OFFICE OF THE STATE ARCHITECT
STATE BUILDINGS PROGRAMS
POLICIES AND PROCEDURES

HIGH PERFORMANCE CERTIFICATION PROGRAM

FOR NEW CONSTRUCTION AND SUBSTANTIAL RENOVATIONS

TABLE OF CONTENTS

SECTION I – INTRODUCTION

THE ORIGINAL DATE OF THIS POLICY IS SEPTEMBER 1, 2007. UPDATED IN FEBRUARY 2010 TO REFLECT NEW STATUTES, NEW K-12 CHPS GUIDELINE AND UPDATED USGBC GUIDELINE.

1) Intent

The Colorado High Performance Certification Program (HPCP) policy establishes the standard that governs the design and construction of state facilities and state-assisted facilities for either new buildings or substantial renovations. The policy encompasses the building process from initial facility master planning through construction with a consideration to final long-term operation and maintenance of buildings. The policy is designed to be compatible with national standards while maintaining Colorado values, priorities and requirements. State controlled maintenance projects are exempt from registration/certification per state statute. Projects that comply with either applicability conditions (101.4.1 or 101.4.3) or comply with the low energy building section (101.5.2) of the 2006 International Energy Conservation Code, or other state or local construction projects with a similar narrowly focused scope are exempt from registration/certification per this policy but each project should be designed and constructed per this policy's goals.

High performance building design is an evolving field with rapid advances in professional design experience, contractor's construction knowledge and practices, equipment specifications, and product diversity. Rating systems, design standards, and methods to verify 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. This policy attempts to address some of the fundamental requirements of 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. 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 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 has the responsibility for ensuring that its construction project comply with all applicable standards, state, and local building codes.

State agencies shall develop energy management programs as per the requirements of the Governor's Executive Orders on Greening of State Government. 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, Energy Management Programs.

The HPCP policy is divided into seven sections: Section I – Introduction; Section II –Authorities Having Jurisdiction; Section III –High Performance Building Design Goals; Section IV –High Performance Building Design Process; Section V – High Performance Premium Cost; Section VI – References, Section VII – Exhibits.

2) High Performance Certification Program Requirements and Sustainable Priorities

(Note: italic words in this section are directly from state statute as published)

Requirement

The Department of Personnel and Administration, Office of the State Architect has established that the U.S. Green Building Council, Leadership in Energy and Environmental Design – New Construction (USGBC LEED™-NC) is the required guideline with Gold as the targeted certification level for the High Performance Certification Program (HPCP) as per section 24-30-1305, C.R.S. and Senate Bill 07-051. For the Colorado Department of Education, K-12 construction program, the Colorado Collaborative for High Performance Schools (CO-CHPS) is an optional guideline with Verified Leader (60 points) as the targeted certification level for the HPCP. *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 certification is attainable if the increased initial costs of substantial renovation, design, or new construction, including the time value of money, can be recouped from decreased operational costs within 15 years. If the state agency estimates that such increased initial cost will exceed five percent of the total cost of the substantial renovation, design, or new construction, the Capital Development Committee shall specifically examine the estimate before approving any appropriation,* section 24-30-1305 (9) (a), (b), (c), C.R.S.

Additional Sustainable Priorities

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

Meet all eight LEED prerequisites and the following credits and requirements in the appropriate LEED Rating System. The following apply to LEED v3.

a. Energy and Water Efficiency resulting in Operational Savings
    i. 24% reduction in energy by cost method based on ASHRAE 90.1 – 2007 for new construction; 20% reduction for renovations (EAc1)
    ii. Enhanced Commissioning of energy systems (EAc3) for projects greater than 20,000 square feet
    iii. Measurement and Verification of energy and water systems (EAc5) for projects greater than 50,000 square feet
    iv. 50% reduction of landscape water (potable) based on LEED calculators (WEc1)
    v. 30% reduction of indoor water use (potable) based on LEED calculators (WEc3)
b. Healthy Indoor Environmental Quality for an enhanced work and/or learning environment
    i. Low toxicity materials-Achieve two of the following: IEQc4.1, 4.2, 4.3, 4.4
    ii. Daylighting (IEQc8.1)
c. Construction Waste Management & Local Materials
    i. 50% diversion rate of construction waste from landfill (MRc2)
    ii. Achieve Regional Materials Credit (MRc5) while sourcing as many materials from Colorado as practical

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 should meter all utilities 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.

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 modification of this policy or a waiver from this policy. See modification/waiver subsection in Section IV.

Buildings that are exempt from the HPCP include as specified in the statute is any building without a heating, cooling, or air conditioning system; buildings that are smaller than 5,000 square feet; and temporary structures. Agencies 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. See modification/waiver subsection in Section IV.

3) High Performance Certification Program Definitions

(Note: italic words in this section are directly from state statute as published)

(a) HIGH PERFORMANCE BUILDING
A high performance commercial building is energy 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.

(b) STATE-ASSISTED FACILITY, section 24-30-1301 (13) C.R.S.
"State-assisted facility" means a facility constructed, or a major facility constructed or renovated, in whole or in part, with state funds or with funds guaranteed or insured by a state agency, except that, for purposes on section 24-30-1305 (9):

"State-assisted facility" means a facility that:

i. *Is substantially renovated, designed, or construction with state funds or with funds guaranteed or insured by a state agency and such funds constitute at least twenty-five percent of the project cost;*
ii. *Contains five thousand or more gross square feet (gsf);*
iii. *Includes a heating, ventilation, or air conditioning system; and*
iv. *Has not entered the design phase prior to January 1, 2008.*

A "STATE -ASSISTED FACILITY" does not include:

i. *A facility specified in section 23-1-106 (9), C.R.S.*
ii. *A public-assisted housing project, as that term is defined in section 24-32-718.*

Senate Bill 08-147 modified the exemptions in statute and therefore the following exemptions in SB-7-051 are now deleted: *(ii) A facility financed by the Colorado Housing and Finance Authority pursuant to part 7 of article 4 of title 29, C.R.S., or the Division of Housing in the Department of Local Affairs; or (iii) a facility the source of funding for which is section 39-29-110 (1) (b), C.R.S.*

(c) STATE FACILITY, section 24-30-1301 (14) C.R.S
"State facility" means a facility constructed, or a major facility constructed or renovated, by a state agency.

(d) SUBSTANTIAL RENOVATION, section 24-30-1301 (15) C.R.S
"Substantial Renovation" means any renovation the cost of which exceeds twenty-five percent of the value of the property.

(e) 2006 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^2 or 1.0 watt/ft^2 of floor area for space conditioning purposes
2. Those that do not contain conditioned space.

(f) 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 goal. The cost shall be tracked by the HPCP champion on the OSA HPCP Registration-Checklist form (provided by OSA on the Energy Management web site) and will indicate by credit, the initial cost estimate and final design/construction cost as explained in Section V.

(g) 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 facility, 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 policy and procedures on building codes. The state approved code consultants will conduct plan reviews and project inspections per the OSA building code policy Building Codes. They 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 orders 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:

24-30-1301-1307	State Buildings, Department of Personnel
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

Energy Performance Contracting to Improve State Facilities, Executive Order D014 03 (July 16, 2003)

Directive: Each state agency responsible for state-owned facilities shall investigate the feasibility for an energy performance contract.

Greening of State Government, Executive Order D005 05 (July 15, 2005)

Directive: Directs the Executive Directors of all state agencies to evaluate their current business operations and develop and implement policies and procedures to promote environmentally sustainable and economically efficient practices.

Greening of State Government: Goals and Objectives, Executive Order D0011 07 (April 16, 2007)

Directive: Directs state agencies to reduce state energy consumption, increase state use of renewable energy sources, increase the energy efficiency and decrease the environmental impact on the state vehicle fleet, and implement an environmental purchasing standard.

Greening of State Government: Detailed Implementation, Executive Order D0012 07 (April 16, 2007)

Directive: Establish policies and procedures to achieve the goals and objectives articulated in Executive Order D0011 07. Sections: Reduction of State Energy Consumption; Materials Management and Environmentally Preferable Purchasing; Greening the State Fleet; Renewable Energy Sources for State Energy Consumption.

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 funding appropriations to local projects dictates.

SECTION II – AUTHORITIES HAVING JURISDICTION

1) Colorado Greening Government Council

The Colorado Greening Government Council was established as part of Executive Order D005 05 and is within the Governor's Energy Office. The Council is directed to 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. The Executive Orders D0011 07 and D0012 07 expanded the responsibilities of the Council and set objectives for the state that the Council will implement. The Executive Orders require an annual report from the Council.

2) Governor's Energy Office

The Governor's Energy Office (GEO) mission is to lead Colorado to a New Energy Economy by advancing energy efficiency and renewable, clean energy resources. The GEO recognizes the critical role it will play in charting Colorado's leading role in the provision of clean and renewable forms of energy. The GEO works with communities, utilities, private and public organizations, and individuals to promote renewable energy such as wind, solar, and geothermal, and energy efficiency technologies in commercial and residential buildings. The New Energy Economy will benefit Colorado by bringing jobs and protecting our natural environment. GEO is the primary leader of the Colorado Greening Government Council and provides staff support to the Council.

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. The Colorado Department of Public Health and Environment focuses on evidence based best practices in the public health and environmental fields and plays a critical role in providing education to citizens so they can make informed choices. In addition to maintaining and enhancing core programs, CDPHE continues to identify and respond to emerging issues that could affect Colorado's public and environmental health.

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 managing state facilities and real estate through the Office of the State Architect (OSA). The OSA has responsibility for capital construction administration, controlled maintenance request prioritization, code compliance; facilities condition tracking, emergency maintenance funds approval, energy conservation and leasing and real estate transaction approval and oversight.

5) Department of Local Affairs

The 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 for its programs to ensure compliance with this HPCP policy (except

the State Housing Board) and to verify to DPA that their clients meet the requirements of this policy.

6) Department of Education

The Colorado Department of Education (CDE) supports and serves 178 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

Agencies and local jurisdictions facility master plans and other long-term strategic planning processes shall incorporate the concepts of high performance buildings.

2) Site Design and Planning

Building placement/orientation and profile is critical to both the long term operation and maintenance of the building and to building's affect 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 by 50% or more than 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, and the connection to the utility provider. The orientation of the building can have a major impact on the energy characteristics of a building through the four seasons and on the occupant's comfort during the day. 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 integrated design

process should be used in the building's design. 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. The final building design requires the combined efforts of all the members of the design team.

Integrated design is the consideration of all building systems and components together. 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 or systems that are not optimized for nontypical conditions. 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 and visible/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 windows glazings 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.

Renewable on site energy technologies should be considered as a potential energy source. Solar photovoltaic, solar thermal, wind power, biofuels, and geothermal are some of the renewable technologies that have potential in specific Colorado locations. 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 that as outlined in LEED™ may currently be the best procedure available. LCA does not need to be determined for every item purchased; instead, LCA should be determined for the top 10 to 20 items selected on volume, cost, or value. The LCA calculation may not always be necessary as part of a decision, but should be used when appropriate. The EPA Energy Star program is an alternative 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 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. Try not to install more electric lighting than necessary just to meet code, instead 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 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 to 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 not 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 heating and cooling system, while specified during the mechanical design are generally not part a HPCP unique credit, but do affect the overall water usage of the 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. 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 the success of a high performance building in order for the design intent to be realized. It is necessary that the site be managed to reduce water run-off, to control dust migration, to control construction waste, and limit other environmental impacts. To control construction waste, the 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 will 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 design intent is accomplished. Commissioning should be an identified project cost and not something to be eliminated when budgets are tight. Within the design and construction of a high performance building there are many levels of commissioning. The level of commissioning varies with the type of building, the size of the building, the complexity of the building's thermal conditioning elements, and the activities conducted within the building. At minimum, all energy systems are verified to meet operation criteria. 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 LEED™-EB: O&M (Existing Buildings: Operation & Maintenance) or the CHPS Best Practices Manual-Maintenance and Operations are excellent programs to initiate to control long term operating costs

SECTION IV – HIGH PERFORMANCE BUILDING DESIGN PROCESS

Projects funded through the annual state legislature's Long Bill need to submit the checklist and supporting documents as underlined to OSA and either OSPB or CDHE. Projects funded by either CDE or DOLA need to adhered to that department's funding request process and submit the underlined items to the appropriate Department. Refer to the attached flowchart.

1) HPCP Modification or Waiver Procedure

Office of the State Architect has established that the USGBC LEED™-NC at the Gold level or CO-CHPS at the Verified Leader level is the targeted certification goal for the High Performance Certification Program (HPCP). Owners can submit a waiver from the policy or a modification of the policy as explained in the following two subsections. The submittal for either a waiver or modification shall be sent to the appropriate state department. State Controlled Maintenance projects do not need to submit a HPCP waiver form.

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 goal. 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 goal. The modification request should be submitted during the project start-up phase as explained in the project start-up subsection below.

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 initial step to achieve the goals of this policy is to determine the appropriate HPCP checklist. This policy recognizes that LEED™-NC (New Construction) is normally the most applicable checklist, but with approval other USGBC checklists may be appropriate. If the agency has determined that LEED-NC checklist does not align with the project scope but would like to use a different USGBC checklist, they need to seek approval from OSA. For K-12 schools, the school district has the option of using the LEED or the CO-CHPS guideline and don't need to receive official approval by either OSA or CDE. Review the applicable checklist 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. (See Section VII-Exhibits, for links to the LEED™, CO-CHPS, OSA LEED, or OSA CO-CHPS checklists). Preliminary determination of strategies should be based upon attributes unique to the building or its site. OSA recognizes

that some LEED™ and CO-CHPS points 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 goals. 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 can not achieve the HPCP goal. If the project as define in Section 1 is outside of the scope of this policy, then a waiver from this policy should be submitted after project scope is defined (to support budget calculations) or with the capital construction request package or grant application. 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 LEED or CO-CHPS checklist is submitted as part of the capital construction request package or grant application to the appropriate state department; Colorado Department of Higher Education (CDHE), Office of State Planning and Budgeting (OSPB), the Department of Local Affaires (DOLA), or Colorado Department of Education (CDE). The preliminary checklist is to indicate HPCP target and support the project's HPCP budget. CDHE and OSPB will forward to the preliminary checklist with attached HPCP clarifying documents. 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, the architects, engineers, commissioning agents and other consultants as considered necessary depending on the type of project and size of the building. Minimum requirements should include a LEED™ Accredited Professional on the design team for a LEED project to act as the HPCP champion. The CO-CHPS guidelines don't have a consultant requirement, but a HPCP champion will help with the coordination of the team to achieve the desired final certification goal. 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 LEED™ or CO-CHPS checklist 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 target of Gold with either a LEED or CO-CHPS checklist. If the agency's pre-registration review of the applicable checklist does not meet the HPCP target, then a written modification request for a modification of the HPCP policy to OSA is required. The modification request shall include a

checklist (template provided by OSA on the Energy Management web site) with explanations for each point not under consideration and for each point that is conditional to the construction phase review. The modified 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 Green Building Certification Institute (GBCI) or the Collaborative for High Performance Schools (CHPS). 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. Per the GBCI online certification process, the design team will be assigned roles and credits to track as assigned by the HPCP champion.

4) Schematic Design/ Design Development

During the schematic and design development phase the design team reviews the initial strategic checklist and refines the selected credits. The HPCP champion shall work with the design team to properly document the points as mandated by the online program. 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 develop a computer energy model that can be used to determine the appropriate equipment size and efficiencies. The commissioning plan shall be developed and started early in the design phase. The measurement and verification plan shall be developed (if applicable) and implemented as the project proceeds. The additional sustainable priorities require enhance commissioning for projects greater than 20,000 gsf and measurement and verification for projects greater than 50,000 gsf for state owner facilities. The HPCP champion should review and update the appropriate HPCP checklist continuously while completing the design development documents.

It is expected that all buildings will consider the LEED-Existing Buildings Operations and Maintenance (LEED-EB: O&M) or the CHPS Maintenance and Operations 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, LEED™ prerequisites and credits, or CO-CHPS prerequisites, the owner's project requirements, and credits 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 either GBCI or CHPS at the completion of the design documents. Submit a copy of a GBCI or CHPS Design Application Review Report upon receipt (this report is generated by the certification organization).

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 goal. The

contractor will monitor, track, and document the materials used in construction. The contractor will submit for review by the HPCP consultant the construction waste management plan and the indoor air quality plan. The commissioning agent 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 agent, 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 agent 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 agent 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 either the GBCI or CHPS at the completion of construction. The project shall be submitted for certification at the highest achievable level. A list of all the credits 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. The final certification results from either GBCI or CHPS will be copied and 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 high performance buildings should consider the LEED™-Existing Building: Operation and Maintenance program or the CHPS Operation and Maintenance program as a process to maintain the long-term performance of the building. Refer to the OSA policy on energy 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-C Capital Construction 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 predesign, 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 Energy Management 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.

SECTION VI – REFERENCES

1) STANDARDS

US Green Building Council – LEED™, http://www.usgbc.org/
U.S. Green Building Council (USGBC) is a non-profit organization committed to cost-efficient and energy-saving green buildings through it's' 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_2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts. U.S. Green Building Council and information on the LEED ratings can be accessed at: www.usgbc.org. USGBC maintains the guidelines, but the verification of the project is performed by GBCI.

Green Building Certification Institute (GBCI) 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.

The Collaborative for High Performance Schools (CHPS) 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 guideline is a nationally 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. CO-CHPS maintains the guidelines and performs the verification of the project. The program has expanded to eleven states, including Colorado.

2) SOFTWARE

The Department of Energy, through the Office of Energy Efficiency and Renewable Energy's (EERE) Building Technologies Program (BTP) provides Building Modeling and Compliance Tools/Software on their website. US DOE BTP Building Energy Software Tools Directory

Building Life Cycle Cost (BLCC) is a program developed by the National Institute of Standards and Technology (NIST) to provide computational support for the analysis of capital investments in buildings. The Department of Energy, through the Office of Energy Efficiency and Renewable

Energy's (EERE) Federal Energy Management Program (FEMP) provides the free program from their web site. US DOE FEMP Software and Database Tools

3) GENERAL INFORMATION

The Building Commissioning Association (BCA) promotes building commissioning practices that maintain high professional standards in accordance with the owner's project requirements. Building Commissioning Association

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, Buildings and Real Estate web page, provide extensive information and solutions on projects. Search their web site for specific information. U.S.GSA

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/

Life Cycle Assessment: Principles and Practice by Scientific Applications International Corporation (SAIC), EPA/600/R-06/060 May 2006, National Risk Management Research Laboratory Office of Research and Development U.S. Environmental Protection Agency.

USDOE, Office of Energy Efficiency and Renewable Energy, Building Technologies Program, Net-Zero Energy Commercial Building Initiative, US DOE BTP Net Zero Initiative

SECTION VII – 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 three worksheets as listed below. Projects can either use the OSA LEED, OSA CO-CHPS checklist, the official LEED 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 CO-CHPS Checklist (worksheet)

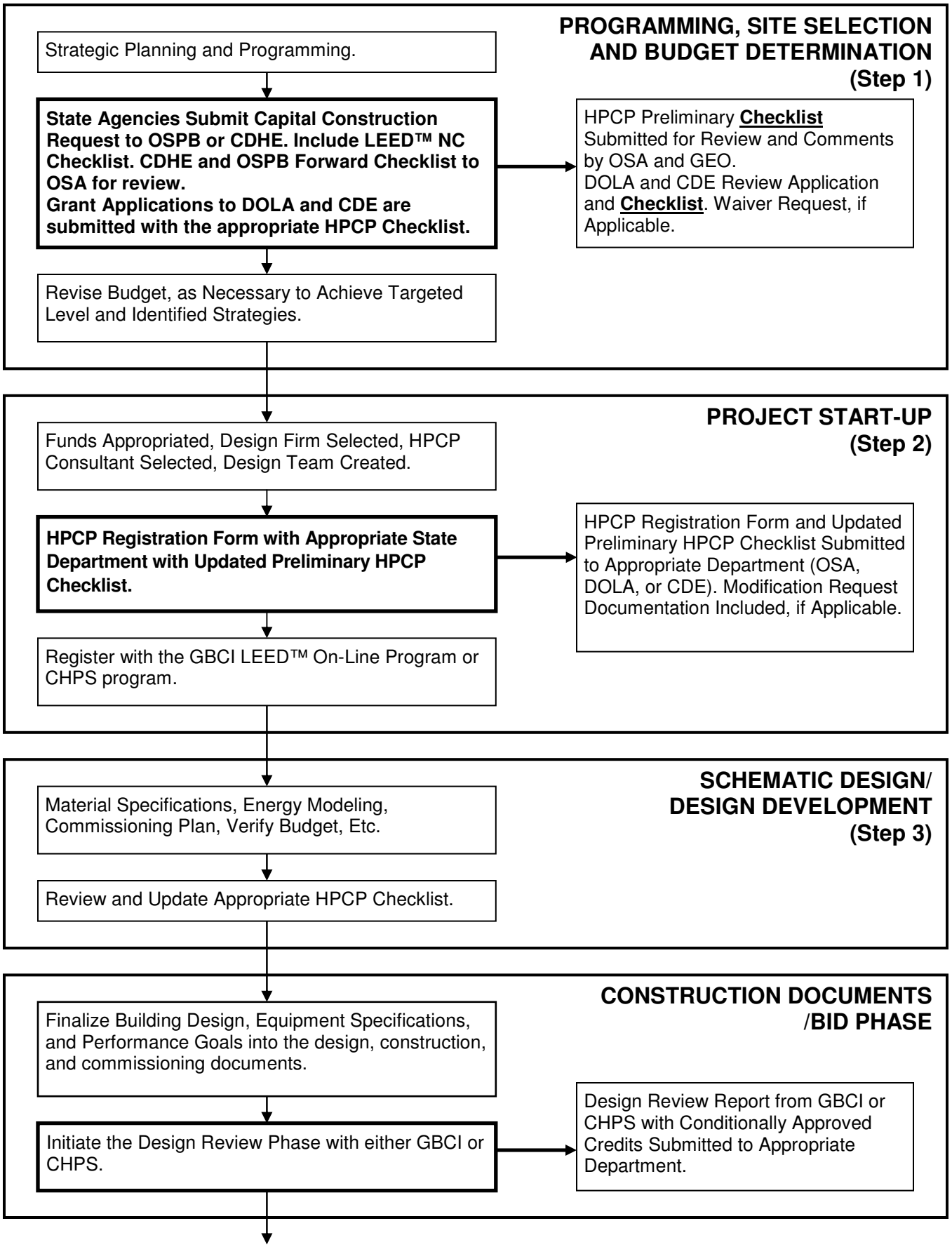
2) OSA HPCP Frequently Asked Questions (FAQs)

3) OSA HPCP Summary State

4) OSA HPCP Summary DOLA/CDE

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