling needs, and creates an outdoor learning environment.

2. Photovoltaic (PV) Panels – Renewable Energy

At the south wall of the science wing, PV panels create energy from sunlight teaching students about renewable energy first hand. The PV panels also act as a sunshade device for the science classroom windows.

3. Water Use Reduction

All toilets, sinks and urinals are low flow helping the school to save over 40% in water use.

4. Indoor Air Quality

With the use of non-toxic, low emitting paints, floor and ceiling finishes as well as increased natural ventilation, the indoor environment is healthier creating a better learning and working environment for all building occupants.

5. Energy Efficient Systems

High efficiency mechanical and electrical systems are used to reduce energy consumption and lower utility costs.

6. Local and Recycled Building Materials

Over 30% of building materials including all exterior CMU, came from a local source helping to reduce transportation needs and promote local businesses. The building also contains over 20% of materials with recycled content cutting back on the use of new materials and reducing waste.





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7. Natural Daylight and Views to the Outdoors

Each classroom and office is exposed to natural daylight and views creating a better learning and working environment that promotes productivity and reduces absenteeism. Natural daylight also significantly reduces artificial lighting requirements and energy costs.

8. Stormwater Management

Retention ponds and wetland areas are located at strategic points around the site to capture large amounts of water to prevent run-off. Since the site is comprised of many impervious surfaces such as sidewalks and parking lots, the water run-off can flow into the ground minimizing the effects of large rains and flooding. The wetlands also create a habitat for native plants and wildlife providing another outdoor learning environment for students.

9. Recycling

Not only was the construction team able to divert over 50% of construction waste from the land-fill, the school participates in an ongoing recycling effort that helps to reduce the amount of waste generated on a daily bases.

10. Water Efficient Landscape

Specific plants, trees and grasses were selected for this region to reduce the amount of potable water used in irrigation.



LEED Checklist

Vista Peak Preparatory School is Aurora Public School's second LEED certified Building. Below are the credits Vista Peak is seeking to achieve LEED Gold Certification.

Sustainable Sites

- | | |
|-------------------|---|
| SS Prerequisite 1 | <u>Construction Activity Pollution Prevention</u>
Pollution was reduced from construction activities by controlling soil erosion, water way sedimentation and airborne dust generation. |
| SS Prerequisite 2 | <u>Environmental Contamination Free Site</u>
An environmental site assessment was conducted to verify that no harmful contamination was found on site. |
| SSc1 | <u>Site Selection</u>
Vista Peak avoided development of inappropriate sites and reduced the environmental impact from the location of a building on a site. |
| SSc4.2 | <u>Alternative Transportation, Bicycle Storage & Changing Rooms</u>
Bike Racks, showers and changing facilities are available to promote bicycle use helping to reduce pollution from individual automobile use. |





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- SSc4.3 Alternative Transportation, Low Emitting & Fuel Efficient Vehicles
Preferred Parking passes for students are available to promote the use of low-emitting fuel-efficient vehicles helping to reduce pollution.
- SSc5.2 Site Development, Maximize Open Space
The site allowed for a high ratio of open space to building footprint helping to promote biodiversity.
- SSc6.2 Stormwater Management: Quality Control
With the implementation of a storm water management plan the site limits distribution and pollution of natural water flows by successfully managing stormwater run-off.
- SSc7.2 Heat Island Effect, Roof
The School's white and vegetated "green roof", help to naturally cool the building and reduce heat islands that minimize the impact on microclimate and human and wildlife habitats.
- SSc8 Light Pollution Reduction
Minimized light trespass from the building and site, reduced sky-glow to increase night sky access, improved night-time visibility through glare reduction and reduced development impact on nocturnal environments.
- SSc9 Site Master Plan
In addition to earning the following Sustainable Site credits: SSc1, SSc5.2, SSc6.1, SSc6.2 and SSc8, a master plan was created for the entire 100 acre site that makes up the P-20 campus. The master plan included close coordination of the P-8 and the High School site Designs, in addition to planning for the other future potential buildings including a stadium, a college building, a community building and a transportation building.
- SSc10 Joint Use of Facilities
The schools are more integrated into the community by enabling the buildings and their playing fields to be used for non-school events and functions.



Water Efficiency

- WEc1.1 Water Efficient Landscaping, Reduced By 56.3%
The use of potable water for landscape irrigation was limited by the use of efficient irrigation systems and native, adaptive plant species that have low water needs.
- WEc3.3 Water Reduction, 44.3% Reduction
Water efficiency was maximized within buildings to reduce the burden on municipal water supply and wastewater systems.



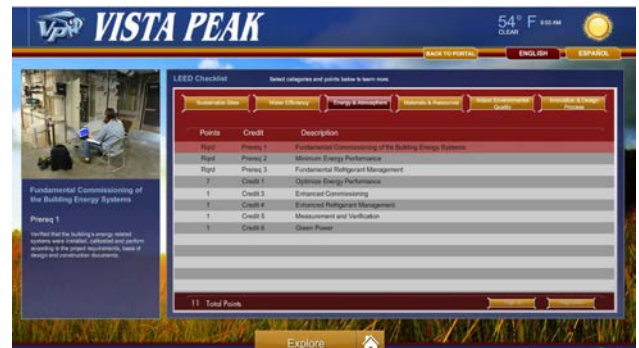


Energy & Atmosphere

EA Prerequisite 1 Fundamental Commissioning of the Building Energy Systems
 The Vista Peak Preparatory School, in collaboration with a third-party Commissioning Agent, verified that the building's energy related systems were installed, calibrated and perform according to the project requirements, basis of design and construction documents.

EA Prerequisite 2 Minimum Energy Performance
 The minimum level of energy efficiency was established for the proposed building and system

EA Prerequisite 3 Fundamental Refrigerant Management
 Ozone depletion was reduced with the use of zero CFC-based refrigerants in the HVAC & R system.



EAc1 Optimize Energy Performance
 Increasing levels of energy performance was achieved above the baseline in the prerequisite standard to reduce environment and economic impacts associated with excessive energy use. Building energy modeling was conducted to estimate the operational energy use and associated costs. The modeling tool predicted a 31.8% cost savings in the project's design and construction.

EAc3 Enhanced Commissioning
 The School exceeded the requirements of EAp1 Fundamental Commissioning by beginning the commissioning process early and executing additional activities after the systems performance verification is completed.

EAc4 Enhanced Refrigerant Management
 The project reduced ozone depletion and supported early compliance with the Montreal Protocol while minimizing direct contributions to global warming.

EAc5 Measurement and Verification
 A M&V plan was created and implemented to measure and evaluate the building's energy consumption over time.

EAc6 Green Power
 Renewable Energy Credits (RECs) were purchased to ensure that 35% of the building's electricity is replaced by renewable sources.

Materials and Resources

MR Prerequisite 1 Storage & Collection of Recyclables
 A recycling plan for the school will help to reduce the amount of waste that ends up in the landfill. A minimum of glass, paper, cardboard, plastics, and metals are recycled within the school.





- MRC2.1 Construction Waste Management, Divert 54.1% from Disposal
Construction, demolition and land-clearing debris were diverted from disposal in landfills and incinerators. Redirected recyclable recovered resources back to the manufacturing process. Reusable materials were also redirected to appropriate sites
- MRC4.1 Recycled Content, 24% (post-consumer + ½ pre-consumer)
The project increased demand for building products that incorporate recycled content materials, thereby reducing impacts resulting from extraction and processing of virgin materials
- MRC5.1 Regional Materials, 32.1% Extracted, Processed & Manufactured Regionally
The project increased demand for building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation

Indoor Environmental Quality

- EQ Prerequisite 1 Minimum IAQ Performance
The minimum indoor air quality (IAQ) performance was established to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants.
- EQ Prerequisite 2 Environmental Tobacco Smoke (ETS) Control
Smoking is prohibited on school grounds to eliminate exposure of building occupants, indoor surfaces and ventilation air distribution systems to environmental tobacco smoke.
- EQ Prerequisite 3 Minimum Acoustical Performance
The schools provide classrooms that are quiet so that teachers can speak to the class without straining their voices and students can effectively communicate with each other and the teacher.
- EQc2 Increased Ventilation
Additional outdoor air ventilation is provided to improve indoor air quality for improved occupant comfort, well-being and productivity.
- EQc3.1 Construction IAQ Management Plan, During Construction
With the implementation of a construction IAQ plan the construction team reduced indoor air quality problems from the construction process in order to help sustain the comfort and well-being of construction workers and building occupants.
- EQc3.2 Construction IAQ Management Plan, Before Occupancy
After construction, before occupancy the building was flushed-out by supplying a large amount of fresh air through the building to cleanse the building of any contaminants.
- EQc4.1 - 4.4 Low-Emitting Materials
Harmful, odorous sealants, adhesives, paints, coatings, flooring systems, and wood and agrifiber products were prohibited from the use on site.



EQc5 Indoor Chemical and Pollutant Source Control

By use of entryway mat system, high quality filtration, and separate exhaust for rooms with hazardous chemicals the building occupants are protected from potentially hazardous particulates and chemical pollutants.

EQc6.1 Lighting System Design & Controllability
Lighting system controls are provided for individual occupants as well as classrooms and conference areas to promote the productivity, comfort and well-being of building occupants.

EQc6.2 Thermal Comfort Controllability

Thermal comfort controls are provided for individual occupants as well as classrooms and conference area to promote the productivity, comfort and well-being of all building occupants.

EQc7.1 Thermal Comfort, Design

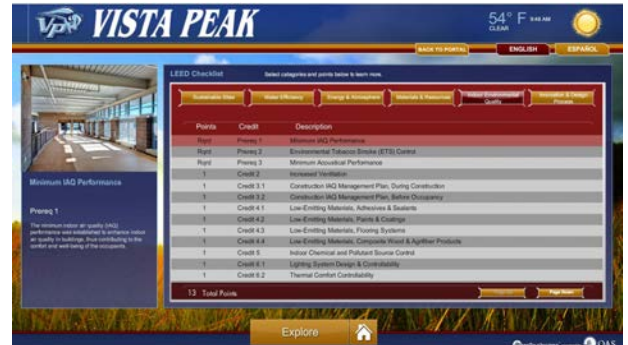
Comfortable thermal environment that supports the productivity and well-being of building occupants is provided.

EQc7.2 Thermal Comfort, Verification

Thermal comfort surveys for all building occupants will be distributed 6 to 18 months after construction to address any thermal comfort issue.

EQc10 Mold Prevention

The building helps to reduce the potential presence of mold through preventive design and construction measures.



Innovation & Design Process

IDc1.1 Innovation in Design: Green Housekeeping

With the implementation of a green cleaning policy, the school will decrease the use of harsh chemicals and cleaning products as well as promote the use of sustainable cleaning equipment for the better health of all building occupants.

IDc1.2 Innovation in Design: Education Outreach Program

The Vista Peak Preparatory School includes special attention and educational focus of the building's green features. As part of a comprehensive Educational Outreach program for sustainability, a Sustainability Case Study was created for distribution during the operational phase, and the building users and guests will have access to the Green Touchscreen. The Green Touchscreen provides extensive detail and information related to the building's energy efficient and environmentally responsible features.



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- IDc1.3 Innovation in Design: Exceed the SSc5.2 Maximize Open Space
The requirements for Sustainable Site credit 5.2 were exceeded. Vegetated open space was provided for an area that exceeded the building footprint size by more than double.
- IDc1.4 Innovation in Design: Pilot Light Pollution Reduction
With the use of LEED's pilot credit program, the school is able to test credits out for the future LEED versions and receive one point under Innovation and Design. The team has chosen Light Pollution Reduction which minimizes light spillage to the site and improves night time visibility.
- IDc2 LEED Accredited Professional
During design the construction of the school at least one principal participant was a LEED Accredited Professional.

Green Building Operations - Live Data

Maintaining the energy savings predicted in design throughout the occupancy phase of a building can be dependent upon many factors, including user habits, schedules, and even real-time weather changes. To continue and improve the building's environmental responsiveness and energy efficiency measures, live data is featured on the Green TouchScreen. The following live information and screen displays of power, lighting, and utility use, as well as weather data, provide users an interactive experience in understanding the building's operations and energy impacts. This information can be used by students, staff, and visitors for educational projects, homework assignments, student reports and more.



Overall Power Site Map

Displays of color coded electrical consumption on a 2D top down floor plan map of the building.



Lighting Power Site Map

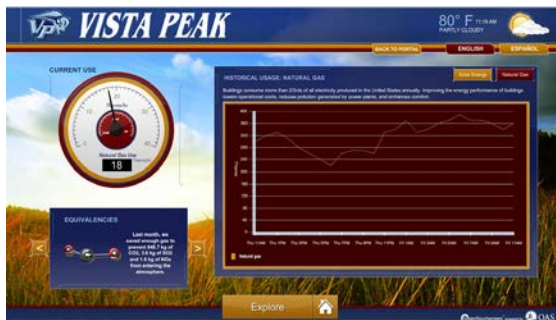
Displays color coded lighting electrical consumption on a 2D top down floor plan map of the building



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Historical Usage: Solar energy

Photovoltaic energy generation is the best known method of generating electric power by using solar cells to convert energy from the sun into a flow of electrons.



Equivalencies

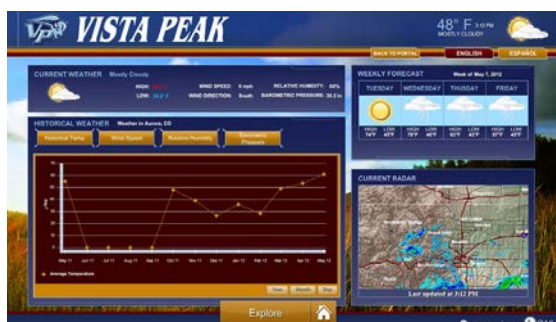
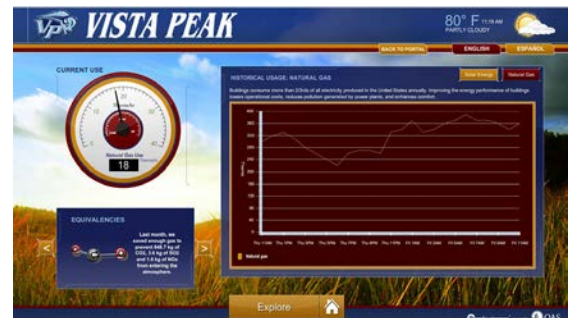
- Within a single month of operations, Vista Peak saved enough Electricity to:
 - Prevent 77927.1 kg of CO₂, 327.2 kg of SO₂, and 143 kg of NO_x from entering the atmosphere.
 - Equal to planting 1,998.1 trees and letting them grow for 10 years.
 - Equal to removing 14.3 cars from the roads for a year.
 - Equal to powering 10.3 average houses for a year.

Historical Usage: Natural Gas

Buildings consume more than 2/3rds of all electricity produced in the United States annually. Improving the energy performance of buildings lowers operational costs, reduces pollution generated by power plants and enhances comfort.

Equivalencies

- Within a single month of operations, Vista Peak saved enough Gas to:
 - Prevent 1414.5 kg of CO₂, 5.9 kg of SO₂, and 2.6 kg of NO_x from entering the atmosphere
 - Equal to planting 36.3 trees and letting them grow for 10 years
 - Equal to removing 0.3 cars from the roads for a year
 - Equal to powering 0.3 average houses for a year



Historical Weather

For detailed information regarding current weather conditions, the weather forecast or any historical data, you are able to view these conditions on the Green Touchscreen, under Historical Weather. Once you have entered into Historical Weather you can view Historical Temperature, Wind speed, relative Humidity and Barometric Pressure. You can view these categories by Year, Month or Day.



Educational Calculations & Environmental Impacts

CFL (Compact Fluorescent Light Bulbs) vs. Incandescent

Assumptions

- 60 watt incandescent bulbs with a life of 1,500 hours will be replaced with 14 watt CFL bulbs with a life of 10,000 hours.
- The bulbs will be burned 750 hours per year.
- Cost of CFL is \$2.75 and an Average cost of electricity is \$2.67 per day.

If you Calculate 12 CFL bulbs to replace 12 Incandescent bulbs, your result are:

- \$40.00 savings per year
- \$543.00 energy cost savings over the life of the CFL's
- 10 months to pay back initial cost difference
- 197 days of electricity savings could buy



Greenhouse Gas Calculations

Assumptions

- Average USA electricity usage per person is 12,000 kw per year
- Colorado quotient for CO2 emissions is 1.788 lbs/kwh

If a house resides 6 people, the household emits an average 128,736 pounds of CO2 per year. This is equivalent to:

- 3,300 trees planted and grown per year
- 23 cars not driven

High Efficiency Toilet

Assumptions

- Average person flushes 6 times a day
- All toilets are being used equally
- Cost of water is \$0.002/gal

If a house resides 6 people and has 3 typical (3.5gpf) toilets, every toilet in the household that is replaced with a high-efficiency toilet (1.1gpf) will save an average of:

- \$21.02 savings per year
- \$2,378,781,504.00 savings if everyone in the USA switched
- 10,512 gallons of water saved per year
- 1.99 miles of gallon milk jugs that could be filled with savings





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The LEED Project Team

Owner:	Aurora Public Schools
Architect:	MOA ARCHITECTURE in joint venture with RTA Architects
Civil Engineer:	JVA Consulting Engineers
Landscape Architect:	Design Concepts
Structural Engineer:	S.A. Miro. Inc.
Mechanical Engineer:	Cator Ruma & Associates, Co.
Electrical Engineer:	Cator Ruma & Associates, Co.
Food Service:	William Caruso & Associates, Inc.
Acoustical Design:	Shen Milsom & Wilke, Inc.
Cost Estimating:	Scovel Management Group
Sustainable Design:	AEC
Contractor:	Adolfson & Peterson Construction

To explore the Vista Peak Green Touchscreen please visit the Green Touchscreen located near the main entry and reception desk where it is available to all building users or you may go to the website at: <http://aurora.highschool.greentouchscreen.com/>