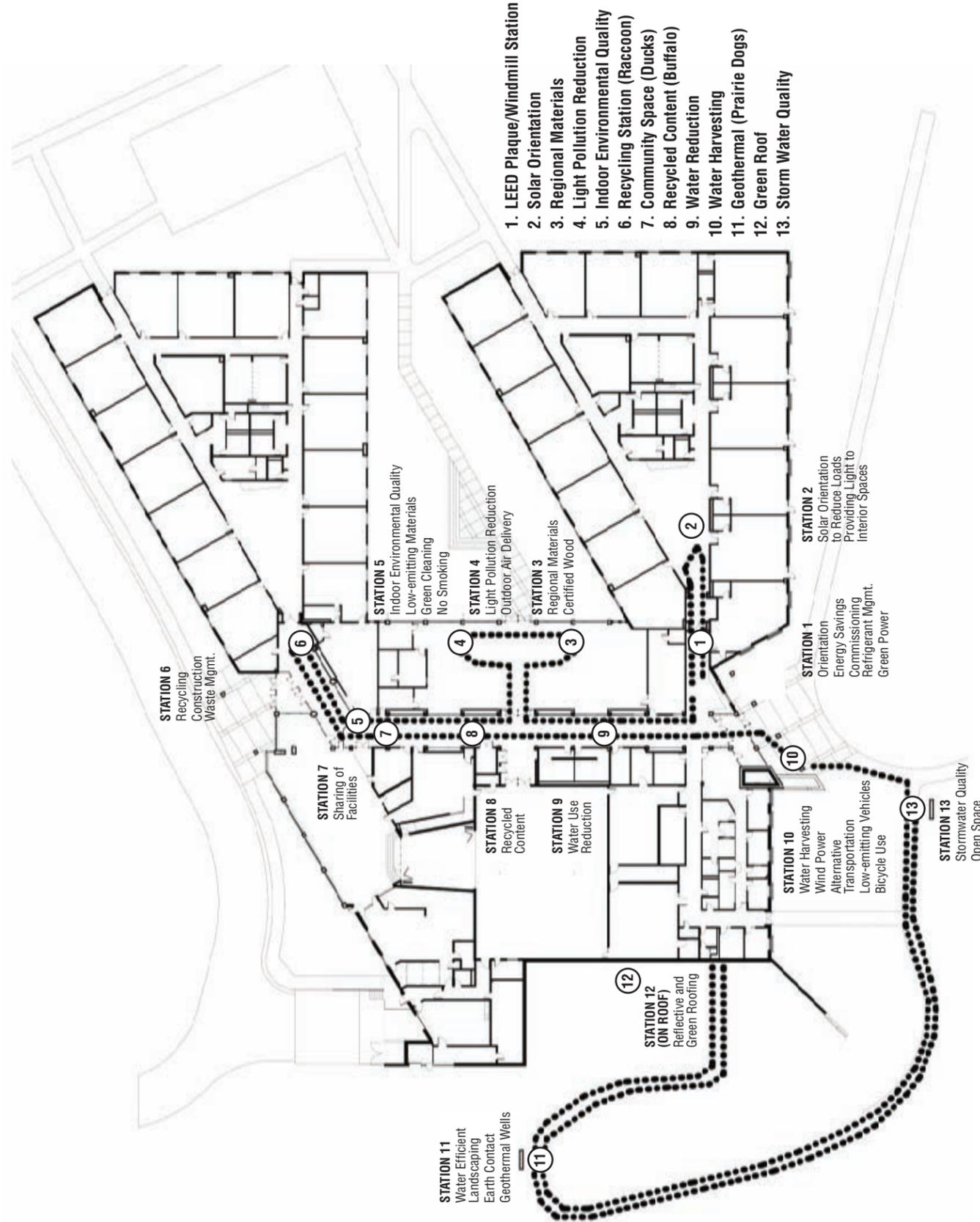


# Bell Prairie Walking Tour Stations Map



<http://www.earthly-ideas.com>  
 Earthly Ideas LLC



## Bell Prairie Elementary School

North Kansas City Schools  
 Kansas City, Missouri



*Awarded LEED Gold by the Green Building Certification Institute*

GROSS SQUARE FOOTAGE: 81,786 ft<sup>2</sup>

BUILDING POPULATION: 810

CONSTRUCTION DATES: 2007-2009

ARCHITECT & STRUCTURAL ENGINEER: Hollis + Miller Architects

MECHANICAL, ELECTRICAL, and PLUMBING ENGINEERS:

Henderson Engineers, Inc.

LANDSCAPE ARCHITECT and CIVIL ENGINEER:

Shafer, Kline & Warren, Inc.

SUSTAINABILITY CONSULTANT: Earthly Ideas LLC

CONSTRUCTION MANAGER: JE Dunn Construction Company, Inc.

COMMISSIONING AGENT: Smith & Boucher Engineers



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## Site and Water

**Orientation:** The building is oriented east-west for solar access and bermed into a hill at its western edge for solar protection.

**Alternative Transportation:** Bicycle storage spaces, showering facilities and preferred parking for low-emitting and fuel-efficient vehicles are provided.

**Area Vegetation:** Protection of the on-site streamway along the east boundary of the property was achieved with a permanent preservation easement. Additional areas on the project site were restored with native plants. In total 140,112 ft<sup>2</sup> was preserved as open space.

**Stormwater:** A stormwater management plan addresses quantity, rate, and quality of runoff. Three bioretention basins totaling .13 acres are planted with native trees, shrubs, forbs, and grasses, and are bordered by native grass filter strips.

**Heat Island Effect:** Roofing materials reject solar heat or are vegetated to reduce thermal gradient differences between developed and undeveloped areas minimizing impact on microclimate and habitat.



**Roof Garden:** This 2,224 ft<sup>2</sup> educational resource has pre-planted sedums in trays and helps reduce heat island effect, improve energy efficiency, and reduce stormwater runoff. An Aermotor windmill pumps rainwater up from the cistern to the roof garden for irrigation.

**Landscaping:** Broadleaf deciduous shade and ornamental trees, evergreen/conifers, ornamental grasses and perennials, and .5 acres of native grasses and wildflowers are all suited to the Kansas City area and are expected to thrive without permanent irrigation.

**Irrigation:** A high-efficiency drip irrigation system for the roof garden uses 100 percent captured rainwater from a 5,370 gallon cistern that collects stormwater runoff from a portion of the roof above the gymnasium. No potable water is used for irrigation. All other landscape areas at the school site are not irrigated.

**Water Efficiency:** The selection of low- and ultra low-flow and flush fixtures (such as urinals, toilets, showerheads, and faucets) resulted in more than 38 percent less water than baseline fixture performance requirements of the Energy Policy Act of 1992.

**Interior and Exterior Lighting:** Selected fixtures minimize light trespass, reduce sky-glow to improve night sky access, and reduce development impact on nocturnal environments, as well as reduce energy costs.



## Energy and Atmosphere

**Energy:** The whole building energy simulation model indicates a 31.6 percent reduction in energy cost between the design building model and the base building model prescribed in ASHRAE 90.1-2004.

**Lighting:** Occupancy sensors are employed throughout the building including classrooms, offices, restrooms, and storage rooms. On average, light fixtures consume 1.0 watts per square foot to efficiently meet lighting needs.

**Commissioning:** Employed this quality-control process to ensure the fundamental building systems were planned, installed, and calibrated to operate as intended by the design team for the district's long-term benefit.

**Building Envelope:** High-efficiency windows, fixed shading devices, and additional insulation in the roof and walls improve the building's envelope and set a path for long-term energy efficiency.

**Heating, Ventilation, and Air Conditioning (HVAC):** Heating, cooling, and domestic hot water are provided by a vertical, closed loop geexchange wellfield and water-to-air heat pump system. The HVAC system's thermal storage is the ground and effectively operates at much lower peak energy demand than a traditional system, reducing the need for additional power plants. A building automation control system further increases energy efficiency.

**Ozone Protection:** Ozone depletion was reduced in support of early compliance with the Montreal Protocol. Direct contributions to global warming were minimized by specifying HVAC equipment refrigerants that minimize or eliminate the emission of compounds that contribute to these global issues.

**Green Power:** Seventy percent of the building's conventional electricity from fossil fuel sources is offset with renewable sources through the purchase of Green-e certified Renewable Energy Certificates for two years.

## Materials and Resources

**Occupant Recycling:** Easily accessible containers and separate storage areas serve the recycling needs of the entire building for the recycling of paper, corrugated cardboard, glass, plastics, and metals.

**Recycled Content Materials:** Recycled materials reduced the impact of extraction and processing of virgin materials and supported closing the loop for recycling. Materials containing substantial amounts of recycled content include: fencing, asphalt, concrete (fly ash), structural steel, steel deck and joists, roofing, aluminum windows, door frames and hardware, overhead doors, metal framing, gypsum board, ceiling grid and tile, carpet tile, insulation, and lockers.

**Regionally Extracted Materials:** Regionally extracted materials (those manufactured and whose raw materials are extracted within a 500-mile radius of the jobsite) reduced transportation impact and supported regional businesses. Regional materials used during construction include: gravel, concrete, rebar, sand, masonry block, Portland cement, grout mix, gypsum board, and some of the doors.

**Certified Wood:** Some of the wood-based materials and products used in the facility are certified in accordance with Forest Stewardship Council's (FSC) Principles and Criteria to encourage responsible forest management. Certified wood materials used include the stave lumber core wood doors, which were FSC Mixed 70 percent.

**Construction Waste:** A successful waste management program diverted more than 55 percent of construction waste from landfills. Recycled or reused materials included: concrete, block, brick, wood, cardboard, metal, and some gypsum board.

**Durability:** Long-life, low-maintenance materials such as brick, concrete block, seamless resinous flooring, and carpet tile are used throughout the building.

## Indoor Environmental Quality

**Indoor Air Quality (IAQ) Monitoring:** Permanent monitoring and feedback of ventilation system performance help sustain long-term occupant health and well-being.

**Construction IAQ Management Plan:** To help sustain the comfort and well-being of construction workers and building occupants, the construction team implemented a combination of housekeeping, HVAC protection, source control, moisture control, and scheduling measures.

**Air Filtering:** Air quality is enhanced by installing permanent air filters with air cleaning efficiencies above normal market installations.

**Low-emitting Materials:** Low-toxicity building products such as adhesives and sealants, paints and coatings, carpeting, and composite wood products were used to reduce the quantity of indoor air contaminants.

**Pollutant Source Control:** Walk-off mats were installed at regular entry points that will be maintained on a regular basis. Chemical use areas (like custodian closets and labs) were designed to be physically separated from other spaces and have appropriate ventilation.

**Controllability of Systems:** One hundred percent of the individual workstations have individual lighting controls and all multi-occupant spaces have lighting system controllability. Seventy-five percent of the individual workstations have individual comfort controls and all multi-occupant spaces have thermal comfort controls to enable adjustments to suit group needs and preferences.

**Thermal Comfort:** Each classroom is provided with its own temperature, humidity, and CO<sub>2</sub> monitoring and adjustments to improve occupant comfort satisfaction, air quality, and energy conservation. The HVAC system includes a heat pump in each classroom, allowing users to operate individual units during off-schedule hours. This not only improves occupant comfort and productivity but also increases overall operating efficiency since the building's main systems are off.

**Thermal Comfort Verification:** The District will implement a thermal comfort survey of building occupants to assess overall satisfaction with thermal performance and identification of thermal comfort-related problems in 2010.

**Daylighting:** A majority of classrooms have a southern or northern exposure for daylighting.

## Innovation and Design Process

**Community Connections:** North Kansas City Schools wanted Bell Prairie Elementary School to be an integrated part of the community by allowing the building and its playing fields to be used for non-school events and functions. The cafeteria, gymnasium, platform stage space, media center, computer lab, flex classroom, restrooms, parking areas, and playing fields are accessible for after-hours use.



**School as a Teaching Tool:** District staff chose to develop curriculum that integrates the sustainable features of a school facility with the school's educational mission. The curriculum met local or state curriculum standards, was approved by school administrators, and provides 10+ hours of classroom instruction per year per full-time student.

**Green Building Education:** The Bell Prairie project will educate students and the public about sustainable design and the impact of buildings on the environment. In addition to a case study, this self-guided tour illustrating the comprehensive signage program was developed.

**Green Cleaning:** After successfully testing a green cleaning program at Staley High School, a comprehensive green cleaning program was implemented to reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical contaminants that adversely impact air quality, occupant well-being, and the environment.

**LEED Accredited Professionals:** Several principal participants of the project team have successfully completed the LEED Accredited Professional exam.

## Background

North Kansas City Schools purchased a 233-acre site to accommodate a District Activities Complex, Staley High School, open space, and future expansion, including the construction of Bell Prairie Elementary School. The site is located near a growing residential area about 17 miles north of Kansas City.

## Awards and Honors

Bell Prairie Elementary School earned LEED Gold in December 2009, making it the first elementary school and K-12 educational facility to earn LEED Gold in the state of Missouri, and the second K-12 educational facility in the state of Missouri to earn LEED certification (North Kansas City Schools Staley High School was the first).