

**OFFICE OF THE STATE ARCHITECT  
STATE BUILDINGS PROGRAMS  
POLICIES AND PROCEDURES**



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**HIGH PERFORMANCE CERTIFICATION PROGRAM  
FOR NEW CONSTRUCTION AND SUBSTANTIAL RENOVATIONS**

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## SECTION I – INTRODUCTION

The High Performance Certification Program (HPCP) policy applies to the design and construction of a new building or the substantial renovation of an existing building. The policy applies to state owned general funded or academic buildings. The policy applies to non-state buildings with moneys guaranteed or insured by the state where such moneys constitute at least 25 percent of the project cost.

**The policy was created in September 2007. The policy was updated in June 2010 to reflect new statutes on the requirement to track and report on building performance. The updated policy included the addition of academic buildings and requirements to other State funded projects. The policy was updated in June 2018 to reflect statute changes, changes in national sustainable guidelines, and the results of over 100 certified projects.**

### 1) Intent

The OSA High Performance Certification Program (HPCP) policy reference's a program that:

- (I) *Is quantifiable, measurable, and verifiable as certified by an independent third party;*
- (II) *Reduces the operating costs of real property by reducing the consumption of energy, water, and other resources;*
- (III) *Results in the recovery of the increased initial capital costs attributable to compliance with the program over time by reducing long-term energy, maintenance, and operating costs;*
- (IV) *Improves the indoor environmental quality of real property for a healthier work environment;*
- (V) *Encourages the use of products harvested, created, or mined within Colorado, regardless of product certification status;*
- (VI) *Protects Colorado's environment; and*
- (VII) *Complies with the federal secretary of the interior's standards for the treatment of historic real property when such work will affect real property fifty years of age or older, unless the state historical society, designated in section 24-80-201, determines that such real property is not of historical significance as defined in section 24-80.1-102 (6).*

It is the intent of the policy to establish design/construction guidelines for applicable buildings. The policy encompasses the building process from initial facility master planning through the design and construction with a consideration to final long-term operation and maintenance of the buildings. The policy is designed to be compatible with national standards while maintaining Colorado values, priorities and requirements.

High performance building design and construction is an evolving field with rapid advances in professional design experience, contractor's construction knowledge and practices, equipment specifications, and product diversity. The rating systems, design standards, sustainable guidelines, and certification procedures to verify design/construction/operation results continue to be developed and improved over time. This policy is intended to familiarize decision-makers and others involved in facility planning, design, construction and operation of buildings with the concepts that achieve high performance buildings. It is organized to present theory, concepts, and practice in order to present the subject without dictating solutions. It is not meant to be a prescriptive document or address all the design/construction questions that are critical to a successful building. It is intended that once building owners and operators become acquainted with the issues presented, they will pursue high performance building and utilize the creative talents and resources of the project team that will result in original, cost-effective, and long-term solutions.

This policy intends to coordinate and track through documentation the efforts of the various state agencies, institutions of higher education, and local jurisdictions with respect to various project phases, starting with the initial strategic planning goals, through the project registration and certification steps,

to the final occupancy of new or renovated buildings. Because compliance is a multi-disciplined effort involving many individuals, departments, and jurisdictions, each project manager and building owner has the responsibility for ensuring that its construction project comply with all applicable standards, state, and local building codes.

Buildings that are exempt from the HPCP include:

1. As specified in the statute any building without a heating, ventilation, or air conditioning system;
2. Buildings that are smaller than 5,000 square feet;
3. Temporary structures;
4. State controlled maintenance projects per state statute C.R.S. 24-30-1305.5 (6);
5. Projects that comply with the International Energy Conservation Code in either applicability conditions (C101.4.1 or C101.4.3) or comply with the low energy building section (C101.5.2) are exempt. Other state or local construction projects with a similar narrowly focused maintenance scope or energy condition.

Even if a building is exempt, building owners should apply all the standards and principles of the HPCP as cost-effective and practicable as possible for all new construction and substantial renovations, regardless of the building type.

The Office of the State Architect recognizes that there are circumstances in Colorado that are not reflected in national high performance standards, guidelines, or additional sustainable priorities, and, therefore, will review individual project planning strategies, design documents, and construction procedures with a consideration to Colorado goals, values, and laws as part of a project's request for a waiver from this policy or a modification of this policy. See waiver/modification process in Section IV.

Historical designed buildings are not exempted from this policy.

## 2) High Performance Certification Program Requirements and Sustainable Priorities

(Note: italic words in this policy are directly from state statute either as published, or shorten to reduce extra wording, but maintaining the meaning)

### Requirement

**The Department of Personnel and Administration, Office of the State Architect has determined the following three guidelines as meeting the High Performance Certification Program (HPCP) requirements per 24-30-1305.5 C.R.S.; the U.S. Green Building Council, Leadership in Energy and Environmental Design – New Construction (USGBC LEED™ BD+C) guideline with Gold as the targeted certification level; and the Green Building Initiative (GBI), Green Globes for New Construction guideline with Three Globes the targeted certification level; and for the Colorado Department of Education, K-12 construction, the Collaborative for High Performance Schools (US-CHPS) is an optional guideline with Verified Leader as the targeted certification level.**

### Statute Summary

*The Office of the State Architect, or an analogous successor office in the department, shall, in consultation with the Colorado Commission on Higher Education, adopt and update from time to time a high performance standard certification program (HPCP). A state agency or state institution of higher education controlling the substantial renovation, design, or new construction of a building shall, pursuant to the program adopted in subsection (1) of this section, perform the substantial renovation, design, or new construction to achieve the highest performance certification attainable as certified by an independent third party pursuant to the high performance standard certification program. A certification is attainable if the increased initial costs of the substantial renovation, design, or new construction, including the time value of money, to achieve the highest performance certification attainable can be recouped from decreased operational costs within fifteen years. If the state agency or state institution of higher education estimates that such increased initial cost to achieve the highest performance certification attainable will exceed five percent of the total cost of the substantial*

*renovation, design, or new construction, the Capital Development Committee shall specifically examine such estimate before approving any appropriation.*

*For all buildings that started the design process on or after January 1, 2010, each state agency or state institution of higher education shall monitor, track, and verify utility vendor bill data pertaining to the building and must annually report to the office (OSA). The general assembly hereby finds, determines, and declares that buildings that have achieved the highest performance certification attainable and started the design process prior to January 1, 2010, are strongly encouraged to monitor, track, and verify utility vendor bill data pertaining to such building in order to ensure that the increased initial costs to achieve the highest performance certification attainable are in fact recouped. If such data is monitored, tracked, and verified, then the state agency or state institution of higher education must annually report to the office. If such data is not monitored, tracked, and verified, then the state agency or state institution of higher education must provide the office, in writing, a reasonable explanation and also must work with the office to find a way to start monitoring, tracking, verifying, and reporting such data.*

#### **Additional Sustainable Priorities**

(required for state projects, recommended for CDE, and DOLA projects)

Meet all the pre-requisites of LEED. If using an approved alternative guideline, comply with the equivalent LEED pre-requisite criterion within that guideline (as attainable per statute and practical for the location).

The concept of “what you meter, you can manage” is important with a high performance building. The minimum requirement of the HPCP is that each new facility or substantial renovation shall meter all utilities (as applicable) and have the ability to submeter selected systems. Each building shall attain a U.S. EPA Energy Star Rating of 75 as the minimum level and to pursue environmentally preferable purchasing of all appropriate equipment, and, in the post occupancy timeframe, maintain and track the performance of the building.

State agencies shall develop energy management programs as per the requirements of applicable Governor’s Executive Orders. Energy management programs for existing buildings are part of the Office of the State Architect (OSA) policy, Energy Management of Existing Buildings. This policy is available from the OSA web site, [Existing Buildings](#) Programs.

### **3) High Performance Certification Program Definitions**

#### **(a) HIGH PERFORMANCE BUILDING**

A high performance commercial building is energy and water efficient, has low short-term and long-term life-cycle costs, is healthy for its occupants, and has a relatively low impact on the environment. High performance buildings use key resources such as energy, water, materials and land much more efficiently than buildings simply built to code or through a standard design process. An agency’s or local jurisdictions facility master plan needs to incorporate high performance building goals as a fundamental initial step. The design process starts with cooperation among building owners, facility managers, users, designers and construction professionals through a collaborative team approach. Each design decision regarding site orientation, design, window location and treatments, lighting, heating, air conditioning, ventilation, insulation, material selection, and controls must be integrated throughout the design, construction and operation in order to create a high performance building. The project considers the true cost of a building through the life cycle assessment of each individual building component. The project is developed to minimize demolition and construction wastes and the use of products that minimize waste in their production or disposal. The building is designed to be easily reconfigured and reused as the use of the building changes. The heating and cooling systems should be designed for easy modification to accommodate future mechanical systems. The process will educate building occupants and users to the philosophies, strategies and controls included in the design, construction and maintenance of the project.

23-1-106 (10.3) C.R.S.

(a) "Academic facility" means any facility, including any supporting utility infrastructure and site improvements, that is central to the role and mission of each state institution of higher education as set forth in this title. Examples include, but are not limited to, classrooms, libraries, and administrative buildings.

(b) "Auxiliary facility" means any facility, including any supporting utility infrastructure and site improvements, funded from an auxiliary source such as housing or parking revenue or any facility that has been historically managed as an auxiliary facility and is accounted for in financial statements of state institutions of higher education as a self-supporting facility. Examples include, but are not limited to, housing facilities, dining facilities, recreational facilities, and student activities facilities.

24-30-1301 C.R.S.

8 Facility means a state-owned building or utility. "Facility" does not include highways or publicly assisted housing projects as defined in section 24-32-718.

15 (a) "Real property" means a facility, state-owned grounds around a facility, a campus of more than one facility and the grounds around such facilities, state-owned fixtures and improvements on land, and every state-owned estate, interest, privilege, tenement, easement, right-of-way, and other right in land, legal or equitable, but not including leasehold interests.

(b) "Real property" does not include:

- I. Land or any interest therein acquired by the department of transportation and used, or intended to be used, for right-of-way purposes;
- II. Land or any interest therein held by the division of parks and wildlife and the parks and wildlife commission in the department of natural resources; and
- III. Public lands of the state or any interest therein that are subject to the jurisdiction of the state board of land commissioners.

24-30-1305.5 C.R.S.

(a)(i) "Building" means a facility that:

- A. Is substantially renovated, designed, or construction with state moneys or with moneys guaranteed or insured by a state agency or institution of higher education and such funds constitute at least twenty-five percent of the project cost;
  - B. Contains five thousand or more gross square feet;
  - C. Includes a heating, ventilation, or air conditioning system; and
  - D. Did not enter the design phase prior to January 1, 2008.
- ii) A "Building" includes an academic facility as defined in section 23-1-106(10.3) (a), C.R.S., including an academic facility as defined in the guidelines described in section 23-1-106 (10.2) (b) (I) C.R.S..
- iii) A "Building" does not include:
- A. An auxiliary facility as defined in section 23-1-106 (10.3) (b), C.R.S., including an auxiliary facility as defined in the guidelines described in section 23-1-106 (10.2) (b) (I), C.R.S.; or
  - B. A publicly assisted housing project, as defined in section 24-32-718.

24-30-1305.5 (8) (c) C.R.S

"Substantial Renovation" means any renovation with the cost that exceeds twenty-five percent of the value of the building.

(f) INTERNATIONAL ENERGY CONSERVATION CODE

101.4.1 Existing buildings. Except as specified in this chapter, this code shall not be used to require the removal, alteration or abandonment of, nor prevent the continued use and maintenance of, an existing building or building system lawfully in existence at the time of adoption of this code.

101.4.3 Additional, alterations, renovations or repairs. Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code, additions, alterations, renovations,

or repairs shall not create an unsafe or hazardous condition or overload existing building systems.

Exception: The following need not comply provided the energy use of the building is not increased:

1. Storm windows installed over existing fenestration.
2. Glass only replacements in an existing sash and frame.
3. Existing ceiling, wall or floor cavities exposed during construction provided that these cavities are filled with insulation.
4. Construction where the existing roof, wall or floor cavity is not exposed.

101.5.2 Low Energy Buildings. The following buildings, or portions thereof, separated from the remainder of the building by building thermal envelope assemblies complying with this code shall be exempt from the building thermal envelope provisions of this code:

1. Those with a peak design rate of energy usage less than 3.4 Btu/h·ft<sup>2</sup> or 1.0 watt/ft<sup>2</sup> of floor area for space conditioning purposes
2. Those that do not contain conditioned space.

(g) INCREASED INITIAL COST

The increased initial cost, now called the High Performance Premium is the cost added to a project's budget to meet the HPCP targeted certification level. The cost shall be tracked by the HPCP champion on the OSA HPCP Registration-Checklist form (provided by OSA on the [New Construction/Major Renovations](#) web site) and will indicate by credit, the initial cost estimate and final design/construction cost as explained in Section V.

(h) OPERATIONAL COST

Operational cost is initially described as in C.R.S. 24-30-1304 (1d) as the *replacement cost* for building components, *and the cost of operation and maintenance of the real property, including energy and water consumption*. Operational cost may also include the cost of landscape operation and maintenance, custodial services, waste management services, and other annual facility operation and maintenance expenditures.

#### 4) Coordination with Approved Building Codes

The High Performance Certification Program does not supersede the Office of State Architect code compliance policy. The list of approved codes and the list of approved code consultants that provide the plan reviews and project inspections per the OSA building code compliance policy is on this web site; [Building Codes](#). The code consultants are not approved to certify buildings as per this HPCP policy.

Non state projects in local jurisdiction shall permit with and follow the building codes enforced for that location. The inspection and certification process for a HPCP building is not a substitute for local permitting and inspections. Local jurisdictions are not approved for certifying a HPCP building.

The Department of Local Affairs/Division of Housing has statutory responsibility over [Factory-Built Nonresidential Structures](#) and such buildings are not subject to the policies within this document. However, all agencies should consider the High Performance Certification Program strategies in all aspects of the location, specification, construction, and ownership of factory-built structures.

#### 5) Statutory Responsibilities/Executive Orders (related to this HPCP policy)

The following statutes and executive order are listed as a reference to the policies and procedures for the design and construction for state owned buildings. Some statutes and executive orders relate directly to this HPCP policy, while some are more general to the design and construction process and goals of the state.

(a) Colorado Revised State Statutes:

24-30-1301-1311	State Buildings, Department of Personnel and Administration
24-30-2001-2003	Utility Cost Savings Measures
24-82-601-602	State-Owned Facilities – Energy Conservation
24-82-901-902	Outdoor Lighting Fixtures

(b) Executive Orders

**Greening of State Government**, Executive Order D2015-013 (October 2015)

This executive order establishes responsibility for environmental leadership in all State agencies and departments. The Executive Director of each agency and department shall support development and implementation of plans, programs, and policies that incorporate sustainability practices into daily agency decision-making and long term planning across all agency and department activities and functions.

In particular, the Executive Order requires all agencies and departments shall include in their capital construction or capital renewal request for new construction and substantial renovations:

1. Funding necessary to meet the State's High Performance Certification Program.
2. Analysis of on-site renewable energy generation or the purchase of renewable clean energy.
3. Documentation on how the agency plans to meet C.R.S. 24-30-1305.5 on reporting utility data to the Office of the State Architect (OSA) through either a nationally recognized building certification program or other OSA accepted procedure.

Local municipalities and counties and the agencies and departments of any municipality or county are not required to comply with the executive orders. The state statutes on high performance standard certification program (C.R.S.24-30-1301-1307) do apply as the state funding appropriations to local projects dictates.

## SECTION II – AUTHORITIES HAVING JURISDICTION

### 1) Greening Government Leadership Council

The Greening Government Leadership Council was established as part of Executive Order D2015-013. This executive order sets one and five year goals in the areas of energy and water efficiency, petroleum reduction, greenhouse gas emissions reduction, and environmental preferable purchasing. The Council working through each agency appointed representative, will continue to serve as a resource to State agencies and departments to develop, implement, and evaluate strategies that support achievement of goals. With support from the Council, agencies and departments will engage staff in efforts to achieve these goals through education, training, and opportunities for participation. develop, implement, and augment programs, plans and policies that save money, prevent pollution and conserve natural resources throughout state government, including but not limited to source and waste reduction, energy efficiency, water conservation, recycling, fleet operations, environmental preferable purchasing, and establishing state-wide goals to save taxpayers' money and reduce environmental impacts. The council is comprised of members from all executive departments. On an annual basis the Council will collect data for each of the goals and directives listed below and provide the Administration with a report card on progress toward goals and agency and department accomplishments.

### 2) Colorado Energy Office

The Colorado Energy Office (CEO) mission is to improve the effective use of all of Colorado's energy resources and the efficient consumption of energy in all economic sectors, through providing technical guidance, financial support, policy advocacy and public communications. The CEO vision is to help Coloradans live more prosperous and healthy lives by promoting innovative energy production and efficient energy consumption practices that are beneficial to the economic and environmental health of the state. [Colorado Energy Office](#)



### **3) Colorado Department of Public Health and the Environment**

The Colorado Department of Public Health and Environment (CDPHE) is committed to protecting and preserving the health and environment of the people of Colorado. Its role is to serve the people of Colorado by providing high-quality, cost-effective public health and environmental protection services. Some of the divisions within CDPHE set regulations on air pollution control, hazardous materials management and clean-up, and other building specific requirements

### **4) Department of Personnel & Administration/Office of the State Architect**

Department of Personnel & Administration (DPA) is the executive branch department that serves as the business center for Colorado's state government. DPA is responsible for the administration of state-wide construction, real estate transactions, and code compliance through the Office of the State Architect (OSA). The OSA has responsibility for capital construction and controlled maintenance request prioritization, code compliance; facilities condition tracking, emergency maintenance funds approval, energy conservation; leasing space or buildings; and other real estate transaction approval and oversight.

### **5) Colorado Department of Local Affairs**

The Colorado Department of Local Affairs (DOLA) for many communities throughout Colorado is the "face of state government" - that initial and primary point of contact where local communities work in partnership with the state. DOLA's mission statement, "Strengthening Colorado Communities," exemplifies the level of responsiveness and attentiveness that lies at the heart of our services. DOLA has the responsibility to ensure that state-funded projects meeting certain threshold criteria must meet the requirements of the HPCP. DOLA staff works with local governments to determine whether or not their projects meet these thresholds, and if so, provides guidance on reporting and documentation.

### **6) Colorado Department of Education**

The Colorado Department of Education (CDE) supports and serves the school districts and their work to provide quality learning for more than 800,000 students statewide. CDE provides all Colorado children equal access to quality, thorough, uniform, well-rounded educational opportunities in a safe, civil environment. CDE also serves adult education and the state's libraries. CDE has the responsibility for its programs to ensure compliance with this policy and to verify to DPA that the K-12 school district construction projects meet the requirements of this policy.

## **SECTION III – HIGH PERFORMANCE BUILDING DESIGN GOALS**

The information in this section is not presented here as requirements for a project, but only as recommendations to consider during the design/construction process and long term ownership.

### **1) Agency/Department Long-term Strategic Plans**

State agencies shall incorporate the concepts of high performance buildings into their operational master plans, their facilities master plans, and their facility program plans (refer to OSA planning documents). Local jurisdictions should incorporate the concepts of high performance buildings into their long-term strategic planning documents. Review local building ordinances that impact building design and operation and incorporate these requirements based upon the local justification having authority on building codes for your project.

### **2) Site Design and Planning**

The building placement/orientation and profile is critical to both the long term operation and maintenance of the building and to building's effect on the site environment. Decisions made early in

the process can often have a significant impact on many aspects of the site development and the building design. The greatest opportunities for project success rest in the initial stages of goal and strategy determination.

Selecting the site location and how the building is placed on the site will impact the surrounding land and local watershed, influence the amount of storm water runoff, and potentially impact local wildlife and wetlands. The site location should attempt to restore previously used sites, be located in urban settings, and, if possible, utilize existing buildings and infrastructure. The landscape design should consider sustainable practices that promote biodiversity and efficient water requirements. The site location should encourage transportation alternatives such as walking, bicycling, mass transit and other options to minimize automobile use. The development should minimize light trespass from the building and site. The building design should minimize the development footprint of all roads, sidewalks, and construction activities. Attention to the building design is an important consideration to achieve a high performance building, but the process starts with selecting the site and managing the building's effects on the site.

### **3) Building Energy Use**

An energy efficient design can reduce the energy use of buildings sufficiently when compared to a building designed to comply with the minimum requirements of the International Energy Conservation Code. The energy aspects of a building can be broken down to a few basic elements: the envelope, the lighting system, the heating/cooling/ventilation system, the electrical plug loads, the plumbing system, and the connection to the utility provider. The orientation of the building will have a major impact on the building's seasonal energy usage and on the daily comfort of the occupants. The integration of the multiple elements is the key to reducing the energy usage of a building, while achieving a productive indoor work environment. The final building design requires the combined efforts of all the members of the design team.

The integrated design process should be used in the building's design. Integrated design is a process that included the consideration of all building systems and components together from the start of the design. It brings together the various disciplines (owners, design consultants, contractors, and occupants) involved in designing a building to develop and review their recommendations as a whole. It recognizes that each discipline's recommendations have an impact on other aspects of the building. A lack of team work can result in oversized systems, unintended heating or cooling problems, unexpected maintenance and operation costs, or designs that create constructability problems. A computer simulation of the building modeling all potential design and equipment options is indispensable to adequately determine the most effective and efficient mix of building elements. Integrated design allows professionals working in various disciplines to take advantage of efficiencies that are not apparent when they work in isolation. The earlier the integration is introduced into the design process, the greater the benefit.

The efficiency of a building is directly related to the integration of the numerous elements: the orientation of the building, the window/wall ratio, the window's visible and thermal properties, the efficiency of the components of each element, the choice of materials and their ventilation requirements, and the balancing of the heating and cooling requirements of each element. The design team needs to address early in the process the integration of the building orientation and envelope components with the heating, cooling, ventilating, and electric lighting requirements. The size, location and properties of the windows have a direct effect on the lighting requirements and heating and cooling loads of the building. The choices of certain window glazing can augment the quality and quantity of the lighting system while reducing the cooling and heating building loads. While the higher quality windows may cost more, they can reduce the cost of the lighting and the heating/cooling systems such that there is no cumulative cost impact to the construction budget. The total insulation value of the walls, windows, roof, and basement areas is an important design determination. Insulating values are very dependent on building location in Colorado. The building design and construction process needs to address and control the infiltration of the outside air. Indoor comfort is dependent on the reduction of cold or hot air drafts. A

complete understanding of all the elements and aspects of a building is important for an efficient building and can be achieved by using the integrated design process.

Intelligent decisions made during the building envelope design and appropriate computer modeling can result in equipment sized to closely match the heating and cooling load without excessive capacity with its additional cost. Heating and cooling systems operate at part-load during most hours and seldom operate at their peak design capabilities. The selection of the heating and cooling equipment should also be based more on its part load efficiency than its full load efficiency. The equipment should be selected with consideration to its annual run time, associated operation and maintenance cost, and not just first cost. A full life cycle cost analysis could be necessary during equipment selection, but is not required. The heating and cooling systems need a well-designed control system to accurately maintain the building indoor environmental condition while controlling the efficiency of the building. A high performance building design can substantially reduce the size, and therefore, the cost of the heating and cooling equipment.

On site renewable energy technologies should be considered as a potential energy source. On-site renewable energy maybe cheaper than the electric energy supplied by the utility company. On-site energy can sufficiently support a goal of net-zero electric energy. Solar photovoltaic, solar thermal, wind power, biofuels, and geothermal are some of the renewable technologies that have potential in specific Colorado locations. The building should consider making the building “solar ready”. Solar ready is reducing shade on the roof, minimizing and group roof systems, design roof load capacity for solar, pre-install roof conduit, plan space for inverters, plan for a PV main service panel, and consider a location battery storage. The building heating and cooling system should be designed with a consideration for new technologies and their different fuel source. The mechanical rooms should be located within a building to easily allow for modification/expansion to accommodate new technologies or different fuel sources. One example of a potential technology is a biomass boiler that may not be currently economically feasible. The mechanical system and building layout should consider where to install a future biomass boiler, how to connect it to the mechanical system, and where to provide space and access for the boiler fuel source.

#### **4) Material and Product Selection**

Colorado based manufacturers should be emphasized during the product and equipment selection. The selection of the materials and products installed will influence the long-term energy and water usage, the quality of the indoor environment, and the long-term maintenance of a building. The materials should be selected for durability, which include the wall and floor finishes, the fixtures, and other equipment. The fixed and movable equipment selected will affect the energy plug loads and the water consumption. The materials and products need to be evaluated based upon their energy impact, their indoor air quality impact, their operation and maintenance impact, and upon a variety of environmental concerns. The environmental concerns include but are not limited to: recycled content, locally/regionally produced, rapidly renewable attributes, local and state environmental goals and targets, and the ability to be reused or recycled. As in the energy design process, the material selection process needs to be evaluated as to its long-term effects to the building and the occupants.

Life cycle assessment (LCA) is the preferred method to determine the appropriate choice for a product or a particular material. LCA is a technique to assess the environmental aspects and potential impacts associated with a product, process, or service, by compiling an inventory of relevant energy and material inputs and environmental releases, evaluating the potential environmental impacts associated with identified inputs and releases, and interpreting the results to help make a more informed decision. However, a complete life cycle assessment of all products and materials is not always available or feasible and, therefore, a prescriptive selection method such as utilized in high building performance guidelines may be the best process available. LCA does not need to be determined for every item purchased or in every building design decision; instead, LCA should be determined for the top 10 to 20 items selected on volume, cost, or value. The EPA Energy Star and WaterSense programs are an excellent source of information to help determine an appropriate product. Refer to the reference section for information on life cycle cost and life cycle assessment methods.

## **5) Indoor Environment**

Indoor environmental quality consists of the overall comfort and health of a building's occupants, not just the indoor air temperature. It is important to design for healthy and adequate air quality, efficient and effective lighting, acoustic and aesthetic qualities, and comfortable temperatures. It is also important to allow occupants some ability to control their individual indoor conditions. Lighting design and control of a space should reflect the usage of the space, the potential occupants of a space and their particular requirements, and the amount and quality of natural light. In designing for a space, meeting the lighting requirement of code is important, but recognizes that lighting quality is more important than quantity. Design for a balance between natural lighting, general lighting, and task lighting to meet the occupant's requirements. The choice of materials for finishes, fixtures, and equipment needs to consider potential off-gassing, acoustic properties, and their aesthetic qualities. The indoor air environment is directly related to the choice of materials and products and their potential impact to the building's air quality. The design and construction of the building should focus on the occupants and their ability to work and be productive.

## **6) Water Efficiency and Management**

Water use in Colorado is a significant issue. Colorado has experienced drought conditions that have directly affected the quantity and quality of water available to users. The quality and quantity of water leaving the state is important since the river basins that originate in Colorado directly affect seven states and indirectly affect at least, another five. The water used inside and outside a building and used during the construction process is a cost issue, but also, impacts the quantity and quality of water for downstream users. Water laws in Colorado, local jurisdiction, or local water providers will influence and may eliminate some of the strategies identified in the national guidelines on high performance buildings.

The landscape design should minimize the disruption and protect the existing vegetation as much as is practical. The design should limit and treat stormwater runoff. The design should incorporate native and drought-resistant plants and low-water landscape principles to minimize irrigation requirements. The design should reduce or eliminate the requirements for potable water for irrigation. The capture of rainwater for irrigation may be allowed (check local water provider rules), but the design should regulate the flow of surface water to support the vegetation. When irrigations systems are necessary, consider the efficiency of the sprinkler components, the location of the sprinklers heads, and the strategies to control when and for how long the system is working. The best way to minimize stormwater volume and treatment requirements is to reduce the amount of impervious area and increase water infiltration into the soil. Some methods that can influence stormwater requirements are; using green roofs, preserving natural areas, design infiltration swales and retention ponds, and reduced paved surfaces such as roads and sidewalks. Check with the local water provider to review the possibility of a "green roof" being utilized as part of the stormwater retention requirement.

Indoor water efficiency is an important aspect of a high performance building. The different guideline's water credits generally consist of the indoor lavatory fixtures, kitchen appliances, and some process water fixtures. Effective methods to reduce water use include installing low-consumption flush fixtures, installing flow restrictors (where appropriate), and maintaining automatic faucet sensors and metering controls. WaterSense, a partnership program sponsored by EPA, helps to identify water-efficient products and programs. WaterSense-labeled products exceed plumbing codes for some high-efficiency fixtures. The heating and cooling systems requirements are specified to meet energy requirements, but should also be review for their impact on building water usage. To determine the most effective strategies for a particular condition, analyzes the water conservation options available to the project based on location, code compliance, and overall building function.

## **7) Construction Administration**

The construction phase is critical to achieve the owners project requirements of a high performance building. It is necessary that the site be managed to reduce water run-off, to control dust migration, to control construction waste, to protect construction material from the weather, and limit other

environmental impacts. During construction, the excessive construction materials need to be organized to extract reusable items, recyclable items, compost items, and hazardous items. Depending on the experience of the contractors, firms new to high performance buildings may require education on all aspects of site management, waste collection, verification of installed items, collection of material data on all items, and their importance to the final quality of the building.

## **8) Commissioning**

Commissioning of a construction project for a building is a prerequisite to verify that the owners project requirements is accomplished. Commissioning should be provided by an independent firm and identified as a project requirement with its own budget and not something to be eliminated when budgets are tight. The level and building systems commissioned varies with the type of building, the size of the building, the complexity of the building's thermal conditioning elements, the building envelope, and the activities conducted within the building. At minimum, all energy systems are verified to meet operation criteria and that the building operators are fully trained on all the system A thoroughly commissioned building is important to integrate all systems to operate properly and control long term cost and utility consumption. Refer to references in Section IV for additional information.

## **9) Operations and Maintenance**

The goal of the operation and maintenance program is to operate the building at maximum efficiency, provide a healthy working environment, and control long term cost. The operations and maintenance manuals need to be written in a language understandable to the individuals in the field performing the maintenance. The commissioning manual needs to explain what was commissioned, the building operation parameters, and the on-going commissioning program. The maintenance manual needs to explain the high performance materials utilized and the steps and procedures to be implemented for future cleaning, repair, and replacement work orders. The maintenance staff needs initial training on all the systems and continuous training to maintain the quality of the high performance building. The utilization of a national high performance building guideline can provide monitoring and tracking programs that can support the control of long term operating costs.

# **SECTION IV – HIGH PERFORMANCE BUILDING DESIGN PROCESS**

Projects for executive departments and for institutions of higher education funded through the State's Long Bill or academic building projects for institutions of higher education funded by internal funds are required to meet the HPCP Policy. Projects funded by either CDE or DOLA may need to meet the HPCP Policy. Refer to their grant application documents.

## **1) HPCP Waiver or Modification Procedure**

Office of the State Architect has established in Section 1.2 the preferred guideline and targeted certification level for the High Performance Certification Program (HPCP). Owners can submit a waiver from the policy or a modification to the policy as explained in the following paragraphs. The waiver or modification shall be submitted to the appropriate state department based upon source of funds. For agencies or institutions of higher education, OSA receives the waiver or modification form. For funds from either CDE or DOLA, the form is submitted to the department controlling the funds. State funded Controlled Maintenance projects because of their limited scope are exempted from the policy and a HPCP waiver form is not required.

Owners can submit a waiver from this policy when they can justify that their project is outside the scope of the policy, as explained in Section 1 (Intent). The waiver request should be submitted as explained in the programming, site selection and budget determination subsection below.

Owners can submit a modification to this policy for projects that can justify a HPCP level below the State's targeted certification level. An owner submitting a modification request recognizes that the

project shall complete the registration and certification process, complete all the reporting requirements of this policy, but the final certification level will not result in meeting the State HPCP targeted certification level but will achieve the highest performance certification attainable. The modification request should be submitted during the project start-up phase as explained in the project start-up subsection below.

Agencies and Institutions of Higher Education with permission from OSA, may use the Green Building Initiative (GBI), Green Globes guideline with Three Globes the targeted certification level.

## **2) Programming, Site Selection and Budget Determination**

Programming processes shall incorporate the High Performance Certification Program (HPCP) requirements at the earliest possible phase. Designing and constructing a high performance building begins with the statement of design intent. The development of the design intent should include the various stakeholders as early as possible. The statement of intent should clearly set forth the goals and strategies of the project. The project budget should both match the statement of intent and the requirement of the HPCP Policy targeted certification level. The initial step to achieve the goals of this policy is to determine the appropriate HPCP guideline per Section 1.2 of this policy.

If the agency has determined that the LEED-NC guideline does not align with the project scope and would like to use a different guideline, they need approval from OSA.

If the project as define in Section I is outside of the scope of this policy, then a waiver from this policy should be submitted after project scope is determined (to support budget calculations) with either the capital construction request package or grant application.

For K-12 schools, the school district should work with the CDE, Division of Capital Construction to determine an appropriate and acceptable guideline.

Review the applicable guideline to determine which strategies are achievable and align with the owner's goals, which strategies require additional information and therefore will be resolved during the design and construction phase, and which strategies are not achievable. Preliminary determination of strategies should be based upon attributes unique to the building or its site. OSA recognizes that some credits are not achievable in all areas of the state and therefore the agency may receive support of their strategic planning goals even if the project is not achieving the HPCP performance targeted certification level. Credits determined as not achievable will require information on the applicable HPCP checklist clarifying the reasons. A modification to this policy may be required if the project cannot achieve the HPCP targeted certification level.

The budget should be reviewed to determine the impact of achievable and potential strategies recognizing that life cycle cost and life cycle assessment should drive budget figures and not first costs.

The preliminary strategic planning for the appropriate guideline is submitted as part of the capital construction request package or grant application to the appropriate state department; Office of the State Architect, Colorado Department of Higher Education (CDHE), the Department of Local Affairs (DOLA), or Colorado Department of Education (CDE).

The preliminary checklist is to indicate HPCP target and support the project's HPCP budget. CDHE will forward the preliminary checklist with attached HPCP clarifying documents to OSA as part of their capital construction review process. DOLA and CDE will review their submittals and work with OSA as necessary and required. During the project's programming phase, it is expected that all projects are formulating their project cost to meet the HPCP target.

## **3) Project Start-up**

The inclusion of high performance standards is an integral part of the project rather than a separate design step. The design team should include appropriate members from the agency, architects, engineers, commissioning authority and other consultants as necessary depending on the type of project and size of the building. Minimum requirements should include a HPCP consultant with experience with the appropriate guideline to will help with the coordination of the team to achieve the desired final certification level. The HPCP consultant may be either an employee of the architectural/engineering firm, a separate firm hired by the A/E design firm, a firm hired directly by the owner, or an employee of the building owner. The design team members should be experienced with cost estimating, life cycle cost and life cycle assessment, local construction knowledge, and building energy modeling. The final building is a direct reflection of the experience of the design team.

The design team will develop the owner's project requirements (OPR) to incorporate the initial appropriate guideline strategies. The OPR forms the basis for evaluating all activities and products during pre-design, design, construction, acceptance, and as part of decisions for long-term maintenance and operations. The OPR is a written document that details the functional requirements of a project and the expectations of how it will be used and operated. This includes project and design goals, budgets, schedules, success criteria, owner's directives, and supporting information. It also includes information to assist the project team to properly plan, design, construct, operate, and maintain systems and assemblies. The OPR sets the performance targets for reducing energy and water use, renewable energy, rapidly renewable materials, the amount of recycled content in construction materials, products purchased from local manufacturers, and other HPCP goals. A design charrette can help all stakeholders develop and agree upon the high performance OPR goals. The design team should review these targets frequently to ensure the project goals are being met and the budget and project cost benefits are being evaluated based on life cycle cost or life cycle assessment criteria. The HPCP champion shall task individuals responsible to collect information for each point. These individuals will be responsible to facilitate the resolving of their assigned conditional points as the project proceeds. The HPCP champion shall set-up a method to track the status of each unresolved credit.

It is expected that each agency will incorporate sufficient points into the project to meet the HPCP targeted certification level.

If the agency's pre-registration review of the applicable guideline's checklist does not meet the HPCP targeted certification level, then a request for a modification of the HPCP policy to OSA is required. The modification request shall include the guideline's checklist (template provided by OSA on the [New Construction/Major Renovations](#) web site) with explanations for each point that is either conditional on the final design or construction or if the point cannot be achieved. The checklist should include columns that indicate the champion for the point, briefly explains the concern for each point, and the action item required to resolve the point.

The agency's HPCP champion will register the project with the applicable national program.

Notify OSA of the registration of the project. Submit the OSA HPCP Registration worksheet (OSA HPCP Registration-Checklist forms.xls – Section VII Exhibits). Attach the preliminary HPCP Checklist updated to indicate the points considered for potential recognition, based upon appropriated funds and any approved modifications to the HPCP policy.

#### **4) Schematic Design/ Design Development**

During the schematic and design development phase the design team reviews the initial strategic checklist and refines the selected points. The HPCP champion shall work with the design team to properly document the points as mandated by the guideline. The HPCP champion shall work with the responsible individuals to further investigate the unconfirmed points to facilitate a final decision for each point.

The design team shall model the building energy loads to determine the appropriate orientation, window/wall ratios, lighting system, heating system, and cooling system. The commissioning plan

shall be started early in the design phase. The measurement and verification plan shall be developed (if applicable) and implemented as the project proceeds. There could be additional Colorado specific sustainable priorities for state owned buildings that shall be review and incorporated into the project The HPCP champion should review and update the appropriate HPCP guideline continuously while completing the design development documents.

It is expected that all buildings will consider an appropriate Existing Buildings guideline after construction is completed and the building is occupied. The design team should recognize that the commissioning plan and the measurement and verification plan will have direct effect on the ability of the building to comply any existing building certification guideline.

## **5) Construction Documents/ Bid Phase**

The final construction documents will incorporate all the HPCP sustainable priorities, applicable guideline prerequisites, the owner's project requirements, and points under consideration. The HPCP champion will confirm all requirements are included in the 100% CD drawings, specifications, and commissioning requirements. The construction documents will finalize all materials specifications and construction methods. The commissioning authority will finalize the commissioning plan during the completion of the construction documents.

The HPCP champion will initiate the design review phase with the applicable national organization at the completion of the design documents.

## **6) Construction Phase**

Prior to commencement of the construction the design team, the HPCP champion and the contractor(s) will meet to discuss roles and responsibilities related to the HPCP targeted certification level. The contractor will monitor, track, and document the materials used in construction. The contractor will submit for review by the HPCP consultant all construction management plans. The commissioning authority will monitor and administer the commissioning plan in cooperation with the contractor and trade partners, which ideally includes a "Commissioning Kickoff" meeting. The design team, the HPCP champion, the contractor, the commissioning authority, and the owner shall continuously review and approve prior to ordering and before installation all materials and products. The HPCP champion shall monitor and help the contractor and commissioning authority as necessary. The HPCP champion shall review and update the applicable HPCP checklist during the construction phase.

## **7) Final Acceptance/Occupancy**

The HPCP champion will verify that all the required information necessary for certification has been collected and entered into the online submittal process. The HPCP champion will confirm that the commissioning authority has verified that the commissioning plan was completed and the final report was presented and accepted by the building owner. The HPCP champion will verify that all operation and maintenance manuals, training videos, or other appropriate medium have been provided to the owner and that the maintenance staff has been trained on all the systems.

The HPCP champion will initiate the construction review phase with the appropriate guideline at the completion of construction. The project shall be submitted for certification at the highest achievable level. A list of all the points appealed and the results of the appeal process should be documented on the applicable HPCP checklist to support the certification at the highest achievable level. A copy of the final certification results shall be submitted to the appropriate state department.

One of the requirements of state HPCP projects is the tracking of the incremental cost to comply with this policy. The HPCP champion should use the OSA HPCP Registration checklist form to track by point any unique, additional, or incremental design and construction cost necessary for each attempted



and awarded credit. This information shall be submitted during the standard OSA close-out documents process.

An example of a cost tracked is the incremental cost of a more efficient boiler essential to achieve the HPCP requirements compared to a boiler purchased that simply complies with the state's energy code requirements. The total incremental cost is the actual cost to comply with the HPCP policy. The incremental cost (positive or negative) could be either soft design cost or hard construction cost. The incremental cost (hard and soft) shall be tracked within the applicable worksheet in the OSA HPCP Registration Checklist file (Section VII). The incremental cost should equal to or be less than the project's premium cost (Section V).

## **8) Six and Eleventh Month Walkthroughs**

The owner will verify compliance with the commissioning plan, the operation and maintenance requirements, and that the owner's project requirements are satisfied. The owner will review and compare the annual and monthly utility consumption and cost with the measurement and verification plan. The agency will discuss with the design team and contractor any outstanding certification issues.

## **9) High Performance Building Long-Term Operation**

All buildings should track building performance by utilizing a sustainable rating and certification program to maintain the long-term performance of the building. Refer to the OSA policy on Energy and Water Management of Existing Buildings.

# **SECTION V – HIGH PERFORMANCE PREMIUM COSTS**

The High Performance Certification Program allows for a project to increase its initial cost with additional funds necessary to achieve a certified building. The increased initial costs are called the Premium cost and are a line-item on the CC/CR-CS Capital Construction/Capital Renewal Project Request cost summary request form. SB07-051 allows for up to five percent of additional funds to design and construct a high performance building if those costs can be recouped in operational savings within 15 years. It is expected that when projects are in programming and pre-design, the project's budget will include the funds necessary to achieve a high performance certified building. This premium is not part of the project's contingency line item, but is a separate project line item. The cost to achieve a high performance building shall be tracked by the HPCP champion on the applicable HPCP Checklist (template provided by OSA on the [New Construction/Major Renovations](#) web site). The final actual premium cost, which is the total of all the incremental cost, shall be reported to OSA and any excess premium dollars shall be reverted.

All agencies with HPCP buildings that started the design process on or after January 1, 2010 shall monitor, track, and verify utility vendor bill data pertaining to the building. The information must be annually reported to OSA. The annual report must include information related to building performance to ensure that the increased initial costs to achieve the highest performance certification attainable are in fact recouped.

All agencies with HPCP buildings that started the design process prior to January 1, 2010, are strongly encouraged to monitor, track, and verify utility vendor bill data pertaining to the building. If the data is collected, such data must be annually reported to OSA. If such data is not collected, the agency must provide to OSA, in writing, a reasonable explanation and also work with OSA to find a method to collect data.

# **SECTION VI – TRACKING BUILDING PERFORMANCE**

Each state agency or state institution of higher education should monitor, track, and verify utility vendor bill data pertaining to the building. For HPCP projects that started the design process on or after January 1, 2010 the information shall be reported to OSA. For HPCP projects that started the design process prior January 1, 2010, it is strongly encouraged to report the information to OSA.

Projects should collect the energy and water consumption data (usage and cost) monthly from a starting point of either the month of physical occupancy or the month the project is certified.

EPA ENERGY STAR Portfolio Manager®, is an online tool that can measure and track energy and water consumption to benchmark the performance of one building or a whole portfolio of buildings. This program has the ability to share data with colleagues. Other programs may be used if they can collect the data monthly and are approved by OSA.

The building performance shall be submitted to OSA with the capital and controlled maintenance requested projects and other annually required forms.

## SECTION VII – REFERENCES

### 1) STANDARDS

US Green Building Council – LEED™, <http://www.usgbc.org/>

U.S. Green Building Council (USGBC) is committed to cost-efficient and energy-saving green buildings through its' mission of market transformation through its LEED™ green building certification program. LEED stands for Leadership in Energy and Environmental Design. LEED is an internationally recognized third-party verified green building certification system that measures how well a building performs across all the metrics that matter most: energy efficiency, water efficiency, CO<sub>2</sub> emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts. USGBC maintains the guidelines, but the verification of the project is performed by GBCI.

Green Building Certification Institute (GBCI) <http://www.gbci.org>

GBCI was established in January 2008, provides third-party project certification and professional credentials recognizing excellence in green building performance and practice. GBCI administers project certification for commercial and institutional buildings and tenant spaces under the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED®) Green Building Rating Systems™ addressing new construction and ongoing operations.

Green Building Initiative® (GBI) <http://www.thegbi.org/>

The Green Building Initiative® (GBI) seeks to be innovative and provide responsive customer service as we collectively move the needle toward a sustainable built environment. We recognize that credible and practical green building approaches for commercial and governmental construction are critical in this effort. Responding to the reality that one size does not fit all in sustainable improvements, we sought to create a more tailored approach that takes into account the building's type, purpose and occupants. GBI is dedicated to accelerating the adoption of building practices that result in energy-efficient, healthier and environmentally sustainable buildings.

The Collaborative for High Performance Schools (CHPS) [www.chps.net](http://www.chps.net)

CHPS is a non-profit organization dedicated to making schools better places to learn. The guideline was initially developed in 1999 and practices continuous updates. The CHPS guideline is a third-party verified green building certification system that measures how well a building performs across all the metrics that matter to K-12 schools: energy, water and material efficient, well-lit, thermally comfortable, acoustically sound, safe, healthy and easy to operate. US-CHPS is available from their website. .

## 2) SOFTWARE

The Federal Energy Management Program (FEMP) offers links to tools that can help reduce energy use and meet laws and requirements. Tools include software, calculators, data sets, and databases created by the U.S. Department of Energy and other federal organizations. [US DOE FEMP Tools](#)

## 3) GENERAL INFORMATION

Information on commissioning can be found at *ASHRAE/NIBS Guideline 0 – The Commissioning Process and Guideline 1.1 – HVAC&R Technical Requirements for The Commissioning Process*, ([ASHRAE](#)), [Building Commissioning Association](#), or [AABC Commissioning Group](#)

ENERGY STAR is a joint program of the U.S. Environmental Protection Agency and the U.S. Department of Energy helping us all save money and protect the environment through energy efficient products and practices. [EnergyStar](#)

U.S. Environmental Protection Agency, WaterSense, is a partnership program sponsored by EPA, seeks to protect the future of the water supply by promoting water efficiency and enhancing the market for water-efficient products, programs, and practices. [EPA WaterSense](#)

The U.S. General Services Administration, Real Estate web page, provides extensive information and solutions on projects. Search their web site for specific information. [U.S.GSA - Real Estate](#)

[Green Construction Guide for Federal Specifiers](#), by the National Institute of Building Sciences, Whole Building Design Guide, is a comprehensive guide for procuring green building products.

Green Seal provides science-based environmental certification standards that are credible, transparent, and essential in an increasingly educated and competitive marketplace. <http://www.greenseal.org/>

## SECTION VIII – EXHIBITS

All Exhibits are available on the OSA Energy Management Web Site: [Energy Management Programs](#)

### 1) OSA HPCP Registration-Checklist Forms

The OSA HPCP Registration-Checklist Forms file is an excel spreadsheet provided by OSA and contains the four worksheets as listed below. Projects can either use the OSA LEED, OSA Green Globes, OSA CO-CHPS checklist, the official LEED, Green Globes, or CHPS checklist, or a checklist developed by the design firm (if substantially similar to the official checklist).

- a. HPCP Registration (worksheet)
- b. OSA LEED Checklist (worksheet)
- c. OSA Green Globes Checklist (worksheet)
- d. OSA US-CHPS Checklist (worksheet)

### 2) OSA HPCP Frequently Asked Questions (FAQs)

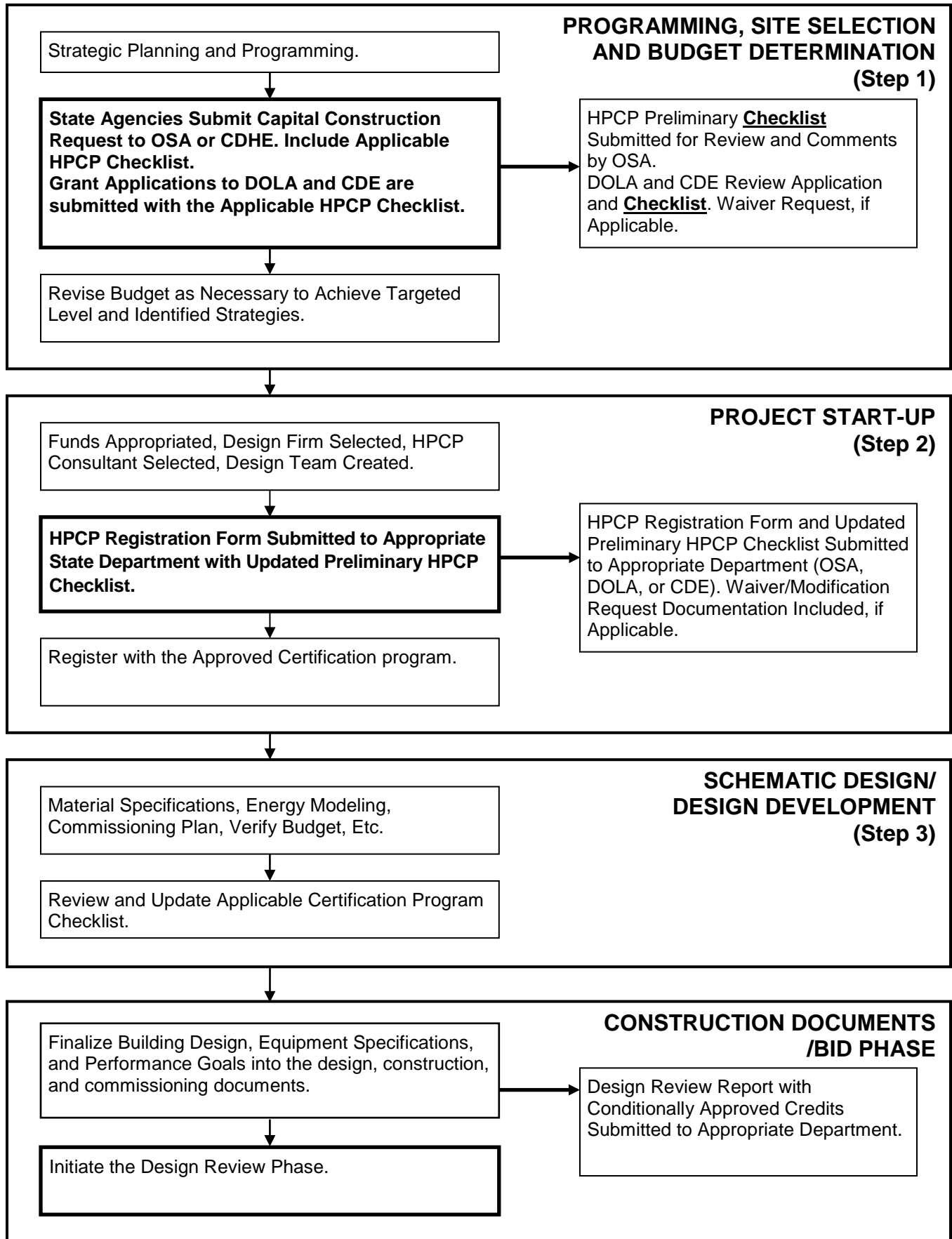
### 3) OSA HPCP Summary State

**4) OSA HPCP Summary DOLA/CDE**

**5) High Performance Building Design Process Flowchart**  
(The following two pages)

# HIGH PERFORMANCE BUILDING DESIGN PROCESS FLOWCHART

State Agency or DOLA/CDE Grantees responsibilities per project phase as listed below



# HIGH PERFORMANCE BUILDING DESIGN PROCESS FLOWCHART

State Agency or DOLA/CDE Grantees responsibilities per project phase as listed below

