Washington Sustainable Schools Protocol

Criteria for High Performance Schools

2010 Edition
Washington Sustainable Schools Protocol

Criteria for High Performance Schools

2010 Edition
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table of Contents</td>
<td>3</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>6</td>
</tr>
<tr>
<td>Overview</td>
<td>8</td>
</tr>
<tr>
<td>Site</td>
<td>13</td>
</tr>
<tr>
<td>Site Selection</td>
<td>13</td>
</tr>
<tr>
<td>S1.0: Code Compliance</td>
<td>13</td>
</tr>
<tr>
<td>S1.1: Sensitive Areas</td>
<td>14</td>
</tr>
<tr>
<td>S1.2: Greenfields</td>
<td>15</td>
</tr>
<tr>
<td>S1.3: Central Location</td>
<td>15</td>
</tr>
<tr>
<td>S1.4: Joint Use On-Site</td>
<td>16</td>
</tr>
<tr>
<td>S1.5: Joint Use Off-Site</td>
<td>16</td>
</tr>
<tr>
<td>S1.6: Minimal Footprint</td>
<td>16</td>
</tr>
<tr>
<td>Transportation</td>
<td>17</td>
</tr>
<tr>
<td>S2.1: Public Transportation</td>
<td>17</td>
</tr>
<tr>
<td>S2.2: Bicycle Lanes &amp; Security</td>
<td>17</td>
</tr>
<tr>
<td>S2.3: Minimize Parking</td>
<td>18</td>
</tr>
<tr>
<td>Stormwater Management</td>
<td>19</td>
</tr>
<tr>
<td>S3.0: Sedimentation and Erosion Control</td>
<td>19</td>
</tr>
<tr>
<td>S3.1: On-Site Infiltration and Flow Control</td>
<td>20</td>
</tr>
<tr>
<td>S3.2: Stormwater Treatment</td>
<td>21</td>
</tr>
<tr>
<td>S3.3: Enhanced Stormwater Treatment</td>
<td>21</td>
</tr>
<tr>
<td>Outdoor Surfaces</td>
<td>22</td>
</tr>
<tr>
<td>S4.1: Reduce Heat Islands - Site</td>
<td>22</td>
</tr>
<tr>
<td>S4.2: Reduce Heat Islands – Roof Design</td>
<td>23</td>
</tr>
<tr>
<td>Outdoor Lighting</td>
<td>25</td>
</tr>
<tr>
<td>S5.1: Light Pollution Reduction</td>
<td>25</td>
</tr>
<tr>
<td>Water</td>
<td>26</td>
</tr>
<tr>
<td>Outdoor Systems</td>
<td>26</td>
</tr>
<tr>
<td>W1.0: Outdoor Water Use Budget</td>
<td>26</td>
</tr>
<tr>
<td>W1.1: Irrigation Water Reduction</td>
<td>28</td>
</tr>
<tr>
<td>W1.2: Control Irrigation Water Use</td>
<td>29</td>
</tr>
<tr>
<td>W1.3: Irrigation Systems Testing and Training</td>
<td>30</td>
</tr>
<tr>
<td>Indoor Systems</td>
<td>31</td>
</tr>
<tr>
<td>W2.1: Potable Water Use Reduction for Sewage Conveyance</td>
<td>31</td>
</tr>
<tr>
<td>W2.2: Water Potable Indoor Use Reduction</td>
<td>33</td>
</tr>
</tbody>
</table>
## Overview

### Materials

<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Reduction and Efficient Material Use</td>
<td>35</td>
</tr>
<tr>
<td>M1.0: Storage and Collection of Recyclables</td>
<td>35</td>
</tr>
<tr>
<td>M1.1: Construction Site Waste Management</td>
<td>36</td>
</tr>
<tr>
<td>M1.2: Building Reuse – Structure and Shell</td>
<td>37</td>
</tr>
<tr>
<td>M1.3: Building Reuse – Interior Non-Structural Elements</td>
<td>38</td>
</tr>
<tr>
<td>M1.4: Materials Reuse</td>
<td>39</td>
</tr>
<tr>
<td>M1.5: Resource Reuse - Furniture</td>
<td>40</td>
</tr>
<tr>
<td>Sustainable Materials Procurement</td>
<td>41</td>
</tr>
<tr>
<td>M2.1: Recycled Content</td>
<td>41</td>
</tr>
<tr>
<td>M2.2: Rapidly Renewable Materials</td>
<td>43</td>
</tr>
<tr>
<td>M2.3: Certified Wood</td>
<td>44</td>
</tr>
<tr>
<td>M2.4: Environmentally Preferable Products</td>
<td>45</td>
</tr>
<tr>
<td>M2.5: Regional/Local Materials</td>
<td>46</td>
</tr>
</tbody>
</table>

### Energy

<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficiency</td>
<td>47</td>
</tr>
<tr>
<td>E1.0: Minimum Energy Performance</td>
<td>47</td>
</tr>
<tr>
<td>E1.1: Superior Energy Performance</td>
<td>48</td>
</tr>
<tr>
<td>Controls</td>
<td>50</td>
</tr>
<tr>
<td>E2.1: HVAC Controls and Operable Windows</td>
<td>50</td>
</tr>
<tr>
<td>E2.2: Daylight-Responsive Controls</td>
<td>51</td>
</tr>
<tr>
<td>Alternative Sources of Energy</td>
<td>53</td>
</tr>
<tr>
<td>E3.1: On-Site Renewable Energy</td>
<td>53</td>
</tr>
<tr>
<td>E3.2: Green Power Contract</td>
<td>54</td>
</tr>
<tr>
<td>E3.3: Distributed Generation</td>
<td>55</td>
</tr>
<tr>
<td>Commissioning</td>
<td>56</td>
</tr>
<tr>
<td>E4.0: Fundamental Commissioning</td>
<td>56</td>
</tr>
<tr>
<td>E4.1: Enhanced Commissioning</td>
<td>58</td>
</tr>
<tr>
<td>Management</td>
<td>60</td>
</tr>
<tr>
<td>E5.1: Energy Management Systems</td>
<td>60</td>
</tr>
</tbody>
</table>

### Indoor Environmental Quality

<table>
<thead>
<tr>
<th>Section</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daylighting</td>
<td>62</td>
</tr>
<tr>
<td>IEQ1.1: Daylighting</td>
<td>62</td>
</tr>
<tr>
<td>IEQ1.2: Permanent Shading</td>
<td>64</td>
</tr>
<tr>
<td>IEQ1.3: Views</td>
<td>64</td>
</tr>
<tr>
<td>Electric Lighting Quality</td>
<td>65</td>
</tr>
<tr>
<td>IEQ2.1: Electric Lighting Quality</td>
<td>65</td>
</tr>
</tbody>
</table>
Overview

Indoor Air Quality

IEQ3.0: Minimum Requirements
IEQ3.1: Low-Emitting Interior Finishes
IEQ3.2: Low-Emitting Furniture
IEQ3.3: Source Control
IEQ3.4: Ducted HVAC Returns
IEQ3.5: Particle Arrestance Filtration
IEQ3.6: Construction IAQ Management
IEQ3.7: Natural Cooling

Acoustics

IEQ4.0: Acoustic Performance
IEQ4.1: Improved Acoustic Performance
IEQ4.2: Audio Enhancement

Thermal Comfort

IEQ5.0: Thermal Code Compliance

User Control

IEQ6.1: User Control - Windows
IEQ6.2: User Control – Temperature & Lights

Planning, Education, & Operations

1. Planning
   PEO 1.1: Integrated Design Workshop
   PEO 1.2 Durability, Efficiency, and Maintainability Features
   PEO 1.3 Innovation

2. Education
   PEO 2.1: Green Building Learning Opportunities

3. Operational Activities
   PEO 3.0: Operational Performance Monitoring
   PEO 3.1: Post Occupancy Evaluation
   PEO 3.2: Energy and Life Cycle Cost Analysis
   PEO 3.3: Project or District Level Operational Activities

Documentation & Reporting
ACKNOWLEDGEMENTS

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Advisors

The Washington Sustainable Schools Protocol was developed under a collaboration of many agencies and organizations within the State of Washington and the Pacific Northwest.

The following individuals participated on the original Washington Sustainable Schools Advisory Committee and/or Washington Sustainable Schools Protocol Team (2004-2006), providing valuable guidance and support for the project. Place of employment listed was at the time of original publication, so some have changed.

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David Weigand, formerly of New Buildings Institute

Development Team

A WSSP Update Team convened between March 2009 and August 2010 to make updates and changes to the WSSP. The team referred to the most recent version of CHPS and LEED for Schools in updating the WSSP.

The WSSP Update Committee:

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George Bryant – Vancouver Public Schools
Tim Byrne – Olympia School District
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Bruce Pitts – Wood Harbinger
Jeanne Rynne – Office of Superintendent of Public Instruction
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OVERVIEW

This document is designed to help school districts plan and implement the requirements in RCW 39.35D High Performance Public Buildings. State assisted major school construction projects are required to use green building standards, and can use this Washington Sustainable Schools Protocol (WSSP) or the Leadership in Energy and Environmental Design (LEED) for Schools design silver standard.


The WSSP is based on the Collaborative for High Performance Schools (CHPS) Criteria, but explicitly defines a high performance school for the State of Washington. The original WSSP was created by members of the WSSP Protocol Committee and vetted by members of the Implementation Team. The WSSP Update Committee included many members of the original team, as well as some new participants with experience implementing the WSSP on projects.

The Collaborative for High Performance Schools (CHPS) began in November 1999 in California. Interest in high performance design grew, and CHPS expanded its focus, developing a national version of the manuals as well as other state or region specific versions in Massachusetts, Washington, New York, New England, Colorado and Texas. In early 2002, CHPS incorporated as a non-profit organization. To reflect the growing interest in CHPS, the organization became national in 2008.

This Update

A pilot version of WSSP was produced and used in 2004-2005, and 2006 WSSP was finalized. That version has been in use since then. It was necessary to undertake an update to keep up with changing code requirements and incorporate other changes. The basic premises are the same, and the goals are the same. Many more points have been added, as well as additional ways to receive points, making WSSP more adaptable to specific needs and conditions.

**ENERGY CODE:** At the time of this publication (October 2010) of the 2009 version of the Washington State Energy Code had not yet been adopted statewide. Therefore, some of the energy credits remain the same while the 2006 energy code is in use, and some are updated, to be used when the 2009 code is implemented. [http://www.neec.net/energy-codes](http://www.neec.net/energy-codes)

**SCHOOL HEALTH AND SAFETY RULE:**

The State Board of Health adopted modernized rules governing environmental health and safety for primary and secondary schools in August 2009, and will be promulgated under chapter 246-366A WAC. As of this publication, those rules may not be implemented under restrictions imposed by the Legislature; however, existing school health rules continue to apply. It is not known when the Board’s modernized rules will replace the existing rules. The existing rule as of this publication (October 2010) is chapter 246-366 WAC. [http://apps.leg.wa.gov/WAC/default.aspx?cite=246-366](http://apps.leg.wa.gov/WAC/default.aspx?cite=246-366)

Point Requirements and Documentation

**The WSSP is useful as a goal-setting and planning tool.** Districts can use it to clearly communicate their design goals. It allows designers to deliver a Washington Sustainable School while addressing the regional, district, and site-specific constraints relevant to a particular district. Districts are reminded to work with their local jurisdictions to ensure they are meeting local requirements when implementing innovative strategies. In addition, local jurisdictions may set higher requirements than the State, and therefore may be higher than those expressed in the “Required Credits” of the WSSP.
OVERVIEW

The WSSP Standard addresses the multiple facets of high performance schools by providing credits in the categories of energy efficiency, water efficiency, site planning, materials and indoor environmental quality. In addition, it offers a section that emphasizes comprehensive planning, operations, and evaluation actions that cross the categories, as well as innovative actions that go above and beyond what is described in existing credits offered within the main categories.

For each of the categories, the WSSP has both required and optional credits. A school project must meet all of the required credits and earn a minimum number of points overall.

For this version, for Class I districts, the minimum is 45 points, and for Class II districts the minimum is 40 points. No more than 4 points out of a possible 8 can be derived from credit PEO3.3, Project or District Operational Activities category. The WSSP is pass/fail based on the requirements and minimum point levels. However, school district planners are encouraged to earn as many points as possible and appropriate for a given project above the required threshold. In other words, treat the 40 or 45 point threshold as a minimum to beat.

Each design team or building owner is expected to document compliance with the WSSP through a process of self-certification. The Washington State’s Office of Superintendent of Public Instruction (OSPI) requires documentation of WSSP compliance through the School Construction Assistance Program. The WSSP Scorecard is provided following this introduction. The Scorecard summarizes the requirements and applicable points for each credit.

WSSP, CHPS, and LEED

The WSSP is based on the Collaborative for High-Performance Schools (CHPS) rating systems, and is organized similar to the USGBC’s LEED rating system. No interchangeability between the systems is expressed or implied. A school qualifying for Washington Sustainable Schools or CHPS may contain many of the elements needed for LEED certification, but there is no reciprocity between the two systems. Teams wishing to pursue a LEED rating or to be CHPS verified must do so independently. The USGBC and CHPS have developed excellent support materials that could be useful as background for understanding related WSSP credits. See the USGBC’s web site at http://www.usgbc.org and CHPS at http://www.chps.net/dev/Drupal/node for more information on how to join these organizations and obtain technical resources.

Priorities

Washington Sustainable Schools Protocol spans a wide variety of areas, from site planning and energy use, to material specifications and indoor environmental quality. Required credits in the Protocol generally reflect actions that are required by state law, although they may exceed those requirements slightly if the Protocol Team felt the action could and should be met by most projects.

There are credits that relate directly to high priorities expressed by school planners, designers, and legislators. The intent of these credits is to ensure schools are healthy, operate efficiently, increase student productivity, and reduce large scale environmental impact.

Listed below are design areas and credits that are recommended as high priorities by the Washington Sustainable Schools Protocol to optimize performance of schools in the state. The points ascribed to each credit are the amount of points possible.

**Daylighting.** Quality daylighting designs have been shown to improve student productivity. When integrated properly with the electric lighting system, daylighting can save significant energy.

Daylighting (4 possible points).

**Energy Efficiency.** Energy efficiency should be a cornerstone of a Washington Sustainable School to reduce operational expenses, conserve natural resources, and reduce local and global pollution and greenhouse gas emissions. All schools must be commissioned to ensure that the design meets the expectations of the district, and that the school is built as it was designed. Commissioning ensures that all building systems are working properly, and that school staff know how to operate and maintain them.

- Superior Energy Performance (20 possible points).
OVERVIEW

- Controls (2 possible points).
- Commissioning (3 possible points).
- Management (2 possible points).

Indoor Air Quality. Good indoor air quality is essential for healthy schools and occupants. Indoor air quality can be impacted by design and construction choices, as well as material choices and maintenance practices.

Indoor Air Quality (15 possible points).

Acoustics. If not controlled, noise from loud ventilation systems, outdoor sources, and neighboring rooms can significantly impede communication between teachers and students. Young learners, students with hearing difficulties, and those learning English as a second language are particularly vulnerable. Classrooms should be designed to enable all students to hear clearly.

- Improved Acoustical Performance (4 possible points).

Sustainable Materials. Hidden within all materials are the resources, energy, chemicals, and environmental damage related to their production. When reuse is possible (of either building materials or the building itself), this can represent avoided costs for new materials and disposal, as well as avoided environmental impacts of producing new building materials.

- Waste Reduction and Efficient Use (9 possible points).
- Sustainable Materials Procurement (9 possible points).

Site Selection. A high performance school will avoid degrading natural ecosystems, while seeking to incorporate natural conditions to enhance the building’s performance. In addition, the school design will encourage non-polluting transportation alternatives.

- Selection & Use (8 possible points).
- Transportation (3 possible points).
- Stormwater Management (3 possible points).

Water Efficiency. Basic efficiency measures can significantly reduce a school’s water use. These reductions help the local environment, while reducing operating expenses.

- Outdoor Systems (4 possible points).
- Indoor Systems (5 possible points).

Planning, Education, and Operations

This update turned the former “Extra Credit” section into “Planning, Education, and Operations”, and reorganized the points. The Planning and Education sections should be considered part of the WSSP scorecard. The points in Operations are generally the activities that require “plans” – IPM energy, cleaning, etc. A project may earn up to 4 (out of 8) points as part of the minimum 40 or 45 from the Operations section.

Resources

For most credits, resources are listed to assist you in finding more information regarding strategies that may help you achieve the credit. In addition to these resources, you may want to consult with the CHPS Best Practices Manual (you can download the document at chps.net), and the LEED Reference Guide (available for purchase from the USGBC).


The LEED Reference Guides are available for purchase from the USGBC at http://www.usgbc.org.

The “WSSP Workbook”, an Excel file with calculation worksheets, scorecard, and work plan template, is planned as a companion to this protocol, and will be available through the OSPI website, http://www.k12.wa.us/SchFacilities/Programs/HighPerformanceSchoolBuildings.aspx
<table>
<thead>
<tr>
<th>Category</th>
<th>Group</th>
<th>Credit</th>
<th>Points</th>
<th>Achieved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site</td>
<td>1) Selection &amp; Use</td>
<td>S1.0 Code Compliance</td>
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</tr>
<tr>
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<td></td>
</tr>
<tr>
<td></td>
<td>S1.2 Greenfields</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S1.3 Central Location</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S1.4 Joint Use of On-Site Facilities</td>
<td>1-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S1.5 Joint Use of Off Site Facilities</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S1.6 Minimal Footprint</td>
<td>1-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) Transportation</td>
<td>S2.1 Public Transportation</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S2.2 Bicycle Lanes &amp; Security</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S2.3 Minimize Parking</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3) Stormwater Management</td>
<td>S3.0 Sedimentation and Erosion Control</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S3.1 On-site Infiltration and Flow Control</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S3.2 Stormwater Treatment</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>S3.3 Enhanced Stormwater Treatment</td>
<td>R - 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4) Outdoor Surfaces</td>
<td>S4.1 Reduce Heat Island - Site</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>S4.2 Reduce Heat Island - Roof Design</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5) Outdoor Lighting</td>
<td>S5.1 Light Pollution Reduction</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>17 points</td>
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<td>17</td>
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</tr>
<tr>
<td>Water</td>
<td>1) Outdoor Systems</td>
<td>W1.0 Outdoor Water Use Budget</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>9 points</td>
<td>W1.1 Irrigation Water Reduction (50%, 100%)</td>
<td>1-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W1.2 Control Irrigation Water Use</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>W1.3 Irrigation System Testing and Training</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) Indoor Systems</td>
<td>W2.1 Potable Water Use Reduction for Sewage (25%, 45%)</td>
<td>1-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>W2.2 Potable Water Use Reduction (20%, 30%, 40%)</td>
<td>1-3</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>9 points</td>
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<td></td>
</tr>
<tr>
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<td>1) Waste Reduction &amp; Efficient Material Use</td>
<td>M1.0 Storage and Collection of Recyclables</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>18 points</td>
<td>M1.1 Construction Site Waste Management (50%, 75%)</td>
<td>1-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M1.2 Building Reuse - Structure/Shell (50%, 75%, 95%)</td>
<td>1-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M1.3 Building Reuse - Non-Structural Elements (50%)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M1.4 Materials Reuse (5%, 10%)</td>
<td>1-2</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M1.5 Resource Reuse - Furniture (30%)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2) Sustainable Materials Procurement</td>
<td>M2.1 Recycled Content (10% / 4 mtls, 20% / 8 mtls)</td>
<td>1-2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M2.2 Rapidly Renewable Materials</td>
<td>1</td>
<td></td>
<td></td>
</tr>
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<td>M2.3 Certified Wood 50%, Chain of Custody</td>
<td>1-2</td>
<td></td>
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<tr>
<td></td>
<td>M2.4 Environmentally Preferable Products</td>
<td>1-2</td>
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<tr>
<td></td>
<td>M2.5 Regional/Local Materials</td>
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<td>18 points</td>
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<td>Energy</td>
<td>1) Efficiency</td>
<td>E1.0 Minimum Energy Performance</td>
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<tr>
<td>34 points</td>
<td>E1.1a Superior Energy Performance (2009 NREC)*</td>
<td>4-20 ('09)</td>
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<tr>
<td>(‘09)</td>
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<td>4-12 ('06)</td>
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<tr>
<td>27 points</td>
<td>2) Controls</td>
<td>E2.1 HVAC Controls and Operable Windows</td>
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<td>E2.2a Daylight-Responsive Controls (2009 NREC)*</td>
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<td>E2.2b Daylight-Responsive Controls (2006 NREC)</td>
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<td>3) Alternative Energy</td>
<td>E3.1 On-Site Renewable Energy (5-10% bldg supply)</td>
<td>1-4</td>
<td></td>
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<tr>
<td></td>
<td>E3.2 Green Power Contract</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>E3.3 Distributed Generation (5-10% bldg supply)</td>
<td>1-3</td>
<td></td>
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<tr>
<td></td>
<td>4) Commissioning</td>
<td>E4.0 Fundamental Commissioning</td>
<td>R</td>
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<tr>
<td></td>
<td>E4.1 Enhanced Commissioning (1-3 possible)</td>
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<td>E4.1.1 Commissioning Review</td>
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<td>E4.1.2 Verification and Assurances</td>
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<td>E4.1.3 Systems Manual</td>
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<td>5) Management</td>
<td>E5.1 Energy Management Systems</td>
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<tr>
<td>Indoor Environmental Quality</td>
<td>29 points</td>
<td>Indoor Environmental Quality</td>
<td>29 points</td>
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<td>-----------------------------</td>
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</tr>
<tr>
<td>1) Daylighting</td>
<td>IEQ1.1</td>
<td>Daylighting (25%, 50%, 75%, 100% critical visual spaces)</td>
<td>1-4</td>
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</tr>
<tr>
<td>IEQ1.2</td>
<td>Permanent Shading</td>
<td></td>
<td>1</td>
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</tr>
<tr>
<td>IEQ1.3</td>
<td>Views</td>
<td></td>
<td>1</td>
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</tr>
<tr>
<td>2) Electric Lighting Quality</td>
<td>IEQ2.1</td>
<td>Electric Lighting Quality</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3) Indoor Air Quality</td>
<td>IEQ3.0</td>
<td>Minimum Requirements (Ventilation, Filtration, &amp; Moisture Control)</td>
<td>R</td>
<td></td>
</tr>
<tr>
<td>IEQ3.0.1</td>
<td>Evaluate Envelope</td>
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<td>1</td>
<td></td>
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<tr>
<td>IEQ3.0.2</td>
<td>Mitigation Measures</td>
<td></td>
<td>1</td>
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</tr>
<tr>
<td>IEQ3.1</td>
<td>Low-Emitting Interior Finishes</td>
<td></td>
<td>1-4</td>
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</tr>
<tr>
<td>IEQ3.2</td>
<td>Low-Emitting Furniture</td>
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<td>1</td>
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<tr>
<td>IEQ3.3</td>
<td>Source Control</td>
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<td>IEQ3.4</td>
<td>Ducted HVAC Returns (Required when 246-366A in effect)</td>
<td></td>
<td>1 or R</td>
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<tr>
<td>IEQ3.5</td>
<td>Particle Arrestance Filtration</td>
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<td>1</td>
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<tr>
<td>IEQ3.6</td>
<td>Construction IAQ Management</td>
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<td>1-2</td>
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<tr>
<td>IEQ3.7</td>
<td>Natural Cooling</td>
<td></td>
<td>3</td>
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<tr>
<td>4) Acoustics</td>
<td>IEQ4.0</td>
<td>Acoustic Performance</td>
<td>R</td>
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<tr>
<td>IEQ4.1</td>
<td>Improved Acoustical Performance</td>
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<td>1-4</td>
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<td>IEQ4.2</td>
<td>Audio Enhancement</td>
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<tr>
<td>5) Thermal Comfort</td>
<td>IEQ5.0</td>
<td>Thermal Code Compliance</td>
<td>R</td>
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<tr>
<td>6) User Controls</td>
<td>IEQ6.1</td>
<td>User Control - Windows</td>
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<tr>
<td>IEQ6.2</td>
<td>User Control - Temperature &amp; Lights</td>
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<th>Planning, Education, and Operations</th>
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<td>1) Planning</td>
<td>PEO1.1</td>
<td>Integrated Design Workshop</td>
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<td>Durability, Efficiency &amp; Maintainability Features</td>
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<td>PEO1.3</td>
<td>Innovation</td>
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<td>1-2</td>
</tr>
<tr>
<td>2) Education</td>
<td>PEO2.1</td>
<td>Green Building Learning Opportunities</td>
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<tr>
<td>3) Operational Activities</td>
<td>PEO3.0</td>
<td>Operational Performance Monitoring</td>
<td>R</td>
</tr>
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<td>PEO3.1</td>
<td>Post Occupancy Evaluation</td>
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<td>1-2</td>
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<tr>
<td>PEO3.2</td>
<td>ELCCA/LCCA</td>
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<td>4 out of 8</td>
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<td>Project and/or District Operational Activities</td>
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<tr>
<td>No more than 4 towards minimum</td>
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<td>- Maintenance Plan Enhancement</td>
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<td></td>
<td>- Resource Conservation Plan</td>
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<td></td>
<td>- IAQ Management – Tools for Schools</td>
<td></td>
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<td></td>
<td></td>
<td>- Integrated Pest Management Program</td>
<td></td>
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<td></td>
<td></td>
<td>- Transportation Options</td>
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<td></td>
<td></td>
<td>- Fuel Efficient Buses</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>- Food Waste Related Waste Prevention &amp; Mgmt</td>
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<td></td>
<td></td>
<td>- Green Purchasing and Cleaning Plan</td>
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<tr>
<td>Total possible</td>
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<td>12</td>
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<table>
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<tr>
<th>GRAND TOTAL Possible Points</th>
<th>119 ('09)</th>
<th>GRAND TOTAL Possible Points</th>
<th>112 ('06)</th>
</tr>
</thead>
</table>

Minimum required for Washington Sustainable School
Two-tier system:
For Class I Districts: Minimum 45 points
For Class II Districts: Minimum 40 points

Max "Project or District Operational Activity" points that can be claimed toward the minimum requirement is 4; however, a district could implement all of the points

* At time of publication of this standard, the 2009 NREC (Non-Residential Energy Code, of the WA State Energy Code) was not adopted statewide. If adopted locally use E1.1a and E2.2a.
SITE SELECTION AND USE

SITE

Site Selection

**Purpose:** Choose sites that protect students and staff from outdoor pollution and minimally impact the environment. Channel development to centrally located areas, with existing infrastructure, to protect greenfields, minimize transportation requirements, and preserve habitat and natural resources.

The site is a crucial element in determining the overall sustainability of the school design. Sites are sometimes purchased years in advance, and some of these credits may be out of the control of the districts and/or designers at the time the school is being built. In addition, some of these credits may be more difficult for rural/suburban areas where distances between home and school can be significant. However, districts considering multiple sites can substantially lower the environmental impact of the school by choosing centrally located sites, sharing parks or facilities with community organizations, preserving open space, and protecting environmentally sensitive areas.

### S1.0: Code Compliance

| Required | School Facilities Compliance. Comply with all siting and environmental impact study requirements of the most current edition of the School Facilities Manual, issued by the Washington State Office of the Superintendent of Public Instruction. |

**Resources**


S1.1: Sensitive Areas

1 point

Environmentally sensitive or important spaces should be avoided. Do not develop buildings or improvements on sites that meet any of the following criteria:

- Important farmland as defined by the US Department of Agriculture.
- Land whose elevation is lower than five feet above the elevation of the 100-year flood as defined by FEMA.
- Land that provides habitat for any species on the federal or state threatened or endangered list.
- Within 100 feet of any wetland as defined by 40 CFR, Parts 230-233 and Part 22, OR as defined by local or state rule or law, whichever is more stringent.

References

**Important Soils:** The Natural Resources Conservation Services (NRCS) division of the United States Department of Agriculture maintains the definitions and soil surveys that designate areas as “important farmland.” Lists of *Prime and Statewide Important Farmland Soils* are maintained for each soil survey area and may be obtained from the Field Office Technical Guide located in each NRCS field office. County and state offices of the NRCS keep maps showing the status of maps within their jurisdiction. County offices can be located at [http://offices.sc.egov.usda.gov/locator/app](http://offices.sc.egov.usda.gov/locator/app).

**100-Year Flood Plains:** Washington is in FEMA’s Region X [http://www.fema.gov/about/contact/regionx.shtm](http://www.fema.gov/about/contact/regionx.shtm). To request a map showing the 100-year flood elevations (called Flood Insurance Rate Maps, or FIRM Maps) contact a Region X Map Specialist toll-free by phone at 1-877-FEMA MAP, or by email at FEMAMapSpecialist@mapmodteam.com. Unofficial maps by ESRI are available online at [http://www.esri.com/software/geographynetwork/index.html](http://www.esri.com/software/geographynetwork/index.html).

**Wetlands:** The term wetlands is defined in Title 40 CFR as “those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.” [Source: CFR: Title 40.330.4].


**CFR:** The Code of Federal Regulations (CFR) is a publication of the United States Federal Government that lists rules authorized by the executive departments and agencies.
S1.2: Greenfields

1 point  Do not build on greenfields. Greenfields are defined as those sites that are undeveloped except for agricultural use.

When choosing between multiple sites, use previously developed sites instead of greenfields.

Greenfields are semi-rural or rural properties that are undeveloped except for agricultural use, and being considered as a site for expanding urban development.

Urban redevelopment reduces environmental impacts by utilizing established infrastructure and preserving undeveloped lands. If the site already contains a building, additional points may be earned with Materials Credit M1.3: Building Reuse.

S1.3: Central Location

1 point  Locate sites where at least 50% of students live within the following distances from the school:

- Elementary Schools: within one mile.
- Middle Schools/Junior: within two miles.
- High Schools: within four miles.

Over the lifetime of the building, school districts and families invest significant time, energy, and money transporting students to and from school. Cars driven by parents, guardians, or the students themselves are the largest resource users and sources of transportation-related pollution. Centrally located sites allow more students to walk or bike to school, while reducing the distance cars must travel.

For rural districts, this credit may be difficult to achieve since distances between home and school are much larger.

To earn this point, calculations must be based on the estimated school population when the school opens. Additional transportation-related points are covered in Site Credit 2: Transportation, as well as a transportation options credit (see Planning, Education, and Operations section).
S1.4: Joint Use On-Site

| Shared Use  
| = 1 point |
| Shared and Dedicated Use  
| = 2 points |

Make portion(s) of the school building or grounds available for either shared or dedicated use by community and other appropriate organizations. One point if the space is “shared” use.

An additional point (total of two points) if the space is dedicated for use by the community and other appropriate organizations.

Across the country, schools are being integrated with a variety of facilities, from laundromats and coffee shops to police stations and park districts. These credits apply to both existing and newly created parks. Joint use can have significant benefits, including increased campus security, improved community integration, and reduced site acquisition and construction costs. School districts should have formal agreements for all building users in place before occupancy. Dedicated use does not preclude school use if it is appropriate, but the other organization should be the primary and priority user. A formal written agreement is required to achieve this credit.

S1.5: Joint Use Off-Site

| 1 point |

Share park or recreation space with local park boards or other organizations (off-site).

Using parks or other spaces off-site may help reduce the development footprint of the school project and make better use of existing community assets. School or district must have a letter of agreement with the off-site facilities management.

S1.6: Minimal Footprint

| 80% = 1 point  
| 60% = 2 points |

Provide multi-story construction to reduce the area of the site disturbed by construction. Receive 1 point for ground floor footprint that does not exceed 80% of the building’s total square footage, or 2 points for a ground floor footprint that does not exceed 60% of the total building area.

A multi-story building reduces the ground floor footprint, minimizing the impact of construction and overall site disturbance. Design the building such that the floor area of the ground floor (not including any overhangs) is 61-80% of the total building area for 1 point, or 60% or less for 2 points.
Transportation

**Purpose:** Reduce dependence on fossil fuels, and reduce pollution and land development impacts from automobile use.

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### S2.1: Public Transportation

| 1 point | In urban areas, locate the school within \( \frac{1}{2} \) mile of a commuter rail or light rail station, or within \( \frac{1}{4} \) mile of one or more bus lines. In rural and suburban areas, with limited or non-existent rail/bus service, provide busing to the school. |

When available, public transportation can provide significant reductions in energy impacts. Some school districts offer reduced or subsidized fares for students and staff using public transportation. If sufficient capacity exists, schools can use public transportation to replace district-provided bus service.

**Notes:** Schools near high traffic areas must ensure safe student access. In addition, transportation-related pollution (and the site’s air quality) must be considered when investigating the project’s potential for natural ventilation.

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### S2.2: Bicycle Lanes & Security

| 1 point | Provide bike lanes or sidewalks that extend to the end of the property AND provide suitable means for securing bicycles for at least 5% of building occupants in an elementary or middle school, and 3% of building occupants in a high school. |

Bicycles are a popular and pollution-free form of transportation. To protect pedestrians and bicyclists, bike lanes and sidewalks must extend to the end of the school property. Work with local planners to develop safe pedestrian and bike connections to likely destinations, such as public transportation and town centers.
S2.3: Minimize Parking

1 point

Provide preferred parking totaling **5% of staff and student spaces** for carpools or vanpools and alternative fuel vehicles,

AND size parking capacity not to exceed **2.25 spaces** per classroom plus parking for 20% of students at High Schools; or three spaces per classroom for Elementary and Junior/Middle Schools.

OR, provide preferred parking totaling 5% of staff and student spaces for carpools or vanpools and alternative fuel vehicles, and size parking capacity not to exceed local codes.

OR, add no new parking for rehabilitation projects and provide preferred parking totaling 5% of staff and student spaces for carpools, vanpools, and alternative fuel vehicles.

Excess parking spaces encourage increased automobile use, contribute to urban heat island effects, and can increase pollution from stormwater runoff. To accommodate overflow parking, strategies include dual use of school space (such as playgrounds), using pervious paving (such as grass pavers), and/or developing inter-local agreements with neighboring businesses and institutions. **Pervious paving will not be counted as part of the percentage of parking area.**

Design parking so as not to exceed listed amounts and include clearly marked, preferred parking areas for carpools and alternative fuel vehicles. Stand-alone alternative fuel vehicles such as electric hybrid vehicles use less fuel per mile traveled than conventional gasoline vehicles, and reduce the pollution associated with automobile use.

An innovation point can be earned for projects that undertake a substantial transportation options planning process (see Planning, Education, and Operations section).
Stormwater Management

**Purpose:** Manage stormwater during and after construction to control erosion and runoff, reducing the negative impacts on water and air quality.

### S3.0: Sedimentation and Erosion Control

<table>
<thead>
<tr>
<th>Required</th>
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<tbody>
<tr>
<td>Design a site sediment and erosion control plan that follows the best management practices outlined by the Washington State Department of Ecology's <strong>Stormwater Management Manuals</strong> (for Western Washington: Volume II -- Construction Stormwater Pollution Prevention, and for Eastern Washington), or the local ordinance, whichever is more stringent. The plan shall meet the following objectives:</td>
</tr>
<tr>
<td>- Prevent loss of soil during construction by storm water runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.</td>
</tr>
<tr>
<td>- Prevent sedimentation of storm sewer or receiving streams and/or air pollution with dust and particulate matter.</td>
</tr>
</tbody>
</table>

Construction site stormwater runoff is regulated at the state and local levels. Check with your local agencies for local permit requirements. Construction sites disturbing **one-acre** or more and discharge to waters of the state will likely need coverage under the **Construction Stormwater General Permit** issued by Department of Ecology.

A variety of **best management practices** (BMPs) help address this prerequisite, including:

<table>
<thead>
<tr>
<th>Runoff Control</th>
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<tbody>
<tr>
<td>- Minimize clearing: land grading, permanent diversions, preserving natural vegetation.</td>
</tr>
<tr>
<td>- Stabilize drainage ways: check dams, filter berms, grass-lined channel, and riprap.</td>
</tr>
<tr>
<td>- Restrict land clearing and grading activities from May to September</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Erosion Control</th>
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</thead>
<tbody>
<tr>
<td>- Stabilize exposed soils: chemical stabilization, mulching, permanent seeding, sodding, soil roughening.</td>
</tr>
<tr>
<td>- Protect steep slopes: geotextiles, gradient terraces, soil retention, and temporary slope drain.</td>
</tr>
<tr>
<td>- Protect waterways: temporary stream crossings, vegetated buffer.</td>
</tr>
<tr>
<td>- Phase construction: construction sequencing, dust control.</td>
</tr>
<tr>
<td>- Install sediment control BMPs as one of the first steps in grading.</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Sediment Control</th>
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</thead>
<tbody>
<tr>
<td>- Install perimeter controls: temporary diversion dikes, wind fences and sand fences, brush barrier, silt fence.</td>
</tr>
<tr>
<td>- Install sediment-trapping devices: sediment basins and rock dams, sediment filters and sediment chambers, sediment trap.</td>
</tr>
<tr>
<td>- Storm drain inlet protection: sandbags, concrete blocks, gravel barriers.</td>
</tr>
</tbody>
</table>

**Resources**


S3.1: On-Site Infiltration and Flow Control

| 1 point | Promote on-site infiltration. No net increase in the rate or quantity of stormwater leaving the site from the existing to the developed conditions. OR if existing imperviousness is greater than 50%, implement a stormwater management plan that results in a 25% decrease in the rate and quantity of stormwater runoff. |

Stormwater runoff is water that flows over surfaces, moves laterally through the upper soil horizons, through pipes or other features into a defined surface water body, constructed drainage facility, or natural low area. Stormwater can carry sediment and pollutants from the site into drainage facilities, onto adjacent properties and/or into local bodies of water.

On-site infiltration reduces the rate and quantity of stormwater runoff that could leave the site. Stormwater treatment reduces the contaminants leaving the site, thus addressing water quality. Reducing the amount of runoff is the most effective way to minimize the negative impacts of runoff.

A variety of best management practices address infiltration. One option is listed below:

**Low impact development (LID)** is an integrated approach to site development and storm water management that emphasizes strategies to mimic natural site hydrology rather than using conventional "pipe and pond" techniques. In practice, a site will use multiple, small-scale LID strategies distributed across the site. LID strategies include:

- Maximize on-site stormwater infiltration by directing site water through use of bioretention/rain gardens and infiltration facilities.
- Use native plants or adaptable species for vegetated swales.
- Maximize retention of stormwater in soil by protecting existing soils on site that have high infiltration, and by using bioretention/rain gardens.
- Reduce impervious surfaces while increasing pervious and vegetated areas.
- Capture rainwater from impervious areas for irrigation or reuse within the building.
- Install green/vegetated roofs.
- Disconnect roof downsputs from centralized, piped systems and direct stormwater into vegetated areas or into water collection devices.
- Reduce building footprint.
- Decrease street widths and if possible, remove curb and gutter to encourage sheet flow.
S3.2: Stormwater Treatment

| 1 point | Install treatment systems designed to remove 80% of the average annual post-development total suspended solids (TSS) by implementing best management practices outlined in Washington State Department of Ecology’s Stormwater Management Manual for either Western or Eastern Washington or in EPA’s Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters (EPA 840-B-92-002 1/93). |

Total suspended solids (TSS) are particles that are too small or light to be removed from stormwater by gravity settling alone, and must typically be removed with filtration methods. Common treatment systems include infiltration basins and trenches, porous pavement, vegetated filter strips, grassy swales, filtration basins, constructed wetlands, rain gardens and compost amended filter strips.

S3.3: Enhanced Stormwater Treatment

| R 1 point | Required if the site has conditions that warrant enhanced stormwater treatment, then 50% is required to be treated.  
Provide the equivalent of “Enhanced Treatment” as described in the Department of Ecology Manual for Western Washington for at least 70% of the volume of water required to be treated by your jurisdiction.  
AND, implement the Department of Ecology’s BMP T5.13 “Post-Construction Soil Quality and Depth” which provides guidelines for amending soils with compost. |

If the site has conditions that warrant enhanced stormwater treatment, such as discharging into fish-bearing waters, then providing enhanced treatment to at least 50% of the volume of water is required to be treated by your jurisdiction already. A point can be earned if at least 70% is treated. Enhanced treatment is intended to provide a combination of infiltration, retention and treatment. Significant data is available regarding the benefit of using compost amended soil to treat stormwater.

Resources


Department of Ecology:

Outdoor Surfaces

Purpose: Reduce heat islands to minimize impact on microclimate, and human and wildlife habitat.

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**S4.1: Reduce Heat Islands - Site**

<table>
<thead>
<tr>
<th>1 point</th>
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</table>
| Provide shade (at plant maturity) on at least 30% of non-roof, impervious surfaces on the site, including parking lots, walkways, plazas, etc.  
OR use light-colored/ high-albedo materials (reflectance of at least 0.3) for 30% of the site’s non-roof, impervious surfaces.  
OR use an open-grid pavement system (net impervious area of LESS than 50%) for a minimum of 50% of the parking lot area. |

Employ design strategies, materials, and landscaping designs that reduce heat absorption of exterior materials. Note albedo/reflectance requirements in the drawings and specifications. Provide shade using native or climate-tolerant trees and large shrubs, vegetated trellises, or other exterior structures supporting vegetation. Substitute vegetated surfaces for hard surfaces. Use concrete, or explore elimination of blacktop and the use of new coatings and integral colorants for asphalt to achieve light colored surfaces. Use pervious pavers or pervious concrete.
S4.2: Reduce Heat Islands – Roof Design

On low-sloped roofs (2:12 or less) install an ENERGY STAR® labeled Cool Roof for a minimum of 75% of the roof surface, with a minimum initial solar reflectance of 0.65 and after 3 years, 0.5 (ENERGY STAR Table 1, low-sloped roof)

OR install a “green” (vegetated) roof for at least 50% of the roof area.

OR install high-albedo and vegetated roof surface that, in combination, meet the following criteria:

Area of Roof Meeting Minimum SRI + Area of Vegetated Roof ≥ Total Roof Area

<table>
<thead>
<tr>
<th>Roof Type</th>
<th>Slope</th>
<th>SRI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-sloped roof</td>
<td>≤2:12</td>
<td>78</td>
</tr>
<tr>
<td>Steep-sloped roof</td>
<td>&gt;2:12</td>
<td>29</td>
</tr>
</tbody>
</table>

Cool roofs can significantly reduce school cooling loads and urban heat island effects by reflecting the sun’s energy, instead of absorbing, retaining, and radiating it into the occupied spaces below. With cool roofs, both the reflectivity and emissivity are important. Solar reflectance is the ratio of the electromagnetic energy reflected by a surface to the total amount incident upon it. A solar reflectance of 0.0 means all the solar energy hitting the surface is absorbed and none is reflected. Emissivity is the ability of a material to shed infrared radiation. In other words, surfaces with high emissivity lower their surface temperatures by shedding infrared radiation. Bare metals, for example, have low emissivity and stay hotter for longer periods than materials with high emissivity. The EPA’s ENERGY STAR® program includes a database of high-reflectance roofing materials. To ensure high emissivity, do not use bare metal roofing products.

It should be noted that projects in climate zones other than 1 through 3 should evaluate the life cycle cost-benefit of installing an ENERGY STAR® labeled Cool Roof. The ASHRAE Advanced Energy Design Guide for K-12 School Buildings recommends cool roofs in climate zones 1-3 (Hawaii, Guam, Southern U.S.); Washington State is in climate zones 4, 5, and 6. EPA ENERGY STAR rating defines ENERGY STAR labeled product as “roof products [that] save money and energy by reducing the amount of air conditioning needed to keep a building comfortable."

The calculator for ENERGY STAR labeled roof products states: “No savings are available for a building that is not air conditioned . . .” Cool roofs can also increase heat loss during heating months. This needs to be evaluated against the cost savings anticipated during the cooling months.

Green roofs can reduce heat gain/loss and cooling needs. Green roofs can also act as sound insulation. Other potential benefits are reduction in the size of HVAC equipment, insulation, and roof drains. Green roofs can potentially incorporate cooling and/or water treatment functions and stormwater management requirements, depending on the local jurisdiction.
Resources

USGBC, LEED for Schools 2009, SS Credit 7.2, Heat Island Effect – Roof
Outdoor Lighting

**Purpose:** Eliminate light trespass from the building site, improve night sky access, and reduce development impact on nocturnal environments.

**S5.1: Light Pollution Reduction**

<table>
<thead>
<tr>
<th>1 point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do not exceed <a href="http://www.iesna.org">Illuminating Engineering Society of North America</a> foot-candle level requirements as stated in the <a href="http://www.ies.org/store/">IESNA RP-33 Recommended Practice for Exterior Environmental Lighting</a> or applicable sections of the IESNA Lighting Handbook, Current Edition; AND design interior and exterior lighting (<em>excluding sports fields</em>) such that zero direct-beam illumination leaves the building site.</td>
</tr>
</tbody>
</table>

Consult IESNA *Recommended Practice Manual: Lighting for Exterior Environments for Commission International de l’Eclairage* (CIE) zone and pre- and post-curfew hour descriptions and associated ambient lighting level requirements. Ambient lighting for pre-curfew hours for CIE zones range between 0.01 foot-candles for areas with dark landscapes such as parks, rural, and residential areas, and 1.5 foot-candles for areas with high ambient brightness such as urban areas with high levels of nighttime activity.

Design site lighting and select lighting styles and technologies to have minimal impact off-site and minimal contribution to sky glow. Minimize lighting of architectural and landscape features. There are fixtures that are certified dark sky compliant listed at the [International Dark Sky Association](http://www.darksky.org/mc/page.do?sitePageId=55060&orgId=idsa) web site (below). Lighter colored surfaces used to achieve credit S4.1 may also help reduce lighting requirements.

Although sports fields are excluded from this point, sports fields have a significant impact on the environment. It is recommended that steps be taken to reduce the impact of sports field lighting through field placement, beam shielding, and timing controls consistent with current technology.

**Resources**


The International Dark Sky Association: [http://www.darksky.org/mc/page.do?sitePageld=55060&orgId=idsa](http://www.darksky.org/mc/page.do?sitePageld=55060&orgId=idsa)


**WATER**

Outdoor Systems

**Purpose:** Reduce water use for landscaping and ornamentation.

---

**W1.0: Outdoor Water Use Budget**

| Required | Develop and design a landscape and ornamental water-use budget that conforms to local water efficient landscape ordinances. If no local ordinance exists, use the landscape and ornamental budget ordinance developed by the City of Bellevue. |

To comply with this credit, calculate the estimated water use (EWU) landscape and the Maximum Applied Water Allowance (MAWA) for the landscape. The EWU must not exceed the MAWA. Once a water budget is established, design the landscape to meet established budget baselines.

MAWA is the most irrigation water allowed for the landscape on an annual basis. It takes into account local conditions and the size of the landscape area and is calculated as follows:

\[
MAWA = (ET) \times (LA) \times (0.8) \times (0.62)
\]

Where:

- **MAWA** = Maximum Applied Water Allowance (gallons per year).
- **ET** = Evapotranspiration Rate for the site (inches per year): The amount of water that transpires from plants and evaporates from adjacent soil surfaces. ET takes into account local soil conditions and the local, average annual net rainfall (total rainfall minus runoff).
- **LA** = Landscaped Area (sf).
- **0.8** = ET Adjustment Factor. This factor adjusts for plant factors and irrigation efficiency.
- **0.62** = Conversion Factor. This converts the maximum applied water allowance to units of gallons per year.

1 gal = 0.001337 CCF

To estimate total annual irrigation water use, calculate the EWU for each plant zone according to the equation below, then sum up the EWUs for all zones in the landscaped area:

\[
EWU = (ET) \times (PF) \times (LA) \times (0.62) / IE
\]

Where:

- **EWU** = Estimated Water Use (gallons per year).
- **ET** = Evapotranspiration Rate for the site (inches per year).
- **PF** = Plant Factor for the zone (For low water use plants PF = 0 to 0.3, medium water use plants, PF = 0.4 to 0.6, high water use plants, PF = 0.7 to 1; all irrigated turf grass, PF = 0.8 to 1).
- **LA** = Landscape Area (sf) for the zone.
- **0.62** = Conversion Factor (to gallons per sf). This converts EWU to units of gallons per year.
- **IE** = Irrigation Efficiency (0.625 for conventional overhead spray systems, 0.925 for low volume or drip irrigation systems).

Sports or activity fields are considered recreational areas and may require water in addition to the MAWA. A statement should be included with the landscape design plan, designating recreational areas to be used for such purposes and specifying any needed amount of additional water above the MAWA.
Example: What is the annual water use budget for a 50,000 sf landscaped area in Bellevue?

The ET for Bellevue is 14.5", so the MAWA is about 0.36 million gallons/year

MAWA = (ET) (LA) (0.8) (0.62)

MAWA = 14.5" (50,000) (0.8) (0.62) = 359,600 gallons/year

359,600 gallons/year x 0.001337 CCF/gal = 479.7 CCF/year

Resources

City of Bellevue, Washington landscape budget ordinance example: Municipal Code Section 24.02.205
http://www.bellevuewa.gov/doc_library.htm

Water Engineering Standards, section W3-12,

Irrigation Water Management Society, Advanced Sprinkler Calculation,
http://www.iwms.org/SprinklerCalcA.htm Includes ET rates for the Seattle area.

Good sources for site-specific data to calculate the net evapotranspiration:

- Golf course weather stations.
- Local weather stations.
- Parks departments.
- Washington State University, the Agricultural Extension Office.
- USDA Natural Resources Conservation Service.
W1.1: Irrigation Water Reduction

| 50% = 1 point | Reduce potable and river or groundwater irrigation district water consumption for irrigation after the establishment period by **50% over landscape budget baselines** with the use of water-efficient native (or adapted) climate-tolerant plantings, high-efficiency irrigation technologies, or using captured rain or municipally provided reclaimed water. |
| 100% reduction or no permanent use = 2 points | For an additional point, reduce potable and river or groundwater irrigation district water for site irrigation by additional **50%** (a total of 100% reduction in water use) from water budget baselines; OR do not use permanent landscape irrigation systems after two years (for plant establishment purposes). |

Water resources are a growing concern in Washington, even in the rain-drenched west, as expanding populations and multiple uses increase the demand for limited supplies. Precipitation patterns in much of Washington make it difficult to store enough rainwater for irrigation through the dry summers, though school grounds may not require irrigation during summer months. High efficiency irrigation technologies such as micro irrigation, moisture sensors, and weather-data based controllers save water by reducing evaporation losses or operating only when needed. However, these systems require careful design, as well as additional operations and maintenance requirements. For example, some drip irrigation systems may be more vulnerable to vandalism; moisture sensors must be carefully placed to represent the soil type and exposure of individual irrigation zones accurately; and timers and controls, if not weather-data based, need to be adjusted seasonally.

**Resources**


EPA Water Sense, Landscape Irrigation Services, [http://www.epa.gov/watersense/pp/irrprof.htm](http://www.epa.gov/watersense/pp/irrprof.htm)

Local water utility staff, water efficient landscape consultants, Certified Irrigation Designers ([http://www.irrigation.org/](http://www.irrigation.org/)), and Master Gardeners would also be good resources for helping achieve this credit.


Using rainwater and gray water, American Rainwater Catchment Systems Association, [http://www.arcsa.org](http://www.arcsa.org)
W1.2: Control Irrigation Water Use

<table>
<thead>
<tr>
<th>1 point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan for and control irrigation water use to water based on actual need. Options include: Create a schedule for the irrigation controller based on historical rates of rainfall and evapotranspiration, combined with watering requirements for the different planting zones (shrub and tree vs. lawn) and soil types, or install sensor-based controllers.</td>
</tr>
</tbody>
</table>

Irrigation design takes the following into consideration: DU - Distribution uniformity; root zone depth of plants; intake rate and water holding capacity of soils; precipitation rates of emitters, sprays or rotors; efficiency of irrigation system; soil characteristics, including the percentages of sand, loam and clay - and depth of soil, combined with the percentage of volume of organics, and the hydraulic conductivity of the soil; plant types (lawn vs ornamental); slopes of planting beds or lawn areas; rainfall patterns; climate factors; and evapotranspiration.

To properly manage water usage a seasonally dependent time factor also needs to be managed - namely when the system is on or off, and how much, how often, and when irrigation water needs to be delivered during different periods of the year. The management of this time sequence is done by setting the irrigation controller's schedule for the months of operation relative to the factors listed above. Commonly, the establishment and implementation of such a schedule for each site can realize upwards of 40% savings. All automatic irrigation systems have an irrigation controller. This credit requires that detailed calculations are made and input into the controller.

Using the formulas as provided by the Irrigation Association or others calculate the yearly schedule for the irrigation controller. Establish the date at which the irrigation system is turned on and turned off, and determine the appropriate schedule for irrigation during the watering system for a minimum of four different watering programs.

Controllers should provide at least four separate programs in order to establish a minimum of four separate periods during the watering season. For example, in Puget Sound Lowlands, calculate the appropriate schedule for a monthly grouping of April, May, and June as one period, July and August as a second, September and October as a third, and the period that the system is off as a fourth. Input the soil, plant, and climate characteristics, especially the evapotranspiration rates for each of the program periods, as outlined in the Irrigation Association's Landscape Irrigation Scheduling and Water Management, March 2005.

Resources


W1.3: Irrigation Systems Testing and Training

1 point

Create an irrigation commissioning plan (also known as a water audit plan) for any landscape irrigation or recreational field irrigation, followed by installation review during construction, performance testing after installation, and documentation for ongoing operations and maintenance.

Verify that the irrigation systems and controls are operating as intended and that effective training has been provided.

Commissioning is a rigorous quality assurance process administered by a knowledgable party that ensures the irrigation systems perform as expected. Irrigation system commissioning can help to ensure that water efficiency measures are working properly and design water savings are achieved.

Create an Irrigation Commissioning Plan for both ornamental landscape and recreational areas. The plan shall be prepared by the installing contractor, landscape architect/designer of record, or school district’s agent during design, followed by:

- Review of installation during construction, with record of deficiencies found and corrected, plus
- Performance testing and documentation of results (as compared to specified performance) at least once during the first year of installation, and
- Creation and distribution of site-specific documentation for ongoing operation and maintenance information, including recommended irrigation and maintenance schedules.
- Acceptance testing shall be performed on the following, if applicable:
  - Irrigation pipes and connections.
  - Irrigation heads and coverage.
  - Back-flow devices.
  - Coverage of irrigation.
  - Automatic sensors, timers, and other controls.

For equipment not listed above, the design team shall provide acceptable test results and the contractor shall certify that the tests were performed and the equipment performs as specified.

Coverage of irrigation should be tested, keeping in mind the precipitation requirements for each plant zone. For example, a zone with drought tolerant plants may need less than one inch of water per week; other zones may need more than one inch of water per week.
Indoor Systems

**Purpose**: Maximize water efficiency within buildings to reduce the burden on municipal water supply and wastewater systems.

**W2.1: Potable Water Use Reduction for Sewage Conveyance**

<table>
<thead>
<tr>
<th>25% = 1 point</th>
<th>45% = 2 points</th>
</tr>
</thead>
</table>
| Reduce the use of municipally provided potable water for building sewage conveyance by a minimum of **25%** (1 point) or **45%** (2 points) beyond the baseline calculated for the building (*not including irrigation*) after meeting the **Energy Policy Act of 2005** fixture performance requirements.

Well designed, water efficient systems can earn points by reducing the amount of potable water used for sewage conveyance.

Use water-efficient fixtures and/or municipally supplied reclaimed water or rainwater supplementation to reduce the amount of potable water used for sewage conveyance. **Only those fixtures that convey sewage, such as toilets and urinals, are included in this credit.** The use of reclaimed water for flushing toilets and urinals automatically qualifies the project for this point because it results in a **100% reduction in the use of municipally provided potable water for this purpose.**

Calculate and compare the baseline and design water uses as described below. To qualify for the credit, the calculated design water use must be at least **25% less than the baseline.**

**EXAMPLE**: A water-efficient design for a 1,000-student school.

**Baseline Water Use.** For baseline calculations, assume flow rates outlined by the Energy Policy Act of 2005 and UPC 2006 fixture performance requirements:

<table>
<thead>
<tr>
<th>Fixture</th>
<th>EPA Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toilets</td>
<td>1.6 gal/flush</td>
</tr>
<tr>
<td>Urinals</td>
<td>1.0 gal/flush</td>
</tr>
<tr>
<td>Showerheads</td>
<td>0.5 gal/min</td>
</tr>
<tr>
<td>Public Lavatory</td>
<td></td>
</tr>
<tr>
<td>Faucets</td>
<td>2.5 gal/min</td>
</tr>
<tr>
<td>Kitchen and Janitor</td>
<td>2.2 gal/min</td>
</tr>
<tr>
<td>Sink Faucets</td>
<td></td>
</tr>
<tr>
<td>Metering Faucets</td>
<td>0.25 gal/cycle</td>
</tr>
</tbody>
</table>

**To calculate the baseline water use:**

1. Calculate Daily Water Use per fixture based on occupancy and estimated frequency of use:
   
   Daily Water Use = (Flow-rate) (Duration) (Occupants) (Daily Uses)

2. Sum Daily Water Volumes for each fixture to find Total Daily Volume.

3. Multiply the Total Daily Volume by the number of school days for Total Annual Volume.
EXAMPLE:

<table>
<thead>
<tr>
<th>Fixture Type</th>
<th>Flow-rate</th>
<th>Occupants</th>
<th>Daily uses</th>
<th>Water use (gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Toilet (male)</td>
<td>1.6 gal/flush</td>
<td>500</td>
<td>1</td>
<td>800</td>
</tr>
<tr>
<td>Conventional Urinal (male)</td>
<td>1.0 gal/flush</td>
<td>500</td>
<td>2</td>
<td>1000</td>
</tr>
<tr>
<td>Conventional Toilet (female)</td>
<td>1.6 gal/flush</td>
<td>500</td>
<td>3</td>
<td>2400</td>
</tr>
</tbody>
</table>

Total Daily Volume: 4200
Number of School Days: 180
Baseline Total Annual Volume: 756,000

Design Water Use (Efficient Fixtures). Now assume the design case is based on the use of extra-efficient fixtures. In this case:

<table>
<thead>
<tr>
<th>Fixture Type</th>
<th>Flow-rate</th>
<th>Occupants</th>
<th>Daily Uses</th>
<th>Water Use (gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Flow Toilet (male)</td>
<td>1.28 gal/flush</td>
<td>500</td>
<td>1</td>
<td>640</td>
</tr>
<tr>
<td>Low Flow Urinal (male)</td>
<td>0.5 gal/flush</td>
<td>500</td>
<td>2</td>
<td>500</td>
</tr>
<tr>
<td>Low Flow Toilet (female)</td>
<td>1.28 gal/flush</td>
<td>500</td>
<td>3</td>
<td>1,920</td>
</tr>
</tbody>
</table>

Total Daily Volume: 2500
Number of School Days: 180
Design Total Annual Volume: 550,800

Comparing the two calculations, the water-efficient fixtures reduced potable water use for sewage conveyance by:

\[
\text{\% Savings} = 1 - \left( \frac{\text{Design Total Annual Volume}}{\text{Baseline Total Annual Volume}} \right) = 1 - \left( \frac{550,800}{756,000} \right) = 0.271 = 27\%
\]

Therefore, this design would earn one point because potable water used for sewage conveyance has been reduced over 25% through the use of extra-efficient toilets and urinals.

Design Water Use (Fixtures & Reclaimed or Rainwater Supplementation). Now assume the design case is based on the use of low flow urinals and the use of 166,000 gallons per year of reclaimed water or captured rain water. In this case:

<table>
<thead>
<tr>
<th>Fixture Type</th>
<th>Flow-rate</th>
<th>Occupants</th>
<th>Daily Uses</th>
<th>Water Use (gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Flow Toilet (male)</td>
<td>1.28 gal/flush</td>
<td>500</td>
<td>1</td>
<td>640</td>
</tr>
<tr>
<td>Ultra-Low Flow Urinal (male)</td>
<td>0.125 gal/flush</td>
<td>500</td>
<td>2</td>
<td>125</td>
</tr>
<tr>
<td>Low Flow Toilet (female)</td>
<td>1.28 gal/flush</td>
<td>500</td>
<td>3</td>
<td>1,920</td>
</tr>
</tbody>
</table>

Total Daily Volume: 2,685
Number of School Days: 180
Design Total Annual Volume: 483,300

Supplemental Non-Potable Water Use: 166,000

\[
\text{Total Supplementary Potable Water Use} = 371,300
\]

Comparing the two calculations, the water-efficient fixtures reduced potable water use for sewage conveyance by:

\[
\text{\% Savings} = 1 - \left( \frac{\text{Design Total Annual Volume}}{\text{Baseline Total Annual Volume}} \right) = 1 - \left( \frac{371,300}{756,000} \right) = 0.0509 = 51\%
\]

Therefore, this design would earn two points because potable water used for sewage conveyance has been reduced over 45% through the use of waterless urinals and supplemental non-potable water for toilet flushing.
Develop a water-use baseline including all water consuming fixtures, equipment, and seasonal conditions according to methodology outlined below. Specify water conserving plumbing fixtures that exceed the Energy Policy Act of 2005 fixture requirements in combination with ultra high efficiency or dry fixture and control technologies. Specify high water-efficiency equipment and appliances (dishwashers, laundry, cooling towers).

Because water-efficient devices can vary in quality and performance, specify only durable, high performance fixtures. Design and maintenance issues will be different with low flow toilets compared to toilets with higher flow.

These credits award reductions in total water use, therefore all water-consuming fixture uses are included in the calculations. To quantify water use reductions, calculate and compare baseline and design water uses. List each water-using appliance or fixture, the amount of daily uses, number of occupants, and calculate the total water use. Any reclaimed water used for sewage conveyance is subtracted from the total amount of water used.

A water-efficient design for the school in the previous example is shown below.

<table>
<thead>
<tr>
<th>Fixture Type</th>
<th>Flow-rate</th>
<th>Duration</th>
<th>Automatic Controls</th>
<th>Occupants</th>
<th>Daily uses</th>
<th>Water use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Flow Toilet (male)</td>
<td>1.28 gal/flush</td>
<td>1 flush</td>
<td>-</td>
<td>500</td>
<td>1</td>
<td>640</td>
</tr>
<tr>
<td>Ultra-Low Flow Urinal (male)</td>
<td>0.125 gal/flush</td>
<td>1 flush</td>
<td>-</td>
<td>500</td>
<td>2</td>
<td>125</td>
</tr>
<tr>
<td>Low Flow Toilet (female)</td>
<td>1.28 gal/flush</td>
<td>1 flush</td>
<td>-</td>
<td>500</td>
<td>3</td>
<td>1,920</td>
</tr>
<tr>
<td>Bathroom Sink</td>
<td>2.5 gal/min</td>
<td>0.25 min</td>
<td>20% saved</td>
<td>1000</td>
<td>3</td>
<td>1,500</td>
</tr>
<tr>
<td>Low Flow Shower</td>
<td>1.8 gal/min</td>
<td>5 min</td>
<td>-</td>
<td>100</td>
<td>1</td>
<td>900</td>
</tr>
<tr>
<td>Low Flow Kitchen Sink</td>
<td>1.8 gal/min</td>
<td>45 min</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>324</td>
</tr>
<tr>
<td>Efficient Washing Machine</td>
<td>20 gal/load</td>
<td>1 load</td>
<td>-</td>
<td>10</td>
<td></td>
<td>200</td>
</tr>
</tbody>
</table>

Total Daily Volume
Number of School Days 180
Subtotal 1,009,620
For the baseline calculation, create a similar spreadsheet but change only the type of fixture and its associated design details. The baseline calculation for this example would therefore be:

<table>
<thead>
<tr>
<th>Fixture Type</th>
<th>Flow-rate</th>
<th>Duration</th>
<th>Automatic Controls</th>
<th>Occupants</th>
<th>Daily uses</th>
<th>Water use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional Toilet (male)</td>
<td>1.6 gal/lflsh</td>
<td>1 flush</td>
<td>-</td>
<td>500</td>
<td>1</td>
<td>800</td>
</tr>
<tr>
<td>Conventional Urinal (male)</td>
<td>1.0 gal/lflsh</td>
<td>1 flush</td>
<td>-</td>
<td>500</td>
<td>2</td>
<td>1000</td>
</tr>
<tr>
<td>Conventional Toilet (female)</td>
<td>1.6 gal/lflsh</td>
<td>1 flush</td>
<td>-</td>
<td>500</td>
<td>3</td>
<td>2400</td>
</tr>
<tr>
<td>Bathroom Sink</td>
<td>2.5 gal/min</td>
<td>0.25 min</td>
<td>-</td>
<td>1000</td>
<td>3</td>
<td>1875</td>
</tr>
<tr>
<td>Conventional Shower</td>
<td>2.5 gal/min</td>
<td>5 min</td>
<td>-</td>
<td>100</td>
<td>1</td>
<td>1250</td>
</tr>
<tr>
<td>Kitchen Sink</td>
<td>2.5 gal/min</td>
<td>45 min</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>450</td>
</tr>
<tr>
<td>Clothes Washer</td>
<td>40 gal/load</td>
<td>1 load</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>400</td>
</tr>
<tr>
<td><strong>Total Daily Volume</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8175</td>
</tr>
<tr>
<td><strong>Number of School Days</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>180</td>
</tr>
<tr>
<td><strong>Baseline Total Annual Volume</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>1,471,500</strong></td>
</tr>
</tbody>
</table>

Comparing the two spreadsheets, the water-efficient fixtures reduced potable water use by:

\[
\text{% Savings} = 1 - \frac{\text{Design Total Annual Volume}}{\text{Baseline Total Annual Volume}}
\]

\[
= 1 - \frac{1,009,620}{1,471,500} = 31\%
\]

Therefore, this design would earn two points because total potable water use has been reduced by over 30%.

Additional potable water-saving measures may also be included in a similar manner; for example, geo-exchange water source heat pumps. A common HVAC system for schools is a water source heat pump. The system consists of compressorized heat pumps, boilers, and cooling towers. The cooling towers traditionally use large amounts of potable water as make-up water for the evaporation process. Using a subset of this technology (such as earth-coupled, lake-coupled, or aquifer-coupled) replaces the cooling tower with a geo-heat exchanger. If this alternate technology is employed, the traditional water use of a cooling tower would be modeled and included as part of the baseline. This kind of closed loop system has other benefits such as lower maintenance and reduced chemical use and discharge into the sanitary sewer system.

Provide training for maintenance and operations staff since best practices are critical to saving water with low flow devices.

Rainwater harvesting presents some challenges on large scale systems. The use of water, even before it enters a stream system, is governed under Water Rights law. Check with your local jurisdiction and Department of Ecology to ascertain any legal issues associated with rainwater harvest at your site.

**Resources**


MATERIALS

Waste Reduction and Efficient Material Use

Purpose: Reduce the amount of construction and occupant waste entering the landfill and promote the efficient reuse of materials and buildings.

M1.0: Storage and Collection of Recyclables

<table>
<thead>
<tr>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>The building/school shall meet local ordinance requirements for recycling space; AND provide an easily accessible area serving the entire school that is dedicated to the separation, collection, and storage of materials for recycling including—at a minimum—paper, cardboard, glass, plastics, and metals. AND Meet local ordinance requirements for managing construction and demolition materials at construction sites.</td>
</tr>
</tbody>
</table>

In Washington, some local municipalities have ordinances requiring areas for collection and loading of recyclable materials in development projects. Areas without local ordinances should refer to the Resource Venture’s Designing for Occupant Recycling Guide, http://www.resourceventure.org/green-your-business/green-building which is based on the City of Seattle’s ordinance.

Reserve space for recycling functions early in the building occupancy programming process and show areas dedicated to the collection of recycled materials on space utilization plans.

Plan for adequate and accessible space indoors for deposit of recyclable materials by building occupants. Collection bins should accommodate a 75% diversion rate and be easily accessible to custodial staff and recycling collection workers. Consider bin designs that allow for easy cleaning to avoid health concerns. Ensure that the spaces are compatible with the policies of local waste handling companies. Control odors by separately venting these areas. Waste materials should not be located near the ventilation air intake.

Schools are encouraged to go beyond the minimum and design for collection and storage of newspaper, organic waste (food and soiled paper), and dry waste. An innovation credit can be earned for designing a food waste minimization and diversion program. Organic materials typically account for 30% of the overall waste stream. Use bins that allow for easy cleaning to avoid health issues. Bins for organic materials that have storage seals help reduce vermin and odors.

Resources


M1.1: Construction Site Waste Management

<table>
<thead>
<tr>
<th>50% = 1 point</th>
<th>75% = 2 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop and implement a waste management plan, quantifying material diversion by weight to: recycle, compost, and/or salvage at least 50% (or 75%) by weight of construction and demolition waste.</td>
<td></td>
</tr>
</tbody>
</table>

Develop and specify a waste management plan that identifies licensed haulers and processors of recyclables; identifies markets for salvaged materials; employs deconstruction, salvage, and recycling strategies and processes; includes waste auditing; and documents the cost for recycling, salvaging, and reusing materials. Source reduction on the job site should be an integral part of the plan.

The plan should address recycling of corrugated cardboard, metals, concrete, brick, asphalt, land clearing debris *(if applicable)*, beverage containers, clean dimensional wood, plastic, glass, gypsum board, and carpet. It must also evaluate the availability and cost-effectiveness of recycling rigid insulation, engineered wood products, and other materials.

Compliance calculations for this credit must be based on weight. Many recycling and landfill facilities weigh incoming materials. Shipments that cannot be weighed can be estimated based on their volume and density. Land-clearing debris that is composted or recycled as mulch on-site may be counted, using volume and density estimates as well. Burning is not allowed.

Recycle Rate (%) = \[
\frac{\text{Recycled Waste [Tons]}}{\text{Recycled Waste [Tons] + Garbage [Tons]}} \times 100
\]

**Resources**

http://www.resourceventure.org/green-your-business/green-building/green-building

King County *Green Tools Program* Construction Recycling web page:  
http://your.kingcounty.gov/solidwaste/greenbuilding/index.asp

Department of General Administration, *Construction Waste Management Guidelines*,  
http://www.ga.wa.gov/EAS/cwm/guideline.html

Department of Ecology’s Demolition Debris web page provides info on how to dispose of hazardous and solid demolition waste.  
# M1.2: Building Reuse – Structure and Shell

| 50% = 1 point | Maintain a minimum of 50%, (or 75% or 95%) of existing building structure and shell (exterior skin and framing, excluding window assemblies). |
| 75% = 2 points | |
| 95% = 3 points | |

Reusing parts of the building can save significant money and resources, while greatly reducing the amount of construction waste. When materials are reused, the environmental benefits start with resource savings and extend down through the entire lifecycle of the material: less energy is spent extracting, processing, and shipping the materials to the site. Depending on the amount of building reused, school districts can significantly reduce their construction and material costs. However, the building envelope will significantly affect many important high performance areas, such as space programming, energy performance, opportunities for daylighting, and indoor air quality. In addition, care must be taken to ensure that any environmental hazards such as toxins, lead, and asbestos have been identified and addressed. Develop a list of benefits and tradeoffs, and make the decision based upon the overall, integrated design tradeoffs.

Calculating the percent of building reused is a three-step process.

**Step 1.** Approximate total structural materials and reused structural materials (foundation, slab on grade, beams, floor and roof decks, etc) in terms of cubic feet. Divide the reused structural materials (cf), by the total structural materials (cf), to get the percent of structural materials that are reused.

**Step 2.** Approximate total shell materials and reused shell materials (roof and exterior walls) in terms of square feet. Divide the reused shell materials (sf), by the total shell materials (sf), to get the percent of shell materials that are reused.

**Step 3.** Calculate the approximate building reuse percentage by adding together the structural and shell reuse percentages from Step 1 and Step 2 and dividing the sum by two.

$$\text{Building Reuse (%)} = \frac{\text{Structural Materials Reused [%] from Step 1} + \text{Shell Materials Reused [%] from Step 2}}{2}$$

Here is a look at the whole calculation.

$$\text{Building Reuse (%)} = \frac{\frac{\text{Reused Structural Materials [cf]}}{\text{Total Structural Materials [cf]}} + \frac{\text{Reused Shell Materials [ft}^2]\text{]}{\text{Total Shell Materials [ft}^2]\text{]}}}{2}$$

**Resources**


M1.3: Building Reuse – Interior Non-Structural Elements

1 point

| Reuse at least 50% of non-shell (walls, floor coverings, and ceiling systems) materials. |

Percentage of reused, non-shell building portions will be calculated as the total area (sf) of reused walls, floor covering, and ceiling systems, divided by the existing total area (sf) of walls, floor covering, and ceiling systems.

Non-shell Reuse (%) = \frac{\text{Total Reused non-shell elements (sf) (walls, floors, ceiling)}}{\text{Total Existing area (sf) (walls, floors, ceiling)}}

This credit does not include salvaged materials from offsite.

Keep demolition plans and calculations that were used in the determination.

Resources

Building Material Reuse Association has information about reuse and deconstruction, http://www.bmra.org/about-bmra and a Washington State directory of reuse companies,
M1.4: Materials Reuse

<table>
<thead>
<tr>
<th>1 point:</th>
<th>2 points:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5% or 10% Prescriptive approach #1</td>
<td>Prescriptive approach #2</td>
</tr>
<tr>
<td>Install salvaged or refurbished materials using either a percentage approach or prescriptive approach for one or two points.</td>
<td>Install salvaged or refurbished materials for 5% (or 10%) of building materials.</td>
</tr>
</tbody>
</table>

**Performance Approach (1):** Install salvaged or refurbished materials obtained from off-site for 5% of building materials.

OR

**Prescriptive Approach (1):** Specify salvaged or refurbished materials for 25% of one of the following major interior finish materials:

- Flooring (sf)
- Casework (sf)
- Acoustical ceiling tile (sf)
- Wall coverings (sf)
- Tile (sf)

**Performance Approach (2):** Install salvaged or refurbished materials for 5% (or 10%) of building materials.

OR

**Prescriptive Approach (2):** Specify salvaged or refurbished materials obtained off-site for 50% of one (or 25% of two) of the following major interior finish materials:

- Flooring (sf)
- Casework (sf)
- Acoustical ceiling tile (sf)
- Wall coverings (sf)
- Tile (sf)

This credit only includes materials which are salvaged from off-site.

For materials salvaged within the construction site, refer to credit M1.3 Building Reuse – Interior Non-Structural.

Calculate percentages for these credits using total and salvaged materials costs. Exclude all labor costs, all mechanical and electrical material costs, and project overhead and fees. If the cost of the salvaged or refurbished material is below market value, use replacement cost to estimate the material value; otherwise, use actual cost to the project.

Re-used materials or products are salvaged from a previous use or application and then used in a new use or application with only minor modification, finishing, or repair. Commonly salvaged building materials include wood flooring/paneling/cabinets, doors and frames, mantels, ironwork and decorative lighting fixtures, brick, masonry, heavy timbers, and on-site concrete used as aggregate. Ensure the salvaged materials, especially structural elements, comply with all applicable codes.

Calculate percentages using materials costs, as illustrated below:

\[
\text{Salvaged Rate} \[\%\] = \frac{\text{Salvaged Material Cost} \[\$\]}{\text{Total Material Cost} \[\$\]} \times 100
\]
M1.5: Resource Reuse - Furniture

1 point

Install salvaged, refurbished, or used furniture and equipment for at least 30% of total furniture and equipment budget.

In order to reduce the demand for virgin materials and reduce waste, and the associated impacts of harvesting, processing, and manufacturing new materials, purchase used and refurbished furniture and equipment. Furniture and equipment would include items like case pieces, desks and chairs, tables, filing systems, decorative lighting and accessories, as well as computers, printers, copiers, fax machines, and other electrical equipment common in schools.

As above, calculate percentages using materials costs:

\[
\text{Salvaged F&E Rate [\%]} = \frac{\text{Salvaged Furniture and Equipment Cost} \times 100}{\text{Total Furniture and Equipment Cost}}
\]
Sustainable Materials Procurement

**Purpose:** Increase demand for building products that have incorporated recycled content material, reducing the impacts resulting from extraction of new material; reduce the use and depletion of finite raw and long-cycle renewable materials by replacing them with rapidly renewable materials; encourage environmentally-responsible forest management; and avoid materials that accumulate in the atmosphere.

### M2.1: Recycled Content

<table>
<thead>
<tr>
<th>Recycled Content Percentage</th>
<th>Performance Approach</th>
<th>Prescriptive Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>10% = 1 point</td>
<td>Use materials with recycled content such that the sum of post-consumer recycled content plus one-half of the post-industrial (pre-consumer) content constitutes at least 10% (or 20%) of the total value of the materials in the project.</td>
<td></td>
</tr>
<tr>
<td>20% = 2 points</td>
<td>OR</td>
<td>Install at least four (or 8) major materials from the Construction Products category of the <em>EPA Comprehensive Procurement Guidelines 2007 Buy-Recycled Series</em>. For the higher threshold, at least six of the 8 building materials must be from the Construction Products Category.</td>
</tr>
<tr>
<td>4 materials = 1 point</td>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>8 materials = 2 points</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The number and variety of products using recycled content materials expands every year. Using these materials closes the recycling loop by creating markets for materials collected through recycling programs across the country. It also reduces the use of virgin materials and landfill waste. Recycled-content alternatives exist for all major building materials and surfaces.

Recycled content is classified as either post-consumer (collected from end users) or post-industrial. Post-industrial (also known as pre-consumer) is collected from manufacturers and industry. The objective is to maximize post-consumer recycled content.

Fly ash generated from municipal solid waste incinerator or as a coal-combustion by-product from hazardous or medical waste or tire-derived fuel is not acceptable.

Recycled content materials shall be defined in accordance with the Federal Trade Commission document, *Guides for the Use of Environmental Marketing Claims*, 16 CFR 260.7 (e).

The US EPA’s Comprehensive Procurement Guidelines program provides fact sheets for various product categories as well as a list of materials with recommended recycled content levels.
**PERFORMANCE APPROACH**

The total recycled content value is calculated in five steps. Mechanical and electrical components shall not be included in these calculations.

**Step 1.** For each material, identify the percentage of post-consumer recycled content (by weight), the percentage of post-industrial recycled content (by weight), and the material cost.

**Step 2.** For each material, use info from Step 1 to calculate the Post Consumer Recycled Content Value, as shown below

\[
\text{Post Consumer Recycled Content Value} [\$] = \text{Material Cost} [\$] \times \text{Post Consumer Recycled Content} [%]
\]

**Step 3.** For each material, use info from Step 1 to calculate the Post Industrial Recycled Content Value, as shown below

\[
\text{Post Industrial Recycled Content Value} [\$] = \text{Material Cost} [\$] \times \text{Post Industrial Recycled Content} [%]
\]

**Step 4.** Sum the total value of all materials.

**Step 5.** Calculate Recycled Content Percentage for this Credit, which equals the combined value of post consumer recycled content (from Step 2) plus one-half of post industrial recycled content (from Step 3) as a percentage of total value of all materials, as shown below.

\[
\text{Recycled Content Percentage for this Credit} \% = \frac{\text{Total Post Consumer Recycled Content Value} [\$] + \left(\frac{1}{2}\right) \text{Post Industrial Recycled Content Value} [\$]}{\text{Total Project Material Cost} [\$]} \times 100
\]

Earn 1 point if: Recycled Content Percentage for this Credit (%) = 10% or more

Earn an additional 1 point if: Recycled Content Percentage for this Credit (%) = 20% or more

**PRESCRIPTIVE APPROACH**

Install at least four major materials from the Construction Products category of the EPA Comprehensive Procurement Guidelines 2007 Buy-Recycled Series. A “major” material is defined as those materials covering more than 50% of a major building surface (such as parking areas, floor, roof, partitions, walls), or serving a structural function throughout the majority of the building. For the purposes of these prescriptive points, nylon carpeting with at least 50% recycled-content materials can be used in addition to the carpet with recycled polyester (PET resin) materials listed on the EPA’s site. (Some PET carpets are not sufficiently durable for school applications.)

For the additional point, eight major materials must be installed from the EPA’s Comprehensive Procurement Guidelines, and at least six must be from the construction products category.

**Resources**


M2.2: Rapidly Renewable Materials

1 point

Install rapidly renewable building materials for 5% of the total value for all building materials.

OR

Prescriptive approach: Specify rapidly renewable materials for 50% of one of the following major interior finish or structural materials:

- Flooring, casework, acoustical ceiling tile, wall covering, tile, exterior walls, and roof.

A product must contain 25% rapidly renewable raw materials based on weight.

Rapidly renewable resources are those materials that substantially replenish themselves faster than traditional demand (*planted and harvested in less than a 10-year cycle*). Products in this category include, but are not limited to, bamboo, wheat grass cabinetry, and other wood products made from fast-growing trees such as poplar and Monterey pine, and linoleum made from linseed oil. Ensure that the products are low emitting and are durable.

To earn this credit, determine the percentage of total building materials from rapidly renewable sources. Exclude all labor costs, all mechanical and electrical material costs, and project overhead and fees.

\[
\text{Rapidly Renewable Material} \, [%] = \frac{\text{Rapidly Renewable material cost} \, [\$]}{\text{Total material cost} \, [\$]} \times 100
\]
## M2.3: Certified Wood

<table>
<thead>
<tr>
<th>50% = 1 point</th>
<th>At least <strong>50% of the cost</strong> of wood-based materials and products are from a sustainable forest certified by a third party. One additional point is available if all of the certified wood also has chain-of-custody tracking.</th>
</tr>
</thead>
</table>

Certified wood is available for a variety of applications including framing and interior finishes (ceilings, casework, millwork, and flooring).

Compliance for this credit is based on cost of the certified wood as a percentage of total wood-based products. The following equation can be used to determine point level.

\[
\text{Certified Wood Portion [\%]} = \frac{\text{Certified wood cost}[\$]}{\text{Total wood-based cost}[\$]} \times 100
\]

Wood-based products include all wood consumed by the overall project including, but not limited to: casework, formwork, shoring, structural framing and general dimensional framing, flooring, finishes, furnishings, and non-rented temporary pedestrian barriers used in construction.


There are three main sustainable forestry management systems in North America:

**The Forest Stewardship Council (FSC)** international system provides standards for the sustainable growth and harvest, and provides a chain-of-custody process for certified wood products that tracks the wood from harvesting, through milling, distribution, and retail. The sustainable forests in the FSC system are certified by a third party.

**The Sustainable Forestry Initiative (SFI)** is required for all American Forest & Paper Association (AF&PA) members. Verification of conformance with SFI program requirements is first, second, or third party audited. However, for certification and to claim this point, third party auditing is required to ensure conformance with the SFI Standard. SFI program participants who have successfully completed independent third party certification to the SFI Standard may also choose to have their facilities certified for chain-of-custody.

**The Canadian Standards Association (CSA)** is an independent non-profit organization accredited by the Standards Council of Canada. CSA is primarily focused on Canadian forests. Third-party certification is required. Chain of custody is available.

American Tree Farm System is a program of the American Forest Foundation, and is primarily focused on non-industrial forests in the US. Third-party certification is required. Chain of custody is available on a limited scale. [http://www.treefarmsystem.org/](http://www.treefarmsystem.org/) Another certification program is the PEFC – Programme for the Endorsement of Forest Certification Schemes PEFC: [http://www.pefc.org/index.php](http://www.pefc.org/index.php)

Forests regulated under chapter 76.09 RCW, the Washington forest practices act, will also be recognized as complying.

### Resources

The Forest Certification Resource Center is not currently maintaining a database of forests and products; however, other search engines may be available. [http://www.metafore.org/index.php?p=Forest_Certification_Resource_Center&s=147](http://www.metafore.org/index.php?p=Forest_Certification_Resource_Center&s=147)
**M2.4: Environmentally Preferable Products**

This point is an alternative approach for carpet and resilient flooring. If claiming points under M2.4, you may not use claim points under M1.4 and M2.1 – M2.3. This environmentally preferable products alternative offers points for specifying and installing building products that are certified under applicable Environmentally Preferable Products (EPP) certification programs.

<table>
<thead>
<tr>
<th>Minimum requirement for M2.4 points.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prerequisite: Interior finish materials must meet IEQ3.1: Low Emitting Materials requirements to attain points under this credit. Salvaged materials are excluded.</td>
</tr>
</tbody>
</table>

Earn one point (with a maximum of two) for each major product that is certified as an Environmentally Preferable Product (EPP) under nationally recognized certification programs (see below)

**OR**

Earn one point (with a maximum of two) for each major product that is certified by one of the following multi-attribute standards:

- NSF/ANSI 140 Platinum for Carpet
- NSF/ANSI 332 for Resilient Flooring

As of June 2008 ANSI / NSF 140 and 332 are the only EPP standards developed in the construction industry through multi-stakeholder review with a consensus based process.

Environmentally Preferable Product (EPP) is defined in accordance with ASTM as a “material, component, system, or service that has measurable and statistically significant, positive, or reduced negative environmental impacts when compared with other material(s), component(s), and system or service(s) that serve similar purpose(s).”

The building materials that earn points under this credit must be certified as an Environmentally Preferable Product under one of the EPP certification programs. A total of two points shall be achieved when at least two major building materials are specified and installed that have been certified as an Environmentally Preferable Product. A “major” material is defined as those building products covering more than 50% of a building surface (such as flooring, roofing, walls, ceiling, parking areas), or serving a structural function throughout the majority of the building.

**Resources**


M2.5: Regional/Local Materials

<table>
<thead>
<tr>
<th>20% Manufactured</th>
<th>1 point</th>
</tr>
</thead>
<tbody>
<tr>
<td>20% Manufactured and extracted, etc.</td>
<td>2 points</td>
</tr>
</tbody>
</table>

For one point, 20% of the building materials that are installed are manufactured within a 500-mile radius of the site.

Add a point if the same materials are also extracted, harvested, or recovered from within a 500-mile radius of the site.

Regional and locally produced materials support the local economy while helping to reduce resource and energy consumption by minimizing transportation distances.

Buying regional/local materials is only one aspect of sustainable purchasing. Some materials may be local, but are not chosen because more distant products have higher recycled content, longer lifespan, or lower costs. It will be up to the team to determine the project’s priorities.

Base percentage calculations in terms of dollar value:

\[
\text{Regional Material Portion [%]} = \left( \frac{\text{Regional material cost} \times 100}{\text{Total material cost}} \right)
\]

The location of manufacturer refers to the final assembly of components into the building product that is furnished and installed.

Resources

Northwest Builders Network Directory of NW Building Supply Manufacturers.  
http://www.nwbuildnet.com/stores/
ENERGY Efficiency

Purpose: To reduce the amount of energy used to operate the building through better building design and more efficient equipment. Reducing the building load both reduces the associated costs and environmental impacts of using non-renewable energy sources.

**ENERGY-EFFICIENCY**

E1.0: Minimum Energy Performance

| Required | The school design must meet the currently adopted edition of the Washington State Non-Residential Energy Code (NREC) efficiency standards. |

* * * * Use the edition of NREC that is in effect. As of October 2010, the 2009 NREC has been adopted by some jurisdictions already. Use of the 2006 or 2009 NREC will determine the point scales for E1.1 and E2.2 * * * *

Energy-efficient schools save money while conserving non-renewable energy resources and reducing atmospheric emissions of pollutants and greenhouse gases. The Washington State Non-Residential Energy Code (NREC) has been a major factor in advancing energy efficiency in schools. Support for the NREC is provided by the Northwest Energy Efficiency Council (NEEC).

While the NREC is considered an aggressive baseline for energy efficient construction practices, there are numerous cost-effective, practical, and straightforward measures that can reduce energy use by 10-20% from the NREC. Please refer to E1.1 for some strategies to achieve this.

Regardless whether you are meeting the code or going beyond the code, it will be important to ensure that the energy efficiency designed in is actually achieved in practice. Commissioning, maintenance and training are vitally important to the performance of the school and its systems. Commissioning ensures that operability and maintenance are considered in the design of the building, and after construction, systems operate to their design intent. Once built, no building can perform optimally without maintenance. In addition, training is critically important to ensure that teachers and facilities staff understand how to operate and maintain building systems. When turnover occurs, appropriate documentation must be on hand to ensure that new staff is properly trained.

Resources


E1.1a Superior Energy Performance: 2009 NREC

Reduce the source energy of the proposed design to be below what is required by the current Non-Residential Energy Code (NREC) by increasing energy efficiency through the integrated design of system components.

If the 2009 NREC applies: Achieve between a 10% - 44% reduction in total net energy use compared to NREC baseline, for up to 20 points.

There is a difference in amount of points and point scale between the two editions of the code. The 2009 code is harder to achieve, therefore more points are allowed for reducing usage beyond the code.

E1.1b Superior Energy Performance: 2006 NREC

Reduce the source energy of the proposed design to be below what is required by the current Non-Residential Energy Code (NREC) by increasing energy efficiency through the integrated design of system components.

If the 2006 NREC applies: Achieve between a 10% - 50% reduction in total net energy use compared to NREC baseline, for up to 12 points.

Investments in energy efficiency measures provide good long term value, and net reductions of 10% to 20% are feasible. When energy efficiency goals are established (and followed) in the design process, a wide array of measures can reduce energy use. The amount of energy saved depends on local climate, the quality of the design, whether the interactions between the building systems have been optimized, the extent of commissioning, and the amount of training given to teachers and facilities staff. Consider opportunities throughout the school in the following areas:

Daylighting: Optimize daylighting to reduce reliance on electric lighting during daylight hours. Use daylighting controls designed to dim or turn off electric lights when sufficient daylight is available. Remember to minimize glare and eliminate direct beam light in the classroom.

HVAC systems: Use high efficiency equipment, correctly sized for the estimated demands of the facility; use economizers and other controls that optimize system performance.

Electric lighting: Use high efficiency products, optimize the number of light fixtures in each room, use occupant sensors and other control devices that ensure peak system performance, successfully integrate electric lighting and daylighting strategies.

Enclosure: Ensure that walls, floors, roofs, and windows of the school are as energy efficient as cost-effectively possible.
Commissioning. Commissioning is increasingly important as more savings are expected through energy conservation measures. Commissioning ensures that operability and maintenance are considered in the design of the building, and after construction, systems operate to their design intent. See Energy Credit 4: Commissioning for more information.

Include additional integrated design measures to increase the energy efficiency of the school. Perform an annual energy analysis comparing a standard design to the proposed design using design criteria and assumptions contained in RS-29 of the Non-Residential Energy Code (NREC). The unit of measure for performance is source energy.

Resources


The Northwest Energy Efficiency Council (NEEC) provides support for Washington's Non-Residential Energy Code, http://www.neec.net/energy-codes, and provides compliance forms

Building Operator Certification, formally recognized by WAMOA, includes facilities' operator training that has been proven to result in energy savings for school districts in the state. More information at www.TheBOC.info
Controls

**Purpose**: To reduce the amount of energy used to operate the building through the use of user-friendly or automatic controls of energy using fixtures and equipment. Reducing the building load both reduces the associated costs and environmental impacts of using non-renewable energy sources. It often also serves an educational function, in that it makes obvious the District's value of energy conservation.

### E2.1: HVAC Controls and Operable Windows

| 1 point | Install controls/devices on HVAC systems that are responsive to operable windows or doors when opened. |

The Protocol recognizes the benefit of providing natural ventilation (IEQ3.7) and user control (IEQ6.1) by providing each classroom with an operable window. However, care must be taken to avoid energy penalties due to exterior windows or doors being opened while HVAC systems are operating. Controls or devices on HVAC systems that respond when operable windows or doors are opened can prevent energy penalties and actually support the energy savings that can occur with a naturally ventilated space.

**Controls should be installed to set back HVAC systems to unoccupied settings when windows and doors are opened for extended periods**. The controls should be set so that normal use of doors does not cause HVAC systems to cycle on and off unnecessarily. The controls should not turn off ventilation fans, but adjust the thermostat settings to unoccupied levels or what is commonly called the “night set-back” when windows and doors are opened. Adequate amounts of ventilation must be supplied to the classroom at all times. Insufficient ventilation can have serious health effects on students, teachers, and other staff members.

Also, see Credit IEQ6.2 (user control of temperature and lighting). Overall system as detailed in this credit may not account for CO₂ sensors that may provide additional energy savings. Design (and energy use calculations) should consider the impact of multiple strategies when proposed.

### Resources

**E2.2: Daylight-Responsive Controls**

**E2.2a Daylight-Responsive Controls: 2009 NREC**

As per the 2009 NREC, in day lit areas, automatic daylight responsive lighting controls shall be installed that automatically reduce electrical lighting power in response to available daylight in a day lit area. Controls must be capable of reducing the light output of controlled luminaries; control only luminaries in the day lighted area; and incorporate time-delay circuits.

**If the 2009 NREC applies:** This is REQUIRED

**E2.2b Daylight-Responsive Controls: 2006 NREC**

In day lit areas, install automatic daylight responsive lighting controls that automatically reduce electrical lighting power in response to available daylight in a day lit area. Controls must be capable of reducing the light output of controlled luminaries; control only luminaries in the day lighted area; and incorporate time-delay circuits.

**If the 2006 NREC applies:** One point is allowed

**NREC = Non-Residential Energy Code**

A combination of dimming ballasts and daylight-sensing automatic controls that is capable of automatically reducing the power of general lighting in the day lit zone continuously to less than 35% of rated power at maximum light output. OR

A combination of multi-level switching and daylight-sensing controls that are capable of reducing the lighting power automatically. If the control is a switching control, it shall provide at least two control channels per zone and be installed in a manner such that at least one control step shall reduce power of general lighting in the day lit zone by 30% to 50% of rated power and another control step shall reduce lighting power by 65% to 100%. This control shall be capable of automatically reducing the general lighting in the day lit area in multiple steps in response to available daylight while maintaining a reasonably uniform and appropriate level of illumination.

The light sensor shall be separate from the location where set-point adjustments are made, and the controls for calibration adjustments to the lighting control device shall be readily accessible to authorized personnel.

**Exceptions:**

- Daylight spaces enclosed by floor to ceiling partitions containing only one luminaire.
- Lighting required by a health or life safety statute, ordinance or regulation, including but not limited to emergency lighting.
- Lighting for steps or stairs that require illumination during daylight hours.
- Lighting for theatrical purposes, including performances, stage, film production and video.

In addition to providing natural illumination, an important aspect of indoor environmental quality, daylighting can be a source of energy savings, potentially reducing the annual lighting budget from 10% to 50%. However, this only occurs when electric lighting is adjusted to account for the illumination daylighting is providing.
ENERGY>CONTROLS

This can be done manually. However, more institutions are finding it more reliable to use automatic daylighting controls. These regulate the level of illumination provided by electric lights in response to the presence of daylight. They usually consist of a sensing device that monitors either the total light level in the space or the available daylight level at the daylight opening, and a control module that than switches or dims the electric lighting to maintain the required illumination.

Resources

Washington State Energy Code 2009 Edition, 1513.3 Daylight Zone Control


Alternative Sources of Energy

Purpose: To increase the amount of renewable energy used in place of finite and polluting non-renewable energy sources. On-site sources of energy reduce transmission losses, and also serve an educational function.

### E3.1: On-Site Renewable Energy

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>5%</td>
<td>2 points</td>
</tr>
<tr>
<td>7.5%</td>
<td>3 points</td>
</tr>
<tr>
<td>10%</td>
<td>4 points</td>
</tr>
</tbody>
</table>

Use on-site renewable energy for a portion of a school’s energy use. Point levels correspond to the percentage of net energy use supplied by this method.

Employ on-site renewable energy technologies to supply part of the building energy. Renewable Energy Systems include:

- Photovoltaic
- Wind
- Geothermal (does not include air source heat pumps)
- Fuel cells utilizing biogas

On-site renewable energy has many benefits. Renewable sources, such as photovoltaic, wind turbines, and geothermal sources, use the sun, air, and earth instead of non-renewable, polluting sources, such as coal or natural gas. Fuel cells can be powered by (renewable) biogas (as well as non-renewable natural gas).

**Sources covered under this credit must be located at the school site**, eliminating the environmental impacts and transmission losses associated with remote sources. On-site sources can become effective components of school curriculums, educating students on a wide variety of energy and science issues.

The costs and feasibility of on-site renewable energy and distributed generation vary significantly with location, technology, site-specific constraints, and maintenance concerns. Typical school installations supply less than 5% of total energy. Renewable systems generally reach a point of diminishing returns before they supply 100% of total energy. Incentive or “buy-down” programs from state or local energy providers can substantially reduce startup costs.

**Sources should be installed using net metering.** Net metering attaches the on-site system to the electrical power grid. When the school produces more energy than it uses, the excess energy is traded back to the local energy provider. In essence, this “spins the meter backwards” and is vital to the cost-effectiveness of the system. In general, facilities with on-site renewable energy and net metering can only receive credit up to the amount of energy they use. In other words, buildings can only “zero-out” their utility bill and not make a profit from selling their excess energy. Check with your utility to determine if they participate in net metering and how they would account for your building’s net contribution to the grid.

**To earn points with this credit:**

- Model the school building systems (no plug loads) to estimate the amount of energy used annually. Employ figures from E1.0 or E1.1.
- Calculate the amount of energy the particular on-site renewable system can supply annually,
- Calculate the net amount of energy provided by renewable energy.
### E3.2: Green Power Contract

**1 point**

Provide at least 50% of the building’s annual electricity *(regulated power)* from renewable sources by engaging in a minimum two-year contract to purchase green power as defined by the local utility or a recognized green power provider. Report this on the Annual Progress Report (see PEO3.0).

Using renewable energy reduces environmental impacts associated with production and consumption of conventional fuels, including air and water pollution, and natural resource destruction. Perhaps more directly relevant to school districts, these environmental impacts have associated economic and human health impacts for our general population, and when located near schools, for our students.

An alternative to producing renewable energy on-site (see WSSP Credit E3.1) and still support the use of renewable energy in Washington State is to purchase it through a utility green pricing program, or as renewable energy certificates available through certificate marketers listed by the U.S. Department of Energy’s Green Power Network (See Resources).

Washington State law (RCW 19.29A.090) requires electric utilities to offer customers renewable “green” power options.

**Resources**


E3.3: Distributed Generation

<table>
<thead>
<tr>
<th>5% = 1 point</th>
<th>7.5% = 2 points</th>
<th>10% = 3 points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use on-site distributed generation for a portion of a school's energy use. Point levels correspond to the percentage of net energy use supplied by this method.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Distributed Generation Systems**

- Fuels cells utilizing non-renewable fuels and waste heat recovery.
- Micro-turbine utilizing waste heat recovery.

The distributed generation systems listed above use non-renewable fuels. However, their improved efficiencies and technologies produce less air pollutants than traditional, centrally located coal or natural gas plants. Fuel cells can be powered by either renewable (biogas) or non-renewable (natural gas) sources, see Credit E3.1.

**Sources covered under this credit must be located at the school site,** eliminating the environmental impacts and transmission losses associated with remote sources. On-site sources can become very effective components of school curriculums, educating students on a wide variety of energy and science issues.

The costs and feasibility of distributed generation sources vary significantly with location, technology, site-specific constraints, and maintenance concerns.

**To earn points with this credit:**

- Model the school building systems (no plug loads) to estimate the amount of energy used annually Employ figures from E1.0 or E1.1.
- Calculate the amount of energy the particular on-site distributed generation system can supply annually.
- Calculate the net amount of energy provided by distributed generation.
Commissioning

**Purpose:** To optimize the building’s performance by verifying that fundamental building elements and systems are designed, installed, and operate as intended by the construction documents.

### E4.0: Fundamental Commissioning

<table>
<thead>
<tr>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>The design team and the school district shall comply with completion requirements outlined in Section 1416 of the Washington Non-Residential Energy Code (NREC) and WAC 392-343-080 regarding:</td>
</tr>
<tr>
<td>Drawings</td>
</tr>
<tr>
<td>Manuals</td>
</tr>
<tr>
<td>System balancing</td>
</tr>
<tr>
<td>Systems commissioning</td>
</tr>
<tr>
<td>AND, in conformance with RCW 39.35D, commissioning shall be performed for projects over 5,000 square feet.</td>
</tr>
</tbody>
</table>

- **Drawings:** Construction documents shall require that within 90 days after the date of system completion, record drawings of the actual installation be provided to the building owner. Record drawings shall include as a minimum the location and performance data on each piece of equipment, general configuration of duct and pipe distribution system including sizes, and the terminal air and water design flow rates.

- **Manuals:** Construction documents shall require that an operating manual and a maintenance manual be provided to the building owner. The manuals shall be in accordance with industry accepted standards and shall include, at a minimum, the following:

  Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.

  Operation and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the project. Required routine maintenance actions shall be clearly identified.

  Names and addresses of at least one service agency.

  HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined set points shall be permanently recorded on control drawings at control devices, or, for digital control systems, in programming comments.

  A complete narrative of how each system is intended to operate including suggested set points.

- **System Balancing:** Construction documents shall require that all HVAC systems be balanced in accordance with generally accepted engineering standards. Air and water flow rates shall be measured and adjusted to deliver final flow rates within 10% of design rates.

  **Air System Balancing:** Air systems shall be balanced in a manner to first minimize throttling losses. For fans with system power of greater than 1 hp, fan speed shall be adjusted to meet design flow conditions.

  **Hydronic System Balancing:** Hydronic systems shall be proportionately balanced in a manner to first minimize throttling losses, then the pump impeller shall be trimmed or pump speed shall be adjusted to meet design flow conditions. Each hydronic system shall have either the ability to measure pressure across the pump, or have test ports at each side of each pump.
ENERGY>COMMISSIONING

Exceptions:

Pumps with pump motors of 10 hp or less.

When throttling results in no greater than 5% of the nameplate horsepower draw above that which would be required if the impeller were trimmed.

Systems Commissioning: Commissioning shall include documentation, reports, and acceptance as specified by Washington’s NREC and WAC 392-343-080, and the commissioning agent must be a professional agent or authority not contractually or otherwise associated with the project design team or contractor. In addition, per WAC 393-344-067, the commissioning program shall include the attributes outlined by the Building Commissioning Association. In conformance with RCW39.35D, commissioning is required for projects over 5,000 square feet.

Prepare a final commissioning report following the Building Commissioning Final Report Guidelines available from NEEC. Review with the school district, verifying that systems are operational to the Owner’s Project Requirements (OPR) and Basis of Design BOD and work is completed.

Resources


PIER Construction Specifications, see http://www.archenergy.com/lrp/


Building Commissioning Association, www.bcxa.org
### E4.1: Enhanced Commissioning

Three points are possible in Enhanced Commissioning. **E4.1.1 must be achieved first** before going to E4.1.2. **E4.1.2 must be achieved to go to E4.1.3.**

<table>
<thead>
<tr>
<th>1 – 3 total points</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 point</strong></td>
<td><strong>E4.1.1 Conduct a Commissioning Review</strong></td>
</tr>
<tr>
<td></td>
<td>The Independent Commissioning Agent (CxA) required by E4.0 and State regulations as referenced in E4.0 shall:</td>
</tr>
<tr>
<td></td>
<td>• <strong>Conduct a commissioning design review</strong> of the Owner’s Project Requirements (OPR), Basis of Design (BOD), and design documents prior to mid-construction documents phase and back-check the review comments in the subsequent design submission.</td>
</tr>
<tr>
<td></td>
<td>• <strong>Review contractor submittals</strong> applicable to systems being commissioned for compliance with OPR and BOD. This review shall be concurrent with A/E reviews and submitted to the design team and owner.</td>
</tr>
<tr>
<td><strong>1 point</strong></td>
<td><strong>E4.1.2 Verification and Assurances</strong></td>
</tr>
<tr>
<td></td>
<td>The Commissioning Agent (CxA) shall:</td>
</tr>
<tr>
<td></td>
<td>• Verify functional and maintenance training of O&amp;M Staff, and verify that such training is completed in the Final Commissioning Report.</td>
</tr>
<tr>
<td></td>
<td>• Verify that training of building occupants regarding optimal operation of commissioned systems they interface with has been completed.</td>
</tr>
<tr>
<td></td>
<td>• Assure, through contractual arrangements, involvement by the CxA in reviewing building operation after one academic year of building use with O&amp;M staff and occupants. Include a plan for resolving outstanding commissioning-related issues.</td>
</tr>
<tr>
<td><strong>1 point</strong></td>
<td><strong>E4.1.3 Develop a Systems Manual</strong></td>
</tr>
<tr>
<td></td>
<td>Develop a Systems Manual to provide operations personnel with a tool that describes how the systems were developed, installed and tested. The manual shall be prepared in accordance with <strong>ASHRAE Guideline 0 Appendix O</strong>. The intent of the manual is to allow operations personnel to maintain the peak performance of the commissioned system.</td>
</tr>
<tr>
<td></td>
<td>• The manual shall be focused and arranged according to commissioned systems.</td>
</tr>
<tr>
<td></td>
<td>• The manual shall contain the necessary calibration data and forms to allow operations personnel to verify and test the systems at peak performance.</td>
</tr>
</tbody>
</table>

Buildings, even simple structures, are complex systems of electrical, mechanical, and structural components. High performance buildings are healthy, efficient, environmentally sensitive structures whose performance can be significantly affected if the building has not been designed following the district’s intent or constructed according to the designer’s specifications. Commissioning is a rigorous
Energy & Commissioning

quality assurance program administered by a knowledgeable third party that ensures the building performs as expected.

This credit ensures that the design is developed in a way that meets the objectives of the building program including, in particular, its mechanical systems and energy requirements. However, it is important to coordinate the commissioning program with the overall environmental goals of the project. The WSSP highly recommends a facilitated integrated design workshop (See Planning, Education, Operations category) BEFORE the schematic design process has concluded. This credit assumes that the CxA either participates in the integrated design workshop or is familiar with the results of the workshop.

Resources

ASHRAE Guideline 0-2005


Commissioning Report Templates are available for free at:
http://www.bcxa.org/resources/templates/index.htm
http://www.peci.org/large-commercial/mcpgs.html

Building Operator Certification, formally recognized by WAMOA, includes operator training that has been proven to result in energy savings for school districts in the state. More information at www.TheBOC.info

Building Commissioning Association, www.bcxa.org


Energy Management

**Purpose:** To optimize the building’s performance and comfort by monitoring and managing systems that deliver heating, cooling, ventilation, lighting, and other services.

### E5.1: Energy Management Systems

| 1 point | For one point, install an energy management system (EMS) to monitor the energy use of the following systems throughout the school (including all portables).
|         | • Lighting (Internal and external)
|         | • HVAC (heating, cooling, fans)
|         | • Hot water

| + 1 add'l point | For an additional point (*if the first was achieved*), the EMS also monitors the energy use throughout the school for:
|                | Equipment (plug loads)

Energy management systems (EMS) are typically installed in new schools. However, care must be taken to specify and install an appropriate system for the district and maintenance staff. An appropriate EMS is the simplest system that adequately addresses the school’s needs. Increased complexity does not always mean increased value for the district. EMS systems can potentially save significant energy, but only if the staff understands how to operate it. Proper training of district staff is critical, and high turnover rates to challenge school districts in keeping training up-to-date.

Control systems design shall include:

1. **Sensors, which should be provided as follows:**
   a) Sensors to monitor and trend at the operator interface controlled variables. Control variables may include air and/or water flow, temperature, pressure, CO₂, and pump or fan speed.
   b) Sensors to trend outdoor air temperature.
   c) In marine and humid climates, sensors to trend humidity.
   d) Sensors to monitor and trend equipment status for all equipment with motors greater than 1/2 hp.
   e) Indication and trending of damper and valve commanded position.
   f) Sensors to monitor building electrical and natural gas demand and consumption.
   g) Sensors to monitor indoor and outdoor CO₂.

   Relevant multiplexed data from microprocessors located in chillers, boilers, humidifiers, VAV box controllers, variable speed drives, and other HVAC equipment with multiplexing capabilities may be used in lieu of specifying separate sensors.

Wells and other ports shall be specified for the installation of calibration devices to facilitate calibration of sensors.
Exceptions:

Unit heaters, cabinet heaters, radiation and convectors located in vestibules, storage rooms, janitor closets, and other unoccupied areas.

Natural gas demand sensors not required on buildings less than 50,000 sf.

2. **Points Matrix**: A points matrix, including all hardwired input and output devices connected to the automation system, all set points, upper and lower control limits.

3. **Trend Capabilities**: Trend requirements including a trend point list and preprogrammed sample of point (performed by controls contractor), sample rate, storage interval, upload interval, custom trend abilities, alarms, and automated trend data review and notification (automated diagnostics).

4. **System Architecture**: system architecture capable of allowing sampling of these points to facilitate building commissioning and diagnostics without significantly affecting system performance.

5. **Data Storage**: A data storage system with adequate capacity to record trend data for use by building operators. Data export requirements must facilitate user-friendly data access and manipulation.

6. **Operator Interface**: An operator interface designed for remote/web access, monitoring requirements, trend-log reporting and diagnosing building problems through a user-friendly interface. This includes providing a visual (non-text based) operations and reporting interface to facilitate rapid system assessment that utilizes color coding, diagrams of floor plans and graphing capabilities.

Monitoring capabilities should allow for comparison between various types of building loads throughout all spaces of the school (including portables). This information is valuable and can be used to manage and optimize energy use.

Energy savings can result by optimizing a building’s ventilation control through effective air quality monitoring. New systems are now available that integrate indoor air quality monitoring with your building management system.

**Resources**

INDOOR ENVIRONMENTAL QUALITY

Daylighting & Views

Purpose: Improve student productivity through quality daylighting designs that minimize glare and direct sunlight penetration, and integrate views in day lit spaces. Provide a connection between indoor spaces and the outdoor environment through the introduction of daylight and views into the occupied areas of the building. Daylighting is fundamentally important to high performance design, from the standpoint of student and teacher preference, and should be the primary source of illumination in classrooms.

* * * * Daylighting in schools is a complex and evolving issue. This WSSP version uses the 2009 CHPS-California point-based system for percent of day lit area. Use of the 2009 LEED for Schools, IEQ Credit 8.1 Daylight is another allowable option. * * * *

IEQ1.1: Daylighting

The minimum daylighting requirements in WAC 246-366-050 (8) and (9) must be achieved.

<table>
<thead>
<tr>
<th>Requirement</th>
<th>1 Point</th>
<th>2 Points</th>
<th>3 Points</th>
<th>4 Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>25%</td>
<td>25%</td>
<td>50%</td>
<td>75%</td>
<td>100%</td>
</tr>
</tbody>
</table>

IEQ1.1 Single Point in Time Approach

1 Point  25% of classrooms are day lit
2 Points 50% of classrooms are day lit
3 Points 75% of classrooms are day lit
4 Points 100% of classrooms are day lit

Note: Laboratories and computer rooms are excluded from the percentage calculations.

The following requirements must be satisfied in order for a classroom to qualify as day lit.

- Achieve an average horizontal daylight illumination in each qualifying classroom of not less than 25 foot-candles for a clear sunny day at noon on March 21. Illumination shall be calculated at a work plane located 30 in. above the floor.

- Achieve uniformity at the work plane (from daylighting) not greater than 8:1, determined at grid points spaced no greater than 4 ft by 4 ft, for a clear sunny day at noon on March 21.

- At a minimum, direct sun can be eliminated for day lit spaces with the use of operable shading devices (see IEQ 1.3 for additional shading opportunities). Lighting contrast is not to exceed 10:1.

Calculations for the requirements may be made with either a computer simulation tool or with a physical model.
**Computer Simulation Tool**

Computer simulation tools include Lumen Micro, AGI32, Radiance, Lightscape, SPOT, or Daysim. A minimum analysis grid of 4 ft by 4 ft shall be used. The grid shall be positioned so that no analysis points are located closer than 3 ft to a glazed wall. The average illumination and uniformity calculations should then be performed for the equinox in accordance with both requirements.

**Physical Model**

If a physical model is used, the model should be constructed at a minimum scale of ½ in. equals one foot and care should be taken to use interior materials that have the same reflectance as the materials specified for the classroom. Glass or other material should be used in the openings that have the same light transmission as the fenestration proposed for the classroom. The model shall be positioned outdoors on a sunny day such that the solar angles for noon on the equinox are achieved.

The Daylighting Chapter of the CHPS Best Practices Manual has guidelines to create a suitable daylighting strategy. Orient the school to maximize daylighting options. Do not over-glaze the space.

Daylighting in classrooms, gyms or offices must be uniformly distributed, with no direct-beam sunlight penetration and minimal glare. Fixed or operable means of sun-glare control, such as roll down perforated shades for the view windows and horizontal louvered blinds for the upper daylight windows, must be specified for the period mid-September through mid March. The guidelines in the CHPS Daylighting Chapter thoroughly discuss several different approaches to classroom daylighting, including the use of clerestories, light shelves, and toplighting. There are several daylighting labs in the region, including two in Washington (Seattle and Spokane) that provide daylighting analysis services.


IEQ1.2: Permanent Shading

1 point

Eliminate direct sun from day lit spaces from March 21st until September 21st through the use of permanent shading devices.

Install permanent shading devices such as various louvers, fins, or light shelves. To eliminate direct sun for day lit spaces. The period for complete shading of direct sun is from March 21st until September 21st, from 9 a.m. to 3 p.m., adjusting for daylight savings time.

IEQ1.3: Views

New Construction: 1 point

Provide a direct line of sight to vision glazing from 90% of critical task areas and office spaces, not including copy rooms, storage areas, mechanical, laundry and other low occupancy support areas.

A space shall have view glazing equal to or greater than 7% of the floor area. Windows below 2.5 ft or above 7.5 ft do not qualify.

Resources


Spokane Daylighting Lab, Operated by Washington State University, Interdisciplinary Design Institute


Electric Lighting Quality

**Purpose:** Promote improved visual performance and productivity through electric lighting design. K-12 classrooms must be adaptable to support a wide variety of educational media and learning activities.

* * * * Electric Lighting in schools is a complex and evolving issue, and more research needs to be done. This WSSP version uses the 2009 CHPS-California point developed for lighting quality and configuration. * * * *

**IEQ2.1: Electric Lighting Quality**

<table>
<thead>
<tr>
<th>1 point</th>
</tr>
</thead>
</table>
| Install multi-scene indirect/direct lighting systems for all classrooms except chemistry labs, art rooms, shops, music, and exercise rooms. Provide a separately switched lighting system for the teaching wall that provides white board vertical illumination of at least 30 foot-candles average with maximum uniformity of 8:1 or better. The lighting systems should operate in general illumination mode and A/V mode.  

**In general illumination** mode, achieve an average illumination at the desk level of 35 to 50 foot-candles with a minimum of 25 foot-candles at any point more than 3 ft from any wall.  

**In A/V mode,** not including contribution from the teaching wall light, achieve an average illumination at the desk level of between 10 and 20 foot-candles for any point in the room greater than 3 ft from the side walls, 10 ft from the front wall and 6 ft from the back wall, while limiting vertical illumination on the projection screen to no more than 7 foot-candles at any point on the screen.  

In indirect mode, controls shall provide at least two levels of uniform lighting both at night and when daylight is available. |

The more that teachers teach and students learn by the glow of computers and video screens, the more critical the need for high-quality, adjustable-level lighting. The quality and quantity of light directly affect learning performance and the visual comfort of both student and instructor.

Glare-free ambient lighting provides an excellent visual environment for students and teachers to read, write, and interact with their peers. Direct-indirect and semi-indirect luminaries offer low-brightness while providing good definition of objects in the space.

Care must be taken to integrate the daylight so that the electric lighting is reduced or turned off when natural light levels are adequate. **IEQ6.2: User Controls** is highly recommended as a complementary action. **E2.2: Daylight Responsive Controls** is an automated option. Sensors must be placed correctly to read the available daylight in the space.

A lighting computer program shall be used to determine the performance characteristics of the electric lighting system in typical classrooms. Minimum required calculations shall include point-by-point analysis of horizontal illumination levels at desk height in both modes, vertical illumination levels of the teaching wall in general lighting mode, and vertical ambient illumination on the projection screen in A/V mode. Calculations must be carefully set up to analyze only the specific tasks or zones as defined in the requirement. Use of a lighting analysis program employing radiosity and/or ray tracing is necessary. Some acceptable software packages include Lumen Micro 2000, Lumen Designer, AGI32, Radiance, Desktop Radiance, LightPro, Luxicon and Visual.
Resources


Lighting Design Lab http://www.lightingdesignlab.com/
Indoor Air Quality

**Purpose**: Achieve superior indoor air quality to protect student and staff health, performance, and attendance.

Supplying clean outdoor air to classrooms is essential to assure good indoor air quality. Ensure that the capacity of the ventilation system is sufficient to meet the relevant air quality reference standards in all modes of operation. Locate the outdoor air intakes away from building exhausts, loading areas, building exhaust fans, cooling towers, and other sources of contamination. In addition, consider both current and future traffic and development patterns and consult the regional Clean Air Agency to locate area emission sources. Local air quality may impact the use of natural ventilation or the necessity of improved air filtration.

Merely complying with minimum codes during design and installation will not ensure good indoor air quality. It is also important to use low-emitting VOC (Volatile Organic Compounds) or no-VOC materials, control the sources of indoor air pollutants, take protective measures during construction to reduce contamination, commission the equipment, and perform regular maintenance during occupancy.

Common indoor building materials, such as furniture, carpet, glues, paints, and floor finishes, contain and off-gas chemicals that are harmful to health. Because a single material can off-gas enough to cause health problems, it is important to evaluate and specify materials that are low-emitting, non-irritating, nontoxic, and chemically inert. This is particularly important in schools because children are more susceptible than adults to indoor air pollutants.
### IEQ3.0: Minimum Requirements

<table>
<thead>
<tr>
<th>Required</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Meet the performance requirements of Washington State Minimum Ventilation Code, including:</strong></td>
</tr>
</tbody>
</table>

#### Minimum Ventilation:
- Design building ventilation systems to ensure that the continuous delivery of outside air is no less than the governing design standard; AND will occur at all times in which rooms are occupied. The design must ensure that the supply operates in continuous mode and is not readily defeated (blocked registers or windows) during occupancy periods.
- Meet the minimum requirements of voluntary consensus standard, ASHRAE 62.1 Ventilation for Acceptable Indoor Air Quality.
- Meet the minimum standards in WAC 246-366, the Washington State Board of Health rule for school environmental health and safety, (WAC 246-366A when implemented).

#### Moisture Control:
- All surface grades, drainage systems, and HVAC condensate must be designed to prevent the accumulation of water under, in, or near buildings - including portables. Irrigation systems must not spray on buildings.
- In addition, during the *Design Development* stage of a project, particular emphasis should be made to detailing the building envelope to eliminate the possibility of future moisture infiltration.
- Building materials, especially wood, porous insulation, paper, fabric, and other porous materials must be kept dry before, during, and after installation to prevent the growth of mold and bacteria. Before installation, store all materials in a manner that assures they stay dry. If stored outside, cover building materials with plastic to protect from the rain and other sources of moisture, and keep off of the ground. Immediately discard all water-damaged materials and replace with new, undamaged materials.
- If building envelope components (*foundation, framing and/or sheathing*) are significantly impacted by moisture during the framing process, mitigation measures to reduce the moisture content to acceptable levels must be implemented prior to installation of insulation, wall cover, and other interior finishes.

#### Construction Filtration:
- Temporary filters: If air handlers must be used during construction, install filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 at each return air grille as determined by ASHRAE 52.2.
- Permanent filters: Replace all filtration media immediately prior to occupancy.
Indoor Environmental Quality > Indoor Air Quality

1 point IEQ3.0.1

Receive one point (up to two) for implementing each of the two measures:

IEQ 3.0.1 Evaluate Envelope
Employ the services of a professional consultant to evaluate the envelope details of the construction documents and make recommendations to eliminate the possibility of future moisture infiltration. Also, to perform special inspections during construction to insure the design details are followed and adequate workmanship is performed.

IEQ 3.0.2 Mitigation
Perform aggressive drying and dehumidification by mechanical means (not using any of the permanent HVAC systems components), as well as application of anti-mold/anti-microbial treatment to all affected materials.

All regularly occupied spaces must be ventilated. Washington State requires that the HVAC system shall be operated continuously during working hours except:

- During scheduled maintenance and emergency repairs.
- During periods not exceeding a total of 90 hours per calendar year when a serving electric utility by contractual arrangement requests its customers to decrease electrical power demand.
- During periods for which the employer can demonstrate that the quantity of outdoor air supplied by non-mechanical means meets the outdoor air supply rate required by the code.

For spaces not addressed by Washington State requirements, ventilation systems must meet the minimum requirements of voluntary consensus standard ASHRAE 62.1 Ventilation for Acceptable Indoor Air Quality. Naturally ventilated buildings shall comply with ASHRAE 62.1 Natural Ventilation.

Due to associated health risks that can be caused by mold and microbial growth, all surface grades, drainage systems, and HVAC condensate must be designed to prevent the accumulation of water under, in, or near buildings. Portables are particularly vulnerable, and must be placed on properly drained surfaces.

Permanent irrigation systems that spray onto buildings can cause serious structural damage and promote mold growth. Do not install irrigation systems in locations where they spray onto buildings.

Construction activities can adversely affect indoor air quality. The prevention of mold growth through moisture control and air infiltration are required prerequisites.

Resources


# IEQ3.1: Low-Emitting Interior Finishes

<table>
<thead>
<tr>
<th><strong>1 to 4 points</strong></th>
<th>Receive one point (up to a maximum of four points) for each of the following products that comply with the listed protocols.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Interior adhesives, sealants, and concrete sealers</strong> (South Coast Air Quality Management District, SCAQMD, Rule 1168).</td>
<td></td>
</tr>
<tr>
<td><strong>Interior carpet, resilient flooring</strong> (Carpet and Rug Institute Green Label Indoor Air Quality Test Program).</td>
<td></td>
</tr>
<tr>
<td><strong>Interior paint</strong> (Green Seal GS-11 Standard).</td>
<td></td>
</tr>
<tr>
<td><strong>Building insulation</strong> (Greenguard™ or specified as no added urea-formaldehyde resins).</td>
<td></td>
</tr>
<tr>
<td>Acoustical ceilings or wall panels (Greenguard™).</td>
<td></td>
</tr>
<tr>
<td>Interior wood flooring and composite wood products (specify no added urea-formaldehyde resins).</td>
<td></td>
</tr>
</tbody>
</table>

The Collaborative for High Performance Schools (CHPS) has developed sample material specifications to identify materials that will not compromise the health of students and staff. The CHPS material specifications (available from [http://www.chps.net/](http://www.chps.net/)) identify over 60 specific chemicals that have been found to impact human health and the maximum emission levels for each. Designers should request emissions test data from manufacturers to ensure that the chemical emissions are within safe levels, or obtain products that have been certified by a third party, or otherwise indicate the applicable standards they meet.

## Resources

- Collaborative for High Performance Schools, *High-Performance Products Database*  
  [http://www.chps.net/dev/Drupal/node/445](http://www.chps.net/dev/Drupal/node/445)

  [http://greenseal.org/certification/paint_coating_products.cfm](http://greenseal.org/certification/paint_coating_products.cfm)


IEQ3.2: Low-Emitting Furniture

| 1 point = 75% | Use furniture systems and seating that are low-VOC-emitting, either Greenguard™ certified or registered. OR Use furniture systems and seating whose emissions meet or are lower than the best practice air emissions standards as established by the US EPA’s Environmental Technology Verification (ETV) test method in a qualified testing laboratory. |

When using the US EPA’s Environmental Technology Verification (ETV) test method, the following emission levels must be reached within seven days of unpacking the product and installation in a building.

Emission Limits for Furniture Systems:
- TVOC’s (Total Volatile Organic Compounds) < 0.5 mg/m³
- Formaldehyde < 0.05 ppm
- Total Aldehydes < 0.1 ppm
- 4-PC (as an odorant) below the limits of detection

Emission Limits for Office Seating:
- TVOCs < 0.25 mg/m³
- Formaldehyde < 0.025 ppm
- Total Aldehydes < 0.05 ppm
- 4-PC (as an odorant) below the limits of detection

Resources
Greenguard Product Directory, online at [http://www.greenguard.org](http://www.greenguard.org)
### IEQ3.3: Source Control

<table>
<thead>
<tr>
<th>1 point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design to minimize the contamination of occupied areas by dust and chemical pollutants:</td>
</tr>
<tr>
<td>- Control surface dust by providing <strong>walk-off mats</strong> that meet the EPA IAQ Design Tools for Schools specifications at all entrances, and avoiding use of deep-pile carpets;</td>
</tr>
<tr>
<td>- AND where chemical use occurs (<strong>including housekeeping areas, chemical mixing areas, copying/print rooms</strong>), use structural deck-to-deck partitions with separate outside exhausting, no air recirculation, and negative pressure;</td>
</tr>
<tr>
<td>- AND install range hoods vented to the outside for all cooking appliances (such as stoves and ovens);</td>
</tr>
<tr>
<td>- AND install approved fume hoods in lab and preparation spaces for working with chemicals and for demonstrations. Demonstration hoods should be clear (see through) on all sides. All pottery kilns are to be vented to the outside.</td>
</tr>
<tr>
<td>- AND all plumbing in areas where hazardous chemicals are being used must be resistant to corrosion and degradation if they were to inadvertently come in contact with those materials.</td>
</tr>
</tbody>
</table>

Design to physically isolate activities associated with chemical contaminants from other areas of the building, and provide dedicated systems (direct exhaust, no return air, room under negative pressure) to contain and remove chemical pollutants at their source. Eliminate or isolate high hazard areas, and design all housekeeping chemical storage and mixing areas (central storage facilities and janitors’ closets) to allow for secure product storage. Design copy/fax/printer/printing rooms with structural deck-to-deck partitions and dedicated exhaust ventilation systems.

**Resources**

IEQ3.4: Ducted HVAC Returns

<table>
<thead>
<tr>
<th>1 point</th>
<th>Required when 246-366A is implemented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install ducted HVAC returns to avoid the dust and microbial growth issues associated with plenum returns.</td>
<td></td>
</tr>
</tbody>
</table>

** * * * The update of the health and safety rule for primary and secondary schools (WAC 246-366A) was adopted, but implementation delayed. The new rule, when implemented, will require ducted HVAC returns, with some exceptions. * * * *

Plenum returns are easily contaminated with dust and microbial growth. Ducted returns, though more expensive, will help prevent such problems and reduce the frequency of maintenance and repair costs.

IEQ3.5: Particle Arrestance Filtration

<table>
<thead>
<tr>
<th>1 point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtration media shall have a Minimum Efficiency Reporting Value (MERV) of 13 as determined by ASHRAE 52.2 (Method for Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size) or the highest efficiency filter recommended by the manufacturer.</td>
</tr>
</tbody>
</table>

Filters rated at MERV 13 will remove more pollutants from the air used to ventilate the school. Manufacturers’ recommendations should be followed.
IEQ3.6: Construction IAQ Management

1 point

During construction, meet or exceed all of the following minimum requirements:

**Temporary construction ventilation:** Continuously ventilate affected spaces during installation of materials that emit volatile organic compounds (VOC) and for at least 72 hours after installation. Ventilate longer than 72 hours if necessary to completely remove odors. Exhaust the air directly to the outside; do not re-circulate to other enclosed spaces. If continuous ventilation is not possible using the building’s HVAC system or by using temporary ventilation, then ventilate through open windows and by using temporary fans.

**Duct protection:** Turn the ventilation system off, and protect HVAC supply and return openings from debris generated during dust-producing activities such as drywall installation and finishing. Provide temporary ventilation as needed.

**Preconditioning:** Allow products with odors and significant VOC content to off-gas, off-site in a dry, well-ventilated area for at least two weeks prior to delivery to the construction site. Remove products from their containers and packaging to maximize off-gassing of VOCs.

**Sequencing:** Install any necessary odorous and/or VOC-emitting products and allow to off-gas prior to installation of porous and fibrous materials.

**HEPA vacuuming** (carpets and upholstery): After installation, vacuum carpeted and soft surfaces with a high-efficiency particulate arrestor (HEPA) vacuum as needed and just prior to occupancy.

**HEPA duct cleaning:** Prior to installation, inspect ducts for dust and debris. Remove any dust, dirt, and residual oil. Prior to substantial completion and prior to using the system, inspect the ducts again for dust and other debris that may have collected during construction. Immediately remove any dust using a HEPA vacuum.

**FOR AN ADDITIONAL POINT:**

After construction, flush the building continuously, 24 hours per day, using 100% tempered outside air for at least two weeks after substantial completion of construction is achieved and before the building is occupied. If the contractor is required to perform touch-up work during this time, provide temporary construction ventilation during the work and extend the building flush-out by a minimum of four days after touch-up installation.

OR, Follow LEED for Schools 2009, IEQ 3.2:

“After construction ends, prior to occupancy and with all interior finishes installed, install new filtration media and perform a building flush-out by supplying a total air volume of 14,000 cubic feet of outdoor air per square foot of floor area while maintaining an internal temperature of at least 60° F and relative humidity no higher than 60%. OR, Path 2:

If occupancy is desired prior to completion of the flush-out, the space may be occupied following delivery of a minimum of 3,500 cubic feet of outdoor air per square foot of floor area. Once the space is occupied, it must be ventilated at a minimum rate of 0.30 cubic feet per minute (cfm) per square foot of outside air or the design minimum outside air rate determined in IEQ Prerequisite 1: Minimum Indoor Air Quality Performance, whichever is greater. During each day of the flush-out period, ventilation must begin a minimum of 3 hours prior to occupancy and continue during occupancy. These conditions must be maintained until a total of 14,000 cubic feet per square foot of outside air has been delivered to the space.”

Each of the listed construction practices will improve indoor air quality by minimizing the amount of indoor pollutants that are distributed and retained by the surface materials and ventilation systems.
INDOOR ENVIRONMENTAL QUALITY > INDOOR AIR QUALITY

during construction. Flushing out the building with 100% outside air will help remove indoor pollutants prior to occupancy.

Resources


IEQ3.7: Natural Cooling

3 points  Design 90% of permanent classroom spaces with no air conditioning.

Prior to air conditioning, school buildings required natural ventilation and cooling. This defined the shape of the building as each office or room required an operable window. The T, H, or L-shaped floor plans, which allowed the maximum number of windows to provide natural light and ventilation, are still visible in most cities. Sunlight and solar gain are major influences on buildings in mid to late afternoon when students typically are not present. This scheduling circumstance allows designers to minimize solar gains to keep students comfortable in non-air conditioned buildings by properly orienting and shading windows. It is very important to verify that required ventilation levels can be maintained through natural ventilation, and that no outdoor pollutants (from traffic, industrial sources, or the possible air quality emergencies) eliminate its feasibility.

The selected design should either meet the applicable standards of the most current version of ASHRAE 62.1 Chapter 6 for at least 90% of occupied spaces, or, clearly meet the intent of recommendations set forth in CIBSE AM10.

Additional points for eliminating or reducing air conditioner use can be achieved under E1.1 Energy Performance.

Also see E2.1 HVAC and Operable Window controls, and IEQ6.1 User Control (operable windows).

Air conditioning systems prohibited by this credit include air- and water-source packaged air conditioners or heat pumps. Direct/indirect evaporative systems without compressed refrigerant can be used and still receive this credit.

For natural ventilation, an eight step process is described by the Carbon Trust in their Good Practice Guide 237: “Natural Ventilation in Non-Domestic Buildings”.

The basic steps set forth in CIBSE AM10 are to:

1) Develop the design brief, with attention to heat loads, future use and cultural factors like dress code.
2) Identify airflow paths, paying attention to season, time of day, and pollutant source control.
3) Identify issues to mitigate (e.g. heat gain, pollutants).
4) Determine ventilation and thermal comfort requirements.
5) Estimate wind pressures.
6) Choose ventilation devices.
7) Size openings, (Chapter 5 of CIBSE, AM10)
8) Check the design. You may use public domain software such as NIST’s CONTAM, Multi-zone Modeling Software, along with LOOPDA, Natural Ventilation Sizing Tool.

Resources


**Acoustics**

**Purpose:**

Provide the acoustical qualities necessary for good speech communication between students and teachers in classrooms and other learning spaces.

### IEQ4.0: Acoustic Performance

<table>
<thead>
<tr>
<th>Required</th>
<th>Classrooms must have:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum unoccupied background noise levels generated from HVAC system noise only in classrooms not to exceed an <strong>NC-35</strong>, and overall noise levels from all sources of environmental, interior, and ventilation equipment noise not to exceed <strong>45 dB(A)</strong> at any student location within the unoccupied classroom <em>(measured as a noise average Leq, where x is thirty seconds or more)</em>.</td>
</tr>
<tr>
<td></td>
<td>Maximum (unoccupied) reverberation times at mid-frequencies (500, 1000, and 2000 Hertz) of</td>
</tr>
<tr>
<td></td>
<td><strong>0.6-seconds</strong> for general classroom spaces 10,000 cubic feet or less</td>
</tr>
<tr>
<td></td>
<td>• <strong>0.7-seconds</strong> for general classroom spaces greater than 10,000 but less than 20,000 cubic feet</td>
</tr>
<tr>
<td></td>
<td>The maximum noise exposure for students in vocational education and music areas shall not exceed the levels specified in <strong>WAC 246-366-110</strong>, Table 1. These permissible exposure limits protect state employees and students against the health effects of noise exposure. When exposed to sound exceeding those listed in Table 1, feasible administrative or engineering controls shall be utilized to limit or reduce exposure to within acceptable limits.</td>
</tr>
</tbody>
</table>

Good acoustical qualities are essential in general classrooms in which speech communication is an important part of the learning process. Excessive background noise or reverberation in such spaces interferes with speech communication and thus presents an acoustical barrier to learning. With good classroom acoustics, learning is easier, deeper, more sustained, and less fatiguing. Teaching is more effective and less stressful with good acoustical characteristics in a classroom. There can be more verbal interaction and less repetition between teacher and students when spoken words are clearly understood.

Everyone in a classroom, including teachers, will benefit. Special beneficiaries are young children in early stages of language acquisition and persons with hearing difficulty, second language challenges, speech problems, attention deficit, or other learning disabilities. Conformance with the provisions of this prerequisite will improve the quality of education by removing or significantly reducing any residual acoustical barriers for all students and teachers, including those with communication disabilities. Good architectural design practice and attention to detail throughout the construction or renovation process can ensure conformance to the requirements of this credit.

Compliance with this prerequisite must be determined with the classroom ventilation system and noise generating components, such as compressors and fans, in normal operation during conditions representing reasonable worst-case equipment loads. Specifications for noise measurement equipment and measurement procedures are defined in the American National Standard – "Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools" (ANSI S12.60).
INDOOR ENVIRONMENTAL QUALITY > ACOUSTICS

The prerequisite 45 dB(A) average background noise level is considered *not* conducive to effective instruction, and represents minimal compliance with the noise levels required by the State of Washington (WAC 246-366-110, Sound Control). School districts and designers are strongly encouraged to move beyond these prerequisites and achieve background noise levels of NC 30 (HVAC noise) and 40 dB(A) (all noise sources) for all classrooms (see IEQ4.1).

Resources


National Clearinghouse for Educational Facilities, [http://www.edfacilities.org](http://www.edfacilities.org)

### IEQ4.1: Improved Acoustic Performance

<table>
<thead>
<tr>
<th>1 - 4 possible points</th>
<th>Classrooms must have:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced Unoccupied Classroom Noise = 1 point</td>
<td>Maximum unoccupied background noise levels generated from ventilation equipment noise sources in classrooms not to exceed an <strong>NC-30</strong> and overall noise levels from all sources of environmental, interior and ventilation equipment noise not to exceed <strong>40dB(A)</strong> at any student location within the classroom (measured as a noise average Leq, where x is thirty seconds or more).</td>
</tr>
<tr>
<td>STC 50 (classrooms) = 1 point</td>
<td><strong>STC 50 = 1 point</strong>, provided the preceding point regarding reduced classroom noise level is achieved. Minimum Sound Transmission Class (STC) ratings of <strong>STC 50</strong> for classroom single or composite partition wall and floor- to underside of deck or solid structure above that separate an enclosed instructional space from an adjacent instructional space.</td>
</tr>
</tbody>
</table>
| Gymnasium Reverberation = 1 point | **Gymnasium Reverberation Times:**  
Maximum (unoccupied) reverberation times at all mid-frequency (500, 1000, 2000 Hertz) of:  
| | Not greater than **1.3 seconds** for gymnasiums of 150,000 cubic feet or less, OR |
| | Not greater than **1.5 seconds** for gymnasiums greater than 150,000 cubic feet. |
| Multi-Purpose, Commons or Cafeterias Reverberation Times = 1 point | **Multi-Purpose, Commons or Cafeterias Reverberation Times:**  
Maximum (unoccupied) reverberation times at all mid-frequency (500, 1000, 2000 Hertz) of:  
| | Not greater than **1.2 seconds** for Multi-Purpose, Commons or Cafeterias of 100,000 cubic feet or less, OR |
| | Not greater than **1.4 seconds** for Multi-Purpose, Commons or Cafeterias greater than 100,000 cubic feet. |

Background noise levels in the classroom are typically of two types: noise from outside and noise from within the classroom. Noise that intrudes into the classroom from sources outside of the school building envelope includes vehicular traffic, aircraft, industrial plants, and activity in schoolyards or from grounds maintenance. Control of noise in classrooms from such sources is accomplished through proper selection of materials and acoustical design for the exterior envelope of the school building. Each situation is unique with regard to distance to, and the extent and characteristics of, industrial sources, local traffic, or other transportation noise sources.

The most effective approach to outdoor-to-indoor noise control is to measure the current, or predict the future, noise levels of external sources at the proposed locations for each of the school building facades. The next step is to determine the necessary outdoor-to-indoor noise level reduction to achieve the required interior background noise level. Guidelines and methodologies for designing effective exterior source noise control are available in resources.

The second type of noise originates within the school building and intrudes into the classroom through classroom walls and partitions, floor-ceiling assemblies, and ventilation systems. Interior noise sources can be isolated through the proper design and construction of school building elements and by effective noise control design measures applied to the building services and utilities. Compliance with the background noise level and the STC 50 sound rating for partitions and floor/ceiling assemblies can be demonstrated through testing as specified in ANSI Standard S12.60. A measured Noise Isolation Class (NIC) rating of 45 or higher is considered to be in compliance with the STC requirement.
Resources


National Clearinghouse for Educational Facilities, [http://www.edfacilities.org](http://www.edfacilities.org)

IEQ4.2: Audio Enhancement

Classrooms must have:

- A sound system in each classroom and instructional space to amplify the teacher’s voice, via wired or wireless microphones, and to amplify pre-recorded program material associated with CD, DVD, VHS, or CATV sources.
- Accommodation for a dedicated or portable assistive listening system to amplify the teacher’s voice, via wired or wireless microphones, and to amplify pre-recorded program material associated with CD, DVD, VHS, or CATV sources.

A properly designed sound system is an effective method for increasing the speech level in a classroom, thereby increasing the SNR. In addition to improved speech intelligibility, the use of a sound system can significantly reduce voice fatigue for the teacher, and improve speech perception for impaired individuals, as noted above. It is important to note that amplified speech does not reduce the requirement for background noise control, because communication between students, and between student and teacher, must continue to be facilitated by a low background noise level.

For compliance with this credit, the sound system must:

- Provide uniform sound distribution at all student seating and instructional areas. Uniformity is confirmed if measurements across all student seating and instructional areas are within +/- 2 dB in the 1/1-octave band centered on 2000 Hertz.
- Provide distribution to all student seating and instructional areas utilizing either dedicated or portable assistive listening systems.
- Provide a minimum signal-to-noise ratio of 15 dB across all student seating and instructional areas. Uniformity is confirmed if A-weighted amplified speech sound level measurements are 15 dB above background sound levels across all student seating and instructional areas.

In addition, designers are encouraged to meet the maximum unoccupied background noise levels of 35 dBA, as set in IEQ4.1. Relying solely on amplification is not considered best practice.

Resources


Thermal Comfort

**Purpose:** Provide level thermal comfort to support optimum health, productivity, and comfort.

**IEQ5.0: Thermal Code Compliance**

| Required | Comply with ASHRAE Standard 55 - Thermal Comfort Conditions for Human Occupancy, for thermal comfort standards within established ranges per climate zone. |

Indoor design temperature conditions for general comfort applications shall be determined in accordance with ANSI/ASHRAE 55 or Chapter 8 of the ASHRAE Handbook. Fundamentals volume. Note that winter humidification and summer dehumidification are no longer required.

**Resources**

User Control

**Purpose**: A significant factor in human comfort is the ability to make adjustments based on individual preference or immediate perception of conditions. Allowing teachers to manually control the windows, lights and thermostat, give both student and teachers an immediate way to affect their environment, reducing distraction and discomfort.

### IEQ6.1: User Control - Windows

| 1 point | Provide a minimum of one operable window in each classroom. |

Operable windows are important for personal comfort and can contribute to improved student performance. In addition to providing fresh air, they provide a connection to the outdoors.

Provide at least one operable window in each classroom. It is recommended to **interlock controls with the HVAC system** to optimize energy efficiency. Train teachers on how to properly use the HVAC controls in their rooms and how opening doors and windows affect ventilation and comfort.

Also see Credit E2.1, which provides a point for providing controls/devices or HVAC systems that can respond when windows or doors are opened. This strategy is important as it allows operable windows, yet mitigates energy penalties that might result. And see Credit IEQ3.7 which rewards natural ventilation (no air conditioning).

### IEQ6.2: User Control - Temperature & Lights

| 1 point | Provide temperature and lighting controls for each classroom. |

Individual classrooms will vary in temperature depending on their orientation and other building conditions, as well as occupant preferences. Provide individual or integrated controls systems to allow teachers to regulate the lighting and temperature of their classrooms.

Also see Credit E2.1, HVAC and Operable Windows, and Credit IEQ3.7 Natural Cooling (natural ventilation).
PLANNING, EDUCATION, & OPERATIONS

The purpose of this section is to capture and acknowledge activities before and after construction of a high-performance school that lead to its on-going success. Planning, through integrated design, brings together various disciplines involved in designing, building, and occupying a school facility. The school can also become a hands-on teaching tool to learn about the benefits of high-performance design. There are also things post-construction that districts can do to assure that the goals of the high-performance design are achieved once the building is in operation.

1. Planning

Purpose: To involve the entire project team in incorporating sustainable building strategies in early programming and on-going design decision-making. This approach helps maximize systems integration and associated efficiencies and cost-benefits as well as identify other sustainable opportunities.

<table>
<thead>
<tr>
<th>PEO 1.1: Integrated Design Workshop</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1 point</strong></td>
</tr>
<tr>
<td>Integrated Design Workshop. Conduct a workshop no later than mid-schematic design. Include project stakeholders to collaboratively develop a range of sustainable building strategies for all five categories of the WSSP, document the project's sustainable building goals, and incorporate as an ongoing part of programming and design decision-making.</td>
</tr>
<tr>
<td>A second workshop held prior to construction drawings is highly recommended.</td>
</tr>
</tbody>
</table>

Sustainable building design requires new and often innovative design approaches, which cross boundaries of professional expertise and which need to be considered comprehensively to be successfully incorporated. Experience with project teams in Washington and across the country has shown that projects that successfully incorporate a wide range of sustainable building strategies are those that involve project stakeholders in early design programming, analysis, and design decisions. For best results, this process should begin with a collaborative workshop held no later than mid-schematic design, with another workshop prior to construction drawings.

An integrated design workshop is an important first step in achieving the benefits of integrated design. A collaborative team process can carry out the ideas expressed in the workshop by continuing an interdisciplinary dialogue through the design process, by documenting design decisions related to this effort, and by ensuring sustainable building strategies are incorporated in construction documents and the construction process itself.

To earn this credit, it is suggested that the workshop be a minimum of 3 hours; however more time should be set aside for this event. Software programs are becoming available that can be used during the workshop to provide immediate feedback on the feasibility of strategies being considered.

Stakeholders should include owner representatives, design consultants, construction representatives (if available), and school occupants. Examples of attendees in these categories include:

**Owner Representatives** – Capital projects staff, facilities staff, and representative administrators and school board member.

**Design Consultants** – Architect and sub consultants (civil, structural, electrical, mechanical, acoustic, landscape, etc.) contractor, value engineer. Energy providers and local building and planning officials also can be valuable contributors.

**Construction Representative, if available** - General contractor, commissioning agent.
School Occupants – Teachers, principal, maintenance, custodial, and operations staff, students, and representative parent.

In integrated design workshops, open dialogue is encouraged and expected. They operate with a few fundamental ground rules:

- A neutral, non-confrontational environment
- Life cycle value needs to be considered along with imperatives of first cost.
- Reservations are noted with the expectation that strategy proponents will provide additional investigation to further refine and justify that particular strategy.

Deliverables from the Integrated Design Workshop will guide the collaborative process for the remainder of the project, and include:

- Sustainable building mission statement.
- Set of high-level sustainable building goals that relates to the specific project’s priorities.
- Summary of sustainable strategies to be incorporated or investigated further.
- Identification of project team member(s) responsible for specific sustainable strategy development, including a timeline for reporting back to the team.
- Preliminary WSSP Scorecard indicating credits easy to achieve, credits of moderate difficulty that require further investigation, and credits unlikely to be achieved (easy, moderate, difficult OR yes, maybe, no).

Resources

Energy Scheming software - Overview and ordering info at Oikos -
http://oikos.com/esb/37/scheming.html


U.S. Department of Energy - Whole Building Design:
http://www1.eere.energy.gov/buildings/commercial/whole_building_design.html
Purpose: To select materials and systems that contribute to making the building last longer including selecting those that are durable, efficient, and easy to maintain.

PEO 1.2 Durability, Efficiency, and Maintainability Features

<table>
<thead>
<tr>
<th>1 point</th>
</tr>
</thead>
</table>

**Implementation of Durability, Efficiency and Maintainability Features**

– Provide Architect’s certification that project cost exceeds the State of Washington’s Construction Cost Allowance by at least 5%, and that this excess cost is directly attributable to enhanced systems that will improve durability, increase useable building life, improve operation efficiency, and/or reduce maintenance costs. Ideally these items would arise from the Integrated Design Workshop.

OR, ALTERNATIVELY:

Implementation of Durability, Efficiency and Maintainability Features – Provide Architect’s certification that major components of the facility are designed to exceed the 30 year useful service life envisioned by the State of Washington. A criterion for this certification is that specific features of the design are likely to give the facility a State Building Condition Evaluation score of greater than 60 after 30 years. This aligns with both the state priority system and the sustainability goal of re-using existing buildings. The architect’s certification should outline the specific features and indicate how they will improve service life, given reasonable use and maintenance.

*NOTE: The implementation of this point refers specifically to programs and policies in the State of Washington.*

A commonly-held and common-sense definition of sustainable buildings is that they should be durable, efficient to operate, and easy to maintain. Promoting durability, efficiency of operation and ease of maintenance should be one focus of the integrated design workshop. This point gives credit for actually increasing expenditures to implement goals and strategies developed in the integrated design workshop.

Often it is difficult to track the precise costs of items that serve these ends. Such items may involve more than one design discipline and serve more than one purpose. For example, a shaft connecting a classroom to the roof may be a component of both the natural ventilation and daylighting systems, and provide efficiency and maintainability benefits from reduced energy and maintenance costs. Increasing the R-value and extent of insulation may reduce energy costs and improve classroom acoustics. Upgrading the type and extent of masonry cladding may increase building life and decrease maintenance.

The following are some other examples to consider. This list is neither exhaustive nor complete.

- Type and extent of durable envelope materials (masonry, siding, roofing, windows etc.)
- Efficiency, maintainability and useable life of major heating, ventilation, lighting, communications and data systems.
- Generous floor-to-floor heights and oversized service cores, chases, tracks, raceways etc.

A basic sustainability principal is that, where feasible, functional and prudent, it is preferable to reuse an existing building rather than replace it. The Washington State Construction Assistance Program requires that facilities built with state funds be used for at least 30 years before they are eligible for
additional funding. The priority system for ranking projects for funding has an explicit standing linking building condition to a Schools District’s decision to modernize or replace an existing building.

**From OSPI School Facility Manual – Section 215:**

**Cost/Benefit Factor:** A cost/benefit factor is used to modify the condition score if the proposed project does not correct the problem in the most cost-effective way. If the condition score is less than 40 on the BCEF, up to 10 points are deducted from the score if a modernization is proposed on the basis that new construction replacing the old facility would be the most appropriate approach. Similarly, up to 10 points are deducted if the condition score is greater than 60 and new construction is proposed rather than modernization.

WAC 392-343-515 Modernization or new-in-lieu of modernization priority elements, is the basis for this priority system feature.

“(3) Cost/benefit factor - Ten minus points possible. If the proposed project is a modernization and the BCEF score is less than forty, one point is deducted for each point the BCEF score is less than forty up to a total possible deduction of ten points.

If the proposed project is a new-in-lieu of modernization and the BCEF score is greater than sixty, one point is deducted for each point the BCEF score is higher than sixty to a total possible deduction of ten points.

The scores shall be determined at the time of project approval per WAC 392-341-045. These scores shall be carried until the district requests a redetermination.”

**Resources**


School Construction Assistance Program, [http://www.k12.wa.us/SchFacilities/Programs/SchoolConstructionProjects.aspx](http://www.k12.wa.us/SchFacilities/Programs/SchoolConstructionProjects.aspx)

**PLANNING, EDUCATION, & OPERATIONS > PLANNING**

**Purpose:** To implement and test innovative approaches to improving the health of school occupants and the performance of school facilities. This credit allows project teams to be creative and test new technologies or strategies.

### PEO 1.3 Innovation

| 1 point | Implement a new technology, strategy, or technique that produces actual and measurable results, and is not claiming a point in another WSSP category, that strives for at least one of the following goals: |

| + 1 An additional point for an additional innovation | Improves the health and performance of students and staff |
| Up to 2 points | Improves the performance and efficiency of the school facilities, or operation of those facilities |
| | Improves the natural environment |

The following may be considered for innovation points:

- Performance beyond what is award in a WSSP credit
- Strategies or technologies not tried in school buildings
- Master plans which incorporate high-performance elements
2. Education

**Purpose**: To engage students and teachers in learning about the benefits of green building, using their own building as a learning tool.

**PEO 2.1: Green Building Learning Opportunities**

| 1 point | Develop student learning opportunities highlighting the environmentally sensitive aspects of the building structure and site, through demonstration areas, exposed systems, lesson plans, teaching aids, interpretive graphics and signage. |

For existing schools, students can be involved in analyzing baseline energy conditions as well as planning and implementing outdoor classroom resources (*gardens, native plants*). For new schools, outdoor classrooms and learning environments should be **planned into the site design** for use or further development by students.

Students can create signs, displays, newsletter articles or brochures to educate each other and visitors about the environmental design features that are included. Exposed building systems can be utilized as learning opportunities. When advanced technology and design in new schools are made visible, buildings can become teaching tools and important features of science, math, and environmental curriculum. To earn this credit, the project must, in addition to providing the opportunity and learning elements, have a plan for providing teachers and staff with training and background information.

**Resources**


Alliance to Save Energy, Washington, DC. [www.ase.org/section/_audience/consumers/kids](http://www.ase.org/section/_audience/consumers/kids) and [www.ase.org/section/program/greenschl/gazette](http://www.ase.org/section/program/greenschl/gazette)


SolarQuest, Solar on Schools Program Management, EcoSage, Inc., Chelsea, VT [www.solarschools.com](http://www.solarschools.com)
3. Operational Activities

**Purpose:** To encourage pre- and post-construction activities which contribute to the understanding of high-performance schools, as well as implementing operational plans and systems which assure that the goals of the high-performance design are achieved once the building is in operation.

### PEO 3.0: Operational Performance Monitoring

**Required**

**Operational Performance Monitoring**

For five years after occupancy of the school, districts are required by RCW39.35D to provide an annual report to OSPI, which is defined to include:

- Basic information about the building, to be used in both overall summaries and in generating an Energy Star rating for buildings that have not already done so.
- Monthly energy use, by fuel type.
- Monthly (or less frequent billing period) water use. (If available, separately for indoor and outdoor uses.)
- Anecdotal information on repair, maintenance, and custodial experience related to WSSP points achieved.

Optional: To provide useful information on energy and water use, a benchmark for comparison will also be needed. Enter building information on [Energy Star’s Portfolio Manager](http://www.energystar.gov/index.cfm?c=evaluate_performance.bus_portfoliomanager) to determine an Energy Star rating.

### Resources

- OSPI High-Performance School Building Program,
  [http://www.k12.wa.us/SchFacilities/Programs/default.aspx](http://www.k12.wa.us/SchFacilities/Programs/default.aspx)
- WSSP Annual Report Format
- Washington Middle School POE

- EPA’s Energy Star Portfolio Manager,
PEO 3.1: Post Occupancy Evaluation

<table>
<thead>
<tr>
<th>1 point</th>
<th>Conduct a Post-Occupancy Evaluation (POE) at least one year after the building is occupied. The evaluation shall include at a minimum:</th>
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<tbody>
<tr>
<td></td>
<td>• The required analysis of resource use (energy and water)</td>
</tr>
<tr>
<td></td>
<td>• Surveys of occupants regarding comfort, including thermal comfort, air quality, and acoustical comfort.</td>
</tr>
<tr>
<td></td>
<td>• A written plan and/or contract for a POE should be in place at the time of substantial completion.</td>
</tr>
</tbody>
</table>

For an additional point, the POE should investigate connections between the facility and health, user satisfaction, academic achievement, and other fundamental goals of facility construction.

A POE is a formal process which measures building performance. It is an important means of building a body of knowledge about the impact of sustainable building strategies employed in a particular building. This knowledge will be useful for school districts in planning future capital projects in implementing green building requirements. The first part of this category is required by RCW39.35D, with one point available for expanding this information to include a POE. The POE should be coordinated with meeting this requirement for the first year of operation.

At a minimum, the POE required for earning this credit includes occupant surveys regarding comfort, including thermal comfort, air quality, and acoustical comfort, as well as an analysis of energy and water use. Additional evaluation activities could include air quality monitoring and thermal and light level testing.

A POE can be simple or complex. Examples of POE occupant surveys are available. In 2005-6 Cascadia Region Green Building Council sponsored a small research study including several POEs of green buildings in Washington and Oregon. A thorough POE of a middle school in Washington is available on the OSPI website.

Resources

Center for the Built Environment, University of California, Berkeley, at http://www.cbe.berkeley.edu/

Cascadia Region Green Building Council, www.cascadiagbc.org


New Buildings Institute, www.newbuildings.org


Healthy School Environments Assessment Tool (HealthySEAT v.1.0) free at www.epa.gov/schools/healthyseat/
PEO 3.2: Energy and Life Cycle Cost Analysis

| Required | As part of the early design process, perform an Energy Life Cycle Cost Analysis (ELCCA) showing net present value over 30 years of the major energy using systems considered for the project that are anticipated to consume significant amounts of energy.

1 point | Perform a Life Cycle Cost Analysis (LCCA) showing net present value over 30 years of major building systems (at least 4, not including energy, which is required) considered for the project. Systems included flooring, roofing, envelope, etc.

The ELCCA is required for public buildings in Washington. The State ELCCA program is administered by the Department of General Administration. Guidance and spreadsheets available on the web page.

Typically, first cost is the primary economic factor when analyzing whether to proceed with a specific strategy, sustainable or not. However, it is in the long period of operation that the employed strategy will prove economically advantageous or not.

A Life Cycle Cost Analysis (LCCA) will provide a much more accurate context for decision making. Ideally, this analysis compares alternatives that are relevant and viable options of interest to the owner and project participants.

There are a variety of methods to use to conduct an LCCA, varying in complexity. The National Institute of Building Sciences describes LCCA in its Whole Building Design Guide. The discussion includes a description of “Present Value” Analysis required to earn this credit. This method converts cash flows to present values by discounting them to a common point in time.

The spreadsheet available through the Washington State ELCCA program is available electronically and can be modified to address alternatives other than energy.

Resources

FEDS Software, Pacific Northwest National Laboratory, www.pnl.gov/FEDs
Many operational activities can take place either at the particular high-performance school building or at the district level to further expand the features of high-performance school --- not just the building. Many of these plans and programs may already be implemented in the district, and occur during the operation. To be able to claim these particular points, the responsible members of project team or district will have to commit to implementation and annual reporting, since these activities are beyond the scope of the construction team.

<table>
<thead>
<tr>
<th>From 1 to 4 possible points</th>
<th>Receive one point for each activity (no more than four points for WSSP scorecard). Additionally, each will have to be reported on in the required PEO3.0 Operational Performance Monitoring annual report, for five years.</th>
</tr>
</thead>
</table>

1 point: **Enhancement of Maintenance Plan**

To get this point, the comprehensive building maintenance plan must have a system to track maintenance and operational issues related to high-performance features.

State assisted school buildings, board accepted after 1994, must participate in the new Asset Preservation Program (APP) in order to be eligible for future state assistance. A district maintenance plan is required as part of the APP.

The district maintenance plan includes an inventory of all equipment in the school and the preventative maintenance needs.

**RESOURCE:** OSPI School Facilities, Asset Preservation Program, [http://www.k12.wa.us/SchFacilities/Programs/AssetPreservation.aspx](http://www.k12.wa.us/SchFacilities/Programs/AssetPreservation.aspx)

1 point: **Resource Conservation Plan and GHG Reduction Plan**

Develop an implement a Resource Conservation Plan for the building and the district. Use ENERGYSTAR® Portofolio Manager or other utility tracking system to track energy and resource use at all district buildings. This helps create baseline information in which to compare energy scores of buildings across the district, region, state and nation. To get the point, the district must have the resource conservation plan and active utility tracking software or account and a plan to enter building data. AND

Develop a district plan with goals for greenhouse gas reduction and vehicle miles traveled reduction.


1 point: **IAQ Management Plan.**

Use EPA’s *Design Tools for Schools* as a design reference and resource. Implement the EPA’s *Tools for Schools Program* or an alternative, equivalent in scope and effectiveness. Include the plan in the *Facility Maintenance and Commissioning Plans*.

To get this point, an IAQ management plan must be in place.

**RESOURCE:** EPA’s *Design Tools for Schools*, [http://www.epa.gov/iaq/schooldesign/](http://www.epa.gov/iaq/schooldesign/)
1 point: Integrated Pest Management (IPM) Program.

Develop and implement a formal IPM Program that follows the model IPM program for schools in Washington State developed by Urban Pesticide Education Strategy Team (UPEST). To get this point, an IPM plan must be developed and implemented for the school or the district.


IPM Information, WSU Cooperative Extension service, http://ipm.wsu.edu/

1 point: Transportation Options Program.

Develop and implement a Transportation Options Program, with input from the local community and other stakeholders. The goal of the plan is to improve the school’s connection to the community by offering students and staff more transportation choices – such as public buses, rail, biking, and walking.


1 point: Fuel Efficient Buses.

Provide student bus service in vehicles that are fuel efficient. At least 20% of the district-owned buses and maintenance vehicles serving the school should be fuel efficient. If district bus service is provided under contract from a third party, then 20% of the buses used to service the school’s use fuel efficient.


1 point: Food Related Waste Prevention and Management.

Develop a plan for food waste management, and design the project to address special handling options for food preparation and related wastes. Many systems can handle food waste, either on-site or off-site. Some options include composting, worm bins, municipal collection, vegetable/herb gardens, etc.). To get this point, the school should be planning to manage food waste.


1 Point: Comprehensive Green Purchasing and Cleaning Plans

Develop and implement a green purchasing and cleaning program for the district. To get this point, the district should have a plan for the selection, purchase, and proper use of products used in the school. It should include typical products and cleaning products and any hazardous materials. The plan should ensure the protection of the the students, staff, and workers.

RESOURCES:


Cleaning for Healthy Schools, http://www.cleaningforhealthyschools.org

Each K–12 construction project that is required to comply with RCW 39.35D High-Performance Public Buildings must submit requested documentation to OSPI in alignment with the construction assistance D forms. This section outlines how OPSI has incorporated high-performance requirements into the state construction assistance D-Form Process.

**Planning Grant Award (OSPI to District)**

Please take into consideration the new requirements in [RCW 39.35D](#) High-Performance Public Buildings in the Study and Survey.

**Application for Project Approval (District to OSPI)**

Indicate which High Performance standard this building will use:

- [ ] Washington Sustainable Schools Protocol
- [ ] LEED (silver)  [ ] LEED for Schools (silver)
- [ ] Not Applicable OR “Not Practicable” (Attach description for OSPI determination)

**Project Approval (OSPI to District)**

This project may be subject to [RCW 39.35D](#) High-Performance Public Buildings

**Application for Preliminary Funding Status (District to OSPI)**

Submit preliminary WSSP scorecard or LEED scorecard

See website for this and other documents: WSSP Work Plan & Costing

[http://www.k12.wa.us/SchFacilities/Programs/HighPerformanceSchoolBuildings.aspx](http://www.k12.wa.us/SchFacilities/Programs/HighPerformanceSchoolBuildings.aspx)

**Application to Enter into Contracts**

The D8 letter will include reminders to this affect:

If this project is required to comply with RCW 39.35D High-performance public buildings the following information will need to be submitted to [HPSB@k12.wa.us](mailto:HPSB@k12.wa.us) at the time of the D9 submittal:

1. **Design-phase** WSSP or LEED scorecard (Update of the Preliminary)
2. **Sustainable Building Strategy** (2-4 page narrative of sustainable features selected)
3. **Energy Model Summary** (brief summary showing different systems were evaluated)
4. **Cost Estimate** of the incremental increases related to high-performance compliance for
   - District administration/overhead and reporting costs
   - Professional design and consultant’s fees
   - Construction Costs
   - Permitting and approval fees

See WSSP Cost Sheet of WSSP Work Plan & Costing 2008 (Excel Workbook)

**Application for Release of Retainage**

With the D11, submit a certification letter that the district submitted information below required and certification that annual monitoring and reporting to OSPI (PEO3.0) will take place for 5 years after occupancy. At the time of the D11, submit to [HPSBP@k12.wa.us](mailto:HPSBP@k12.wa.us)

1. **Construction-phase** WSSP or LEED scorecard (Update of Design-phase)
2. **Final Cost Estimates**