King County Green Schools Program

Green Building Best Practices

This guide will help schools and districts design, construct, or renovate facilities that use less energy and water, protect natural resources such as soil, and use non-toxic and sustainable building materials.

This guide is for schools and districts undergoing new construction projects or major renovations. If an existing school facility is working to improve energy and/or water conservation, select those Green Schools Program categories.

Recognition
If your school is focusing on Level Two (Energy Conservation) or Level Three (Water Conservation and Pollution Prevention), see practices in this guide related to energy and water conservation.

If your school is working on achieving Sustaining Green School recognition, see Sustaining Green School for steps to recognition. One requirement for Sustaining Green School recognition is to complete an additional action or educational strategy each year. To fulfill that requirement, your school may select any action from this guide.

Green building best practices are divided into

- Recycling of construction and demolition materials, and planning for school facility inhabitants to recycle paper, metals, plastics, and other recyclable materials
- Site selection and design
- Sustainable building materials
- Water efficiency
- Energy efficiency
- Indoor environmental quality

Recycling of construction and demolition materials and planning for building inhabitants to recycle paper, plastics, metals, and other materials

At a minimum:

- Recycle 75 percent or more of construction and demolition materials.
- Meet local ordinance requirements for managing construction and demolition materials at construction sites, and for designating space for recycling.
- Provide an accessible area for collection and storage of materials for recycling, including cardboard, paper, metals, glass bottles and jars, and plastics.

Schools and school districts are encouraged to go beyond the minimum and design for collection and storage of organic waste (food scraps and food-soiled paper). On space utilization plans, show areas dedicated to collection of recyclable materials. Collection bins should be able to hold a 75 percent or higher diversion rate and should be easily accessible to custodians and others who will collect recyclable and compostable materials from the building.

Make sure outdoor recycling areas are consistent with policies and procedures of the waste hauling companies that will collect materials from the building.

Schools that receive state funding for new capital projects or renovations: Meet the Washington State Sustainable School (WSSP) protocol, per High Performance Public Building statute requirements, or meet LEED-Silver certification.

Schools that do not receive state funding for new capital projects or renovations (and are not required to meet WSSP protocol): Meet as many LEED requirements as possible, or complete at least one strategy from each green building area below.

Site Selection, Design, and Orientation

A building can be situated on its site to take advantage of prevailing winds, sunlight, topography, water flows and other natural phenomena, as well as existing site conditions such as pathways and infrastructure. School design teams may select from the following strategies.

Carefully select and design building site

- Avoid environmentally-sensitive areas, such as critical habitat, or prime farmland.
- Do not build on greenfield sites.
- Choose a central location to minimize transportation impacts.
- Encourage walking and biking to and from school.
- Design pedestrian and bike-friendly features, install bike racks, and connect with existing trails.
- Provide wildlife corridors.

Design for optimum building orientation on the site

- Consider building orientation to facilitate:
    - Passive solar heating.
    - Natural lighting (daylighting).
    - Natural ventilation.
    - Shading of windows by deciduous trees that lose leaves in winter.
    - Placement of solar hot water or photovoltaic panels, usually on south-facing walls.
- Design window placement for views of nature. This has been shown to increase test scores.)

Design for daylighting

- Build to provide daylight factor (DF) of 2 for 75 percent of critical visual task areas.

Consider the U-value, shading coefficient, and visible transmittance when selecting windows and doors with glazing.
Design windows locations with daylighting in mind.
Allow daylight penetration high in a space to reduce excessive brightness.
Design exterior shading devices to reduce heat gain.
Design exterior control devices to diffuse natural light before entering the work space (light shelves, overhangs, horizontal louvers, vertical louvers, and dynamic tracking or reflecting systems).
Integrate daylighting with the electric lighting system using advanced controls to adjust the level of electric light when sufficient daylight is available.

Avoid direct beam daylight on critical visual tasks to reduce excessive brightness.
Introduce as much controlled daylight as deep as possible into a building interior.
To reduce harsh direct light, filter daylight using vegetation, curtains or louvers.

Provide natural and passive ventilation

Make sure windows are operable/openable to catch breezes.
Design building to take advantage of “stack effect” that promotes air movement upward throughout the building.

Design for disassembly or adaptive reuse

Design the building to add flexibility to building uses for future expansion, reconfiguration, and retooling.

Reduce labor time in maintaining the building (through easier access to equipment and components).

Lengthen the life-span of the school by planning for ease of remodeling or re-configuration of the space. (This can be more practical and less expensive than constructing a new building.)

Landscaping and stormwater management

Care should be taken to protect site features before and during construction, and to ensure that soil function is restored after construction is complete.

Water-efficient landscaping

Preserve existing vegetative cover and trees along streams and other natural waterways in order to reduce storm water runoff.

Design bio-swales instead of ditches in order to help treat runoff as it passes through vegetation.

Plant drought-tolerant vegetation that require less water.

Use compost-amended soils specified in King County's Post-Construction Soil Standard.

Vegetated roof

Design and install a vegetated roofing system. A vegetated or green roof provides a variety of benefits, including: additional insulation against cold and hot outdoor temperatures; reduction of the "heat island" effect; reduction of the rate and amount of storm water flowing into municipal drainage systems, which can pollute waterways; preservation of the integrity of the roof's membrane by reducing exposure to UV radiation.

Rainwater collection system

Install a rainwater collection system or cistern

Collected rainwater from a rainwater collection system or cistern may be used for landscape irrigation; equipment washing; toilet flushing, with suitable treatment (such as UV-light treatment).

Sustainable Building Materials

Specify durable, salvaged or refurbished, recyclable, recycled-content, and regionally-manufactured materials helps reduce the overall environmental footprint of the school building.

Consider wood products produced from sustainably managed forests.

Use durable materials like linoleum sheet flooring made from natural sources.

Use rapidly renewable materials, such as wheatboard, instead of particle board.

Use easy-to-maintain materials such as ceramic tile or stained concrete.

Use recycled-content materials, such as concrete aggregate, carpeting, insulation, ceiling tiles, drywall, floor tile, playground surfacing and parking stops.

Use salvaged or refurbished building materials, furniture and equipment.

Water Efficiency

Reducing water use helps to stretch limited fresh water supplies, and to reduce energy use by lowering the amount of water heating required.

Reduce potable water use by 20 percent below baseline calculated for the building.
Specify water conserving plumbing fixtures that exceed the Energy Policy Act of 1992's fixture requirements in combination with ultra high efficiency or dry fixture and control technologies.

Specify high water-efficiency equipment and appliances (sinks, toilets, showers, dishwashers, washing machines, and evaporative cooling towers).
Specify only durable, high performance fixtures. Note that design and maintenance issues will be different with low flow toilets compared to toilets with higher flow.

Reduce irrigation water use

Minimize use of turf grass. Specify use of water-efficient climate-tolerant plants. Reduce potable and river or groundwater irrigation consumption by 50 percent over landscape budget baseline. Use captured rain or municipally provided reclaimed water. Install high-efficiency irrigation systems technologies.

Energy Efficiency

An energy efficient facility provides good long-term value due to reduced operating costs**.**

Reduce source energy of school design to 20 percent below that required by Washington State's Non-Residential Energy Code (version 2004).

Use high efficiency equipment for the HVAC system. Size equipment correctly for the estimated demands of the facility. Use economizers, heat recovery ventilators and other controls that optimize system performance.
Use high-efficiency electric lighting products. Optimize the number of light fixtures in each room. Use occupant sensors and other control devices that help reduce wasted energy.
Ensure that walls, floors, roofs, and windows of the school are as well-insulated and as energy efficient as is cost-effective.
Have the building commissioned. Commissioning ensures that operability and maintenance are considered in building design, that systems are installed correctly, and that systems operate as intended after construction.

Indoor Environmental Quality

In addition to providing adequate ventilation as required by code, Indoor Environmental Quality (IEQ) is enhanced by including features that affect occupant comfort and health and improve occupant productivity and satisfaction. This can include strategies such as using non-toxic materials that do not off-gas harmful chemicals into the air, access by occupants to heating/cooling and lighting controls, and the ability to keep the building free of pollutants.

Low-Toxic Finishes, Materials and Good Construction Practices

Design for good indoor air quality by selecting products that minimize off-gassing, such as no added formaldehyde casework or low- or no-VOC paints and sealants.
Select building materials, finishes, and furniture to limit the introduction of pollutants into the building.
Require contractors to practice good construction IAQ management, such as protecting ductwork from dust and fumes, and storing materials properly to keep them dry (and avoid potential future mold issues).
Place walk-off areas (such as grates or mats) at each building entrance to prevent tracking of pollutants such as roadway oils and pesticides into the building.
Use an Integrated Pest Management approach or only use organic fertilizers, pesticides and herbicides that are not harmful if tracked into building.

An Under-Floor Air Distribution System

- Delivers clean, room-temperature air at floor level, to allow air to rise and stratify naturally, reducing need for fans to push the air down from above.
- Leaves warmer air at the top of the room where the HVAC system can pull it out for cooling, filtration and recirculation.
- Creates less velocity and therefore less whistling and other noise.
- Enables schools to reconfigure floor plans inexpensively and quickly.

Adopt a Whole-Building Approach

- Assemble and involve each member of the project team (architect, building occupants, mechanical engineer, electrical engineer, landscape architect, civil engineer, etc.) from the beginning.
- Think of the project as a whole system using integrated design.
- Conduct an eco-charette or green building design strategy meeting to ensure green design goals are understood and adopted by each project team member.
- Find efficiencies where systems and spaces overlap (e.g., a roof that also captures rainwater).

Make the Building an Educational Tool

- Use signs to identify features that make the building “green” such as
  - Recycled flooring material.
  - Rapidly renewable materials.
  - Certified sustainable wood.
  - Alternative energy systems.
  - Efficient equipment such as lights or appliances.

- Vegetated roof.
- Rainwater collection system.

- Establish visible monitoring systems for energy use, renewable energy, and water use to use as teaching aids in science, math, and other subjects.
- Plant a children's garden and use the garden as part of the curriculum. Include drought-tolerant plants and other water-saving practices.
- Direct exterior lighting downward to reduce light pollution for neighbors and wildlife.