Sites

SS.P1: Site Selection and Evaluation — Prerequisite

Applicability	Verification Required		
This prerequisite applies to new schools (except FIT evaluation). For modernization projects that do not encompass an entire campus, the FIT evaluation shall be provided for each building, portion of building and/or campus area affected by the modernization.	⊗ at Design Review	○ at Construction Review	○ at Performance Review

Intent: To select sites that are safe and healthy environments for students and staff and that protects top soil.

State and federal laws and regulations for school siting and environmental impact studies were created to prevent schools from being constructed on sites containing pollutants known to be hazardous to student and staff health. A variety of factors, from hazardous materials in the soil to airborne pollutants from nearby sources are included in the site review process. At existing facilities, an assessment should be undertaken to determine the environmental and health problems with the facilities prior to modernization.

Requirement

Prerequisite	SS.P1.1 New Schools. Complete a Phase I (and Phase II if necessary based on Phase I assessment) Environmental Site Assessment in accordance with ASTM E1527-05. This must include: • Identification of facilities within ¼ mile which might reasonably be anticipated to emit hazardous air emissions, or to handle hazardous or acutely hazardous material, substances or waste, and a determination is made that such facilities will not adversely affect the health of students, staff or teachers. • A risk assessment and implementation of appropriate mitigation measures, or the establishment of appropriate "buffer zones", to ensure that the proposed school site would not expose school occupants to significant health or safety risks from rail lines, hazardous material pipelines, high power transmission lines, toxic air emissions from stationary sources, or other sources of pollution. • Written findings verifying that the site is not currently or formerly a hazardous, acutely hazardous substance release, or solid waste disposal site or, if so, that the wastes have been removed. Also, the written findings must state that the site does not contain pipelines, which carry hazardous wastes or substances other than a natural gas supply line to the school or neighborhood. If hazardous air emissions are identified, the written findings must state that the health risks do not, and will not, constitute an actual or potential danger of public health for students or staff. If corrective measures of chronic or accidental hazardous air emissions are required under an existing order by another jurisdiction, the governing board shall make a finding that the emissions have been mitigated prior to occupancy of the school. • Identification of train tracks, freeways or traffic corridors within 500 feet of the site and analyses that neither short-term nor long-term exposure to air pollutants poses significant health risks to students.

Requirement Continued

Prerequisite	SS.P1.1	New Schools Requirements Continued... • Site the school with at least the following distances from the edge of respective power easements above ground; 100 feet for 50-133 kV lines, 150 feet for 220-230 kV lines, and 350 feet for 500-550 kV lines. • The site shall be self draining, including detention ponds or other engineered systems (lakes) to control and direct water, and free from depressions in which water may stand and be allowed to stagnate. The site shall be kept free from refuse, weed overgrowth, and other hazards. Livestock or poultry shall be located more than fifty (50) feet from food service areas, offices, or classrooms except those offices and classrooms associated with animal husbandry activities. • The site shall not be located near an above-ground water or fuel storage tank or within 1500 feet of the easement of an above ground or underground pipeline that can pose a safety hazard as determined by a risk analysis study, conducted by a competent professional, which may include certification from a local public utility commission. • If the site is located in an agricultural area, identify drift problems throughout the year from highly toxic and volatile pesticides. Pesticides under concern are listed as "Restricted Use Products" by the U.S. EPA. If highly toxic and volatile pesticides are identified and not mitigated, the school will not meet this prerequisite. • If the school drinking water source is an on-site private well, the well water must be tested by the local health department or authority having jurisdiction to ensure the water is free of harmful contaminants prior to occupancy. The local jurisdiction may require further testing during occupancy. • The site should not be in a tsunami inundation zone; a major flood plan; or a potential landslide area.
Prerequisite	SS.P1.2	Major Modernizations • Identify facilities within ¼ mile, which might reasonably be anticipated to emit hazardous air emissions, or to handle hazardous or acutely hazardous material, substances or waste, and a determination is made that such facilities will not adversely affect the health of students, staff or teachers or that mitigation measures have been implemented. • Modernization projects shall complete the latest version of the FIT (Facility Inspection Tool) developed by the California Office of Public School Construction (OPSC).

Implementation

"A "Freeway or other busy traffic corridors" means those roadways that, on an average day, have traffic in excess of 50,000 vehicles in a rural area, and 100,000 vehicles in an urban area.

Modernization projects shall provide a copy of the Facility Inspection Tool (FIT) spreadsheets, completed within six months of the start of the design phase of the project. The FIT may be undertaken by district facility personnel, school staff, or project architect, but shall be reviewed by the project architect if prepared by others.

Verification

For projects seeking verification through the CHPS Verified Program (Pg 12), compliance documentation is required at only design review.

Design Review Requirements	
SS.P1.1	Provide Phase 1, and Phase 2 if necessary, Environmental Site Assessment in accordance with ASTM E1527-05. The Site Assessment should include all items covered in SS.P1 regardless of whether or not they are normally covered in a Phase 1 or Phase 2 Environmental Site Assessment.
SS.P1.2	Major modernization projects must provide a copy of a completed OPSC FIT (Facility Inspection Tool), EPA Tools For Schools program assessment, or an equivalent assessment.

Resources

Hawaii EDSPECS Chapter 2: Planning: http://fssb.k12.hi.us/educational_specifications.htm

OPSC, FIT – Facility Inspection Tool: General information:
http://www.opsc.dgs.ca.gov/Programs/SABPrograms/GRS.htm

EPA School Sitting Guidelines: http://www.epa.gov/schools/siting/

EPA Travel and Environmental Implications of Schools Sitting:
http://www.epa.gov/smartgrowth/school_travel.htm

EPA Restricted Use Product List: http:/www.epa.gov/opprd001/rup/

ASTM Environmental Assessment Requirements: http://www.astm.org/Standards/E1527.htm

Sites

SS.P2: Construction Site Runoff Control — Prerequisite

Applicability	Verification Required		
This prerequisite applies to a new school that disturbs one acre or more of land. For major modernizations and a new building on an existing campus this prerequisite is required based on the scope of the project.	⊗ at Design Review	⊗ at Construction Review	○ at Performance Review

Intent: Reduce erosion and negative impacts on water and air quality during construction.

Erosion results when wind and precipitation carry away soil that has not been protected during site clearing and earth moving operations. This leads to degradation of property and sedimentation of local water ways. Mitigation measures to protect soil during construction reduce negative impacts to water and air quality.

In some areas, it is the responsibility of all jurisdictions to apply for an annual permit in order to verify compliance with established state and local program requirements.

Requirement

Prerequisite	SS.P2.1 Control erosion and the transport of soil and other pollutants off the site during construction. Design and implement a site-specific plan that incorporates the use of best management practices in compliance with the U.S. EPA's National Pollutant Discharge Elimination System (NPDES). The plan should incorporate Part 2 of the NPDES Construction General Permit: General Permit for Stormwater Discharges from Construction Activities (see link in resources below). The plan shall meet the following objectives: • Prevent soil loss by wind and water erosion, including protecting topsoil by stockpiling for reuse. • Prevent transport of sediment and particulate matter to storm sewers or receiving waters and/or to air. • Eliminate or reduce off-site discharge of construction waste. • Prevent pollution of the air with dust and particulate matter.

Implementation

The contractor or owner must submit and implement a site-specific Stormwater Pollution Prevention Plan (SWPPP) that includes specific controls for preventing water and air-borne soils from being carried off-site. Controls must stay in place and be maintained throughout the period of construction. Provide specification language requiring filing of a SWPPP to local Regional Water Quality Control Board or other agency having jurisdiction.

The property owner must submit a Notice of Intent (NOI), and develop and implement a site-specific Stormwater Pollution Prevention Plan (SWPPP) to comply.

The property owner shall verify with local agencies whether or not any additional requirements apply to the project site.

Verification

For projects seeking verification through the CHPS Verified Program (Pg 12), compliance documentation is required at design review and construction review.

Design Review Requirements	
SS.P2	Construction drawings must include the site runoff control measures and Property Owner Notice of Intent.
Construction Review Requirements	
SS.P2	Provide the SWPPP and pictures identifying measures taken throughout construction.

Resources

CHPS Best Practices Manual, Volume II: Guideline SP11: Stormwater Management and Drainage Materials.

HI Department of Transportation Stormwater SWMPP http://stormwaterhawaii.com/program_plan/

US EPA NPDES Construction General Permit: cfpub2.epa.gov/npdes/stormwater/cgp.cfm

Stormwater Pollution Prevention Plan: http://www.dot.ca.gov/hq/construc/stormwater/manuals.htm

The electronic Notice of Intent can be found here on the EPA's NPDES website:

http://cfpub.epa.gov/npdes/stormwater/enoi.cfm

Sites

SS.C1 Sustainable Site Selection — 4 Points

Applicability	Verification Required		
All projects. A new building on an existing campus or additions to existing buildings can earn this credit if the site for the new building or addition is not on environmentally sensitive land. For major renovations, this credit may be earned if it can be verified that the site is not environmentally sensitive land as defined by SS.C1.	⊗ at Design Review	○ at Construction Review	○ at Performance Review

Intent: Avoid development on environmentally sensitive sites to reduce impact of the building footprint. Protect open space and channel development to previously developed sites in order to protect habitat and natural resources.

Protect environmentally sensitive site features, such as wetlands and tree stands, and encourage landscaping and architecture that responds to and includes the school's immediate environment. A district faces many issues during site selection. Cost, student demographics, and environmental concerns all influence when sites are acquired and how the school district uses them. The site is a crucial element in determining the overall sustainability of the school. 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. However, districts that are 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.

Urban redevelopment reduces environmental impacts by utilizing established infrastructure and preserving the open space of undeveloped lands. If the site already contains a building, additional credits may be possibly earned with Materials Credits MW.C8 and MW.C9 on Building Reuse.

Requirement

	Do not develop buildings or impervious surfaces on portions of sites that meet any one of the following criteria:
1 point	SS.C1.1 Do not temporarily or permanently modify land, which prior to acquisition for the project was public parkland, conservation land, or land acquired for water supply protection.
1 point	SS.C1.2 Do not develop buildings on land whose elevation is lower than 5 feet above the elevation of the 100-year flood as defined by FEMA and as shown on the FEMA Flood Insurance Rate Map (FIRM) for the site OR comply with the National Flood Insurance Program (NFIP) requirements.
1 point	SS.C1.3 Land that is within 50 ft of any wetland as defined by 40 CFR (Code of Federal Regulations), Parts 230-233 and Part 22, OR as defined by local or state rule or law, whichever is more stringent.
1 point	SS.C1.4 Do not build on greenfields. For the purposes of this credit, greenfields are defined as undeveloped lands or lands that are used for agriculture, forestry, or park purposes. Undeveloped lands are defined as lands that have not been in use for a period of 50 years or more and cannot be identified, by visual inspection, as having been developed. SS.C1.5 Do not build on land that provides habitat for any species on the federal or state threatened or endangered list. SS.C1.6 Do not build on land that is important farmland as defined by the US Department of Agriculture (USDA).

Implementation

SS.C1.1

Provide pictures showing the current use of the school site and a letter from the local jurisdiction confirming current and previous uses and designations.

SS.C1.2

Do not construct permanent buildings, or structures to support buildings within the 100-year flood plain. Both federal and state agencies have worked together over the last several decades to prevent construction of buildings in 100-year floodplains to achieve two important results: 1) a significant decrease in building damage and liability and 2) a restoration of functional floodplains to absorb flood waters and minimize impacts to downstream communities.

"Above the floodplain" means that the building footprint must be above the 100-year flood plain, but the requirement does not apply to non-building areas of the site.

Consult with FEMA to determine the 100-year floodplain for the school site. Verify that the proposed construction site is located at an elevation five feet or higher than the 100-year floodplain. Hawaii is in FEMA Region IX. Provide the portion of NEPA document indicating site is located five feet or higher than the 100-year flood plain.

SS.C1.3

Do not build on sites, which are within 50 ft. of a wetland as defined below. Site development includes the school facilities, playing fields and parking lots and construction operations that are not related to wetlands improvement. Survey the site to determine if wetlands exist on, or near the site. Verify that all construction

activity, including parking lots, playgrounds or any structures are located more than 100 feet from wetlands. Consult with federal regulations 40 CFR, Parts 230-233 and Part 22, or local, or state rule to determine if an area qualifies as a wetland. If more than one definition exists, use the one that is more stringent. The term wetlands is defined in Title 40 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]. Provide the portion of NEPAdocument indicating that the site is located more than 50 feet from wetlands.

SS.C1.4

During the site selection process, use previously developed sites instead of greenfields. Redevelopment reduces environmental impacts by utilizing established infrastructure and preserving the open space of undeveloped lands.

SS.C1.5

Verify that the proposed site is not habitat to any species on the federal or state, threatened or endangered list. Provide the excerpt of NEPA document indicating that the site is not habitat to any species on the federal or state, threatened or endangered list.

SS.C1.6

Verify that the proposed site is not important farmland as defined by the U.S. Department of Agriculture (USDA). The Natural Resources Conservation Services (NRCS) division of the USDA maintains the definitions and soil surveys that designate areas as "important farmland".

Verification

For projects seeking verification through the CHPS Verified Program (Pg 12), compliance documentation is required at only design review.

Design Review Requirements	
SS.C1.2 and SS.C1.3	Construction drawings must include a site plan that identifies the building footprint and any wetlands within 100'. (Utilize the U.S. Fish and Wildlife Service Wetlands Mapper at: http://wetlandsfws.er.usgs.gov/wtlnds/launch.html to identify wetland locations.) On the same drawing include the 100-yr flood plain and a line indicating a 5' in elevation above the flood line if either cross the site. (Use a map from the FEMA web site to identify 100-yr flood plain).
SS.C1.1, SS.C1.4, SS.C1.5 and SS.C1.6	Construction drawings must include the site parcel number and the previous use of the site.

Resources

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 (FOTG) located in each NRCS field office. County and state offices of the NRCS keep maps showing the status of lands within their jurisdiction. County offices can be located at: http://offices.sc.egov.usda.gov/locator/app

Federal Wetlands information (40 CFR, Parts 230-233) can be found at the US EPA website: www.epa.gov/owow/wetlands/regs/

FEMA Region IX: http://www.fema.gov/plan/ehp/regionix/hawaii.shtm

Hawaii Department of Land and Natural Resources: http://hawaii.gov/dlnr

Sites

SS.C2: Joint-Use of Facilities and Parks — 3 Points

Applicability	Verification Required		
All projects. A new building on an existing campus can claim this credit only if the building is designated as a "Joint-Use Area", and the above requirements are satisfied for the whole campus. A renovation project can claim this credit if new measures are taken or if the existing campus already satisfies the requirements.	⊗ at Design Review	⊗ at Construction Review	○ at Performance Review

Intent: Allow for more community and neighborhood integration within the school facility and grounds.

Joint-use of school facilities is a growing trend across the country and state. Many schools make their facilities available to community groups during and/or after schools hours providing benefits to both the school and the community. The design of the building must designate an area for joint-use and address access and security measure considerations to facilitate use during and/or after school hours.

Parks, playgrounds and athletic fields are community resources, which should be made available after school hours. By sharing these assets with local parks, the cost of maintenance can also be shared. Joint-use can have a variety of benefits, including increased campus security, improved community integration, and reduced site acquisition and construction costs.

Requirement

1 -2 points	SS.C2.1 Design, with community involvement, one or more spaces (2,500ft^2 minimum) for use by community or other appropriate organizations. The plans shall designate this area as the "Joint-Use Area" and must contain bathroom facilities that can be accessed without compromising the security of the non-joint-use portions of the facility (1 point). Provide an entrance for spaces identified for joint-use so that after school hours access cannot be granted into the non-public parts of the school buildings. The "Joint-Use Area" must be accessed and secured independently of the non-joint-use portions of the facility (2 points).
1 point	SS.C2.2 Share at least 75% of park and recreation space, based on total square feet of availability, with the community.

Implementation

SS.C2.1

The most successful schools have a high level of parent and community involvement. This involvement can be enhanced if a school is designed so that neighborhood meetings, recreation activities, and other community functions can take place at the school in a safe and secure fashion.

Building or renovating a school provides an opportunity for the community to incorporate municipal programs and services into the building program. During the planning stages, school districts should give careful thought

to the types of programs, services, and facilities they may wish to offer via the future school building (e.g., library services, recreation services, meeting space, space for special events, etc.).

Other strategies that contribute to shared use of the school building include designing separate entrances for spaces likely to be shared, adjusting building orientation and layout to separate classroom and administration areas from shared spaces during events, and designing special features into the school that the community can use. This may also lead to additional energy and maintenance benefits.

To earn this credit the physical design must incorporate measures to facilitate joint-use while providing security for the school. Provide doors or security gates to close off portions of the school that are not being used during off-hour events.

SS.C2.2

This credit is intended to encourage schools to share their recreational space with the community at large or vice versa –to encourage municipalities to allow schools to use local parks in lieu of having the school construct playing fields. Either arrangement allows the community to optimize resources dedicated to community and school recreation.

A copy of the formal agreement between the school district and municipality on joint use of parks and recreational space OR provide copies of applicable insurance policies governing use of the parks or recreational space by the municipality or by the school if the spaces are municipally owned.

Urban schools with a lack of adequate outdoor space may consider use of off-site public park space to comply.

Verification

For projects seeking verification through the CHPS Verified Program (Pg 12), compliance documentation is required at design review and construction review.

Design Review Requirements	
SS.C2.1	Construction drawings must include a site plan that identifies the "Joint-Use Area" and the bathroom facilities that can be accessed without compromising the security of the non-joint-use portions of the facility. If credit is claimed for the separately accessed and secured entrance, provide notes indicating its location as well.
SS.C2.2	Construction drawings must include a site plan that identifies the area of recreation space available for joint-use. A calculation must be provided on the sheet that includes the total amount of recreation and park space available, and the percentage of that space available for joint-use.
Construction Review Requirements	
SS.C2.2	Provide a copy of the agreement between organization(s) and school district, school principal, or school board to provide joint-use. The agreement should be signed by both parties and state the facilities /parks to be used and for what purpose. OR provide copies of applicable insurance policies governing use of the parks or recreational space by the municipality or by the school if the spaces are municipally owned.

Resources

New Schools Better Neighborhoods offers information on the benefits of joint-use facilities, examples of join-use projects, joint-use analysis, recommendations, and policies at: www.nsbn.org/case/jointuse/.

Sites

SS.C3: Central Location and Public Transportation — 3 Points

Applicability	Verification Required		
All projects. When calculating the credit for all cases, base calculations on the total school population, not just the population of the new building, addition or the building(s) being modernized. A major modernization project and a new building on an existing campus can claim this credit if the existing campus already satisfies the requirement, or if the site is expanded and satisfies the requirement.	○ at Design Review	⊗ at Construction Review	○ at Performance Review

Intent: To promote smart growth through centrally locating schools close to dense, mixed-use areas to decrease dependence on vehicles, and improve human health through increased physical activity.

Over the lifetime of the building, schools and parents invest significant amounts of time, energy, and money transporting students to and from school. Transportation in Hawaii is the single largest energy using sector, accounting for approximately 48 percent of total energy use in the state. Cars driven by parents, guardians, or the students themselves are one of the largest resource users and sources of pollution. Centrally located sites allow more students to walk or bike to school, while reducing the distance cars must travel.

Furthermore, locating new schools in areas of density and/or mixed use allows more students to walk or bike to school, while reducing the distance cars must travel. Schools located near public and private services such as libraries and community centers not only allow students to access these services after school, they put parents en route to these services if they pick their children up after school (though use of public transportation is strongly encouraged). Planning around centers of public and private activity is embodied in the concept of Smart Growth, which promotes dense development in order to preserve public parks and natural features such as open space and wildlife habitat.

Requirement

2 points	SS.C3.1 Centrally located sites. Create centrally located sites in which 50% of students are located within the following distances; Elementary schools one mile, Middle schools two miles, and High schools two miles. **OR** SS.C3.2 Site the school within a maximum of ½ mile of at least eight (8) of the basic services listed below from entrances: 1) Supermarket; 2) Commercial Office Building; 3) Convenience Grocery or Farmers Market; 4) Day Care; 5) Fitness center; 6) Hardware; 7) Laundry 8) Library; 9) Medical/Dental Services; 10) Senior Care Facility 11) Public Park; 12) Pharmacy; 13) Post Office; 14) Bank; 15) Community Center (e.g., recreation center, after-school program building, or art center).

	OR SS.C3.3 If the project is in a rural school district as defined by the National Rural and Small Schools Consortium (the district inhabitants number is fewer than 150 per square mile, or if the district is located in a county where 60% or more of the population lives in communities of 5,000 or fewer), locate the school so that it relates to the historic central main street business district of the town/city by meeting at least one of the following criteria: • Locate the school within a quarter (1/4) mile of the historic central main street business district. Provide a direct pedestrian connection between the school and the business district that includes walking paths and bicycle paths; or • Locate the school on the grounds of a historic school grounds, that is, or has been the site of school buildings constructed before 1940; or • If there are long term energy use, or transportation circumstances that lead it to be more efficient to site the school in a centralized location to serve multiple districts, or between schools, submit your own proposal showing why it is more transportation and/or energy efficient.
1 point	SS.C3.4 Locate building(s) within 1/2 mile of a commuter rail, light rail or subway station, or within ¼ mile of one or more bus lines. **OR** SS.C3.5 Provide busing service for students where municipal transit is not available, and biking or walking are not practical. 40% of buses used for the project must be low emission buses that use alternative fuel and/or have been retrofitted with a verified emission control strategy.

Implementation

SS.C3.1

To earn this credit, calculations must be based on the estimated school population when the school opens or when a new building on an existing campus opens. Develop a site map that identifies the school site and the location of the student population that the school supports. Draw a circle centered on the school using the mile requirement by school level listed in SS.C3.1 as the radius.

Verify that at least 50% of the school's students are within the circle.

SS.C3.2

Provide a map showing the ½ mile perimeter around the school and indicating the names and location of eight of the basic services listed in the credit text box. The ½ mile radius may be drawn from EITHER the front entrance of the school, where the school driveway meets the public way, or from the front door of the school. The front door of the basic service identified on the map must fall within the ½ mile radius. Online tools such as MapQuest™ or Google Maps™ may also be submitted as documentation of the ½ mile radius.

SS.C3.4

The energy use and pollution associated with transportation often dwarfs the total lifetime energy used by the school itself. Locating the site close to public transportation, encouraging use of public transportation and carpooling by minimizing parking, and creating bike facilities and safe walking/biking access all reduce the automobile-related pollution. 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.

Provide an area map locating transportation lines within the distance to school as noted. Measure from the main entrance of the school building (i.e. front door), and mark bus stops or stations for commuter rail, light rail, or subway lines.

SS.C3.5

Acceptable alternative fuels are defined by the U.S. Department of Energy under the Environmental Policy Act (EPAct) of 1992. Verified emission control strategies are defined by the U.S. Environmental Protection Agency (EPA). The EPA has a list of approved retrofit techniques for engines (See resources for link).

Verification

For projects seeking verification through the CHPS Verified Program (Pg 12), compliance documentation is required only at construction review.

Construction Review Requirements	
SS.C3.1 and SS.C3.3	Provide an explanation or methodology, and appropriate back up for option chosen.
SS.C3.2 and SS.C3.4	Provide a map showing the required features and distance to the school. If both credits are claimed use the same map if reasonable.
SS.C3.5	The district must provide a letter (or school board in the case of private and charter schools) describing the busing service provided for students, including the percentage of buses that meet the required standards, and how they meet it. Provide picture(s) of the buses and identifying signage or the technology demonstrated.

Resources

Population information is available from the U.S. Census Bureau at: www.census.gov/geo/www/ua/ua_2k.html

EPA's Smart Growth site: www.epa.gov/smartgrowth

U.S. EPA Approved Retrofit Techniques: www.epa.gov/otaq/retrofit/verf-list.htm

Sites

SS.C4: Cultural Responsive Design — 1 Point

Applicability	Verification Required		
All projects.	⊗ at Design Review	⊗ at Construction Review	○ at Performance Review

Intent: Provide school environments that embrace and reflect Hawaii's cultural history and "sense of place".

Every Hawaii Island has a unique and rich cultural history. The islands have been influenced by over a century of settlers leaving and adapting their own distinct customs, traditions and lifestyles, from the early Polynesians, Protestant Ministries, and American Colonists, to the plantation era, significant military presence and historic events of World War II. Today more than one in four public school students are Native Hawaiian. School sites and buildings should resonate with the space and area they are in.

Requirement

1 point	SS.C4.1 As part of the school design incorporate cultural, spiritual, historical, archeological and architectural uses of the site and/or local area, also known as the ahupua'a. The integrated features must be physically present, and include appropriate signage signifying its connection and significance.

Implementation

Gain an understanding of the areas cultural, spiritual, historical, archeological, and architectural history. This may include its oral history, and researching previous land uses. In addition, how the project site fits into its ahupua'a, a historical means for division of land between the mountains and sea that is intended to provide a balance in land use, natural resources and conservation.

Examples of features that would be worthy of credit include incorporating crops in the landscaping that were historically produced, responding to historical architectural features, incorporating native permanent art, and honoring the sense of 'ike.

The outcome and proposed features should be documented in the Basis of Design and construction drawings. The features should be considered for incorporation into curriculum, although not required.

Verification

For projects seeking verification through the CHPS Verified Program (Pg 12), compliance documentation is required at design review and construction review.

Design Review Requirements	
SS.C4	Construction drawings must identify (location and details) and describe features used to meet this credit, including the associated educational signage.
Construction Review Requirements	

SS.C4	Provide picture(s) of the features. They must show the associated educational signage.

Resources

Hawaii Department of Land and Natural Resources, State Historic Preservation Division: http://hawaii.gov/dlnr/hpd/

University of Hawaii at Manoa Kamakakukalani Center for Hawaiian Studies: http://www.catalog.hawaii.edu/schoolscolleges/hawaiian/kamakakuokalani.htm

University of Hawaii at Manoa Library-Hawaiian Collection: http://www2.hawaii.edu/~speccoll/hawaii.html

University of Hawaii at Hilo Hale Kuamo'o Center for Hawaiian Language and Culture: http://hilo.hawaii.edu/academics/hawn/

Hawaii State Public Library, Hawaii and Pacific Collection: http://www.librarieshawaii.org/hawaii_and_pacific/index.html

Office of Hawaiian Affairs (OHA) Native Hawaiian Historic Preservation Council: http://www.oha.org

Bishop Museum: Cultural Resources: http://www.bishopmuseum.org/research/cultstud/cultstud.html

HawaiiHistory.Org: http://www.hawaiihistory.org/index.cfm?fuseaction=ig.page&CategoryID=305

Sites

SS.C5: Reduced Building Footprint — 1 Point

Applicability	Verification Required		
All projects. A major renovation project can claim this credit if the building already satisfies the requirement or if an addition is planned above the ground level.	⊗ at Design Review	○ at Construction Review	○ at Performance Review

Intent: Reduce the extent of land used for development.

This credit is intended to mitigate negative impacts on existing ecosystems. Reducing a building footprint can reduce site disturbance to these systems. Multi-story schools decrease the amount of land used in construction and help preserve existing open space.

Requirement

1 point	SS.C5.1 Increase the Floor Area Ratio (FAR) of the school to be at least 1.4 to reduce the development footprint and preserve open space. In this document, the FAR is defined as building's gross square footage divided by the square footage of the building footprint. **OR** SS.C5.2 Provide at least 40% of the school site as open space. Open spaces include those that protect or restore native landscape, landscaped areas, recreational fields and outdoor student activity areas.

Implementation

Demonstrate that the design meets this requirement through the following equation:

$$\frac{\text{Total Floor Area of Building (ft}^2\text{)}}{\text{Total Floor Area of the Building Footprint (ft}^2\text{)}} \geq 1.4$$

Calculate the Floor Area Ratio (FAR) by dividing the school facility's footprint by the facility's entire square footage including all stories. Said another way, achieving a floor area ratio (FAR) of 1.4 requires at least 40% of the total building square footage needs to be above the first floor. The building footprint is defined as the ground surface occupied by the structure and excludes awnings, overhangs and projections from the building.

Special Considerations

When reducing the floor area ratio (FAR), a careful balance must be achieved between the energy benefits and costs of the building envelope, the footprint of the building, and daylighting and ventilation best practices.

Verification

For projects seeking verification through the CHPS Verified Program (Pg 12), compliance documentation is required at only at design review.

Design Review Requirements	
SS.C5.1	Construction drawings, ideally the title page that provides the overview of the project, must include both the building's gross square footage and the building footprint square footage.
SS.C5.2	Construction drawings, ideally the title page that provides the overview of the project, must include the square footage of open space.

Resources

None.

Sites

SS.C6: Human Powered Transportation — 3 Points

Applicability	Verification Required		
All projects; however, for a new building, addition or major modernization project to earn this credit, the calculations must be based on the number of occupants for the entire campus, not the individual building or building(s) being modernized. A major modernization project, a new building on an existing campus, and an addition can also claim this credit if the existing campus already satisfies the requirement.	⊗ at Design Review	⊗ at Construction Review	○ at Performance Review

Intent: Encourage alternative transportation methods to and from school that increase physical activity, improve health, and reduce dependence on fossil fuels.

Bicycles, scooters and skateboards are popular and pollution-free forms of transportation. When encouraging the use of bicycles it is important to encourage the safety of pedestrians and bicyclists through providing bike lanes and sidewalks.

Requirement

1 point	SS.C6.1 Provide suitable means for securing a minimum number of bicycles (anchored to the ground or wall and that support the bicycle in at least two points) and scooters outside the school, and/or skateboards indoors (including lockers and/or cabinets). The storage must be safe, convenient and at accessible locations for a minimum number of occupants (students, teachers and staff) as specified below: • Elementary 20% • Middle school 15% • High school 10%, and plan for an additional 5% in the event of growth through designated space, but not suitable means for securing.
1 point	SS.C6.2 Develop and implement a Safe Routes to School Plan (SRTS). The plan shall include collaboration with local organizations and the municipality to provide safe bike lanes or network that extends appropriately from the school site at least one mile into neighboring communities or access ways.
1 point	SS.C6.3 Promote walkability of the school sites by providing all of the following: • Sidewalks and dedicated bike lanes that extend at least from the school entrance to the end of the school property along roadways, and signage that prohibits use while inside the campus for safety. • Approaches to the school site that are pedestrian friendly (crosswalks) and do not require students on foot to cross main traffic arteries or bus and car loading drop offs. • A site layout should avoid hazardous entrances on main thoroughfares. Locate parking on the side or rear of the property to avoid pedestrian interface. • Street trees or other devices to separate vehicular traffic from pedestrians.

Implementation

SS.C6.3

To earn this credit, safe bicycle lanes must extend from the school entrance to the ends of the school property to protect and encourage cyclists. Work with the local authorities to extend the bike lanes beyond the project limits and across busy roads. Bike lanes should be designed to accommodate significant traffic (lane width established by the local jurisdiction) and be separated from pedestrian sidewalks and parking.

The purpose of this credit is to provide safe access to the school by students and staff who choose to walk or ride their bicycles to school.

Verification

For projects seeking verification through the CHPS Verified Program (Pg 12), compliance documentation is required at design review and construction review.

Design Review Requirements	
SS.C6.1	Construction drawings must identify the location and required storage. Include on the sheet the following completed calculation: Spaces Required: Number of Occupants ( ) x Percentage Required ( ) = ( )

	Spaces Provided: ( )
SS.C6.3	Construction drawings must include the required features.
Construction Review Requirements	
SS.C6.1 and SS.C6.3	Provide picture(s) of the features.
SS.C6.2	Provide the Safe Routes to School Plan (SRTS). Include pictures of strategies implemented to provide safe bike lanes or a network that extends appropriately from the school site at least one mile into neighboring communities or access ways.

Resources

CHPS Best Practices Manual, Volume II: Guideline SP3: Safe and Energy Efficient Transportation.

LEED™-Reference Guide: Site Credit 4.1: Alternative Transportation.

Safe Routes to Schools http://www.saferoutesinfo.org/guide/index.cfm

Sites

SS.C7: Parking and Electric Vehicles — 2 Points

Applicability	Verification Required		
All projects; however, for a new building, addition or major modernization project to earn this credit, the calculations must be based on the entire campus, not the individual building or building(s) being modernized. An existing campus, can claim this credit if the existing campus already satisfies the requirement.	⊗ at Design Review	⊗ at Construction Review	○ at Performance Review

Intent: Discourage the use of automobiles for transportation to and from school and encourage less carbon intensive options.

Excess parking spaces encourage increased automobile use, contribute to urban heat island effects, and can increase pollution from stormwater runoff. Design parking so as not to exceed listed amounts and include clearly marked, preferred parking areas.

Requirement

1 point	SS.C7.1 Comply with either local minimum parking requirements or those below, whichever are more stringent. **New Construction and Additions**: Size parking capacity not to exceed: • High schools: 2.25 spaces per classroom plus parking for 30% of students. • Elementary and Middle schools: 2.25 spaces per classroom. If event parking is provided, it must be permeable. AND provide preferred parking spaces and signage for 5% of total parking spaces for carpools, vanpools, and low-emitting, fuel-efficient vehicles (e.g. hybrids and vehicles using bio-diesel, CNG or other low-emitting fuel or technology). **Major Renovations:** Add no new parking compared to existing conditions, AND provide preferred parking spaces and signage totaling 5% of total parking spaces for carpools or vanpools and for low-emitting, fuel-efficient vehicles (e.g. hybrids, vehicles using bio-diesel, CNG or other low-emitting fuel or technology).
1 point	SS.C7.2 Provide designated electric vehicle spaces, including level 2 or 3 charging infrastructure for at least 2% of the total parking spaces provided (must include at least one space), or comply with a local or state law if more stringent.

Implementation

SS.C7.1

Excess parking spaces encourage increased automobile use, contribute to urban heat island effects, and can increase pollution from stormwater runoff. Design parking so as not to exceed listed amounts, and include clearly marked, preferred parking areas for carpools, vanpools and low-emitting, fuel-efficient vehicles. For the purposes of making calculations for this credit, classrooms include:

- General classrooms
- Art rooms
- Music classrooms
- Computer labs
- Science labs
- Special needs collaborative, and remedial classroom space

For new construction, provide a site plan showing parking layout (indicate total number of parking spaces). Highlight preferred parking spaces. Signage schedule highlighting Preferred Parking signage. Indicate number of classrooms (as defined for this credit) and total number of students.

For major renovation, provide an existing site plan showing existing parking conditions (indicate total number of parking spaces). Site plan of new parking layout (indicate total number of parking spaces). Highlight preferred parking spaces. Include a schedule or notes highlighting preferred parking spaces and signage.

If event parking is provided, it must be permeable (i.e. gravel or concrete grid with drainage).

SS.C7.2
Provide designated electric vehicle spaces, including either level 2 or 3 chargers for at least 2% of the total parking spaces provided (must include at least one space). This requirement builds on the Hawaii Act 156 which requires parking lots over 100 stalls to dedicate 1% to electric vehicle parking. The percentage under the act increases over time as the number of vehicle increases throughout the State.

Verification

For projects seeking verification through the CHPS Verified Program (Pg 12), compliance documentation is required at design review and construction review.

Design Review Requirements	
SS.C7.1	Construction drawings, ideally the site parking plan, must include the maximum allowed spaces and the number of provided spaces. Include on the sheet the complete calculation inputs, not just the result. For example, for a sample high school it would look like follows: Maximum Spaces Allowed: (2.25 spaces x 15 classrooms) + (30% x 300 students) = 124 Spaces Provided: 118 The site plan must also identify the required preferred parking spaces.
SS.C7.2	Construction drawings, ideally the site parking plan, must identify the electric vehicle charging spaces. Installation details and instructions for signage must also be provided on the same or a different sheet.
Construction Review Requirements	
SS.C7.1 and SS.C7.2	Provide picture(s) of the preferred parking spaces and/or electric vehicle spaces and signage.

Resources

CHPS Best Practices Manual, Volume II: Guideline SP3: Safe and Energy Efficient Transportation.

Hawaii Electric Vehicle Ready Program: http://energy.hawaii.gov/programs/transportation-on-the-move/ev-ready-program

Hawaii Act 156: http://hawaii.gov/dbedt/info/energy/efficiency/state

Sites

SS.C8: Post Construction Stormwater Management — 2 Points

Applicability	Verification Required		
All projects. For a new building on an existing campus, addition, or major modernization project, the requirement applies to the entire school site, not just the area around the new building or the building(s) being modernized. SS.C8.3 applies to new construction projects on previously developed land and renovation projects only. The credit does not apply to new construction schools on greenfield sites (open land).	⊗ at Design Review	⊗ at Construction Review	○ at Performance Review

Intent: Manage stormwater after construction to control erosion and runoff, recharge local aquifers, and maintain the quality of receiving waters. Encourage the use of Low Impact Development and other innovative techniques.

Reducing runoff is the most effective way to minimize its negative impacts to water quality. Many strategies exist to limit stormwater runoff, including:

Nonstructural Best Management Practices (BMP's)

- Use green or vegetated roofs.
- Preserve natural areas by concentrate or cluster development on a portion of the site, and leaving remaining land in its natural condition by limiting clearing and grading, maximizing trees and other vegetation, promoting natural vegetation, and preserving riparian areas and wetland.

Structural Best Management Practices (BMP's)

- Maximize on site stormwater infiltration by retaining pervious and vegetated areas and reducing impervious surfaces. Capture rainwater from impervious areas of the building for groundwater recharge or landscaping.
- Minimize stormwater pollutants of concern by designing the project to minimize direct connection between impervious areas with stormwater drainage through BMP's such as silt fences, earth dikes, drainage swales, and sediment traps.
- Protect slopes and channels by conveying runoff safely from the tops of slopes and stabilizing disturbed slopes, utilizing natural drainage systems to the maximum extent practical, stabilizing permanent channel crossings, vegetating slopes with native or drought tolerant vegetations as appropriate, and installing energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, etc.

Requirement

1 point (Quantity)	SS.C8.1 For sites with an existing imperviousness of less than or equal to 50%, limit the post-development peak stormwater runoff discharge rate so that it does not exceed the estimated pre-development rate. For sites with an existing imperviousness of more than 50%, implement a stormwater management plan that results in a 25% reduction in the rate and quantity of stormwater runoff. SS.C8.2 For all sites, design trash storage areas to provide appropriate drainage from adjoining roofs and pavement to divert stormwater runoff around the trash storage areas. The trash container areas must be screened or walled to prevent off-site transport of trash.
1 point (Quality)	SS.C8.3 Provide post-construction treatment control Best Management Practices (BMP). Incorporate, at a minimum, either a volumetric or flow based treatment control design standard, or in combination, as identified below to mitigate (infiltrate, filter or treat) stormwater runoff: Volumetric Treatment Control BMP The 85th percentile 24-hour runoff event determined as the maximized capture stormwater volume for the area, from the formula recommended in Urban Runoff Quality Management, WEF Manual of Practice No. 23/ ASCE Manual of Practice No. 87, (1998); or The volume of runoff produced from a historical-record based reference 24-hour rainfall criterion for "treatment" that achieves approximately the same reduction in pollutant loads achieved by the 85th percentile 24-hour runoff event. **OR** Flow Based Treatment Control BMP The flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity for the area; or The flow of runoff produced from a rain event that will result in treatment of the same portion of runoff as treated using volumetric standards above.

Implementation

For the purpose of verifying compliance, the peak stormwater discharge rate is assumed to be directly proportional to the imperviousness of the site. For example, a 25% reduction in imperviousness is assumed to equate to a 25% reduction in the peak stormwater runoff discharge rate.

The impervious site area is the sum of the area of each surface multiplied by its runoff coefficient, and the imperviousness of the site is the impervious site area divided by the total site area. Use the runoff coefficients for typical surfaces found in the Hawaii Stormwater Plan. Other surfaces or systems not listed may be considered if proper documentation is shown for runoff coefficients. Use manufacturers information or a "best estimate" for surfaces not included in the table. Calculate the imperviousness of the site both before and after development using the following equations. Note that many sites have vegetated surfaces but are underlain with high clay content soils that do not perc. For these sites, Runoff coefficients for the existing site should be adjusted to reflect higher runoff rates and care should be taken to develop methods for reducing the rate of runoff and increasing infiltration, if possible.

$$\text{ImperviousSiteArea} = \sum \text{SurfaceArea} \times \text{RunoffCoefficient}$$

$$\text{Imperviousness} = \frac{\text{ImperviousSiteArea}}{\text{TotalSiteArea}}$$

This calculation should be completed for the proposed development and pre-development conditions. For sites with an existing imperviousness less than 50%, the post-development imperviousness must be equal to, or less than, the pre-development conditions. In cases where the existing imperviousness is greater than 50% the post-development imperviousness must be 25% less than the existing conditions.

Example Calculations

Question: What is the imperviousness of an approximately ½ acre site (20,787 ft²) before and after development? The site is being converted from a *gravel* parking lot (11,420 ft²) to a new school.

Answer: The site has an existing imperviousness of 49% as calculated in Table . After the site is developed, it is estimated to have an imperviousness of 43% as calculated in Table 11. The post-development site has imperviousness less than the pre-development site, therefore, the peak stormwater runoff may be assumed to be lower and the credit may be earned.

Table 11 – Calculation of Existing Imperviousness

Surface Type	Runoff Coefficient	Area (ft²)	Impervious Area (ft²)
Pavement,Gravel	0.75	11,420	8,565
Vegetation, Flat	0.10	2,332	233
Vegetation, Average	0.20	7,035	1,407
Total		20,787	10,205
Imperviousness		49%	

Table 12 – Calculation of Post-Development Imperviousness

Surface Type	Runoff Coefficient	Area (ft²)	Impervious Area (ft²)
Pavement, Pervious	0.60	4,128	2,477
Pavement, Brick	0.85	1,072	911
Roof, Conventional	0.95	4,020	3,819
Roof, Rain Water Collection	0.0	3,400	0
Turf, Flat	0.25	3,542	886
Vegetation, Average	0.20	4,625	925
Total		20,787	9,018
Imperviousness		43%	

Question: What is the imperviousness of an approximately ½ acre site (20,787 ft²) before and after development? The site is being converted from a *paved* asphalt parking lot (11,420 ft²) to a new school.

Answer: The site has an existing imperviousness of 60% as calculated in Table 11. After the site is developed, it is estimated to have an imperviousness of 43% as calculated in Table 12.

60% x 25% = 15%.

60% - (60% x 25%) = 45% > 43%

The site's imperviousness is at least 25% less than it was before development.

Table 13 – Calculation of Existing Imperviousness

Surface Type	Runoff Coefficient	Area (ft²)	Impervious Area (ft²)
Pavement, Ashpalt	0.95	11,420	10.849
Vegetation, Flat	0.10	2,332	233
Vegetation, Average	0.20	7,035	1,407
Total		20,787	12,489
Imperviousness		60%	

Table 14 – Calculation of Post-Development Imperviousness

Surface Type	Runoff Coefficient	Area (ft²)	Impervious Area (ft²)
Pavement, Pervious	0.60	4,128	2,477
Pavement, Brick	0.85	1,072	911
Roof, Conventional	0.95	4,020	3,819
Roof, Rain Water Collection	0.0	3,400	0
Turf, Flat	0.25	3,542	886
Vegetation, Average	0.20	4,625	925
Total		20,787	9,018
Imperviousness		43%	

Design the project to maintain natural stormwater flows by promoting infiltration, using alternative surfaces (e.g., green roofs or permeable paving materials) and sustainable design strategies. Show BMP's on site plans, civil drawings and specifications. Include calculations to verify required levels are met. Schools should consider using organic, natural turf fertilizers during operation to improve water quality.

Verification

For projects seeking verification through the CHPS Verified Program (Pg 12), compliance documentation is required at design review and construction review.

Design Review Requirements	
SS.C8.1	Complete the HI-CHPS Plan Sheet to calculate stormwater management provided to HI-CHPS Verified projects at the point of registration. Surfaces identified will be cross checked with plans.
SS.C8.2	Construction drawings must identify trash storage areas, how water is diverted from this area, and measures taken to ensure the trash is not transported off-site (walls, screens).
SS.C8.3	Construction drawings must include the total volume of runoff and the total volume of runoff treated. In addition, drawings must call out where Best Management Practices (BMP's) are located and details where appropriate.
Construction Review Requirements	
SS.C8.2	Provide picture(s) of the primary trash storage areas showing appropriate draining from adjoining roofs, pavement diverting stromwater runoff and screen or wall preventing transport of trash.
SS.C8.3	Provide pictures of at least one implemented BMP.

Resources

U.S. EPA Storm Water Management for Construction Activities, EPA Document No. EPA-833-R-92-001.

U.S. EPA Best Management Practice Design Guide, EPA Document No. EPA-600/R-04/121A.

U.S. EPA NPDES Construction General Permit: cfpub2.epa.gov/npdes/stormwater/cgp.cfm.

CHPS Best Practices Manual, Volume II: Guideline SP9: Stormwater Management, Groundwater Management, and Drainage Materials.

CHPS Best Practices Manual, Design Volume: Guideline GC4: Site Protection During Construction.

CHPS Best Practices Manual, Design Volume: Guideline SP11: Stormwater Management and Drainage Materials.

LEED™ Reference Guide: Site Credit 6: Stormwater Management.

LEED™ Reference Guide: Site Prerequisite 1: Erosion and Sedimentation Control.

HI Department of Transportation Stormwater SWMPP http://stormwaterhawaii.com/program_plan/

Sites

SS.C9: Reduce Heat Islands – Landscaping — 2 Points

Applicability	Verification Required		
All projects. For a new building on an existing campus, addition, or major modernization project, the requirement applies to the entire school site, not just the area around the new building or the building(s) being modernized.	⊗ at Design Review	⊗ at Construction Review	○ at Performance Review

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

Heat islands raise temperatures and can impact school communities by increasing peak energy demand, air pollution levels, air conditioning costs, and heat-related illness. Employ design strategies, materials, and landscaping designs that reduce heat absorption of exterior materials.

Requirement

1 point	SS.C9.1 Provide shade (within five years) on at least 50% of non-roof, impervious surfaces on the site, including parking lots, walkways, plazas, etc. **OR** Use light-colored/ high-albedo materials (a Solar Reflectance Index* (SRI) of at least 0. 29) for 50% of the site's non-roof, impervious surfaces **OR** Use a combination of shading and high-albedo materials for 50% of the site's non-roof surfaces. **SRI or Solar Reflectance Index is calculated according to ASTM E 1980. Reflectance is calculated according to ASTM E 903, ASTM E 1918 or ASTM C 1549. Emittance is calculated according to ASTME E 408 or ASTM C 1372.*
1 point	SS.C9.2 Protect existing mature and heritage trees on site prior to, and during construction to preserve their historic value, beauty, and the high level of air quality, water quality, social, and global environmental benefits they provide. Designate a tree protection zone around mature (greater than 12" trunk diameter or 20 years of age) and heritage tree trunks to protect their root system and canopy. The zone includes a 6 foot chain link fence that is either 10x the diameter of the tree or 10 feet, whichever is greater. If there is existing impervious surface (i.e. sidewalk) within the tree protection zone, the fencing shall extend to the surface. The fencing must be in place prior to any site work and remain until occupancy. No new trenching or construction may occur within the tree protection zone. No mature or heritage trees may be removed (unless an arborist determines they are dangerous or diseased), unless replanted on the same site.

Implementation

SS.C9.1

Note that the "heat island effect" is largely an urban phenomenon. Dark surfaces, such as pavement, cladding, and roofing absorb heat and radiate it back to surrounding areas. In a city, where there are many dark, heat absorbing surfaces, infrared radiation can easily boost temperatures by 10°F or more. The heat island effect increases the need for air conditioning (and therefore electricity consumption) and is detrimental to site plantings, local wildlife, and maintaining comfortable temperatures.

Employ design strategies, materials, and landscaping designs that reduce heat absorption of exterior materials. Note Solar Reflectance Index (SRI) 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. Explore elimination of blacktop and the use of new coatings and integral colorants for asphalt to achieve light colored surfaces.

A site plan or landscaping plan should show trees that contribute to shade and/or highlight light-colored, non-roof impervious surfaces.

Calculations for shading and/or high-albedo materials:

- Shading

- Identify all non-roof impervious surfaces on the project site and sum the total area.
- Identify all trees that contribute shade to non-roof impervious surfaces. Highlight these trees on the plan you submit.
- Calculate the shade coverage provided by these trees after five years of growth on the non-roof impervious surfaces on June 21 at solar noon to determine the maximum shading effect.
- Determine the total area of shade provided for non-roof impervious surfaces. Divide by total—result must be 50%.

For use of light-colored/ high-albedo materials:

- Identify all non-roof impervious surfaces on the project site and sum the total area.
- Calculate the total area of non-roof impervious surfaces designed with light-colored/high-albedo materials. Divide by total—result must be 50%.
- If light-colored/ high-albedo materials are used to achieve this credit, provide specifications showing an SRI of 29 or better.

SS.C9.2

Mature and heritage trees planted on campuses to shade and protect children in play areas; to increase energy efficiency of buildings; to reduce costs; to create cool, healthy learning environments; and to promote sustainable school facilities should be preserved and protected. Mature is defined as any tree species with a trunk great than 12" in diameter or is at least 20 years of age. Heritage is defined as native or historic species (i.e. acacia koa). The intent of the tree protection zone is to preserve the tree root system and canopy during construction.

Verification

For projects seeking verification through the CHPS Verified Program (Pg 12), compliance documentation is required at design review and construction review.

Design Review Requirements	
SS.C9.1	Construction drawings, likely the landscaping plans, must provide the results described under the implementation section.
SS.C9.2	Construction drawings, likely the landscaping plans must identify mature and heritage trees on the site. The plans must show the required tree protection measures and instructions on when and how long they must be implemented.
Construction Review Requirements	
SS.C9.2	Provide picture(s) of any mature and heritage trees and the installed protection.

Resources

CHPS Best Practices Manual, Volume II: Guideline SP2: Landscaping to Provide Shade to Buildings and paved Areas, SP5: Impervious Surfaces.

Native Hawaii Trees: http://nativeplants.hawaii.edu/

LEED™-NC 2.2 Reference Guide: Site Credit 7: Landscape and Exterior design to Reduce Heat islands.

US EPA Heat Island resources and strategies can be found at: www.epa.gov/heatisland/.

Sustainable Development with Concrete– www.concretethinker.com

Sites

SS.C10 Reduce Heat Islands – Cool Roofs / Vegetated Roofs — 2 Points

Applicability	Verification Required		
All projects.	⊗ at Design Review	⊗ at Construction Review	○ at Performance Review

Intent: Employ cool or vegetated roofs to reduce the heat island effect.

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. This credit is most beneficial for schools with significant cooling loads.

Requirement

1 point	SS.C10.1 Cool Roofs. Use roofing materials that have a Solar Reflectance Index* (SRI) as listed below for roof type for a minimum of 75% of the roof surface. Roof Type — Slope — SRI Low-Sloped Roof — <=2:12 — 78 Steep-Sloped Roof — >2:12 — 29
Or 2 points	SS.C10.2 At least 75% of roofing materials must include cool roof (using the strategies listed above) and vegetated roof (also known as green roofs). The vegetated roof must equal at least 25% of the roof surface. Develop a guide and maintenance plan for the vegetated roof.

Implementation

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. Both the reflectivity and emissivity are important characteristics of cool roofs. A solar reflectance of 0.0 means that all the solar energy hitting the surface is absorbed and none is reflected. Emissivity is the ability of a material to shed infrared radiation.

Schools that do not have significant cooling loads (i.e. schools that do not have significant summer use) or are not located in urban areas may not wish to pursue this credit. In these cases, a cool roof can actually result in more energy use in the heating season than it will offset in cooling loads during the summer. Energy modeling can help predict which facilities would be likely to experience an energy benefit by installing a cool roof. To find qualifying roof products, see the Cool Roof Rating Council website at www.coolroofs.org.

Vegetated roofs have been found to significantly reduce both the heating and cooling loads of buildings on which they are implemented. While they may significantly reduce the urban heat island effect by not using traditional building materials, they also provide increased insulation and help reduce heating costs in the winter months, unlike cool roofs, which can possibly increase a building's energy use during the winter. In addition to improving the insulation of a roof, green roofs have also been found to considerably lengthen the

lifespan of a roof and reduce stormwater runoff. In some cases implementing a vegetated roof has been found to more than double the lifespan of a roof.

Vegetated roofs may be difficult to implement on existing structures due to limitations on the weight load of the existing roof. Retrofitting roofs with certain types of green roofs may not be possible because the substrate and vegetation placed on the roof will exceed permitted static loading. In addition to issues concerning weight load, waterproofing the existing roof structure can potentially be an obstacle because of the amount of water retained on the roof and the potential for roots to penetrate the waterproof membrane. For an informational database containing more information on the implementation and different kinds of green roofs that exist, see http://www.greenroofs.com/.

Verification

For projects seeking verification through the CHPS Verified Program (Pg 12), compliance documentation is required at design review and construction review.

Design Review Requirements	
SS.C10	Construction drawings, likely a roof plan, must include the square footage of total roof surface and the total roof surface covered by cool or vegetated roof. For cool roofs, the specifications must include the CRRC Product ID#, emissivity and reflectance. For vegetated roofs, details should be provided on the construction.
Construction Review Requirements	
SS.C10	Provide picture(s) of the installed cool and/or vegetated roof(s).

Resources

CHPS Best Practices Manual, Volume II: Guideline IN3: Cool Roofs.

Cool Roof Rating Council (CRRC): www.coolroofs.org/

Greenroofs.com provides an informational database for green roofs at: www.greenroofs.com/

US EPA Energy Star ® program reflected roof products can be found at: www.energystar.gov/index.cfm?c=roof_prods.pr_roof_products

US EPA Heat Island resources and strategies can be found at: www.epa.gov/heatisland/

Lawrence Berkeley Laboratory, Heat Island Group resources can be found at: www.epa.gov/heatisland/.

Solar Reflectance Calculator (SRI) available at: http://coolcolors.lbl.gov/assets/docs/SRI%20Calculator/SRI-calc10.xls.

The Potential for Green Roofs in Hawaii: http://www.ctahr.hawaii.edu/oc/freepubs/pdf/RM-15.pdf

Green Roof Poster:
http://www.ctahr.hawaii.edu/kaufmana/downloads/HCPO%20Green%20Roof%20Poster%20Final.pdf

Sites

SS.C11: Light Pollution Reduction — 2 Points

Applicability	Verification Required		
All projects. For a new building on an existing campus, additions, and major modernizations, the exterior requirement applies to the project scope.	⊗ at Design Review	⊗ at Construction Review	○ at Performance Review

Intent: Reduce development impacts on the nocturnal environment.

Good outdoor lighting supports the comfort and safety of the school community. Low glare, appropriate light levels, optical guidance, and good color rendition are attributes of good outdoor lighting. Good lighting also prevents light pollution that impacts the night sky or trespasses onto neighboring properties.

Requirement

	Comply with the following standards unless a local code or policy is more stringent. 2 points will be awarded for compliance across the entire school campus. 1 point will be awarded for major modernizations and new buildings on an existing campus that comply based on the projects scope.
1-2 points	SS.C11.1 Design interior lighting so that the angle of maximum candela from each interior luminaries as located in the building shall intersect opaque building interior surfaces and not exit out through the windows OR maintain all non-emergency lighting on a programmable timer that turns lighting off during non-operable hours. Provide manual override capability for after hours use. SS.C11.2 To avoid over lighting and energy waste, meet but do not exceed the lighting limits in IESNA Recommended Practices. Refer to the current version of the Illuminating Engineering Society of North America (IESNA) RP-33 Lighting for Exterior Environments, IESNA/ANSI RP-8 American National Standard Practice for Roadway Lighting, and IESNA RP-20 Lighting for Parking Facilities. Designers may specify slightly higher initial light levels to account for lamp depreciation over time. SS.C11.3 Specify IESNA Cutoff or IESNA Full Cutoff for all exterior-site and building-mounted lighting fixtures greater than 13 watts. Specify IESNA Full Cuttoff for all exterior-site and building-mounted lighting fixtures greater than 70 watts. Cutoff and Full Cutoff fixtures may not be the adjustable type. Hawaii and Maui County may require full cutoff fixtures regardless of wattage. SS.C11.4 If the school property line abuts residential properties, parks or natural wildlife areas, light levels must not exceed 0.01 foot-candles ten (10) feet over the property line. SS.C11.5 Signs, monuments and flags. Fixtures for school signs, monuments and flags are limited to 50 watts per fixture, and they must incorporate shielding devices such as hoods, louvers, and source shields. The fixtures are exempt from the cutoff and full cutoff requirements of #3 as defined by IESNA RP-33. SS.C11.6 Sports field lighting design must follow IESNA RP-6. Fixtures must incorporate extensive shielding to minimize and redirect stray light. Controls must be provided that encourage the shutting off of the lights when the sports field is not in use. Fixtures specifically for lighting sports fields are exempt from the Full Cutoff requirements listed in SS.C11.3 as defined by IESNA RP-33.

Implementation

Design site lighting and select lighting styles and technologies to have minimal impact off-site and minimal contribution to sky glow. Minimize outdoor lighting of architectural and landscape features and design interior lighting to minimize trespass outside from the interior.

Prepare a photometric site plan produced by computer modeling with the following information:

- Horizontal illuminances at ground level on minimum ten-foot by ten-foot grid with the property line clearly marked in bold on photometric plan and abutting residential properties, parks, or natural wildlife areas noted.
- Average, maximum, and minimum illuminances for each area (walkways, parking lots, driveways, building entries etc.)
- The location and mounting height of all site and building mounted exterior fixtures clearly indicated, with fixture type designations relating to the lighting fixture schedule.
- Light loss factors used for each fixture type.

Submit specifications for exterior lights, showing that Cutoff and Full Cutoff requirements are met, sometimes rated as dark sky or night friendly. Also supply an exterior lighting fixture schedule with manufacturers and model numbers, and manufactures spec sheets, with a clear description of the specified lamps, wattage, IESNA cutoff classification and shielding accessories for each fixture.

Verification

For projects seeking verification through the CHPS Verified Program (Pg 12), compliance documentation is required at design review and construction review.

Design Review Requirements	
SS.C11	Construction drawings must include: • Interior Lighting: provide building section(s) diagramming the angle of the maximum candela value, or the lighting plans should show that all non-emergency lighting is on a programmable timer that turns lighting off during non-operable hours and that provides manual override capability for after hours use. • Provide a photometric site plan (that shows at least 10' beyond the property line) produced by a computer model that includes the average, maximum and minimum illuminances for each area (walkways, parking lots, building entries etc.) Horizontal illuminances at ground level on a minimum ten-foot by ten-foot grid with the property line clearly marked in bold on photometric plan and abutting residential properties, parks, or natural wildlife areas noted. The plan should indicate the location and mounting height of all site building mounted exterior fixtures clearly indicated by fixture type designations relating to the lighting fixture schedule. • Exterior lighting fixture schedule with manufactures and model numbers, and manufacturers spec sheets, with a clear description of the specified lamps, wattage, IESNA cutoff classification and shielding accessories for each fixture.
Construction Review Requirements	
SS.C11	Provide manufacturer receipts or proof of purchase for compliant light fixtures. Provide pictures as alternatives if appropriate.

Resources

CHPS Best Practices Manual, Volume II: Guideline EL11: Outdoor Lighting.

The Illuminating Engineering Society (IES): www.iesna.org/

The International Dark Sky Association: http://www.darksky.org/

The International Dark Sky Association Lighting Handbook is available on line at: www.darksky.org/ordsregs/lchintro.html

Illuminating Engineering Society; www.ies.org

Illuminating Engineering Society, Luminaire Classification System for Outdoor Luminaires, TM-15-07 with Addendum A

Illuminating Engineering Society, Lighting for Exterior Environments, RP-33-99

Illuminating Engineering Society, Lighting for Parking Facilities, RP-20-98

Illuminating Engineering Society, Sports and Recreational Area Lighting, RP-6-01

Hawaii and Maui County Chapter 14, Article 9