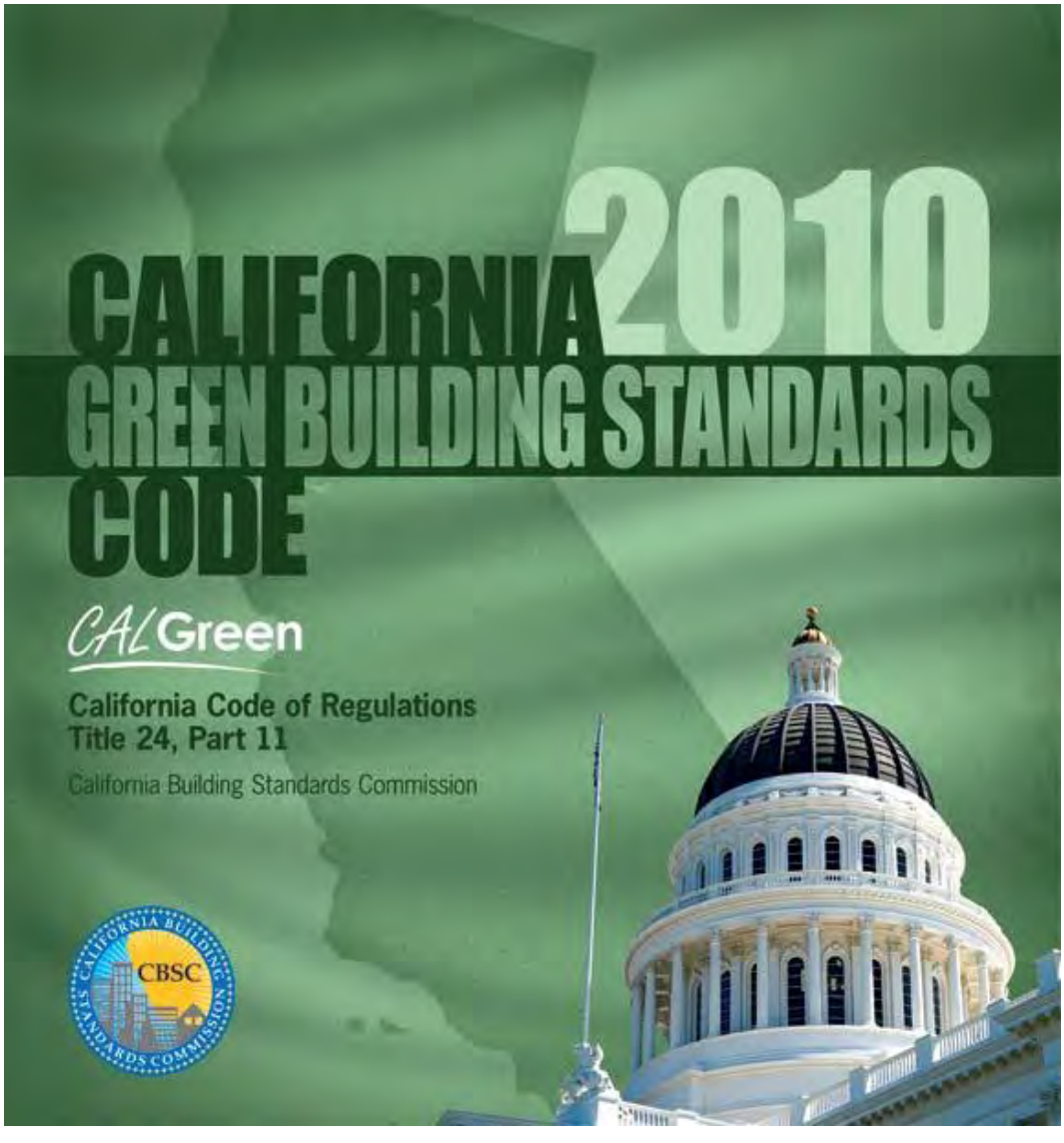
City of Sonoma



CALGreen

Special Inspector Manual

City of Sonoma

Building Department Informational Handout

Becoming a Listed CALGreen Special Inspector

Handout No: 42
Published: 4/28/2011

Chapter 7 of the California Green Building Code (CALGreen) sets forth qualification requirements for CALGreen Special Inspectors. The code states that "When required by the enforcing agency, the owner or the responsible entity acting as the owner's agent shall employ one or more special inspectors to provide inspection or other duties necessary to substantiate compliance with this code. Special inspectors shall demonstrate competence to the satisfaction of the enforcing agency for the particular type of inspection or task to be performed."

For New Residential Buildings, the code further states that "In addition to other certifications or qualifications acceptable to the enforcing agency, the following certifications or education may be considered by the enforcing agency when evaluating the qualifications of a special inspector:

1. Certification by a national or regional green building program or standard publisher (i.e. ICC CALGeen, LEED AP, BIG Rater, etc.).
2. Certification by a statewide energy consulting or verification organization, such as HERS raters, building performance contractors, and home energy auditors.
3. Successful completion of a third party apprentice training program in the appropriate trade.
4. Other programs acceptable to the enforcing agency.

Notes:

1. Special inspectors shall be independent entities with no financial interest in the materials or the project they are inspecting for compliance with this code.
2. HERS raters are special inspectors certified by the California Energy Commission (CEC) to rate homes in California according to the Home Energy Rating System (HERS)."

For New Nonresidential Buildings, the code states that "…the special inspector shall have a certification from a recognized state, national or international association, as determined by the local agency. The area of certification shall be closely related to the primary job function, (i.e. ICC CALGeen, LEED AP, etc.) as determined by the local agency.

Note: Special inspectors shall be independent entities with no financial interest in the materials or the project they are inspecting for compliance with this code."

Each enforcing agency will have different requirements regarding who will be required to verify CALGreen compliance. In some instances, the enforcing agency will provide CALGreen verification of some measures and rely on a CALGreen special inspector to verify other measures. The City of Sonoma requires that a qualified CALGreen special inspector, listed by the City of Sonoma, provide compliance verification for all required CALGreen measures for a project.

To become a City of Sonoma listed CALGreen Special Inspector, the prospective inspector must:

1. Purchase or download and print a copy of the 2010 California Green Building Code; and
2. Download and print a copy of the City of Sonoma – CALGreen Special Inspector Manual; and
3. Meet one or more of the qualification requirements set forth above; and
4. Attend a 1-hour City of Sonoma orientation to discuss special inspector expectations.

In the near future, CALGreen special inspectors will be required to hold CALGreen Inspector and Plans Examiner certifications offered by the International Code Council. More information on this exam and certification can be found online at www.iccsafe.org/specialty.

Download References

- 2010 California Green Building Code - http://www.hcd.ca.gov/codes/shl/2010_CA_Green_Bldg.pdf
- City of Sonoma – CALGreen Special Inspector Manual – http://www.sonomacity.org/default.aspx?PageId=518
- ICC CALGreen Inspector and Plans Examiner Certification - www.iccsafe.org/specialty

RESIDENTIAL COMPLIANCE FORMS AND WORKSHEETS
http://www.hcd.ca.gov/CALGreen.html

Water Use Calculation Forms (Section 4.303)

- WS 1 – Baseline Water Use — (*Adobe PDF*) or (*Microsoft Word*)
- WS 2 – 20% Reduction Water Use Calculation Table — (*Adobe PDF*) or (*Microsoft Word*)

Construction Waste Management Forms (Section 4.408)

- CW 1 – Construction Waste Management Plan (CWMP) — (*Adobe PDF*) or (*Microsoft Word*)
- CW 2 – Construction Waste Management Worksheet (Volume Method) and Instructions — (*Adobe PDF*) or (*Microsoft Excel*)
  - Instructions — (*Microsoft Word*)
- CW 3 – Construction Waste Management Worksheet (Weight Method) and Instructions — (*Adobe PDF*) or (*Microsoft Excel*)
  - Instructions — (*Microsoft Word*)
- CW 4 – Weight or Volume Summary Worksheet — (*Adobe PDF*) or (*Microsoft Excel*)
- CW 5 – Construction Waste Management Worksheet (4 Lbs. per Sq. Ft.) and Instructions — (*Adobe PDF*) or (*Microsoft Excel*)
  - Instructions — (*Microsoft Word*)
- CW 6 – 4 Lbs. per Sq. Ft. Summary Worksheet — (*Adobe PDF*) or (*Microsoft Excel*)
- CW 7 – Construction Waste Management Plan (CWMP) Acknowledgement — (*Adobe PDF*) or (*Microsoft Excel*)

Building Maintenance and Operation Forms (Section 4.410)

- Operation and Maintenance Manual — (*Adobe PDF*) or (*Microsoft Word*)

Pollutant Control Forms (Section 4.504)

- PC 1 – Adhesives, Sealants and Caulks – Product Information — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 2 – Adhesives, Sealants and Caulks – Room/Location Matrix — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 3 – Adhesives, Sealants and Caulks – Declaration Statement — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 4 – Sample Worksheet — (*Adobe PDF*) or (*Microsoft Excel*)

- PC 5 – Paints and Coatings – Product Information — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 6 – Paints and Coatings – Room/Location Matrix — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 7 – Paints and Coatings – Declaration Statement — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 8 – Sample Worksheet — (*Adobe PDF*) or (*Microsoft Excel*)

- PC 9 – Finish Flooring Materials – Product Information — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 10 – Finish Flooring Materials – Room/Location Matrix — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 11 – Finish Flooring Materials – Declaration Statement — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 12 – Sample Worksheet — (*Adobe PDF*) or (*Microsoft Excel*)

- PC 13 – Composite Wood Products – Product Information — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 14 – Composite Wood Products – Room/Location Matrix — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 15 – Composite Wood Products – Declaration Statement — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 16 – Sample Worksheet — (*Adobe PDF*) or (*Microsoft Excel*)

City of Sonoma

RESIDENTIAL

2010 CALGreen+Tier 1 Checklist

*(Applies to newly constructed hotels, motels, lodging houses, dwellings, dormitories, condominiums, shelters, congregate residences, employee housing, factory-built housing and other types of dwellings with sleeping accommodations and new accessory buildings associated with such uses***. Additions, alterations, repairs and existing structures[1] are not subject to the requirements of CALGreen. Existing site and landscaping improvements that are not otherwise disturbed are also not subject to the requirements of CALGreen.**)

APPENDIX A4

(Revised per City of Sonoma Requirements - Based on CALGreen + Tier 1)

Project Name: _____

Project Address: _____

Project Description: _____

Instructions:

1. The Owner or the Owner's agent shall employ a qualified CALGreen Special Inspector, listed by the City of Sonoma Building Department, to perform CALGreen Special Inspector services and to verify and assure the Owner and the Building Department that all required work described herein is properly planned and implemented in the project.
2. The CALGreen Special Inspector r shall not be the design professional or contractor for the project and shall not have a financial interest in the project for which services are being provided except for the cost of providing said services.
3. The CALGreen Special Inspector, in collaboration with the owner and the design professional shall initially complete **Columns 1 and 2** of this checklist, sign and date the **Design Verification** section at the end of this checklist and have the checklist printed on the approved plans for the project.
4. Prior to final inspection by the Building Department, theCALGreen Special Inspector shall complete **Column 3** and sign and date **the Implementation Verification** section at the end of this checklist.

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after installation & prior to final inspection approval*
See Chapter 4 and Appendix A4 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
A4.1 **PLANNING AND DESIGN**	***All checked items are required for the project***	***Select at least two (2) elective measures from A4.1***	***Select all measures verified in the completed project***
Site Selection		A4.1	
A4.103.1 A site which complies with at least one of the following characteristics is selected: 1. An infill site is selected. 2. A greyfield site is selected. 3. An EPA-recognized Brownfield site is selected.		☐ ☐ ☐	☐ ☐ ☐

[1] Where more than seventy-five percent (75%) of all existing walls of an existing structure are demolished or deconstructed the structure shall be treated as a new building (Section 14.10.050 of the Sonoma Municipal Code).

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after installation & prior to final inspection approval*
See Chapter 4 and Appendix A4 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
Site Preservation		A4.1	
4.104.1 A site plan and inventory of the site is developed and used to minimize site disturbance in order preserve desirable existing natural resources and minimize future adverse effects on the proposed structure.	☒		☐
A4.104.1 An individual with oversight responsibility for the project has participated in an educational program promoting environmentally friendly design or development and has provided training or instruction to appropriate entities.		☐	☐
Deconstruction and Reuse of Existing Materials		A4.1	
A4.105.2 Existing buildings are disassembled for reuse or recycling of building materials. The proposed structure utilizes at least one of the following materials which can be easily reused: 1. Light fixtures 2. Plumbing fixtures 3. Doors and trim 4. Masonry 5. Electrical devices 6. Appliances 7. Foundations or portions of foundations		☐	☐ Verify at least one if required ☐ ☐ ☐ ☐ ☐ ☐ ☐
Site Development		A4.1	
4.106.2 A plan is developed and implemented to manage storm water drainage during construction.	☒		
4.106.3 The site shall be planned and developed to keep surface water away from buildings. Construction plans shall indicate how site grading or a drainage system will manage all surface water flows.	☒		☐
A4.106.1 Orient buildings to optimize the use of solar energy with the long side of the house oriented within 30° of south.		☐	☐
A4.106.2.1 Soil analysis is performed by a licensed design professional and the findings utilized in the structural design of the building.		☐	☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after installation & prior to final inspection approval*
See Chapter 4 and Appendix A4 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
A4.106.2.2 Soil disturbance and erosion are minimized by at least one of the following:			
1. Natural drainage patterns are evaluated and erosion controls are implemented to minimize erosion during construction and after occupancy.		☐	☐
2. Site access is accomplished by minimizing the amount of cut and fill needed to install access roads and driveways.		☐	☐
3. Underground construction activities are coordinated to utilize the same trench, minimize the amount of time the disturbed soil is exposed and the soil is replaced using accepted compaction methods.		☐	☐
A4.106.2.3 Displaced topsoil is stockpiled for reuse and protected.	☒		☐
A4.106.2.4 The construction area shall be identified and delineated by fencing or flagging to limit construction activity to the construction area.		☐	☐
A4.106.3 Post construction landscape designs accomplish one or more of the following:			
1. Areas disrupted during construction are restored to be consistent with native vegetation		☐	☐
2. Limit turf areas to not more than 50 percent (Tier 1).		☐	☐
3. Utilize at least 75 percent native Californian or drought tolerant plant and tree species appropriate for the climate zone region.		☐	☐
4. Hydrozoning irrigation techniques are incorporated into the landscape design.		☐	☐
A4.106.4 Permeable paving is utilized for not less than 20 percent of the total parking, walking, or patio surfaces.(Tier 1)	☒		☐
A4.106.5 Roofing materials shall have a minimum 3-year aged solar reflectance and thermal emittance or a minimum aged Solar Reflectance Index (SRI) equal to or greater than the values specified in Tables 4.1.6.5(1). (Tier 1)	☒		☐
Innovative Concepts and Local Environmental Conditions		A4.1	
A4.107.1 Items in this section are necessary to address innovative concepts or local environmental conditions These items must be approved by the Building Department prior to listing here.			
Item 1:	☐	☐	☐
Item 2:	☐	☐	☐
Item 3:	☐	☐	☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after installation & prior to final inspection approval*
See Chapter 4 and Appendix A4 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
A4.2 **ENERGY EFFICIENCY**	***All checked items are required***	***Select at least four (4) elective measures from A4.2***	***Select all measures verified in the completed project***
Performance Approach General			
A4.203.1 Low-rise residential buildings use at least 15 percent less Time-Dependent Valuation (TDV) Energy than the 2008 Title 24 Building Energy Efficiency Standards "budget" building. No calculations are required to demonstrate any specified reduction in CO2 emissions.[2] (Tier 1)	☒		☐
Building Envelope		A4.2	
A4.205.1 Radiant roof barrier is installed in Climate Zones 2, 4, and 8 through 15.		☐	☐
A4.205.2 Exterior shading at least 18 inches in depth is provided on south and west windows.		☐	☐
Air Sealing Package		A4.2	
A.4.206.1 Third party blower door test is conducted and passed to verify building envelope tightness.		☐	☐
HVAC Design, Equipment and Installation		A4.2	
A4.207.1 Radiant, hydronic, ground source and other innovative space heating and cooling systems included in the proposed design shall be designed using generally accepted industry-approved guidelines and design criteria.		☐	☐

[2] Modified by Section 14.10.050 of the Sonoma Municipal Code

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after installation & prior to final inspection approval*
See Chapter 4 and Appendix A4 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
A4.207.2.2 An HVAC system commissioning plan is developed and the following items, as appropriate, pertaining to the heating and cooling systems are inspected and certified by an independent third party agency:		☐	☐
1. Verify compliance with the manufacturers recommended start-up procedures.			☐
2. Verify refrigerant charge by super-heat or other methods specified by the manufacturer.			☐
3. Burner is set to fire at the nameplate input rating.			☐
4. Temperature drop across the evaporator is within the manufacturers recommended range.			☐
5. Test and verify air flow to be within 10 percent of the initial design air flow.			☐
6. Static pressure within the duct system is within the manufacturers' acceptable range.			☐
7. Verify that the whole house and exhaust ventilation systems meet Title 24 requirements.			☐
8. Verify that the recommended maintenance procedures and schedules are documented and provided to the home owner.			☐
A4.207.2.3 Results of the commissioning inspection shall be included in the Operation and Maintenance Manual required in Section 4.4.10.1.		☐	☐
A4.207.4 Install gas-fired (natural or propane) space heating equipment with an Annual Fuel Utilization Ratio (AFUE) of0.90 or higher.		☐	☐
A4.207.5 If an electric heat pump must be used, select equipment with a Heating Seasonal Performance Factor (HSPF) of 8.0 or higher.		☐	☐
A4.207.6 When climatic conditions necessitate the installation of cooling equipment, select cooling equipment with a Seasonal Energy Efficiency Ratio (SEER) higher than 13.0 and an Energy Efficiency Ratio (EER) of at least 11.5.		☐	☐
A4.207.7 Install ductwork to comply with at least one of the following:			
1. Install ducts within the conditioned envelope of the building.		☐	☐
2. Install ducts in an underfloor crawl space.		☐	☐
3. Use ducts with an R-6 insulation value or higher.		☐	☐
4. Install ductwork which is buried in the ceiling insulation.		☐	☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after installation & prior to final inspection approval*
See Chapter 4 and Appendix A4 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
A4.207.8 Perform duct leakage testing to verify a total leakage rate of less than 6 percent of the total fan flow.		☐	☐
A4.207.9 In climate zones 2, 4, and 8 through 15 install a whole-house fan with insulated louvers or an insulated cover.		☐	☐
A4.207.10 ENERGY STAR ceiling fans are installed in all bedrooms and living areas.		☐	☐
Water Heating Design, Equipment and Installation		A4.2	
A4.208.1 The Energy Factor (EF) for a gas fired storage water heater is higher than 0.60.		☐	☐
A4.208.2 The Energy Factor (EF) for a gas fired tankless water heater is 0.80 or higher.		☐	☐
A4.208.3 Where the hot water source is more than 10 feet from a fixture, the potable water distribution system shall convey hot water using a method designed to minimize wait time for hot water to arrive at the fixture.		☐	☐
Lighting		A4.2	
A4.209.1 Building lighting consists of at least 90 percent ENERGY STAR qualified hard-wired fixtures.		☐	☐
Appliances		A4.2	
A4.210.1 Each appliance provided by the builder meets ENERGY STAR if an ENERGY STAR designation is applicable for that appliance.		☐	☐
Renewable Energy		A4.2	
A4.211.1 Install a solar photovoltaic (PV) system in compliance with the California Energy Commission New Solar Homes Partnership (NSHP).[1, 2] [1] In addition each appliance provided by the builder must be Energy Star if an Energy Star designation is applicable for that appliance. [2] Information on NSHP incentives available through the California Energy Commission may be obtained at the "Go Solar California" website: www.GoSolarCalifornia.ca.gov/nshp/index.html.		☐	☐
A4.211.2 A solar water heating system is installed.		☐	☐
A4.211.3 Space on the roof surface and penetrations through the roof surface are provided for future solar installation.		☐	☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after installation & prior to final inspection approval*
See Chapter 4 and Appendix A4 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
A4.211.4 A minimum one inch conduit is provided from the electrical service equipment for the future installation of a photovoltaic (PV) system.		☐	☐
Innovative Concepts and Local Environmental Conditions		A4.2	
A4.213.1 Items in this section are necessary to address innovative concepts or local environmental conditions. These items must be approved by the Building Department prior to listing here.			
Item 1:	☐	☐	☐
Item 2:	☐	☐	☐
Item 3:	☐	☐	☐
A4.3 **WATER EFFICIENCY AND CONSERVATION**	***All checked items are required***	***Select at least one (1) elective measure from A4.3***	***Select all measures verified in the completed project***
Indoor Water Use		A4.3	
4.303.1 Indoor water use shall be reduced by at least 20 percent using one of the follow methods. ☐ Water saving fixtures or flow restrictors shall be used per Table 4.303.2. ☐ A 20 percent reduction in baseline water use shall be demonstrated per Table 4.303.1.	☒ 7/01/2011[3]		☐ ☐
4.303.2 When using the calculation method specified in Section 4.303.1, multiple showerheads shall not exceed maximum flow rates.	☒ 7/01/2011[1]		☐
4.303.3 Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with standards specified in Table 4.303.3.	☒ 7/01/2011[1]		☐
A4.303.1 Kitchen sink faucet shall have a maximum flow rate not greater than 1.5 gallons per minute at 60 psi.	☒		☐
A4.303.2 Non-water supplied urinals or waterless toilets are installed.		☐	☐

[3] *Applies to permit applications submitted on or after 7/1/11.*

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after installation & prior to final inspection approval*
See Chapter 4 and Appendix A4 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
Outdoor Water Use		A4.3	
4.304.1 Automatic irrigation systems installed at the time of final inspection shall be weather-based.	☒		☐
A4.304.1 Install a low-water consumption irrigation system which minimizes the use of spray type heads.		☐	☐
A4.304.2 A rainwater capture, storage and re-use system is designed and installed.		☐	☐
A4.304.3 A water budget shall be developed for landscape irrigation.		☐	☐
A4.304.4 *Provide water efficient landscape irrigation design that reduces the use of potable water in accordance with Chapter 14.32 of the Sonoma Municipal Code. (SMC 14.32)*	☒		☐
A4.304.5 A landscape design is installed which does not utilize potable water.		☐	☐
WATER REUSE SYTEMS		A4.3	
A4.305.1 Piping is installed to permit future use of a graywater irrigation system served by the clothes washer or other fixtures.		☐	☐
A4.305.2 Recycled water piping is installed.		☐	☐
A4.305.3 Recycled water is used for landscape irrigation.		☐	☐
Innovative Concepts and Local Environmental Conditions		A4.3	
A4.306.1 Items in this section are necessary to address innovative concepts or local environmental conditions. These items must be approved by the Building Department prior to listing here.			
Item 1:	☐	☐	☐
Item 2:	☐	☐	☐
Item 3:	☐	☐	☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after installation & prior to final inspection approval*
See Chapter 4 and Appendix A4 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
A4.4 **MATERIAL CONSERVATION AND RESOURCE EFFICIENCY**	***All checked items are required***	***Select at least two (2) elective measures from A4.4***	***Select all measures verified in the completed project***
Foundation Systems		A4.4	
A4.403.1 A Frost-Protected Shallow Foundation (FPSF) is designed and constructed.		☐	☐
A4.403.2 Cement use in foundation mix design is reduced by not less than a 20 percent. (Tier 1)	☒		☐
Efficient Framing Techniques		A4.4	
A4.404.1 Beams and headers and trimmers are the minimum size to adequately support the load.		☐	☐
A4.404.2 Building dimensions and layouts are designed to minimize waste.		☐	☐
A4.404.3 Use pre-manufactured building systems to eliminate solid sawn lumber whenever possible.		☐	☐
A4.404.4 Material lists are included in the plans which specify material quantity and provide direction for on-site cuts.		☐	☐
Material Sources		A4.4	
A4.405.1 One or more of the following building materials, that do not require additional resources for finishing are used: ☐ Exterior trim not requiring paint or stain. ☐ Windows not requiring paint or stain. ☐ Siding or exterior wall coverings which do not require paint or stain.		☐	☐
A4.405.2 Floors that do not require additional coverings are used including but not limited to stained, natural, or stamped concrete floors.		☐	☐
A4.405.3 At least 10 percent of the materials for the project shall have a post-consumer or pre-consumer recycled content value (RCV) not less than 10 percent. (Tier 1)	☒		☐
A4.405.4 Renewable source building products are used.		☐	☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after installation & prior to final inspection approval*
See Chapter 4 and Appendix A4 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
Enhanced Durability and Reduced Maintenance			
4.406.1 Joints and openings. Annular spaces around pipes, electric cables, conduits, or other openings in plates at exterior walls shall be protected against the passage of rodents by closing such openings with cement mortar, concrete masonry or similar method acceptable to the enforcing agency.	☒		☐
Water Resistance and Moisture Management		A4.4	
A4.407.1 Install foundation and landscape drains.		☐	☐
A4.407.2 Install gutter and downspout systems to route water at least 5 feet away from the foundation or connect to landscape drains which discharge to a dry well, sump, bioswale, rainwater capture system or other approved on-site location.		☐	☐
A4.407.3 Provide flashing details on the building plans and comply with accepted industry standards or manufacturers instructions.		☐	☐
A4.407.4 Protect building materials delivered to the construction site from rain and other sources of moisture.		☐	☐
A4.407.5 In Climate Zone 16 an ice/water barrier is installed at roof valleys, eaves and wall to roof intersections.		☐	☐
A4.407.6 Exterior doors to the dwelling are protected to prevent water intrusion.		☐	☐
A4.407.7 A permanent overhang or awning at least 2 feet in depth is provided.		☐	☐
Construction Waste Reduction, Disposal and Recycling			
4.408.2 Where a local jurisdiction does not have a construction and demolition waste management ordinance, a construction waste management plan shall be submitted for approval to the enforcing agency.	☒		☐
A4.408.1 Construction waste generated at the site is diverted to recycle or salvage in compliance with at least a 65 percent reduction. (Tier 1)	☒		☐
Building Maintenance and Operation			
4.410.1 An operation and maintenance manual shall be provided to the building occupant or owner.	☒		☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after installation & prior to final inspection approval*
See Chapter 4 and Appendix A4 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
Innovative Concepts and Local Environmental Conditions		A4.4	
A4.411.1 Items in this section are necessary to address innovative concepts or local environmental conditions.			
Item 1:	☐	☐	☐
Item 2:	☐	☐	☐
Item 3:	☐	☐	☐
A4.5 **ENVIRONMENTAL QUALITY**	***All checked items are required***	***Select at least one (1) elective measure from A4.5***	***Select all measures verified in the completed project***
Fireplaces			
4.503.1 Install only a direct-vent sealed-combustion gas or sealed wood-burning fireplace, or a sealed woodstove.	☒		☐
Pollutant Control		A4.5	
4.504.1 Duct openings and other related air distribution component openings shall be covered during construction.	☒		☐
4.504.2.1 Adhesives, sealants and caulks shall be compliant with VOC and other toxic compound limits.	☒		☐
4.504.2.2 Paints, stains and other coatings shall be compliant with VOC limits.	☒		☐
4.504.2.3 Aerosol paints and other coatings shall be compliant with product weighted MIR Limits for ROC and other toxic compounds.	☒		☐
4.504.2.4 Documentation shall be provided to verify that compliant VOC limit finish materials have been used.	☒		☐
4.504.3 Carpet and carpet systems shall be compliant with VOC limits.	☒		☐
4.504.5 Particleboard, medium density fiberboard (MDF), and hardwood plywood used in interior finish systems shall comply with low formaldehyde emission standards.	☒		☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after installation & prior to final inspection approval*
See Chapter 4 and Appendix A4 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
A504.4.1 Meet the formaldehyde limits contained in Table4.5.4.6 before the mandatory compliance date, or use composite wood products made with either California Air Resources Board approved no-added formaldehyde (NAF) resins or ultra-low emitting formaldehyde (ULEF) resins.		☐	☐
A504.4.2 Eighty (80) percent of floor area receiving resilient flooring shall comply with the VOC-emission limits defined in the Collaborative for High Performance Schools (CHPS) Low-emitting Materials List or be certified under the Resilient Floor Covering Institute (RCFI) FloorScore program. (Tier 1)	☒		☐
A4.504.3 Install thermal insulation in compliance with the VOC-emission limits defined in Collaborative for High Performance Schools (CHPS) Low-emitting Materials List. (Tier 1)	☒		☐
Interior Moisture Control			
4.505.2 Vapor retarder and capillary break is installed at slab on grade foundations.	☒		☐
4.505.3 Moisture content of building materials used in wall and floor framing is checked before enclosure.	☒		☐
Indoor Air Quality and Exhaust		A4.5	
4.506.1 Exhaust fans which terminate outside the building are provided in every bathroom.	☒		☐
A4.506.1 Higher than MERV 6 filters are installed on central air or ventilation systems.		☐	☐
A4.506.2 Direct vent appliances are used or isolated from the conditioned space.		☐	☐
Environmental Comfort			
4.507.1 Whole house exhaust fans shall have insulated louvers or covers which close when the fan is off. Covers or louvers shall have a minimum insulation value of R-4.2.	☒		☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after installation & prior to final inspection approval*
See Chapter 4 and Appendix A4 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
4.507.2. Duct systems are sized and designed and equipment is selected using the following methods: 1. Establish heat loss and heat gain values according to ACCA Manual J or equivalent. 2. Size duct systems according to ACCA 29-D (Manual D) or equivalent. 3. Select heating and cooling equipment according to ACCA 36-S (Manual S) or equivalent.	☒		☐
Innovative Concepts and Local Environmental Conditions		A4.5	
A4.509.1 Items in this section are necessary to address innovative concepts or local environmental conditions.			
Item 1:		☐	☐
Item 2:		☐	☐
Item 3:		☐	☐
INSTALLER AND CALGreen SPECIAL INSPECTOR QUALIFICATIONS			***Select all measures verified in the completed project***
Qualifications			
702.1 HVAC system installers are trained and certified in the proper installation of HVAC systems.	☒		☐
702.2 The CALGreen Special Inspector for this project is listed by the City of Sonoma as an approved green building special inspector and is qualified and able to demonstrate competence in the discipline they inspect and verify.	☒		☐
Verifications			
703.1 Verification of compliance with CALGreen+Tier 1 may include construction documents, plans, specifications builder or installer certification, inspection reports, or other methods acceptable to the enforcing agency which show substantial conformance. Implementation verification shall be submitted to the Building Department after implementation of all required measures and prior to final inspection approval.	☒		☐

Green Building Acknowledgments

Project Address: _____

Project Description: _____

Section 1 - Design Verification

Complete all lines of Section 1- "Design Verification" and submit the completed checklist (Columns 1 and 2) with the plans and building permit application to the Building Department.

The owner, design professional and the Sonoma approved CALGreen special inspector have reviewed the plans and certify that the items checked above are hereby incorporated into the project plans and will be implemented into the project in accordance with the requirements set forth in the 2010 California Green Building Standards Code as amended by Chapter 14.10 of the Sonoma Municipal Code.

Owner's Signature _____ Date _____

Owner Name *(Please Print)* _____

Design Professional's Signature _____ Date _____

Design Professional's Name *(Please Print)* _____

Signature of Listed Green Building Special Inspector _____ Date _____

Listed CALGreen Special Inspector's Name *(Please Print)* _____ Phone _____

Green CALGreen Special Inspector's E-mail Address _____

Section 2 - Implementation Verification

Complete, sign and submit the completed checklist, including Column 3, together with all original signatures on Section 2 – "Implementation Verification" to the Building Department prior to Building Department final inspection.

I have inspected the work have received sufficient documentation to verify and certify that the project identified above was constructed in accordance with this Green Building Checklist and in accordance with the requirements set forth in the 2010 California Green Building Standards Code as amended by Chapter 14.10 of the Sonoma Municipal Code.

Listed CALGreen Special Inspector Signature _____ Date _____

CALGreen Special Inspector's Name *(Please Print)* _____ Phone *(if different than above)* _____

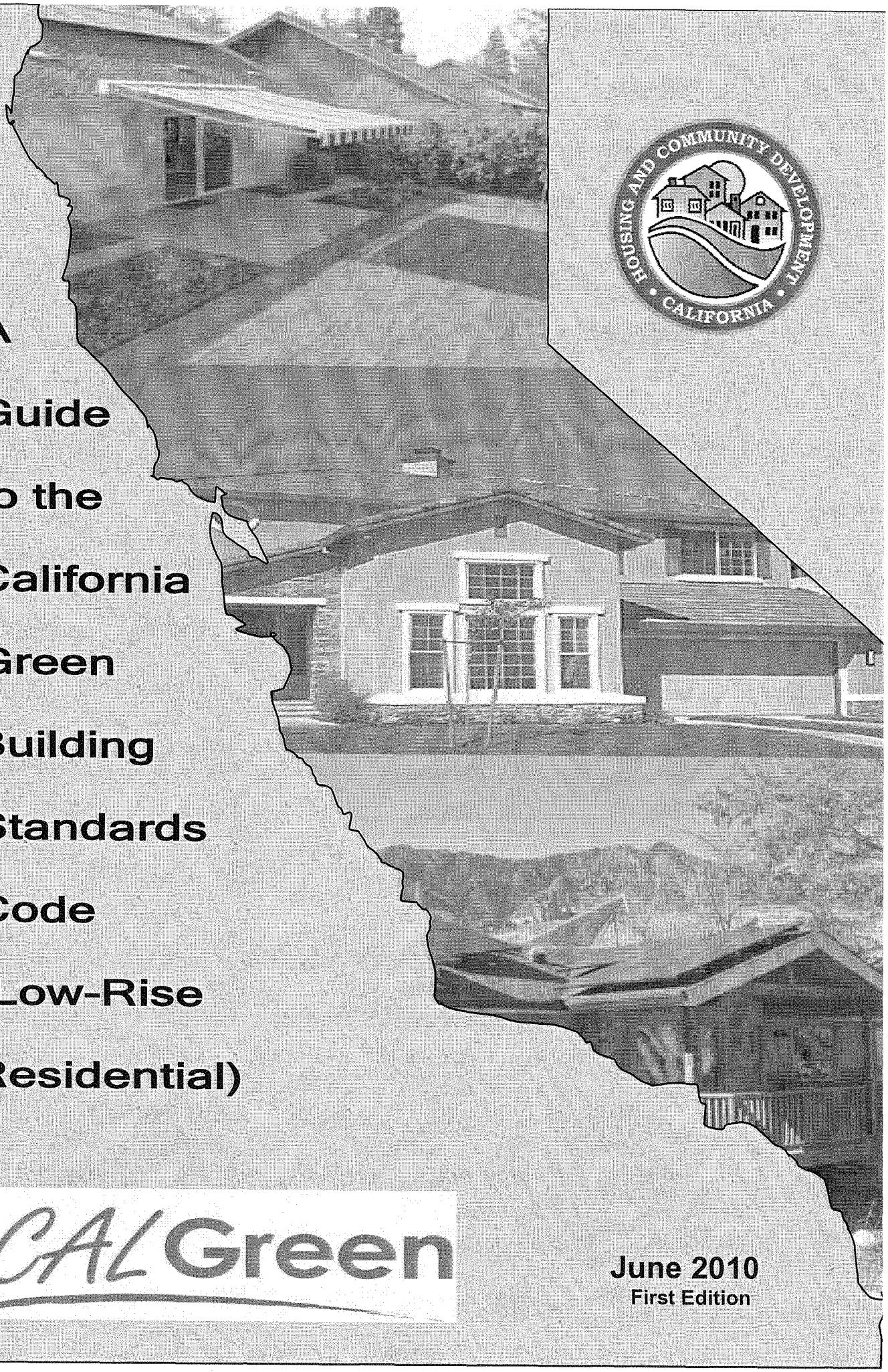
CALGreen Special Inspector's E-mail Address *(if different than above)* _____

NOTE: A clean copy of the

Guide to the California Green Building Standards Code
(Low-Rise Residential)

can be downloaded at

http://www.sonomacity.org/uploadimg/CALGreen%20Residential%20Guide_COMPLETE_6-10.pdf



A Guide to the California Green Building Standards Code (Low-Rise Residential)

CALGreen

June 2010
First Edition

A Guide to CALGreen the California Green Building Standards Code

Information on California's Green Building Standards Code governing construction of low-rise residential hotels, motels, lodging houses, apartments and dwellings.

June 2010

Provided by

Division of Codes and Standards

Kim Strange, Deputy Director

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Department of Housing and Community Development

State of California

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Business, Transportation and Housing

Lynn L. Jacobs, Director, HCD

HCD SHL 600-1 (6/2010)

TABLE OF CONTENTS

PREFACE

The Division of Codes and Standards in the Department of Housing and Community Development (HCD) is pleased to provide a guide to the California Green Building Standards Code (CALGreen). This module is one of several handbooks in development by HCD to supplement our core publication "A Guide to California Housing Construction Codes." It provides commentary, background, questions and answers and some helpful tools for the code user to better understand the mandatory measures developed by HCD for low-rise residential structures. It is intended to provide additional guidance and further enhance user awareness and understanding. Improved awareness of state laws, regulations, and building standards will improve compliance and reduce housing construction costs and delays.

The Department of Housing and Community Development encourages homeowners, design and industry professionals and building department personnel involved in construction, maintenance and use of residential buildings to read this module as a complement to the new mandatory measures and enhanced voluntary tiers in the 2010 California Green Building Standards Code. Further, users of this "Guide to Green Building Standards" handbook should always utilize the most current version of the code and check for any local amendments applicable to structures in that jurisdiction.

Note: Readers new to California laws, regulations, building standards development or HCD's role may find it beneficial to read "A Guide to California Housing Construction Codes" available at: www.hcd.ca.gov

Acknowledgements:
HCD appreciates and acknowledges the time, effort and technical expertise so many participants provided during the development of CALGreen. Participants were comprised of other state agencies, model code organizations, building officials, the construction industry, the environmental community and green building industry.

HCD expresses special thanks to the California Building Industry Association who provided additional assistance, time and resources to facilitate timely completion of this module "A Guide to the California Green Building Standards Code."

CALGreen

CHAPTER 1. INTRODUCTION AND ADMINISTRATION

CALGreen is California's first green building standards code and a first-in-the-nation state-mandated green building code. It is formally known as Title 24, Part 11, the California Green Building Standards Code.

This module will provide helpful tools and information about CALGreen mandatory measures, regulations, other laws and construction codes related to green building standards applicable to low-rise residential dwelling construction in California. It is recommended that the reader be familiar with California building standards development, adoption and implementation processes as discussed in the Department's "A Guide to California Housing Construction Codes." It is also recommended that the reader have a copy of the latest edition of the CALGreen code for reference while reading this module.

Background

Development of green building standards was originally approached from a legislative or statutory approach. Several legislative bills (AB 35, AB 888, and AB 1058) were introduced during the 2007-2008 legislative session to require green building standards for state-owned or leased buildings, commercial buildings, and residential buildings, respectively. Although the broad intent for implementing green building measures was supported by the Schwarzenegger administration, these bills were vetoed. The Governor's veto message stated:

- Building standards should not be statutory. The California Building Standards Commission (CBSC) was created to ensure an open public adoption process allowing experts to develop standards and periodic updates to the building codes.
- Allowing private entities to dictate California's building standards usurps the state's authority to develop and adopt those standards and could compromise the health and safety of Californians. State agencies were encouraged to review all nationally recognized programs and glean from those programs, standards that promote greener construction, energy and water conservation, and reduce greenhouse gas emissions.
- The need to expedite the greening of California's building standards was emphasized and CBSC was directed to work with specified state agencies on the adoption of green building standards for residential, commercial, and public building construction for the 2010 code adoption process.

Development of CALGreen began in 2007 when the CBSC Commissioners directed its staff to develop green building standards for new construction of buildings within its authority and to submit those regulations during the 2007 annual code adoption cycle. Commissioners also requested and encouraged the Department of Housing and Community Development (HCD), the Division of the State Architect (DSA), and the Office of Statewide Health Planning and Development (OSHPD) to develop green building standards for new buildings under their areas of authority. Through the rulemaking process, HCD collaborated with the CBSC, stakeholder groups, other state agencies, considered public input, and reviewed existing green building standards, best practices, guidelines and other published references. This initial effort was successful resulting in the Commission's adoption of the 2008 California Green Building Standards Code (CGBC). Effective August 1, 2009, the 2008 California Green Building Standards Code regulations were primarily voluntary building standards although mandatory provisions that were, in part, required in other building standards codes or had future implementation dates were included.

Introduction of the 2008 California Green Building Standards Code (CGBC) was supplemented by clarifying information (CBSC Building Standards Bulletin 08-02) that local enforcing agencies have the option to adopt local amendments or even adopt the CGBC prior to its effective date. It was acknowledged that the initial 2008 California Green Building Standards Code publication would provide a framework and first step toward establishing green building standards for low-rise residential structures and would be enhanced and/or expanded in the future. This vision came to fruition during the triennial code adoption cycle for the 2010 California Building Standards codes.

As new materials, technology, and designs are developed and become available, and as needs become apparent, future CALGreen iterations will continue to proactively move California forward to a more sustainable and environmentally responsible future.

2010 California Green Building Standards Code

CALGreen is Part 11 of Title 24, the California Building Standards Code. CALGreen is not based upon a model building code nor adopted by reference, but the same rulemaking process applies. The newly adopted 2008 California Green Building Standards Code was used as a base document, analyzed and evaluated during the 2009 triennial adoption cycle for necessary updates to the 2010 CALGreen Code. There are significant changes in the 2010 CALGreen provisions, including mandatory requirements, introduction of Tier 1 and Tier 2 performance levels, and the reorganization of the code provisions to easily distinguish low-rise residential provisions from the non-residential provisions. The 2010 CALGreen Code becomes effective January 1, 2011.

Building standards addressed in the 2010 CALGreen Code are not isolated and must be used in conjunction with other parts of Title 24, the California Building Standards Code to achieve code compliance and ensure minimum standards of life, public health and safety. Knowledge of energy and performance standards in Part 6, the California Energy Code, is also essential. Additionally, changes resulting from recent legislation or statute, federal or state agency regulations, local building code amendments or court rulings must also be recognized and implemented. For these reasons, it is important that the current versions of the building standards codes and any local amendments be used. The code user should also be aware of the other changes mentioned above that may impact a construction project.

See "A Guide to California Housing Construction Codes" for further details on California statutes and regulations.

The balance of this module will provide brief discussions of administration for purposes of the code, definitions, broad-based provisions for green building pursuant to CALGreen and referenced organizations and standards. This module will also provide a detailed discussion of the mandatory and voluntary measures for low-rise residential structures, installer and special inspector qualifications, and associated forms and worksheets.

Note: The CALGreen code also addresses green building standards for non-residential structures. Those provisions are outside the scope of HCD's authority and application and are not discussed in this module.

Administration

Administration of the CALGreen code is similar to the other parts of the building standards code. The following discussion covers some basic provisions. Users should reference the actual code language in CALGreen for purposes of implementation and compliance.

Title

The official name and citation for CALGreen is the "California Green Building Standards Code", California Code of Regulations, Part 11 of Title 24 (the California Building Standards Code).

Purpose

The purpose of CALGreen is to improve public health, safety and general welfare through enhancement of design and construction of buildings using building concepts reducing negative impacts or having positive environmental impacts and encouraging sustainable construction practices. As such, CALGreen has been written to address the following areas of building construction.

- Planning and design
- Energy efficiency
- Water efficiency and conservation
- Material conservation and resource efficiency
- Environmental quality

Application

CALGreen applies to planning, design, operation, construction, use and occupancy of every newly constructed building or structure on a statewide basis, unless otherwise indicated, on a statewide basis.

CALGreen also specifies applications regulated by the California Building Standards Commission, Division of the State Architect, Department of Public Health, Office of Statewide Health Planning and Development, and the Department of Water Resources.

Scope

CALGreen provisions under the jurisdiction of HCD are for newly constructed low-rise residential structures. Therefore, for the purposes of HCD, CALGreen applies to the following types of low-rise* (three stories or less) residential structures:

- Hotels, motels, lodging houses
- Apartment houses, condominiums
- One- and two-family dwellings, townhouses, factory-built housing
- Dormitories, shelters for homeless persons, congregate residences, employee housing
- Other types of dwellings containing sleeping accommodations with or without common toilets or cooking facilities
- Accessory buildings, facilities and uses related to the above residential uses

*CALGreen defines "low-rise residential" as "A building that is of Occupancy Group R and is three stories or less, or that is a one- or two- family dwelling or townhouse."

Use of Appendices

CALGreen provisions included in appendix chapters are not mandatory unless specifically adopted by a state agency or adopted by a local agency

Referenced Codes and Standards

CALGreen is not a stand-alone document and cannot be used solely for building construction. CALGreen identifies the following parts of the California Code of Regulations, Title 24, applicable to building construction:

- Part 2 California Building Code
- Part 2.5 California Residential Code
- Part 3 California Electrical Code
- Part 4 California Mechanical Code
- Part 5 California Plumbing Code
- Part 6 California Energy Code
- Part 9 California Fire Code

Order of Precedence and Use

When there are any differences between CALGreen and standard reference documents, the text of CALGreen building standards shall govern. If local enforcing agencies amend CALGreen, the local amendment, when legally adopted, shall govern.

Local Amendments

CALGreen establishes mandatory minimum green building standards and includes voluntary tiers. Tiers may be adopted by a city, county, or city and county consistent with other building standards. CALGreen does not limit the authority of local agencies to make necessary changes to CALGreen based on climatic, topographical or geological conditions. See CALGreen Section 101.7 for further details on procedures and requirements for adopting local amendments.

Alternate Materials, Designs and Methods of Construction

CALGreen allows the use of any approved alternate material, appliance, installation, device, arrangement, method, design or method of construction not specifically addressed by the code. The alternates are required to be evaluated on a case-by-case basis and at least equivalent to provisions of the code. See CALGreen Section 101.8 for further details and references.

Effective Use of the Code

CALGreen provides a step-by-step approach to determining whether the code is applicable to a project. For purposes of HCD CALGreen requirements for low-rise residential structures, the following steps are the most important:

- Is the project considered "new construction".
- Does the occupancy involve a residential use.
- Is the building three stories or less. (HCD's CALGreen provisions apply to low-rise, three stories or less, residential uses.)
- If Questions 1 through 3 are answered "yes," then CALGreen Chapter 4 and Appendix A4 (if adopted) will specifically apply to the structure. In addition, Chapters 1-3, 6, 7 and 8 will be used for implementation.
- Note that CALGreen Chapter 5 and Appendix A5 may also apply in mixed occupancies (e.g., commercial use combined with residential uses.)
- Always use the most current version of CALGreen and check for local amendments. Building standards are subject to change due to recent legislation, court cases, or updates. Local amendments may be more restrictive than the statewide provisions in CALGreen. This guide may not include the most recent amendments to CALGreen and does not include any local amendments.

Construction Documents and Installation Verification

CALGreen requires that construction documents and other data be submitted in one or more sets with a permit application. Documents must provide information in sufficient detail to determine compliance with CALGreen and other codes. CALGreen provides the enforcing agencies discretion to require additional construction documents or to waive construction documents, as specified. CALGreen also provides for use of alternate methods of documentation demonstrating substantial conformance when satisfactory to the enforcing agency.

Q: Are any documents available that compare CALGreen with established third-party rating systems?

A: No. The U. S. Green Building Council (USGBC) and Build it Green are working on analyses comparing CALGreen with other green building standards.

Q: The definition of "Residential Building" in Section 202 provides a reference to "low-rise residential building". "Low-Rise Residential Building" is further defined to include R occupancy buildings, three stories or less, or a one- or two-family dwelling or townhouse. Does this mean that four story and taller apartment and condominium buildings are classified as nonresidential? Is this the intent of the code?

A: No. All four story and taller residential buildings are not low-rise residential buildings by definition, but are still residential occupancies. Only three stories or less residential buildings are covered by the scope of CALGreen (Section 101.3.1, #3).

Q: Can a local jurisdiction expand the applicability of Chapters 4 and A4 to all Group R occupancies taller than three stories?

A: Yes; however, compliance with Section 101.7 is required.

Q: Is true that "environmental" justification is now allowed in addition to the local conditions of climatic, geographical and topographical justification?

A: Yes. Section 101.7.1 allows consideration of environmental conditions when adopting local amendments.

Q: How would a jurisdiction use the "environmental" justification and does it differ from a climatic justification?

A: The environmental justification would be used similar to how ordinances are enacted. This allows local cities and counties to address their specific needs. The environmental justification is based on the local environment and its needs, and used in conjunction with climatic, geological or topographical conditions.

Q: Section 102.3 of CALGreen is "Verification", which requires that "Documentation of conformance for applicable green building measures shall be provided to the enforcing agency". What type of documentation, and by whom, will meet the provisions of this section?

A: The documentation must be sufficient to satisfy Section 703.1 and the enforcing agency.

CHAPTER 2. DEFINITIONS

CALGreen Chapter 2 provides definitions that are commonly used throughout the document. Additional definitions are placed at the beginning of each chapter when the definitions are specific to the provisions in that chapter, section or subsection and are not used elsewhere in the CALGreen regulations. This placement of definitions is consistent with the format used in other parts of the California Building Standards Code.

CALGreen Chapter 2 also provides clarification of scope, interchangeability of terms, use of terms defined in other documents, and circumstances where terms are not defined in CALGreen.

CHAPTER 3. GENERAL

This chapter provides general information regarding the scope of subsequent CALGreen chapters. It also provides a first introduction to voluntary tiers, direction when a mixed occupancy building is designed, or when a phased development project is considered.

Mixed Occupancy Buildings

CALGreen requires that each portion of a mixed occupancy building comply with the specific green building measures applicable to that occupancy. Therefore, if a building's design includes commercial and residential uses, both non-residential and residential provisions apply to appropriate portions of the building.

Consider the application of a live/work unit. The requirements are described in the California Building Code, but the design is permitted to use the California Residential Code. This type of construction has a dwelling unit or sleeping unit in which a significant portion of space includes a non-residential use.

Phased Projects

CALGreen provisions apply to a newly constructed building. As a result, when a building is constructed as a shell, only certain mandatory measures may be pertinent or applicable at the initial construction phase. However, required CALGreen provisions still apply and other mandatory measures are required of the initial tenant or occupancy improvements to achieve full compliance with CALGreen. Phased residential construction may occur in low-rise residential or live/work development; it is less common with single family development.

Voluntary Tiers

Voluntary tiers and the checklist of measures can be used by enforcing agencies who wish to go beyond the mandatory minimum requirements of this code. During CALGreen's development, stakeholders expressed concern that there was a lack of consistent and streamlined methods local government could use to further enhance their local environment or further reduce the impact of development. State agencies support this concern and the tier concept was viewed as a vehicle to increase the use and acceptability of advanced or enhanced technology, which could ultimately translate to an elevated level of construction and serve to raise mandatory requirements in the future.

CHAPTER 4. MANDATORY REQUIREMENTS FOR LOW-RISE RESIDENTIAL DWELLINGS

This chapter discusses select mandatory building standards in the 2010 CALGreen Code. For clarity, referenced section numbers in this chapter match chapters, sections and headings in the 2010 CALGreen Code. The full text of CALGreen mandatory items are shown in a box with a double border. Tables from CALGreen are not enclosed by a box to avoid confusion. Code text and tables will be followed by non-regulatory commentary in italics, when applicable.

Text of selected sections shown in this chapter is current as of June 2010 and this chapter does not include text that is not part of the mandatory standard discussed. Some items that may be left out of this discussion include regulatory language that provides general information (e.g., scope, definitions, and notes.) The complete text of CALGreen is available for purchase from the International Code Council (www.iccsafe.org). The CALGreen text may be viewed in draft form on HCD's website (www.hcd.ca.gov) or the California Building Standards Commission's website (www.bsc.ca.gov).

It is important that the user reference the most current version of CALGreen applicable to the project and be aware that lawfully enacted local amendments may require additional and/or more restrictive green building standards.

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
2010 CALIFORNIA GREEN BUILDING STANDARDS CODE (CALGreen)

CHAPTER 4. RESIDENTIAL MANDATORY MEASURES

DIVISION 4.1 – PLANNING AND DESIGN

SECTION 4.106 SITE DEVELOPMENT

4.106.1 General. Preservation and use of available natural resources shall be accomplished through evaluation and careful planning to minimize negative effects on the site and adjacent areas. Preservation of slopes, management of storm water drainage and erosion controls shall comply with this section.

4.106.2 Storm water drainage and retention during construction. Projects which disturb less than one acre of soil and are not part of a larger common plan of development which in total disturbs one acre or more, shall manage storm water drainage during construction. In order to manage storm water drainage during construction, one or more of the following measures shall be implemented to prevent flooding of adjacent property, prevent erosion and retain soil runoff on the site.

1. Retention basins of sufficient size shall be utilized to retain storm water on the site.
2. Where storm water is conveyed to a public drainage system, collection point, gutter, or similar disposal method, water shall be filtered by use of a barrier system, wattle or other method approved by the enforcing agency.
3. Compliance with a lawfully enacted storm water management ordinance.

COMMENTARY

Purpose:
Implementation of this standard is intended to help prevent flooding, damage to adjacent property and pollution from storm water runoff by retaining soil on site or by providing soil containment methods to prevent sediment from reaching storm water drainage systems and receiving streams or rivers.

Examples of Acceptable Methods of Implementation and/or Compliance:

- *Retention basins sized and shown on the site plan.*
- *Filtering storm water and routing to a public drainage system.*
- *Compliance with local storm water ordinances.*
- *Develop and implement additional BMP's including, but not limited to:*
    - *Silt fencing*
    - *Hay Bales/Mulch*
    - *Cutback Curbs*
    - *Erosion Control Matting*
    - *Inlet Protectors*
    - *Stabilized Entrances*
    - *Sand/Gravel Bags*
    - *Fiber Rolls/Wattles*

Background:
Currently, the California State Water Resources Control Board (SWRCB) issues permits to ensure a Storm Water Pollution Prevention Plan (SWPPP) in compliance with applicable state regulations is issued and implemented for projects which are larger than one acre. This section applies only to construction projects less than one acre which are outside the scope of SWRCB.

Storm water runoff and the sediment and pollutants it usually contains are commonly identified as the biggest polluters to water bodies and their health. Construction sites that continually receive heavy equipment and truck traffic, utility excavation and exposure to storm water often experience compaction and topsoil loss which unless contained migrates into our downstream water bodies.

The goal of storm water management is to create an effective combination of erosion and sediment controls. Erosion control is the practice of keeping soil from dislodging and migrating from its resting place; while sediment control refers to trapping and containing soil particles after they have been dislodged by storm water or water used during construction. Erosion can be considered the process and sediment as the result.

Best management practices (BMP's) continually evolve as onsite activities change from land development to homebuilding. During land development the site perimeter is the main focus of protection and as activities move to homebuilding the interior streets and catch basins become the main focus of protection. BMP's should be implemented to prevent soil erosion, prevent pollution from mixing with storm water, and to trap pollutants before they can be discharged.

4.106.3 Surface drainage. The site shall be planned and developed to keep surface water from entering buildings. Construction plans shall indicate how the site grading or drainage system will manage surface water flows. Examples of methods to manage surface water include, but are not limited to, the following:

1. Swales.
2. Water collection and disposal systems.
3. French drains.
4. Water retention gardens.
5. Other water measures which keep surface water away from building and aid in groundwater recharge.

COMMENTARY

Purpose:
This section provides protection from unintended entry of surface water and requires construction plans to show how surface water will be managed. Site design and proper installation of drainage systems will help builders protect structures from the dangers of flooding or subsurface water infiltration. This is especially important in areas where setbacks or obstacles interfere with proper surface drainage.

Examples of Acceptable Methods of Implementation and/or Compliance:

- *Develop and implement control methods to address ground water flow both above and below the surface to ensure water flow away from the building.*
- *Channel rain gutter discharge away from the building during large or intense rain events. Builders should consider site design mimicking water flows similar to the natural environment.*
- *Additional design strategies that can be considered are:*

    - *Roof overhangs.*
    - *Sloped ground.*
    - *Properly placed drains.*

Background:

During large rain events the ground can become saturated causing runoff and/or ponding in low-lying areas, which can cause water to migrate into buildings. It is critically important to channel rain gutter discharge away from the building during these events. Builders should consider site design that mimics water flows similar to the natural environment and incorporate methods as described in this section.

In order to keep a site well drained and stable, designers and contractors should consider both storm water from the roof, as well as rainwater penetrating into the area around the site. Ground water can flow above or below the surface. Control methods should be developed and implemented which allow for both types of ground water flow to ensure water can continually flow away from the building.

DIVISION 4.2 – ENERGY EFFICIENCY

SECTION 4.201 GENERAL

4.201.1 Scope. The Department of Housing and Community Development does not regulate mandatory energy efficiency standards in residential buildings. For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory building standards.

Note: It is the intent of this code to encourage buildings to achieve exemplary performance in the area of energy efficiency. For the purposes of energy efficiency standards, the California Energy Commission believes specifically, a green building should achieve at least a 15 percent reduction in energy usage when compared to the State's mandatory energy efficiency standards. The Department of Housing and Community Development's mandatory green building standards for residential buildings do not require compliance with levels of minimum energy efficiency beyond those required by the California Energy Commission.

COMMENTARY

Purpose:
This section clarifies the California Energy Code as the ongoing authority for adopting statewide energy mandates.

Examples of Acceptable Methods of Implementation and/or Compliance:

- *Prescriptive method*
- *Performance method*

Background:
The California Energy Commission (CEC) is the state's primary energy policy and planning agency. As such, the CEC adopts regulations to establish the minimum level of energy efficiency a heated or cooled structure must meet or exceed.

For this section, designers should refer to CEC's latest minimum energy standards. The proper integration of the mandatory requirements as well as the voluntary requirements is important to long term building performance and assurance of good occupant indoor air quality, comfort, safety and durability.

California's Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24, Part 6, of the California Code of Regulations) is available online at http://www.energy.ca.gov/title24/. The CEC's website also provides links to information such as detailed California Climate Zone Maps, appliance efficiency standards, and other information related to implementation and enforcement of the California Energy Code.

Contact the California Energy Commission regarding questions about Title 24 at:

E-mail: *title24@energy.state.ca.us*
Phone: *(916) 654-5106 or 1-800-772-3300 (toll free in California)*

SECTION 4.303 INDOOR WATER USE

4.303.1 Twenty Percent Savings. A schedule of plumbing fixtures and fixture fittings that will reduce the overall use of potable water within the building by at least 20 percent shall be provided. The reduction shall be based on the maximum allowable water use per plumbing fixture and fitting as required by the *California Building Standards Code*. The 20 percent reduction in potable water use shall be demonstrated by one of the following methods.

PRESCRIPTIVE METHOD

1. Each plumbing fixture and fitting shall meet reduced flow rates specified in Table 4.303.2; or

2. A calculation demonstrating a 20 percent reduction in the building "water use" baseline as established in Table 4.303.1 shall be provided. For low-rise residential occupancies, the calculation shall be limited to the following plumbing fixture and fitting types: water closets, urinals, lavatory faucets and showerheads.

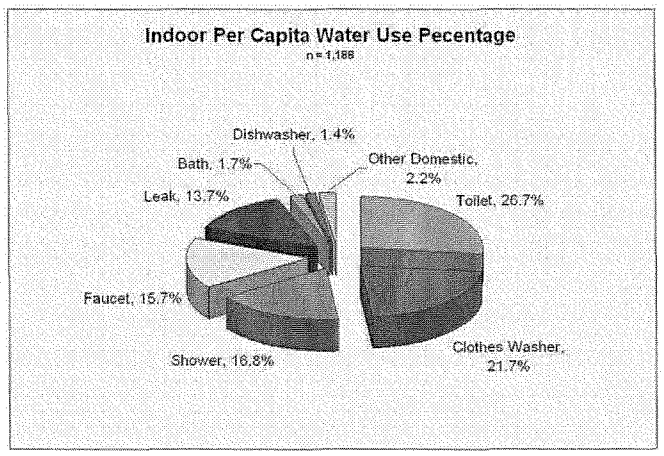
PERFORMANCE METHOD

COMMENTARY

Purpose:

Section 4.303 provides guidelines on how to achieve a 20% reduction in indoor water use. There are two options to use for compliance: the ***prescriptive*** *method and the* ***performance*** *method.*

The following graphic shows an average breakdown of indoor water use. As shown, toilets, showers, clothes washers, and faucets are the greatest indoor water users. CALGreen focuses on water use related to toilets (water closets and urinals), faucets and showers for purposes of potable water conservation.



Examples of Acceptable Methods of Implementation and/or Compliance:
Mandatory effective date for 20% reduction is July 1, 2011.

PRESCRIPTIVE METHOD DISCUSSION: *The plumbing fixtures listed below must comply with Table 4.303.2.*

a) *Toilets (Water Closets): The standard single flush toilet (1.6 gal/flush) only allows the user to complete a full-flush with each flush regardless of waste type. A "dual flush" toilet provides the user the option based on waste type to utilize the "half flush" or "full-flush" technology. A "dual flush" toilet will have two flushing mechanisms clearly marked for each flushing option minimizing the total water used by the toilet. The "1.28 flush" for a "dual flush" toilet is measured by taking the average of three flushes: (two fluid flushes = 1.0 gal/flush) + (one solid flush = 1.6 gal/flush) x (1/3). Additional compliance models include gravity-fed single flush low-flow toilets, pressure-assisted low-flow toilets and composting or waterless toilets.*

b) *Urinals: Not commonly found in a low-rise residential application. However, this fixture type is a viable option to reduce indoor water usage. The maximum flow rate allowed for use by a urinal is 0.5 gallons/flush to be greater than the 20% reduction. Many manufacturers are now producing low-flow, ultra low-flow, high efficiency and waterless urinals that are seeing water consumption ranges form 0 gal/flush to 0.125 gal/flush.*

c) *Showerheads: Studies show that approximately 17 percent of indoor water use can be directly related to showering and even modest flow rate reductions can greatly reduce water savings. A showerhead is a perforated nozzle of various designs that applies water to a bather. As shown in Table 4.303.2, the maximum flow rate of a showerhead is 2 gpm @ 80psi. Showerheads with flow rates ranging from 0.5 gpm to 1.6 gpm are readily available.*

***Note**: The 2010 California Plumbing Code references a higher acceptable flow rate for showerheads. If a showerhead with a higher flow rate is used, it will be necessary to use the performance-based calculation method to achieve the overall 20 percent indoor water reduction rate. Showerheads with a flow rate less than 2 gpm @ 80psi shall be equipped with scald protection that functions at that reduced rate.*

d) *Lavatory Faucets: Lavatory faucets provide an excellent source of water reduction. Aerators on reduced flow faucets inject air bubbles into the water stream creating the consumer appeal of large soft water flow with less water. Residential lavatory faucets must not exceed a maximum flow rate of 1.5 gpm @ 60 psi and may not be less than 0.8 gpm @ 20 psi. Faucets must also comply with the low-lead requirements of AB 1953 as summarized in the "INFORMATIVE NOTE".*

***Note**: The 2010 California Plumbing Code references a higher acceptable flow rate for lavatory faucets. If a faucet with a higher flow rate is used, it will be necessary to use the performance based calculation method to achieve the overall 20 percent reduction rate.*

e) *Kitchen Faucets: Kitchen faucets must not exceed a maximum flow rate of 1.8 gpm @ 60psi as defined in Table 4.303.2 below. Faucets must also comply with the low-lead requirements of AB 1953 as summarized in the "INFORMATIVE NOTE".*

***Note**: The 2010 California Plumbing Code references a higher acceptable flow rate for kitchen faucets.*

f) *Verify with local jurisdictions if there are any special conditions which may preclude use of low-water use toilets or urinals.*

INFORMATIVE NOTE
AB 1953: Lead-Free Plumbing Law Effective 1/1/10

*Legislation redefining what constitutes "lead-free plumbing" took effect on January 1, 2010. Signed into law in 2006, AB 1953 effectively reduced the maximum amount of allowable lead content in plumbing pipes, fixtures and fittings used for potable (drinking) water to **0.25 percent.***

When initially signed into law, there were no major manufacturers with compliant product. That situation has changed in a big way over the past three years. The Plumbing Manufacturers Institute (PMI) has announced that there is a substantial supply of compliant products now on the market. Further information regarding manufacturers and products can be found at PMI's website at www.pmihome.org.

Follow-up legislation, SB 1334 (Calderon) and SB 1395 (Corbett), requires all plumbing products, as defined, to be certified by an independent ANSI-accredited third party for compliance with existing lead standards. This follow-up legislation should make it easier for homebuilders and purchasing agents to obtain documentation that they are indeed purchasing AB 1953-compliant products.

TABLE 4.303.2
FIXTURE FLOW RATES

FIXTURE TYPE	FLOW-RATE	MAXIMUM FLOW RATE AT ≥ 20 PERCENT REDUCTION
Showerheads	2.5 gpm @ 80 psi	2 gpm @ 80 psi
Lavatory faucets residential	2.2 gpm @ 60 psi	1.5 gpm @ 60 psi[2]
Kitchen faucets	2.2 gpm @ 60 psi	1.8 gpm @ 60 psi
Gravity tank type water closets	1.6 gallons/flush	1.28 gallons/flush[1]
Flushometer tank water closets	1.6 gallons/flush	1.28 gallons/flush[1]
Flushometer valve Water Closets	1.6 gallons/flush	1.28 gallons/flush[1]
Electromechanical hydraulic water closets	1.6 gallons/flush	1.28 gallons/flush[1]
Urinals	1.0 gallons/flush	.5 gallons/flush

[1] **Includes single and dual flush water closets with an effective flush of 1.28 gallons or less. Single Flush Toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is the average flush volume when tested in accordance with ASME A112.19.233.2.**
Dual Flush Toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is defined as the composite, average flush volume of two reduced flushes and one full flush. Flush volumes will be tested in accordance with ASME A112.19.2 and ASME A112.19.14.

[2] **Lavatory Faucets shall not have a flow rate less than 0.8 gpm at 20 psi.**

PERFORMANCE METHOD DISCUSSION: *A calculation demonstrating a 20% reduction in the building "water use" baseline as established in Table 4.303.1 shown below shall be provided. For low-rise residential occupancies, the calculation shall be limited to the following plumbing fixture and fitting types: water closets, urinals, lavatory faucets and showerheads. The following example calculations will assist in determining compliance with this method.*

TABLE 4.303.1
WATER USE BASELINE[1]

FIXTURE TYPE	FLOW-RATE[2]	DURATION	DAILY USES	OCCUPANTS[3]
Showerheads residential	2.5 gpm @ 80 psi	8 min.	1	
Lavatory faucets residential	2.2 gpm @ 60 psi	.25 min.	3	
Kitchen faucets	2.2 gpm @ 60 psi	4 min.	1	
Replacement aerators	2.2 gpm @ 60 psi			
Gravity tank type water closets	1.6 gallons/flush	1 flush	1 male 3 female	
Flushometer tank water closets	1.6 gallons/flush	1 flush	1 male[4] 3 female	
Flushometer valve water closets	1.6 gallons/flush	1 flush	1 male[4] 3 female	
Electromechanical hydraulic water closets	1.6 gallons/flush	1 flush	1 male[4] 3 female	
Urinals	1.0 gallons/flush	1 flush	2 male	

1 **Use Worksheet WS-1 to calculate baseline water use.**

2 **The Flow-rate is from the CEC Appliance Efficiency Standards, Title 20 California Code of Regulations; where a conflict occurs, the CEC standards shall apply.**

3 **For low rise residential occupancies, the number of occupants shall be based on two persons for the first bedroom, plus one additional person for each additional bedroom.**

4 **The daily use number shall be increased to three if urinals are not installed in the room.**

Background:

Provisions for a 20 percent reduction in indoor water use were introduced in the 2008 CALGreen Code. These provisions utilized the minimum appliance flow rates for showerheads, faucets and other plumbing fixtures and fittings pursuant to the California Appliance Efficiency Standards in Title 20. For implementation purposes, HCD provided a prescriptive 20 percent reduction in the flow rate of each fixture based on requirements in the California Appliance Efficiency Standards in Title 20 and a performance-based calculation method. With the 2010 CALGreen Code, 20 percent water reduction for indoor water use is mandatory as of July 1, 2011. The 2010 CALGreen Code also permits indoor water use reduction in excess of the 20 percent.

The following worksheets are provided in the 2010 CALGreen Code, Chapter 8, and are reproduced here for reference. These worksheets are used to calculate a water usage baseline and a 20% reduction of water use based on this baseline. Two sets of sample calculations follow the worksheets.

WORKSHEET (WS-1)
BASELINE WATER USE

BASELINE WATER USE CALCULATION TABLE									
Fixture Type	**Flow-rate (gpm)**		**Duration**		**Daily uses**		**Occupants[3,4]**		**Gallons per day**
Showerheads	2.5	X	5 min.	X	1	X		=	
Showerheads Residential	2.5	X	8 min.	X	1	X		=	
Lavatory Faucets Residential	2.2	X	.25 min.	X	3	X		=	
Kitchen Faucets	2.2	X	4 min.	X	1	X		=	
Replacement Aerators	2.2	X		X		X		=	
Wash Fountains	2.2	X		X		X		=	
Metering Faucets	0.25	X	.25 min.	X	3	X		=	
Metering Faucets for Wash Fountains	2.2	X	.25 min.	X		X		=	
Gravity tank type Water Closets	1.6	X	1 flush	X	1 male[1] 3 female	X		=	
Flushometer Tank Water Closets	1.6	X	1 flush	X	1 male[1] 3 female	X		=	
Flushometer Valve Water Closets	1.6	X	1 flush	X	1 male[1] 3 female	X		=	
Electromechanical Hydraulic Water Closets	1.6	X	1 flush	X	1 male[1] 3 female	X		=	
Urinals	1.0	X	1 flush	X	2 male	X		=	

1 **The daily use number shall be increased to three if urinals are not installed in the room.**
2 **The Flow-rate is from the CEC Appliance Efficiency Standards, Title 20 California Code of Regulations; where a conflict occurs, the CEC standards shall apply.**
3 **For low-rise residential occupancies, the number of occupants shall be based on two persons for the first bedroom, plus one additional person for each additional bedroom.**
4 **For non-residential occupancies, refer to Table A, Chapter 4, 2007 California Plumbing Code, for occupant load factors.**

WORKSHEET (WS-2)
20% REDUCTION WATER USE

20% REDUCTION WATER USE CALCULATION TABLE									
Fixture Type	**Flow-rate (gpm)[2]**		**Duration**		**Daily uses**		**Occupants[3,4]**		**Gallons per day**
Showerheads		X	5 min.	X	1	X		=	
Showerheads Residential		X	8 min.	X	1	X		=	
Lavatory Faucets Residential		X	25 min.	X	3	X		=	
Kitchen Faucets		X	4 min.	X	1	X		=	
Replacement Aerators		X		X		X		=	
Wash Fountains		X		X		X		=	
Metering Faucets		X	.25 min.	X	3	X		=	
Metering Faucets for Wash Fountains		X	.25 min.	X		X		=	
Gravity tank type Water Closets		X	1 flush	X	1 male[1] 3 female	X		=	
HET [5] High Efficiency Toilet	1.28	X	1 flush	X	1 male[1] 3 female	X		=	
Flushometer Tank Water Closets		X	1 flush	X	1 male[1] 3 female	X		=	
Flushometer Valve Water Closets		X	1 flush	X	1 male[1] 3 female	X		=	
Electromechanical Hydraulic Water Closets		X	1 flush	X	1 male[1] 3 female	X		=	
Urinals		X	1 flush	X	2 male	X			
Urinals Non-Water Supplied	0.0	X	1 flush	X	2 male	X		=	

1 **The daily use number shall be increased to three if urinals are not installed in the room.**

2 **The Flow-rate is from the CEC Appliance Efficiency Standards, Title 20 California Code of Regulations; where a conflict occurs, the CEC standards shall apply.**

3 **For low-rise residential occupancies, the number of occupants shall be based on two persons for the first bedroom, plus one additional person for each additional bedroom.**

4 **For non-residential occupancies, refer to Table A, Chapter 4, 2007 California Plumbing Code, for occupant load factors.**

5 **Single Flush Toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is the average flush volume when tested in accordance with ASME A112.19.233.2.**

Dual Flush Toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is defined as the composite, average flush volume of two reduced flushes and one full flush. Flush volumes will be tested in accordance with ASME A112.19.2 and ASME A112.19.14.

MEDIUM HOME SIZE EXAMPLE

No. of Stories: 2
Square Footage: 2,400
Bedrooms: 4
Occupants: 5 (2 for first bedroom + 1 for each additional bedroom per WS-1)
Daily uses = 3 male + 3 female = 6 per WS-1 per Footnote 1
(no urinals in structure)

SAMPLE BASELINE WATER USE CALCULATION TABLE FOR MEDIUM SIZE HOME EXAMPLE

BASELINE WATER USE CALCULATION TABLE									
Fixture Type	**Flow-rate (gpm)**		**Duration**		**Daily uses**		**Occupants[3,4]**		**Gallons per day**
Showerheads	2.5	X	5 min.	X	1	X		=	N/A
Showerheads Residential	2.5	X	8 min.	X	1	X	5	=	100
Lavatory Faucets Residential	2.2	X	.25 min.	X	3	X	5	=	8.25
Kitchen Faucets	2.2	X	4 min.	X	1	X		=	N/A
Replacement Aerators	2.2	X		X		X		=	N/A
Wash Fountains	2.2	X		X		X		=	N/A
Metering Faucets	0.25	X	.25 min.	X	3	X		=	N/A
Metering Faucets for Wash Fountains	2.2	X	.25 min.	X		X		=	N/A
Gravity tank type Water Closets	1.6	X	1 flush	X	1 male[1] 3 female	X	5	=	48
Flushometer Tank Water Closets	1.6	X	1 flush	X	1 male[1] 3 female	X		=	N/A
Flushometer Valve Water Closets	1.6	X	1 flush	X	1 male[1] 3 female	X		=	N/A
Electromechanical Hydraulic Water Closets	1.6	X	1 flush	X	1 male[1] 3 female	X		=	N/A
Urinals	1.0	X	1 flush	X	2 male	X		=	N/A

Fixture "Water Use" = Flow rate x Duration x Occupants x Daily Uses

*Example **Baseline** Calculation:*

Water Closets = 1.6 gpm x 1 gal/flush x 6 (daily uses) x 5 (occupants) = 48 Gallons per day

Urinals = Not included in calculation

Lavatory Faucets = 2.2 gpm x 0.25 min x 3 (daily uses) x 5 (occupants) = 8.25 Gallons per day

Showerheads = 2.5 gpm x 8 min x 1 (daily use) x 5 (occupants) = 100 Gallons per day

***Total Daily Baseline Water Use** = 156.25 Gallons per day*

SAMPLE 20% REDUCTION WATER USE CALCULATION TABLE FOR MEDIUM SIZE HOME EXAMPLE

20% REDUCTION WATER USE CALCULATION TABLE									
Fixture Type	**Flow-rate (gpm)[2]**		**Duration**		**Daily uses**		**Occupants[3,4]**		**Gallons per day**
Showerheads		X	5 min.	X	1	X		=	*N/A*
Showerheads Residential	*2.0*	X	8 min.	X	1	X	*5*	=	*80*
Lavatory Faucets Residential	*1.5*	X	25 min.	X	3	X	*5*	=	*5.63*
Kitchen Faucets		X	4 min.	X	1	X		=	*N/A*
Replacement Aerators		X		X		X		=	*N/A*
Wash Fountains		X		X		X		=	*N/A*
Metering Faucets		X	.25 min.	X	3	X		=	*N/A*
Metering Faucets for Wash Fountains		X	.25 min.	X		X		=	*N/A*
Gravity tank type Water Closets	*1.28*	X	1 flush	X	1 male[1] 3 female	X	*5*	=	*38.4*
HET [5] High Efficiency Toilet	1.28	X	1 flush	X	1 male[1] 3 female	X		=	*N/A*
Flushometer Tank Water Closets		X	1 flush	X	1 male[1] 3 female	X		=	*N/A*
Flushometer Valve Water Closets		X	1 flush	X	1 male[1] 3 female	X		=	*N/A*
Electromechanical Hydraulic Water Closets		X	1 flush	X	1 male[1] 3 female	X		=	*N/A*
Urinals		X	1 flush	X	2 male	X			*N/A*
Urinals Non-Water Supplied	0.0	X	1 flush	X	2 male	X		=	*N/A*

*Example **Proposed** Calculation: **20% Reduction***

Water Closets = 1.28 gpm x 1 gal/flush x 6 (daily uses) x 5 (occupants) = 38.4 Gallons per day

Urinals = Not included in calculation

Lavatory Faucets = 1.5 gpm x 0.25 min x 3 (daily uses) x 5 (occupants) =5.63 Gallons per day

Showerheads = 2.0 gpm x 8 min x 1 (daily use) x 5 (occupants) = 80 Gallons per day

Total Daily Proposed Water Use = *124.03 Gallons per day ≤ 125 Gallons per day (20% Reduction of 156.25 Gallons per day Baseline)*

SMALL HOME SIZE EXAMPLE

No. of Stories: *1*
Square Footage: *1,200*
Bedrooms: *3*
Occupants: *4 (2 for first bedroom + 1 for each additional bedroom per WS-1)*
Daily uses = 3 male + 3 female = 6 per WS-1 per Footnote 1
(no urinals in structure)

SAMPLE BASELINE WATER USE CALCULATION TABLE FOR SMALL SIZE HOME EXAMPLE

BASELINE WATER USE CALCULATION TABLE									
Fixture Type	**Flow-rate (gpm)**		**Duration**		**Daily uses**		**Occupants[3,4]**		**Gallons per day**
Showerheads	2.5	X	5 min.	X	1	X		=	*N/A*
Showerheads Residential	2.5	X	8 min.	X	1	X	*4*	=	*80*
Lavatory Faucets Residential	2.2	X	.25 min.	X	3	X	*4*	=	*6.6*
Kitchen Faucets	2.2	X	4 min.	X	1	X		=	*N/A*
Replacement Aerators	2.2	X		X		X		=	*N/A*
Wash Fountains	2.2	X		X		X		=	*N/A*
Metering Faucets	0.25	X	.25 min.	X	3	X		=	*N/A*
Metering Faucets for Wash Fountains	2.2	X	.25 min.	X		X		=	*N/A*
Gravity tank type Water Closets	1.6	X	1 flush	X	1 male[1] 3 female	X	*4*	=	*38.4*
Flushometer Tank Water Closets	1.6	X	1 flush	X	1 male[1] 3 female	X		=	*N/A*
Flushometer Valve Water Closets	1.6	X	1 flush	X	1 male[1] 3 female	X		=	*N/A*
Electromechanical Hydraulic Water Closets	1.6	X	1 flush	X	1 male[1] 3 female	X		=	*N/A*
Urinals	1.0	X	1 flush	X	2 male	X		=	*N/A*

*Example **Baseline** Calculation:*

Water Closets = 1.6 gpm x 1gal/flush x 6 (daily uses) x 4 (occupants) = 38.4 Gallons per day

Urinals = Not included in calculation

Lavatory Faucets = 2.2 gpm x 0.25 min x 3 (daily uses) x 4 (occupants) = 6.6 Gallons per day

Showerheads = 2.5 gpm x 8 min x 1 (daily use) x 4 (occupants) = 80 Gallons per day

***Total Daily Baseline Water Use** = 125 Gallons per day*

SAMPLE 20% REDUCTION WATER USE CALCULATION TABLE FOR SMALL SIZE HOME EXAMPLE

20% REDUCTION WATER USE CALCULATION TABLE									
Fixture Type	**Flow-rate (gpm)[2]**		**Duration**		**Daily uses**		**Occupants[3,4]**		**Gallons per day**
Showerheads		X	5 min.	X	1	X		=	*N/A*
Showerheads Residential	*2.0*	X	8 min.	X	1	X	*4*	=	*64*
Lavatory Faucets Residential	*1.5*	X	25 min.	X	3	X	*4*	=	*4.5*
Kitchen Faucets		X	4 min.	X	1	X		=	*N/A*
Replacement Aerators		X		X		X		=	*N/A*
Wash Fountains		X		X		X		=	*N/A*
Metering Faucets		X	.25 min.	X	3	X		=	*N/A*
Metering Faucets for Wash Fountains		X	.25 min.	X		X		=	*N/A*
Gravity tank type Water Closets	*1.28*	X	1 flush	X	1 male[1] 3 female	X	*4*	=	*30.72*
HET[5] High Efficiency Toilet	1.28	X	1 flush	X	1 male[1] 3 female	X		=	*N/A*
Flushometer Tank Water Closets		X	1 flush	X	1 male[1] 3 female	X		=	*N/A*
Flushometer Valve Water Closets		X	1 flush	X	1 male[1] 3 female	X		=	*N/A*
Electromechanical Hydraulic Water Closets		X	1 flush	X	1 male[1] 3 female	X		=	*N/A*
Urinals		X	1 flush	X	2 male	X			*N/A*
Urinals Non-Water Supplied	0.0	X	1 flush	X	2 male	X		=	*N/A*

*Example **Proposed** Calculation: **20% Reduction***

Water Closets = 1.28 gpm x 1 gal/flush x 6 (daily uses) x 4 (occupants) = 30.72 Gallons per day

Urinals = Not included in calculation

Lavatory Faucets = 1.5 gpm x 0.25 min x 3 (daily uses) x 4 (occupants) =4.5 Gallons per day

Showerheads = 2.0 gpm x 8 min x 1 (daily use) x 4 (occupants) = 64 Gallons per day

***Total Daily Proposed Water Use** = 99.22 Gallons per day ≤ 100 Gallons per day (20% Reduction of 125 Gallons per day Baseline)*

4.303.2 Multiple showerheads serving one shower. When single shower fixtures are served by more than one showerhead, the combined flow rate of all the showerheads shall not exceed the maximum flow rates specified in the 20 percent reduction column contained in Table 4.303.2 or the shower shall be designed to only allow one showerhead to be in operation at a time.

Exception: The maximum flow rate for showerheads when using the calculation method specified in Section 4.303.1, Item 2, is 2.5 gpm @ 80 psi.

COMMENTARY

The maximum flow rate established in the 20% reduction table covers all applications where water sprays from multiple sources at one time. Sources include but are not limited to showerheads, handshowers and bodysprayers.

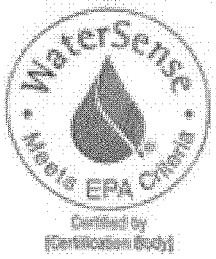
This section also clarifies that no showerhead shall exceed a maximum flow of 2.5 gpm @ 80 psi.

4.303.3 Plumbing fixtures and fittings. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall meet the standards referenced in Table 4.303.3.

COMMENTARY

Purpose

This section provides specifications for plumbing fixtures and fixtures referencing the US Environmental Protection Agency's WaterSense label, for fixture types that could be used to meet the 20 percent reduction criteria.



Graphic from US Environmental Protection Agency WaterSense Program.
Website: http://www.epa.gov/watersense/pubs/showerheads.html

SECTION 4.304 OUTDOOR WATER USE

4.304.1 Irrigation controllers. Automatic irrigation system controllers for landscaping provided by the builder and installed at the time of final inspection shall comply with the following:

1. Controllers shall be weather- or soil moisture-based controllers that automatically adjust irrigation in response to changes in plants' needs as weather conditions change.

2. Weather-based controllers without integral rain sensors or communication systems that account for local rainfall shall have a separate wired or wireless rain sensor which connects or communicates with the controller(s). Soil moisture-based controllers are not required to have rain sensor input.

Note: More information regarding irrigation controller function and specifications is available from the Irrigation Association at http://www.irrigation.org/SWAT/Industry/ia-tested.asp.

COMMENTARY

Purpose:

Water savings can be achieved by eliminating water use when not needed such as during periods of rain or when soils are holding enough moisture for support of landscaping. Controlled water use can also reduce damage from over watering such as erosion, foundation damage, mold, premature death of plants and runoff.

Examples of Acceptable Methods of Implementation and/or Compliance:

- *Applies to controllers installed at time of final inspection. This section does not mandate that controllers be installed.*
- *Smart irrigation control systems are manufactured and supplied by many companies and are easily accessible in stores or online.*
- *Acceptable control systems automatically delay watering due to rain.*
- *Systems may be communication-based, based on plant watering needs, or soil moisture.*

Background:

Automatic irrigation systems are often referred to as "smart irrigation control systems" and will either have a single control system or a secondary add-on device that can interface with the controller. Smart controllers estimate or measure depletion of available plant soil moisture in order to operate an irrigation system, replenishing water as needed while minimizing excess water use. The irrigation system is monitored by either soil or moisture base devices that allow irrigation to occur when water is required and not by a preprogrammed time clock.

The choice of irrigation system emitters should be established during the design phase and based on evaluation of the land topography (slope), soil type, water availability and pressure, plant type, and climate conditions.

Weather-based smart irrigation control systems evaluate current weather conditions and adjust schedules based on several parameters; weather conditions, plant types, and site conditions. The system will continually monitor the parameters and adjust the irrigation schedule as required.

Soil moisture-based smart irrigation control system monitor soil moisture conditions onsite with one or multiple moisture sensors. It is key to maintain an appropriate level of moisture for each plant species zone. Wilting will occur if moisture level within the soil depletes to a point the species cannot recover during the night.

Users should be aware that both fully- and semi-automatic systems are available. Smart irrigation systems require the user to participate in the baseline irrigation schedule, and then the system will determine the days and run time of irrigation. Automatic controllers that determine irrigation run times are preprogrammed with the crop coefficients established by the manufacturers. Users who decide to modify the coefficients due to geographical variations should consult a professional to make sure their revised coefficients do not cause under- or over-irrigating.

Frequently Asked Questions

Q: What is the effective date of the indoor water use requirements for nonresidential occupancies? (The Checklist for residential occupancies indicates an effective date of July 1, 2011, while the Checklist for nonresidential occupancies is silent.)

A: The effective date for residential indoor water reduction is July 1, 2011.

The effective date for nonresidential indoor water reduction is January 1, 2011.

Q: How is the reduced water flow for a dual flush toilet calculated?

A: To get the flow rate of a dual flush toilet, an average use is determined by totaling two reduced rate flushes with one full rate flush, then dividing by 3. (R+R+F)/3 = Average flow. This flow must be 1.28 gallons per flush or less to meet the reduced flow requirements.

Q: Does CALGreen require a "smart" irrigation system to be installed prior to the final inspection?

A: No. Section 4.304.1 requires either weather- or soil moisture-based controllers for automatic irrigation systems only if controllers are installed at the time of final inspection.

DIVISION 4.4 – MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

SECTION 4.406 ENHANCED DURABILITY AND REDUCED MAINTENANCE

4.406.1 Joints and openings. Openings in the building envelope separating conditioned space from unconditioned space needed to accommodate gas, plumbing, electrical lines and other necessary penetrations must be sealed in compliance with the *California Energy Code*.

Exception: Annular spaces around pipes, electric cables, conduits, or other openings in plates at exterior walls shall be protected against the passage of rodents by closing such openings with cement mortar, concrete masonry or similar method acceptable to the enforcing agency.

COMMENTARY

Purpose:
This section addresses the importance of sealing or providing barriers in openings to keep out rodents and preventing damage from rodents. This section also addresses an issue not addressed by the California Energy Code and provides acceptable materials for sealing.

Background (on Exception):
The California Energy Code requires joints and other openings in the building envelope, which are potential sources of air leakage, to be sealed to limit infiltration and exfiltration.

It is also necessary for other penetrations, voids, joints and openings to be sealed to avoid the passage of rodents. Openings include, but are not limited to, cuts in bottom or top plates, exterior wall openings around plumbing pipes, flues, exhaust vents, and HVAC conduits. A cement mortar or similar method approved by the enforcing agent and capable of withstanding rodent penetration is required.

SECTION 4.408
CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING

4.408.1 Construction waste reduction of at least 50 percent. Recycle and/or salvage for reuse a minimum of 50 percent of the non-hazardous construction and demolition debris, or meet a local construction and demolition waste management ordinance, whichever is more stringent.

Exceptions:

1. Excavated soil and land-clearing debris.

2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist or are not located reasonably close to the jobsite.

COMMENTARY

Purpose:

These provisions will help reduce landfill production of methane gas, a direct greenhouse gas. In addition, reusing and recycling materials typically results in less energy use than producing materials from virgin materials, conservation of the original resources, and reduces the burden on landfills. This section requires 50 percent of construction waste to be diverted from the landfill with options for calculating the reduction by weight or volume, but not both. This section also provides for alternate waste reduction methods.

Background:

Where a local jurisdiction has not adopted a minimum waste reduction requirement the 50% reduction established by Section 4.408.1 will apply. Section 4.408.1 also provides an exemption for alternate waste reduction methods developed in consultation with local agencies. This provision is to be used when waste facilities do not exist or are not reasonably close to the jobsite. The determination of what is "reasonably close" may vary according to the location of the jobsite and the nearest waste facility; and whether the type of waste in question is accepted at the facility. If utilizing the closest facility would result more use of more resources and energy than saved, the net savings to energy and resources may not be effective. In addition, the services may be prohibitively expensive or not available in certain areas.

Many local agencies will allow the use of a variety of public and private sector recycling options. Local authorities should be contacted during the preconstruction phase to obtain a list of approved haulers. Any successful recycling program will involve upfront due diligence and planning and the consideration of several factors. Many of these factors include, but are not limited to:

- *Local authority approved hauler*
- *Location of site to recycler in carefully considered*
- *Method of recycling: onsite sorting or commingling*
- *Recycler has a good track record*
- *Clearly marked bins*
- *Bins are routinely checked for material accuracy*
- *Subcontractors are on board*
- *Tags are collected and recorded*

Definitions for "Hazardous waste," "Recycle and Recycling," and "Re-use" are located in Chapter 2, Section 202, if needed for reference.

This section also supports legal requirements for local jurisdictions to divert 50 percent of solid waste through source reduction, recycling, and composting activities as required in the Public Resource Code Section 41780.

4.408.2 Construction waste management plan. Where a local jurisdiction does not have a construction and demolition waste management ordinance, a construction waste management plan shall be submitted for approval to the enforcing agency that:

1. Identifies the materials to be diverted from disposal by recycling, reuse on the project or salvage for future use or sale.
2. Specifies if materials will be sorted on-site or mixed for transportation to a diversion facility.
3. Identifies the diversion facility where the material collected will be taken.
4. Identifies construction methods employed to reduce the amount of waste generated.
5. Specifies that the amount of materials diverted shall be calculated by weight or volume, but not by both.

4.408.2.1 Documentation. Documentation shall be provided to the enforcing agency which demonstrates compliance with Section 4.408.2, Items 1 through 5. The waste management plan shall be updated as necessary and shall be accessible during construction for examination by the enforcing agency.

COMMENTARY

Purpose:
This section addresses use of a construction waste management plan intended to save raw materials and preserve landfill space, especially where local regulations do not apply.

Examples of Acceptable Methods of Implementation and/or Compliance:

1. *Comply with local waste management ordinance.*

2. *Develop a construction waste management plan and submit for approval to the local enforcing agency.*

   - *Provide evidence of compliance such as worksheets or documentation from waste management facility.*

Supporting sample plans and worksheets are included in CALGreen Chapter 8 and in this document to reduce time and costs for completing CWM Plans. There may be items not listed within the worksheet that will be required to be added by the representative preparing the construction waste management plan. Please contact the local authority early to discuss any items that may be unclear.

Sample Forms and Templates:

1) *Construction Waste Management (CWM) Plan*
2) *Construction Waste Management (CWM) Worksheet*
3) *Construction Waste Management (CWM) Worksheet (Volume Method)**
4) *Construction Waste Management (CWM) Worksheet (Weight Method)**
5) *Construction Waste Management (CWM) Worksheet (Summary)**
6) *Construction Waste Management (CWM) Acknowledgement*

**Not part of the 2010 CALGreen Code – these are simplified optional forms.*

Background:
The construction waste management (CWM) plan will provide a direct and clearly understood route to the successful diversion target of waste from landfills. With proper planning and on-site posting employees and subcontractors are further able to understand and participate in the process.

The CWM plan should be used to assist in identifying materials to be recycled and the method of their disposal. The CWM plan should also provide documentation and verification that the established diversion goals requirements have been satisfied.

4.408.2.2 Isolated jobsites. The enforcing agency may make exceptions to the requirements of this section when jobsites are located in areas beyond the haul boundaries of the diversion facility.

Notes:
1. Sample forms found in Chapter 8 may be used to assist in documenting compliance with the waste management plan.
2. Mixed construction and demolition debris (C&D) processors can be located at http://www.ciwmb.ca.gov/ConDemo.

COMMENTARY

Purpose:
This provision provides an exception from Section 408, as approved by the enforcing agency, for job sites where construction and demolition waste processing facilities are not readily available.

Examples of Acceptable Methods of Implementation and/or Compliance:

- *If your project is located outside the haul boundaries of a diversion facility contact your local authority as soon as possible for resolution.*
- *It is recommended that the owner/authorized agent research and discuss with the enforcing agency all logistical requirements early in the submittal process.*

CONSTRUCTION WASTE MANAGEMENT (CWM) PLAN

Note: This sample form may be used to assist in documenting compliance with the waste management plan.

Project Name: _____
Job #: _____
Project Manager: _____
Waste Hauling Company: _____
Contact Name: _____

All Subcontractors shall comply with the project's Construction Waste Management Plan.
All Subcontractor foremen shall sign the CWM Plan Acknowledgement Sheet.

Subcontractors who fail to comply with the Waste Management Plan will be subject to backcharges or withholding of payment, as deemed appropriate. For instance, Subcontractors who contaminate debris boxes that have been designated for a single material type will be subject to backcharge or withheld payment, as deemed appropriate.

1. The project's overall rate of waste diversion will be ____ %.

2. This project shall generate the least amount of waste possible by planning and ordering carefully, following all proper storage and handling procedures to reduce broken and damaged materials and reusing materials whenever possible. The majority of the waste that is generated on this jobsite will be diverted from the landfill and recycled for other use.

3. Spreadsheet 1, enclosed, identifies the waste materials that will be generated on this project, the diversion strategy for each waste type and the anticipated diversion rate.

4. Waste prevention and recycling activities will be discussed at the beginning of weekly subcontractor meetings. As each new subcontractor comes on-site, the WMP Coordinator will present him/her with a copy of the CWM Plan and provide a tour of the jobsite to identify materials to be salvaged and the procedures for handling jobsite debris. All Subcontractor foremen will acknowledge in writing that they have read and will abide by the CWM Plan. Subcontractor Acknowledgement Sheet enclosed. The CWM Plan will be posted at the jobsite trailer.

5. Salvage: Excess materials that cannot be used in the project, nor returned to the vendor, will be offered to site workers, the owner, or donated to charity if feasible.

6. [HAULING COMPANY] will provide a commingled drop box at the jobsite for most of the construction waste. These commingled drop boxes will be taken to [Sorting Facility Name and Location]. The average diversion rate for commingled waste will be ____%. As site conditions permit, additional drop boxes will be used for particular phases of construction (e.g. concrete and wood waste) to ensure the highest waste diversion rate possible.

7. In the event that the waste diversion rate achievable via the strategy described in (6) above, is projected to be lower than what is required, then a strategy of source-separated waste diversion and/or waste stream reduction will be implemented. Source separated waste refers to jobsite waste that is not commingled, but is instead allocated to a debris box designated for a single material type, such as clean wood or metal.

   Notes:
   1. Waste stream reduction refers to efforts taken by the builder to reduce the amount of waste generated by the project to below four (4) pounds per square foot of building area.
   2. When using waste stream reduction measures, the gross weight of the product is subtracted from a base weight of four (4) pounds per square foot of building area. This reduction is considered additional diversion and can be used in the waste reduction percentage calculations.

8. [HAULING COMPANY] will track and calculate the quantity (in tons) of all waste leaving the project and calculate the waste diversion rate for the project. [HAULING COMPANY] will provide Project Manager with an updated monthly report on gross weight hauled and the waste diversion rate being achieved on the project. [HAULING COMPANY's] monthly report will track separately the gross weights and diversion rates for commingled debris and for each source-separated waste stream leaving the project. In the event that [HAULING COMPANY] does not service any or all of the debris boxes on the project, the [HAULING COMPANY] will work with the responsible parties to track the material type and weight (in tons) in such debris boxes in order to determine waste diversion rates for these materials.

9. In the event that Subcontractors furnish their own debris boxes as part of their scope of work, such Subcontractors shall not be excluded from complying with the CWM Plan and will provide [HAULING COMPANY] weight and waste diversion data for their debris boxes.

10. In the event that site use constraints (such as limited space) restrict the number of debris boxes that can be used for collection of designated waste the project Superintendent will, as deemed appropriate, allocate specific areas onsite where individual material types are to be consolidated. These collection points are not to be contaminated with non-designated waste types.

11. Debris from jobsite office and meeting rooms will be collected by [DISPOSAL SERVICE COMPANY]. [DISPOSAL SERVICE COMPANY] will, at a minimum, recycle office paper, plastic, metal and cardboard.

CONSTRUCTION WASTE MANAGEMENT (CWM) WORKSHEET

Note: This sample form may be used to assist in documenting compliance with the waste management plan.

Project Name:	
Job Number:	
Project Manager:	
Waste Hauling Company:	
Construction Waste Management (CWM) Plan	

Waste Material Type	Diversion Method:		Projected Diversion Rate
	Commingled and Sorted Off-site	Source Separated Onsite	
Asphalt			
Concrete			
Shotcrete			
Metals			
Wood			
Rigid Insulation			
Fiberglass Insulation			
Acoustic Ceiling Tile			
Gypsum Drywall			
Carpet/Carpet Pad			
Plastic Pipe			
Plastic Buckets			
Plastic			
Hardiplank Siding and Boards			
Glass			
Cardboard			
Pallets			
Job office trash, paper, glass & plastic bottles, cans, plastic			
Alkaline and rechargeable, batteries, toner cartridges, and electronic devices			
Other:			
Other:			
Other:			
Other:			

Construction Waste Management Worksheet (Volume Method)

Project Name:							Date:	Page of
Project Location:							Completed By:	
Project Manager:								
Waste Hauler:							Signature:	
	A		B		C	D		
	Insert cubic foot or cubic yard totals into proper category below						Notes:	
Waste Material Type	Recycled		Reused		Diverted	Non-Recycled		
Asphalt		+		=				
Asphalt Shingles		+		=				
Brick (broken)		+		=				
Cardboard		+		=				
Carpet/Carpet Pad		+		=				
Concrete		+		=				
Gypsum Board (Drywall)		+		=				
Masonry		+		=				
Metals		+		=				
Pallets		+		=				
Plastic		+		=				
Wood (engineered)		+		=				
Wood (solid sawn)		+		=				
Office Waste		+		=				
Other		+		=				
Other		+		=				
Other Non-Recyclable		+		=				
Totals:		+		=				

Step 1 - Insert volume totals into Columns A, B, and D where appropriate.

Step 2 - Add column A to Column B and insert total into Column C for total diverted volume.

Step 3 - Add each Column down and enter totals in the boxes provided.

If multiple worksheets are used, transfer Column totals from each worksheet to the summary sheet.

If Column C is larger than Column D (on the summary sheet) Compliance with the 50% waste reduction requirement is achieved.

For additional instructions and information please see reverse.

Instructions:

- Choose which method of tracking to be used throughout the project.

  Either the weight method or the volume method can be used.

- You may need to use more than one worksheet to track all of your materials. When more than one worksheet is used, and upon completion of the project, transfer the data to the summary sheet.

- When performing demolition of an existing building, prior to the new construction, fill in any materials selected for reuse, such as doors or windows, in the reused column (Column B). For example, you can write doors or windows into the (Waste Material Type) column, on one of the "Other" lines, and then put the weight or volume of the material into (Column B).

- Once construction has commenced and materials are ready to be diverted, segregate materials whenever possible. Materials which are recycled, such as lumber, will be entered into the "Waste Material Type" under Wood, and then put the weight or volume of the material into the recycled (Column A). If some of your new construction material can be reused, write the appropriate information into Reused (Column B). Total the Recycled and Reused (Columns A + B) into the Diverted (Column C). Any material which does not get Reused or Recycled will go into the Non-Recycled (Column D).

- Total all of the columns from top to bottom of the Tracking Worksheet; if the Diverted Column is larger than the Non-Recycled Column you have met the 50% reduction requirement.

Examples of weights and volumes of some typical construction waste materials*

Material	Range of pounds per cubic yard	Typical pounds per cubic yard	Typical cubic yards per ton
Asphalt roofing material	250-460	360	5.5
Asphalt - paving	1300-2200	1750	1.1
Cardboard	70-135	85	23.5
Concrete	1300-2200	1750	1.1
Gypsum Board (Drywall)	315-470	400	5
Metals	220-1940	540	3.7
Wood	200-540	450	4.4

* Source: Sacramento Regional Solid Waste

Standard Conversions: 1 cubic yard (3'x3'x3') equals 27 cubic feet. 1 ton equals 2000 pounds

Construction Waste Management Worksheet (Weight Method)

Project Name:		Date:	Page of
Project Location:		Completed By:	
Project Manager:			
Waste Hauler:		Signature:	

	A		B		C	D
	Insert weight totals into proper category below					
Waste Material Type	Recycled		Reused		Diverted	Non-Recycled
Asphalt		+		=		
Asphalt Shingles		+		=		
Brick (broken)		+		=		
Cardboard		+		=		
Carpet/Carpet Pad		+		=		
Concrete		+		=		
Gypsum Board (Drywall)		+		=		
Masonry		+		=		
Metals		+		=		
Pallets		+		=		
Plastic		+		=		
Wood (engineered)		+		=		
Wood (solid sawn)		+		=		
Office Waste		+		=		
Other		+		=		
Other		+		=		
Other Non-Recyclable		+		=		
Totals:		+		=		

Notes:

Step 1 - Insert volume totals into Columns A, B, and D where appropriate.

Step 2 - Add column A to Column B and insert total into Column C for total diverted volume.

Step 3 - Add each Column down and enter totals in the boxes provided.

If multiple worksheets are used, transfer Column totals from each worksheet to the summary sheet.

If Column C is larger than Column D (on the summary sheet) Compliance with the 50% waste reduction requirement is achieved.

For additional instructions and information please see reverse.

Instructions:

- Choose which method of tracking to be used throughout the project.

  Either the weight method or the volume method can be used.

- You may need to use more than one worksheet to track all of your materials. When more than one worksheet is used, and upon completion of the project, transfer the data to the summary sheet.

- When performing demolition of an existing building, prior to the new construction, fill in any materials selected for reuse, such as doors or windows, in the reused column (Column B). For example, you can write doors or windows into the (Waste Material Type) column, on one of the "Other" lines, and then put the weight or volume of the material into (Column B).

- Once construction has commenced and materials are ready to be diverted, segregate materials whenever possible. Materials which are recycled, such as lumber, will be entered into the "Waste Material Type" under Wood, and then put the weight or volume of the material into the recycled (Column A). If some of your new construction material can be reused, write the appropriate information into Reused (Column B). Total the Recycled and Reused (Columns A + B) into the Diverted (Column C). Any material which does not get Reused or Recycled will go into the Non-Recycled (Column D).

- Total all of the columns from top to bottom of the Tracking Worksheet; if the Diverted Column is larger than the Non-Recycled Column you have met the 50% reduction requirement.

Examples of weights and volumes of some typical construction waste materials*

Material	Range of pounds per cubic yard	Typical pounds per cubic yard	Typical cubic yards per ton
Asphalt roofing material	250-460	360	5.5
Asphalt - paving	1300-2200	1750	1.1
Cardboard	70-135	85	23.5
Concrete	1300-2200	1750	1.1
Gypsum Board (Drywall)	315-470	400	5
Metals	220-1940	540	3.7
Wood	200-540	450	4.4

* Source: Sacramento Regional Solid Waste

Standard Conversions: 1 cubic yard (3'x3'x3') equals 27 cubic feet. 1 ton equals 2000 pounds

Construction Waste Management Summary Worksheet

Project Name:		Date:
Project Location:		
Project Manager:		
Waste Hauler:		

	C	D	
	Insert Totals Below		Compliance Method
Worksheets by page #	Diverted	Non-Recycled	☐ Volume ☐ Weight
Worksheet 1			
Worksheet 2			Notes:
Worksheet 3			
Grand Totals:			

Step 1 - Insert totals from worksheets in Column C or D.

Step 2 - Add each Column down and enter grand totals in the boxes provided.

If Column C is larger than Column D Compliance with the 50% waste reduction requirement is achieved.

Certification:

The signature below represents that the information provided on this form is true and correct and certifies that I have tracked construction waste during the course of this project and that a minimum of 50% of the total waste has been diverted for either reuse or recycling.

Company Name: (general contractor, subcontractor, or homeowner)		
Responsible Person's Name:		Responsible Person's Signature:
CSLB License:	Date Signed:	Position with Company or Title:

CONSTRUCTION WASTE MANAGEMENT (CWM) ACKNOWLEDGMENT

Project Name: _____
Job Number: _____
Project Manager: _____
Waste Hauling Company: _____

CWM Plan Acknowledgment

The Foreman for each new Subcontractor that comes on site is to receive a copy of the Construction Waste Management Plan and complete this Acknowledgement Form.

I have read Waste Management Plan for project; I understand the goals of this plan and agree to follow the procedures described in this plan.

Date	Subcontractor Company	Foreman	Signature

SECTION 4.410
BUILDING MAINTENANCE AND OPERATION

4.410.1 Operation and maintenance manual. At the time of final inspection, a manual, compact disc, web-based reference or other media acceptable to the enforcing agency which includes all of the following shall be placed in the building:

1. Directions to the owner or occupant that the manual shall remain with the building throughout the life cycle of the structure.

2. Operation and maintenance instructions for the following:

   a. Equipment and appliances, including water saving devices and systems, HVAC systems, water heating systems and other major appliances and equipment.
   b. Roof and yard drainage, including gutters and downspouts.
   c. Space conditioning systems including condenser and air filters.
   d. Landscape irrigation systems.
   e. Water reuse systems.

3. Information from local utility, water and waste recovery providers on methods to further reduce resource consumption including recycle programs and locations.

4. Public transportation and/or carpool options available in the area.

5. Educational material on the positive impacts of an interior relative humidity between 30-60 percent and what methods an occupant may use to maintain the relative humidity level in that range.

6. Information about water conserving landscape and irrigation design and controllers which conserve water.

7. Instructions for maintaining gutters and downspouts and importance of diverting water at least 5 feet away from foundation.

8. Information on required routine maintenance measures, including, but not limited to, caulking, painting, grading around the building, etc.

9. Information about state solar energy and incentive programs available.

10. A copy of all special inspection verifications required by the enforcing agency or this code.

COMMENTARY

Purpose:

As construction practices become more sophisticated, a certain level of knowledge is required to maintain building systems and equipment. This section provides a minimum list of items to be included in a comprehensive homeowner manual. The manual is also intended to provide information on the home for homeowners who are not the builders or first occupants of the home.

Examples of Acceptable Methods of Implementation and/or Compliance:

- *If a builder/developer does not currently have a manual then a single manual should be created, placed in the home at the time of final inspection, and provided to the purchaser. It should be noted on the manual cover that "Manual shall remain with the building for the life cycle of the structure."*
- *Media should be approved by the enforcing agency.*
- *Options for developing a home manual include use of web-based programs or templates that may be available for purchase or may be free share.*
- *HCD is developing an optional template or standard format for the manual.*
- *It is recommended that homeowners update or supplement the manual to keep information accurate.*

Background:

Even the most efficient home can operate poorly when uninformed users are responsible for their continued maintenance and operation. Many homeowners continually fail to complete even the most minor maintenance tasks such as changing air filters or operating exhaust fans to prevent excess moisture in bathrooms. An operation and maintenance manual is a one-stop location for maintenance and operational information and will promote the continued health of the complete building system. The manual could also be used as a record for compliance if additional information is included. It is recommended that the manual remain with the building for the "life cycle" of the structure.

The manual will provide technical, operational, and educational resources so owners and occupants can make well informed decisions. Providing owner's information on green features, equipment operation, warranties, special inspection reports, sub-contractor names and phone numbers, utility information, landscape and irrigation plans, along with water and energy conservation ideas. Additionally, the manual will provide residence-related information such as transportation options, recycle opportunities, and energy incentive programs. This will also help the owners and occupants make environmentally conscientious decisions.

Frequently Asked Questions

Q: Section 4.406.1 requires the sealing of joints and openings in compliance with the California Energy Code. The exception in Section 4.406.1 applies to openings at exterior walls. Does the exception combine all openings through exterior walls or just the openings in the top and bottom plates?

A: The exception applies to all openings not covered by the California Energy Code unless specifically allowed, such as vents. The exception requires the sealing of openings to prevent entry of rodents and the resulting damage.

Q: The building department in my jurisdiction does not allow the re-use of previously used materials. Is re-use of materials a violation of CALGreen?

A: No. There are provisions for used materials in the California Building Standards Code. The code specifies that used materials, equipment and devices shall not be re-used unless approved by the building official. This means that some materials cannot be re-used if they do not comply with the requirements of the California Building Standards Code and/or the local ordinances for new construction. CALGreen Sections A4.105.1 and A4.105.2 state that re-used materials or products must comply with current building standards requirements or be an accepted alternate method or material.

DIVISION 4.5 – ENVIRONMENTAL QUALITY

SECTION 4.503 FIREPLACES

4.503.1 General. Any installed gas fireplace shall be a direct-vent sealed-combustion type. Any installed woodstove or pellet stove shall comply with US EPA Phase II emission limits where applicable. Woodstoves, pelletstoves and fireplaces shall also comply with applicable local ordinances.

COMMENTARY

Purpose:
This requirement prevents use of indoor air for either combustion or exhaust of combustion products and is consistent with current Title 24, Part 6, California Energy Code.
Examples of Acceptable Methods of Implementation and/or Compliance:

- *Install a direct-vent gas fireplace*
- *Install a pellet or wood stove which meets US EPA Phase II emission standards*
- *Comply with local ordinance*

Background:
A direct-vent fireplace pulls outside air in to assist in combustion and then directly vents byproducts (fumes) outside. Contaminated air and any unused fuel cannot escape the sealed fireplace and therefore cannot contaminate quality of the indoor air.

Additional benefits of the fireplaces include energy efficiency. As a self-contained unit which requires no household air the direct-vent fireplace does not experience drafts or heat loss. Many sealed combustion direct-vent fireplaces can be found that operate near 90 percent efficiency and, in some cases, provide up to 40,000 BTUs.

SECTION 4.504 POLLUTANT CONTROL

4.504.1 Covering of duct openings and protection of mechanical equipment during construction. At the time of rough installation or during storage on the construction site and until final startup of the heating and cooling equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheetmetal or other methods acceptable to the enforcing agency to reduce the amount of dust or debris which may collect in the system.

COMMENTARY

Purpose:

This section provides protection for duct openings, permanent mechanical equipment and other components which are often used for conditioning purposes during construction. Protection would result in reduced recirculation of construction dust, debris and other airborne contaminants upon occupancy and increased operating efficiency.

Examples of Acceptable Methods of Implementation and/or Compliance

- *Several methods of protection are acceptable ranging from supply boots to cardboard and duct tape to specially designed rolled sheeting.*
- *Protection of equipment, ducting, and plenums should be protected in a method that the protection is successful during the entire construction process.*
- *Equipment stored on the construction site for future installation should be wrapped or protected.*
- *If the system is operated during construction, then it is recommended that a high efficiency filter such as a MERV 6 or 8 be used throughout the construction process. Prior to start-up, it is recommended that the entire system, including ductwork, furnace and coil, be thoroughly cleaned and inspected to remove any construction-related particles.*
- *Consider use of alternate space conditioning systems during construction.*

Background:

Pollutants caused from natural construction activities are of major concern as they migrate to the duct systems and air-handling units. Both visible and invisible pollutants can greatly affect indoor air pollution when distributed throughout the dwelling by a forced air system. Dust, dirt, and airborne particles can substantially reduce the efficiency and operation of coils and compressors. This practice encourages and provides a method of protection to ensure that the long term mechanical efficiency and occupant health is not adversely affected by construction pollution.

4.504.2 Finish material pollutant control. Finish materials shall comply with this section.

4.504.2.1 Adhesives, sealants and caulks. Adhesives, sealants and caulks used on the project shall meet the requirements of the following standards unless more stringent local or regional air pollution or air quality management district rules apply:

1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 4.504.1 or 4.504.2 as applicable. Such products also shall comply with the Rule 1168 prohibition on the use of certain toxic compounds (chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene), except for aerosol products as specified in subsection 2 below.

2. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of *California Code of Regulations*, Title 17, commencing with Section 94507.

   Note: Title 17 may be found at http://ccr.oal.ca.gov/

COMMENTARY

Purpose:
This section adopts the South Coast Air Quality Management District's (SCAQMD's) limits for volatile organic compounds (VOCs) contained in adhesives, sealants and caulks. Compliance with SCAQMD VOC limits or more restrictive local VOC limits, will help improve indoor air quality.

Background:
Volatile organic compounds (VOCs) are recognized as one of several factors that can affect indoor air quality and occupant health and comfort. Requiring the use of low-emitting construction materials can greatly help improve indoor air quality. One compliance path with this section is to satisfy the requirements of the South Coast Air Quality Management District's Rule 1168:

> *Purpose and Applicability of Rule 1168 as described by South Coast Air Quality Management District: "The purpose of this rule is to reduce emissions of volatile organic compounds (VOCs) and to eliminate emissions of chloroform, ethylene dichloride, methylene chloride, perchloroethylene, and trichloroethylene from the application of adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, or any other primers. This rule applies to all commercial and industrial sales and applications of adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, or any other primers, unless otherwise specifically exempted by this rule."*

If required by the enforcing agency proof of compliance may be required. Product manufacturers' information, material safety data sheets (MSDS), technical data sheets or compliance letters may be acceptable forms of compliance.

TABLE 4.504.1
ADHESIVE VOC LIMIT[1, 2]

Less Water and Less Exempt Compounds in Grams per Liter

ARCHITECTURAL APPLICATIONS	CURRENT VOC LIMIT
Indoor carpet adhesives	50
Carpet pad adhesives	50
Outdoor carpet adhesives	150
Wood flooring adhesive	100
Rubber floor adhesives	60
Subfloor adhesives	50
Ceramic tile adhesives	65
VCT and asphalt tile adhesives	50
Drywall and panel adhesives	50
Cove base adhesives	50
Multipurpose construction adhesives	70
Structural glazing adhesives	100
Single-ply roof membrane adhesives	250
Other adhesive not specifically listed	50
SPECIALTY APPLICATIONS	
PVC welding	510
CPVC welding	490
ABS welding	325
Plastic cement welding	250
Adhesive primer for plastic	550
Contact adhesive	80
Special purpose contact adhesive	250
Structural wood member adhesive	140
Top and trim adhesive	250
SUBSTRATE SPECIFIC APPLICATIONS	
Metal to metal	30
Plastic foams	50
Porous material (except wood)	50
Wood	30
Fiberglass	80

1 **If an adhesive is used to bond dissimilar substrates together, the adhesive with the highest VOC content should be allowed.**

2 **For additional information regarding methods to measure the VOC content specified in this table, see South Coast Air Quality Management District Rule 1168, http://www.arb.ca.gov/DRDB/SC/CURHTML/R1168.PDF.**

TABLE 4.504.2
SEALANT VOC LIMIT

Less Water and Less Exempt Compounds in Grams per Liter

SEALANTS	CURRENT VOC LIMIT
Architectural	250
Marine deck	760
Nonmembrane roof	300
Roadway	250
Single-ply roof membrane	450
Other	420
SEALANT PRIMERS	
Architectural Nonporous Porous	 250 775
Modified bituminous	500
Marine deck	760
Other	750

TABLE 4.504.3
VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS[2, 3]

Grams of VOC Per Liter of Coating, Less Water and Less Exempt Compounds

COATING CATEGORY	EFFECTIVE 1/1/2010	EFFECTIVE 1/1/2012
Flat coatings	50	
Nonflat coatings	100	
Nonflat - high gloss coatings	150	
Specialty coatings		
Aluminum roof coatings	400	
Basement specialty coatings	400	
Bituminous roof coatings	50	
Bituminous roof primers	350	
Bond breakers	350	
Concrete curing compounds	350	
Concrete/masonry sealers	100	
Driveway sealers	50	
Dry fog coatings	150	
Faux finishing coatings	350	
Fire resistive coatings	350	
Floor coatings	100	
Form-release compounds	250	
Graphic arts coatings (sign paints)	500	
High temperature coatings	420	
Industrial maintenance coatings	250	
Low solids coatings[1]	120	
Magnesite cement coatings	450	
Mastic texture coatings	100	
Metallic pigmented coatings	500	
Multi-color coatings	250	
Pre-treatment wash primers	420	
Primers, sealers, and undercoaters	100	
Reactive penetrating sealers	350	
Recycled coatings	250	
Roof coatings	50	
Rust preventative coatings	400	250
Shellacs: • clear • opaque	 730 550	
Specialty primers, sealers, and Undercoaters	350	100
Stains	250	
Stone consolidants	450	
Swimming pool coatings	340	
Traffic marking coatings	100	
Tub and tile refinish coatings	420	
Waterproofing membranes	250	
Wood coatings	275	
Wood preservatives	350	
Zinc-rich primers	340	

1 **Grams of VOC per liter of coating, including water and including exempt compounds**

2 **The specified limits remain in effect unless revised limits are listed in subsequent columns in the table.**

3 **Values in this table are derived from those specified by the California Air Resources Board, Architectural Coatings Suggested Control Measure, February 1, 2008. More information is available at http://www.arb.ca.gov/coatings/arch/approved_2007_scm.pdf.**

4.504.2.2 Paints and coatings. Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Suggested Control Measure, as shown in Table 4.504.3, unless more stringent local limits apply. The VOC content limit for coatings that do not meet the definitions for the specialty coatings categories listed in Table 4.504.3 shall be determined by classifying the coating as a Flat, Nonflat, or Nonflat-High Gloss coating, based on its gloss, as defined in subsections 4.21, 4.36, and 4.37 of the 2007 California Air Resources Board, Suggested Control Measure, and the corresponding Flat, Nonflat, or Nonflat-High Gloss VOC limit in Table 4.504.3 shall apply.

4.504.2.3 Aerosol Paints and Coatings. Aerosol paints and coatings shall meet the Product-Weighted MIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances, in Sections 94522(c)(2) and (d)(2) of *California Code of Regulations*, Title 17, commencing with Section 94520; and in areas under the jurisdiction of the Bay Area Air Quality Management District additionally comply with the percent VOC by weight of product limits of Regulation 8 Rule 49.

Notes:
1. Title 17 may be found at http://ccr.oal.ca.gov/.
2. See Bay Area Air Quality Management District Regulation 8 Rule 49 at http://www.arb.ca.gov/DRDB/BA/CURHTML/R8-49.HTM.

COMMENTARY

Purpose:
Section 4.504.2.2 adopts the California Air Resources Board's (ARB's) VOC limits for architectural paints and coatings. Compliance with ARB VOC limits or more restrictive local VOC limits, will help improve indoor air quality. Section 4.504.2.2 provides standards for paints and coatings.

Background:
The requirements of Section 4.504.2.2 only apply to the use of paints and coatings as an indoor application and as applied on-site. Coating classification by flat, nonflat or nonflat-high gloss is required to determine the allowable levels of VOC content as established in Table 4.504.3. Verification of product compliance may be required and product manufacturers' information should be available for enforcement agency review.

4.504.2.4 Verification. Verification of compliance with this section shall be provided at the request of the enforcing agency. Documentation may include, but is not limited to, the following:

1. Manufacturer's product specification.
2. Field verification of on-site product containers.

COMMENTARY

Examples of Acceptable Methods of Implementation and/or Compliance:
Builders should be ready to provide verification of compliance with any portion of this section to the enforcing agency. It is suggested to have a method of compliance ready and prepared so inspections are not failed or postponed because compliance materials are not available.

- *Product specifications should be easily accessible from the product and material suppliers. Make these available at time of inspection.*
- *Contractors should be cognizant that field inspectors can request to field verify that applied products meet the requirements of Section 4.504.2.3. It is suggested that contractors keep available any containers and/or product labels for inspectors verification until such time the inspector deems they are not required.*

4.504.3 Carpet systems. All carpet installed in the building interior shall meet the testing and product requirements of one of the following:

1. Carpet and Rug Institute's Green Label Plus Program
2. California Department of Public Health Standard Practice for the testing of VOCs (Specification 01350)
3. NSF/ANSI 140 at the Gold level
4. Scientific Certifications Systems Indoor Advantage™ Gold

Notes:
1. For Green Label Plus, see http://www.carpet-rug.com/.
2. For NSF/ANSI 140, see http://www.carpet-rug.org/carpet-and-rug-industry/sustainability/sustainable-carpetlist.cfm.
3. For Indoor Advantage™ Gold, see http://www.scscertified.com/iaq/indooradvantage.htm .
4. Scientific Certifications Systems Indoor Advantage™ http://www.scscertified.com/iaq/indooradvantage.htm.

4.504.3.1 Carpet cushion. All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program.

4.504.3.2 Carpet adhesive. All carpet adhesive shall meet the requirements of Table 4.504.1.

COMMENTARY

Examples of Acceptable Methods of Implementation and/or Compliance:
Builders should be ready to provide verification of compliance with any portion of this section to the enforcing agency. Compliance information is readily available online and should be accessible if required by an enforcing agency. It is

recommended that a method of compliance be ready and prepared so inspections are not failed or postponed because compliance materials are not available.

- *Product specifications should be easily accessible from the product and material suppliers. Make these available at time of inspection.*
- *Contractors should be cognizant that field inspectors can request to field verify that applied products meet the requirements of Section 4.504.2.1. It is suggested that contractors keep available any containers and/or product labels for inspectors verification until such time the inspector deems they are not required.*

Background:
All carpet systems, cushion, and adhesives are required to comply with the VOC requirements set forth by Sections 4.504.3, 4.504.3.1 and 4.504.3.2. This practice will help reduce indoor emission levels thereby improving the overall health of indoor air quality. Installed products used are third party-certified and installed in a manner acceptable to the manufacturer's requirements.

***Note**: All website addresses, especially those that are document-specific, may change over time. If there is a problem with accessing specific websites, you may be able to access the needed information by typing in the most basic website address for the organization (e.g., www.carpet-rug.org), and then searching for keywords, such as NSF.*

4.504.4 Resilient flooring systems. Where resilient flooring is installed, at least 50% of floor area receiving resilient flooring shall comply with the VOC-emission limits defined in the Collaborative for High Performance Schools (CHPS) Low-emitting Materials List or certified under the Resilient Floor Covering Institute (RFCI) FloorScore program.

COMMENTARY

Purpose:
This section adopts VOC limits for interior resilient flooring based on the CHPS Low-emitting Materials List or RFCI FloorScore program. Compliance with these VOC limits will help improve indoor air quality.

Background:
Resilient flooring is commonly used in kitchens, bathrooms, entryways, family rooms and slowly gaining traction for use in other areas. These systems are commonly made from materials such as cork, vinyl, linoleum and rubber providing a natural sturdiness, and springiness to the flooring system. Resilient flooring provides users a more comfortable standing surface due to its natural characteristics of "give" and "bounce back". The ability for the material to be resistant to stains and microbial contamination make it a natural choice for use in homes.

4.504.5 Composite wood products. Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in ARB's Air Toxics Control Measure for Composite Wood (17 CCR 93120 et seq.), by or before the dates specified in those sections, as shown in Table 4.504.5.

COMMENTARY

Purpose:

Compliance with these VOC limits will help improve air quality and reduce health risks. This section adopts VOC (formaldehyde) limits for specified composite wood products based on ARB's Air Toxics Control Measure for Composite Wood.

Background:

The following information is an excerpt from ARB's website on Composite Wood Products Airborne Toxics Control Measure (ATCM) regarding formaldehyde.

"... One major use includes the production of wood binding adhesives and resins. The ARB evaluated formaldehyde exposure in California and found that one of the major sources of exposure is from inhalation of formaldehyde emitted from composite wood products containing urea-formaldehyde resins. The International Agency for Research on Cancer (IARC) reclassified formaldehyde from "probably carcinogenic to humans" to "carcinogenic to humans" in 2004, based on the increased risk of nasopharyngeal cancer. Formaldehyde was also designated as a toxic air contaminant (TAC) in California in 1992 with no safe level of exposure. State law requires ARB to take action to reduce human exposure to all TACs."

TABLE 4.504.5
FORMALDEHYDE LIMITS[1]

Maximum formaldehyde emissions in parts per million.

PRODUCT	CURRENT LIMIT	JANUARY 1, 2012	JULY 1, 2012
Hardwood plywood veneer core	0.05		
Hardwood plywood composite core	0.08		0.05
Particle board	0.09		
Medium density fiberboard	0.11		
Thin medium density fiberboard[2]	0.21	0.13	

[1] **Values in this table are derived from those specified by the California Air Resources Board, Air Toxics Control Measure for Composite Wood as tested in accordance with ASTM E1333-96 (2002). For additional information, see *California Code of Regulations*, Title 17, Sections 93120 through 93120.12.**

[2] **Thin medium density fiberboard has a maximum thickness of 8 millimeters.**

4.504.5.1 Documentation. Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall include at least one of the following:

1. Product certifications and specifications.
2. Chain of custody certifications.
3. Other methods acceptable to the enforcing agency.

COMMENTARY

Examples of Acceptable Methods of Implementation and/or Compliance:
Builders should be ready to provide verification of compliance with any portion of this section to the enforcing agency. It is recommended to have methods of compliance ready and prepared so inspections are not failed because compliance materials are not available.

- *Product specifications should be easily accessible from the product and material suppliers. Make these available at time of inspection.*
- *Contractors should be cognizant that field inspectors can request to field verify that products meet the requirements of Section 4.504.5. It is recommended that contractors keep available any packaging and/or product labels for inspector verification until such time the inspector deems they are not required.*
- *Chain of custody certifications.*
- *Other methods acceptable to the enforcing agency*

Background:
Chain of Custody: Refers to the chronological documentation or paper trail, showing the seizure, custody, control, transfer, analysis, and disposition of evidence, physical or electronic. Obtaining Chain of Custody certification assures the consumer that labeled products have been produced with wood or fiber sourced from a properly managed forest.

SECTION 4.505 INTERIOR MOISTURE CONTROL

4.505.2 Concrete slab foundations. Concrete slab foundations required to have a vapor retarder by *California Building Code*, CCR, Title 24, Part 2, Chapter 19, shall also comply with this section.

4.505.2.1 Capillary break. A capillary break shall be installed in compliance with at least one of the following:

1. A 4-inch (101.6 mm) thick base of ½ inch (12.7 mm) or larger clean aggregate shall be provided with a vapor barrier in direct contact with concrete and a concrete mix design, which will address bleeding, shrinkage, and curling shall be used. For additional information, see American Concrete Institute, ACI 302.2R-06.
2. Other equivalent methods approved by the enforcing agency.
3. A slab design specified by a licensed design professional.

COMMENTARY

Purpose:
These provisions reduce movement of moisture into the slab as well as into the building. The size of the base material is specified. The vapor retarder is also required to be in direct contact with the concrete. Equivalent alternate methods or designed systems are also permitted.

Examples of Acceptable Methods of Implementation and/or Compliance:
- *Follow prescriptive requirements in this section.*
- *Use appropriate concrete mix design and cure periods for area.*
- *Obtain approval from the enforcing agency for an alternate design.*
- *Use the design specified by a licensed California architect or engineer.*

Background:
Concrete is frequently subject to cracks due to shifting of substrate, uneven stresses, or exposure to temperature extremes or chemical or biological processes. Therefore, vapor retarders are commonly being used in both residential and commercial applications to retard moisture migration from beneath the slab. When selecting a vapor retarder several important physical properties should be considered such as, a low moisture vapor transmission (MVY), high tensile strength, high puncture resistance, and resistance to chemical or environmental attacks. Vapor retarders can be located and purchased in several thicknesses; consult an engineer to determine which product is best for your application. Both the CBC and CRC reference a minimum 6 mil thickness vapor retarder for vapor retardant purposes.

Moisture penetrating the building envelope is a major concern when protecting indoor air quality. This practice provides a method to address the growing concern of water intrusion through the slab and foundation walls. A capillary break will provide a barrier between the water wicked from the ground before it can be absorbed and transmitted through the concrete slab and foundation.

This section mandates the installation of a vapor retarder in all concrete slabs to achieve the capillary break. The break must be placed in direct contact with the slab thereby separating the aggregate layer from the concrete. The vapor retarder must be overlapped by a recommended 6 inches to ensure continuity and taped with a water resistive tape product.

NOTE: *A common mistake found in the application process is that the tape applied to the vapor retarder is not a vapor transmission barrier itself. Be sure to apply a moisture resistive tape to the vapor retarder.*

CALGreen Section 4.505.2 specifically references concrete slab foundations required to have vapor retarders pursuant to the California Building Code. Since provisions of CALGreen will largely apply to low-rise residential buildings built according to the newly adopted California Residential Code, Section 4.505.2 should also apply to these structures.

4.505.3 Moisture content of building materials. Building materials with visible signs of water damage shall not be installed. Wall and floor framing shall not be enclosed when the framing members exceed 19% moisture content. Moisture content shall be verified in compliance with the following:

1. Moisture content shall be determined with either a probe-type or a contact-type moisture meter.
2. Moisture readings shall be taken at a point 2 feet (610 mm) to 4 feet (1219 mm) from the grade stamped end of each piece to be verified.
3. At least three random moisture readings shall be performed on wall and floor framing with documentation acceptable to the enforcing agency provided at the time of approval to enclose the wall and floor framing.

Insulation products which are visibly wet or have a high moisture content shall be replaced or allowed to dry prior to enclosure in wall or floor cavities. Wet-applied insulation products shall follow the manufacturers' drying recommendations prior to enclosure.

COMMENTARY

Purpose:
The purpose of this section is to provide additional protection against growth of mold or other biological growth in moist enclosed areas. This section requires field verification of moisture content and prevents enclosure of wood framing members exceeding 19 percent moisture content. This section also prevents the enclosure and use of wet or moist insulation products.

Examples of Acceptable Methods of Implementation and/or Compliance:

- *Cover building materials to protect from rain and moisture.*
- *Ensure building is weather-tight before insulating.*
- *Use other precautions necessary to ensure building materials are kept dry.*
- *Test for moisture levels of building materials.*
- *Moisture sensors are available for purchase and range from $80 to $200. To comply with the requirements of this section moisture readings must be properly taken and recorded and made available for review by the enforcing agency.*

Background:
Wood construction is the most commonly used form of building construction in single-family and multi-family homes today. Freshly cut wood often displays moisture content levels of 30% and higher. Levels of this magnitude, especially when enclosed and prevented from drying, could cause serious problems with constructability as well as long-term building and occupant health.

Commonly used by building inspectors as a criteria for serviceability and performance of wood products; the maximum allowable 19% moisture level is the performance threshold for kiln-drying for many building codes. Section 4.505.3 details the requirements and methods to insure that the supplied building materials are safe for installation.

SECTION 4.506 INDOOR AIR QUALITY AND EXHAUST

4.506.1 Bathroom exhaust fans. Mechanical exhaust fans which exhaust directly from bathrooms shall comply with the following:

1. Fans shall be ENERGY STAR compliant and be ducted to terminate outside the building.

2. Unless functioning as a component of a whole house ventilation system, fans must be controlled by a humidistat which shall be readily accessible.

   Humidistat controls shall be capable of adjustment between a relative humidity range of 50 to 80 percent.

Note: For the purposes of this section, a bathroom is a room which contains a bathtub, shower, or tub/shower combination.

COMMENTARY

Purpose:
This provision is intended to reduce moisture inside the residence. Clarifies that whole house ventilation systems can be used to comply with this section.

Methods of Implementation and/or Compliance:
- *Install a whole house ventilation system.*
- *Install ENERGY STAR fans with humidistat control in each bathroom.*

Background:
***ENERGY STAR** states that, "qualified ventilation fans use **70%** less energy than standard models. These fans provide better efficiency and comfort with less noise, and use high performance motors that work better and last longer than motors used in conventional models. They feature high performance motors and improved blade design, providing better performance and longer life."*

*A **humidistat** is a sensor used to control various pieces of equipment meant to regulate humidity levels. Often used on ventilation systems to control fans and other equipment when the humidity level reaches unwanted levels. A humidistat can control an exhaust fan based on the moisture level in a room. The control mechanism allows the humidity setting to be typically adjusted from 20 to 80 percent relative humidity. Based on the pre-program or set level of humidity the humidistat can control the on/off function of the bathroom exhaust fan to regulate desired level.*

SECTION 4.507 ENVIRONMENTAL COMFORT

4.507.1 Openings. Whole house exhaust fans shall have insulated louvers or covers which close when the fan is off. Covers or louvers shall have a minimum insulation value of R-4.2.

COMMENTARY

Purpose:
This section, in conjunction with Section 4.406 addresses the importance of sealing or separating conditioned space from nonconditioned space and maintaining temperature control.

Examples of Acceptable Methods of Implementation and/or Compliance:

- *Install a whole house fan with insulated louvers.*
- *Install a fan with an insulated cover.*
- *Use a fan with insulated duct connected to penetrations in the conditioned envelope.*

4.507.2 Heating and air conditioning system design. Heating and air conditioning systems shall be sized, designed and have their equipment selected using the following methods:

1. The heat loss and heat gain is established according to ACCA Manual J, ASHRAE handbooks or other equivalent design software or methods.
2. Duct systems are sized according to ACCA 29-D Manual D, ASHRAE handbooks or other equivalent design software or methods.
3. Select heating and cooling equipment according to ACCA 36-S Manual S or other equivalent design software or methods.

Exception: Use of alternate design temperatures necessary to ensure the systems function are acceptable.

COMMENTARY

Purpose:
Section 405.7.2 requires HVAC systems to be appropriately sized to the heating and cooling loads (heat gain/heat loss) of the structure. This section also provides an exception to allow use of appropriate design temperatures reflecting design needs of buildings instead of broad-based climate information.

Examples of Acceptable Methods of Implementation and/or Compliance

- *Heat loss and heat gain calculation using software (available on the Internet) or hand calculations or an equivalent.*
- *Duct system design to ensure adequate air flow is provided to address the heat loss and gain in each area of the home.*
- *Select equipment which will provide the necessary air flow and level of conditioning to satisfy the loads, function within the duct design criteria and within the equipment limitations.*
- *The referenced ACCA manuals are available from:*

Air Conditioning Contractors of America
2800 Shirlington Road, Suite 300
Arlington, VA 22206
www.acca.org

Background:
ASHRAE was formed by the merger of two societies, American Society of Heating and Ventilating Engineers (ASHVE), known after 1954 as American Society of Heating and Air-Conditioning Engineers (ASHAE) and the American Society of Refrigerating Engineers (ASRE). The two merged in 1959.

ASHRAE is an international organization of 51,000 persons. ASHRAE fulfills its mission of advancing heating, ventilation, air conditioning and refrigeration to serve humanity and promote a sustainable world through research, standards writing, publishing and continuing education.

ACCA Manual J: *Produces equipment sizing loads for single-family-detached homes, small multi-unit structures, condominiums, town houses and manufactured homes.*

ACCA Manual D: *"Residential Duct Systems," is a comprehensive guide outlining the methods and procedures used to design residential duct systems.*

ACCA Manual S: *Shows how to select and size heating and cooling equipment to meet Manual J loads based on local climate and ambient conditions at the building site.*

Q: What is the difference between a vapor retarder and a vapor barrier? What is the importance of a capillary break?

A: Concrete under-slab vapor retarders are designed to intercept and block moisture vapor before it can reach the slab. They are always installed below the slab, either below or on top of the capillary break. This positioning is critical, as no concrete top coat can protect slabs from moisture migrating from beneath the concrete. The terms "vapor retarder," "vapor barrier," and "moisture barrier" are often used interchangeably; however, there are differences.

The California Building Code provides the definition for "vapor retarder class" as follows:
(A similar definition is included in the California Residential Code.)
A measure of a material or assembly's ability to limit the amount of moisture that passes through that material or assembly. Vapor retarder class shall be defined using the desiccant method of ASTM E 96 as follows:

Class I: 0.1 perm or less.
Class II: 0.1 < perm ≤ 1.0 perm.
Class III: 1.0 < perm ≤ 10 perm.

The CALGreen Code defines "vapor barrier" as follows:
Material that has a permeance of one perm or less and that provides resistance to the transmission of water vapor.

A "capillary break" as used in this section provides a separation by which capillary action in the soil or rock is disrupted. "Capillary action" is generally defined by the U. S. Geological Survey as the movement of water within the spaces of a porous material due to the forces of adhesion, cohesion, and surface tension.

Q: Does the requirement for 19% maximum moisture content of building materials (Section 4.505.3) apply to pressure treated wood and fire-retardant treated wood?

A: Yes. In general, as per the manufacturers' specifications, the moisture content for treated lumber is high – over 35% (sometimes as high as 75%) – and the wood is still wet when it arrives at the job site. CALGreen and the California Building Code do not make distinctions between regular lumber and pressure treated lumber. Pursuant to 2010 CBC (Section 2303.1.8.2), where preservative-treated wood is used in enclosed locations where drying in service cannot readily occur, such wood shall be at a moisture content of 19% or less before being covered with insulation, interior wall finish, floor covering or other materials. One way to comply with this requirement is by using kiln-dried after treatment (KDAT) material, with moisture content of 19% or less. Another option is to air-dry the treated lumber on the job site (or in the lumberyard). This process will take time depending on the type of weather and the extent to which the lumber is exposed. The requirement for fire-retardant treated wood is the same: for interior application, it shall be dried to a moisture content of 19% or less for lumber, and 15% less for wood structural panels, before use.

CHAPTER 5. CALGREEN RESIDENTIAL TIER 1 AND TIER 2*

CALGreen Appendix A4 is not mandatory as adopted by HCD. The voluntary measures or alternatives were developed in response to numerous stakeholder requests for a statewide, consistent, method of enhancing green construction practices beyond CALGreen's mandatory minimum levels. To meet Tier 1 or Tier 2, designers, builders, or property owners must increase the number of green building measures and further reduce percentages of water and energy use and waste to landfills in order to meet the threshold levels for each tier.

To provide a guide for implementing these "reach levels," HCD developed a tier-based Residential Occupancies Application Checklist indicating both mandatory and voluntary measures. Use of this checklist provides enforcing agencies a consistent method to identify, assess and implement tier levels.

Users should be aware that voluntary measures in Appendix A4 align with similarly numbered divisions addressing mandatory measures in CALGreen Chapter 4. For example, mandatory measures for water efficiency and conservation are discussed in Division 4.3 and voluntary measures are discussed in Appendix A4, Division A4.3.

It is extremely important to recognize that the measures in Appendix A4 are voluntary unless adopted by a city, county, or city and county through a local ordinance. (See sample Residential Model Ordinance in Appendix A4, Division A4-7.) However, if the Tier 1- and Tier 2-based systems are adopted, there are prerequisites associated with each tier. In addition, there are also a specified number of elective measures which must be selected. For this reason, the exact requirements for Tier 1 or Tier 2 may vary between local agencies and it is important to verify the specific local requirements of each jurisdiction.

Tier 1 and Tier 2 – Mandatory, Prerequisite and Elective Measures

Tier 1 and Tier 2 levels require compliance with all the mandatory provisions of CALGreen and incorporate higher thresholds of required prerequisite measures based upon each tier level. The measures are listed in Section A4.601.4.2 (Tier 1), Section A4.601.5.2 (Tier 2) and shown on the Residential Application Occupancies Checklist in Section A4.602. In addition to the required mandatory minimum and prerequisite measures, Tier 1 and Tier 2 buildings must incorporate at least the designated number of elective measures specified in Sections A4.601.4.2 and A4.601.5.2.

***Note**: This chapter is not a discussion of CALGreen Chapter 5, which addresses nonresidential mandatory measures.

As specified in Section 101.7, additional prerequisite measures may be included by the enforcing agency to address specific local environmental conditions and may be listed in the Innovative Concepts and Local Environmental Conditions portions of the checklist.

CALGreen Code Residential Occupancies Application Checklist in Appendix A4, Section A4.602, provides an easy reference to the mandatory measures in CALGreen and the Tier 1 and Tier 2 prerequisites and optional elective measures. To be used as a guide for measures associated with Tier 1 and/or Tier 2, the checklist may be customized with each local adopting agency's selection of Tier 1 and/or Tier 2 and the specifically adopted elective measures. Local agencies have the discretion to include additional measures to those included in the checklist or have more restrictive requirements than shown in CALGreen; therefore, it is important to check for local amendments or requirements related to green building standards when planning a project. The complete checklist is included in CALGreen Appendix A4, Section A4.602. The sample checklist at the end of this chapter illustrates various components of the checklist.

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
2010 CALIFORNIA GREEN BUILDING STANDARDS CODE (CALGreen)

APPENDIX A4
RESIDENTIAL VOLUNTARY MEASURES

DIVISION A4.6 – TIER I AND TIER 2

SECTION A4.601 GENERAL

A4.601.1 Scope. The measures contained in this appendix are not mandatory unless adopted by a city, county, or city and county as specified in Section 101.7. The provisions of this section outline means of achieving enhanced construction or reach levels by incorporating additional green building measures. In order to meet one of the tier levels designers, builders, or property owners are required to incorporate additional green building measures necessary to meet the threshold of each level.

A4.601.2 Prerequisite measures. Tier 1 and Tier 2 thresholds require compliance with the mandatory provisions of this code and incorporation of the required prerequisite measures listed in Section A4.601.4.2 for Tier 1 and A4.601.5.2 for Tier 2. Prerequisite measures are also identified in the Residential Application Checklist in Section A4.602.

As specified in Section 101.7, additional prerequisite measures may be included by the enforcing agency to address specific local environmental conditions and may be listed in the Innovative Concepts and Local Environmental Conditions portions of the checklist.

A4.601.3 Elective measures. In addition to the required measures, Tier 1 and Tier 2 buildings must incorporate at least the number of elective measures specified in Sections A4.601.4.2 and A4.601.5.2.

COMMENTARY

Purpose:

These sections provide clarity for achieving enhanced green building utilizing CALGreen's Tier 1 and Tier 2 voluntary options. These sections clarify that although local adoption of Tier 1 and Tier 2 standards is voluntary, use of these tiers include some prerequisite measures as well as a specified number of elective measures.

TIER 1 REQUIREMENTS
Tier 1 Prerequisite and Elective Measures (A4.601.4.2)

In addition to the mandatory measures, compliance with the following prerequisite and elective measures from Appendix A4 is also required to achieve Tier 1 status:

A4.601.4 Tier 1. To achieve Tier 1, status a project must comply with the following:

A4.601.4.1 Mandatory measures for Tier 1. The project shall meet or exceed all of the mandatory measures in Chapter 4, Divisions 4.1 through 4.5 and Chapter 7 as applicable.

A4.601.4.2 Prerequisite and elective measures for Tier 1. In addition to the mandatory measures, compliance with the following prerequisite and elective measures from Appendix A4 is also required to achieve Tier 1 status:

1. From Division A4.1, Planning and Design.
   - 1.1 Comply with the topsoil protection requirements in Section A4.106.2.3.
   - 1.2 Comply with the 20% permeable paving requirements in Section A4.106.4.
   - 1.3 Comply with the cool roof requirements in Section A4.106.5.
   - 1.4 Comply with at least two elective measures selected from Division A4.1.

2. From Division A4.2, Energy Efficiency.
   - 1.1 Exceed the California Energy Code requirements, based on the 2008 Energy Efficiency Standards by 15%.
   - 1.2 Comply with at least four elective measures selected from Division A4.2.

3. From Division A4.3, Water Efficiency and Conservation.
   - 1.1 Comply with the reduced flow rate for kitchen sink faucets in Section A4.303.1
   - 1.2 Comply with the Tier 1 potable water use reduction for landscape irrigation design in Section A4.304.4.
   - 1.3 Comply with at least one elective measure selected from Division A4.3.

4. From Division A4.4, Material Conservation and Resource Efficiency.
   - 1.1 Comply with the 20% cement reduction requirements in Section A4.403.2.
   - 1.2 Comply with the 10% recycled content requirements in Section A4.405.3.
   - 1.3 Comply with the 65% reduction in construction waste in Section A4.408.1.
   - 1.4 Comply with at least two elective measures selected from Division A4.4.

5. From Division A4.5, Environmental Quality.
   - 1.1 Comply with the 80% resilient flooring systems requirements in Section A4.504.2.
   - 1.2 Comply with the thermal insulation requirements for Tier 1 in Section A4.504.3.
   - 1.3 Comply with at least one elective measure selected from Division A4.3.

Note: The Residential Occupancies Application Checklist contained in Section A4.602 may be used to show which elective measures are selected.

TIER 2 REQUIREMENTS
Prerequisite and Elective Measures for Tier 2 (A4.601.5.2)

The measures necessary to achieve Tier 2 status are very stringent. Cities, counties, and cities and counties considering adoption of Tier 2 as mandatory should carefully consider the stringency of each measure and ensure that the measures are achievable in their location.

A4.601.5 Tier 2. To achieve Tier 2, status a project must comply with the following:

Note: The measures necessary to achieve Tier 2 status are very stringent. Cities, counties and cities and counties considering adoption of Tier 2 as mandatory should carefully consider the stringency of each measure and ensure that the measures are achievable in their location.

A4.601.5.1 Mandatory measures for Tier 2. The project shall meet or exceed all of the mandatory measures in Chapter 4, Divisions 4.1 through 4.5 and Chapter 7 as applicable.

A4.601.5.2 Prerequisite and elective measures for Tier 2. In addition to the mandatory measures, compliance with the following prerequisite and elective measures from Appendix A4 is also required to achieve Tier 2 status.

1. From Division A4.1, Planning and Design.
   - 1.1 Comply with the topsoil protection requirements for Tier 1 and Tier 2 in Section A4.106.2.3.
   - 1.2 Comply with the 30% permeable paving requirements in Section A4.106.4.
   - 1.3 Comply with the cool roof requirements in Section A4.106.5.
   - 1.4 Comply with at least four elective measures selected from Division A4.1.

2. From Division A4.2, Energy Efficiency.
   - 1.1 Exceed the California Energy Code requirements, based on the 2008 Energy Efficiency Standards by 30%.
   - 1.2 Comply with at least six elective measures selected from Division A4.2.

3. From Division A4.3, Water Efficiency and Conservation.
   - 1.1 Comply with the Tier 1 reduced flow rate for kitchen sink faucets in Section A4.303.1.
   - 1.2 Comply with the Tier 2 dishwasher requirements in Section A4.303.1.
   - 1.3 Comply with the Tier 2 potable water use reduction for landscape irrigation design in Section A4.304.4.
   - 1.4 Comply with at least two elective measures selected from Division A4.3.

4. From Division A4.4, Material Conservation and Resource Efficiency.
   - 1.1 Comply with the 25% cement reduction requirements in Section A4.403.2.
   - 1.2 Comply with the 15% recycled content requirements in Section A4.405.3.
   - 1.3 Comply with the 75% reduction in construction waste in Section A4.408.1.
   - 1.4 Comply with at least four elective measures selected from Division A4.4.

5. From Division A4.5, Environmental Quality.
   - 1.1 Comply with the 90% resilient flooring systems requirements in Section A4.504.2.
   - 1.2 Comply with the thermal insulation requirements for Tier 1 and Tier 2 in Section A4.504.3.
   - 1.3 Comply with at least one elective measure selected from Division A4.3.

Note: The Residential Occupancies Application Checklist contained in Section A4.602 may be used to show which elective measures are selected

SAMPLE COMPLETED CHECKLIST FOR PORTIONS OF DIVISIONS 4.4 AND A4.4.
[DELETED SECTIONS ARE SHOWN BY ELLIPSES (...)]

CITY OF X
RESIDENTIAL OCCUPANCIES APPLICATION CHECKLIST

FEATURE OR MEASURE	LEVELS APPLICANT TO SELECT ELECTIVE MEASURES			VERIFICATIONS ENFORCING AGENCY TO SPECIFY VERIFICATION METHOD		
		Prerequisites and electives [1]		Enforcing Agency	Installer or Designer	Third party
	Mandatory	Tier 1	Tier 2	☐ All	☐ All	☐ All
MATERIAL CONSERVATION AND RESOURCE EFFICIENCY						
.....	.....	.....	.....	.....	.....	.....
Water Resistance and Moisture Management						
.....	.....	.....	.....	.....	.....	.....
A4.407.6 Exterior doors to the dwelling are protected to prevent water intrusion.		☒	☒			
A4.407.7 A permanent overhang or awning at least 2 feet in depth is provided.		☐	☒			
Construction Waste Reduction, Disposal and Recycling						
4.408.1 A minimum of 50 percent of the construction waste generated at the site is diverted to recycle or salvage.	☒			☐	☐	☐
4.408.2 Where a local jurisdiction does not have a construction and demolition waste management ordinance, a construction waste management plan shall be submitted for approval to the enforcing agency.	☒					
A4.408.1 Construction waste generated at the site is diverted to recycle or salvage in compliance with one of the following: 1. Tier 1 at least a 65 percent reduction 2. Tier 2 at least a 75 percent reduction **Exception:** Equivalent waste reduction methods are developed by working with local agencies.		☒[2]	☒[2]			
.....	.....	.....				
Innovative Concepts and Local Environmental Conditions						
A4.411.1 Items in this section are necessary to address innovative concepts or local environmental conditions.						
Item 1.	☐	☐				

City X is requiring CALGreen elective measure A4.407.6 for Tier 1.

City X is requiring both CALGreen elective measures A4.4.07.6 and A4.407.7 for Tier 2.

Project needs to comply with mandatory measures 4.408.1 and 4.408.2 for all new low-rise residential construction

Project will need to comply with a mandatory 65% reduction if a Tier 1 Project.

Project will need to comply with a mandatory 75% reduction if a Tier2 project.

City X may allow equivalent reduction methods provided.

CALGreen allows alternate materials, appliances, installation, devices, arrangements, methods, or designs or methods of construction. These are acceptable as "elective measures." Division A4.4 Tier 1 requires at least 2 elective measures; Tier 2 requires at least 4 elective measures.

1. Green building measures listed in this table may be mandatory if adopted by a city, county, or city and county as specified in Sec. 101.7.
2. Required prerequisite for this Tier.

Frequently Asked Questions

Q: What is the benefit of achieving Tier 1 or Tier 2 compliance to a designer/building owner, and for local building departments?

A: The benefit is that a home constructed above the mandatory minimum code in all categories, preserves and improves the environment, reduces its demand for energy and water, improves air quality, and minimizes the consumption of materials and resources. Taking part in the effort towards sustainability reduces the amount of carbon dioxide emissions generated by construction.

Q: CALGreen has mandatory provisions and optional measures as defined by prescriptive requirements for Tier 1 and Tier 2 compliance levels. Can a local jurisdiction adopt any Tier 1 or Tier 2 voluntary measure and make it mandatory without having to justify it with climatic, geological or topographical conditions?

A: No. The tiers must be adopted in compliance with Section 101.7; however, Section 101.7.1 clarifies that local environmental conditions are considered to be included in the climatic, geological or topographical scope.

Q: Can a local jurisdiction pick and choose elective measures under each tier (understanding that a few of them have been pre-determined) and call it, for example, "The County of XX Tier Measures"?

A: Yes, as long as express findings are filed with the California Building Standards Commission pursuant to CALGreen Section 101.7. The residential occupancies application checklist includes check boxes in each category for enforcing agencies to identify these areas.

Q: Residential Voluntary Measure A4.211.1 for Renewable Energy requires a third party verification for Tier 1 and Tier 2 energy efficiency measures. What is a third party verification and who is the verifier?

A: The New Solar Homes Partnership (NSHP) requires a third party inspector, called a Home Energy Rating System (HERS) rater, to provide field verification for certain energy efficiency measures and the Photo Voltaic (PV) system in an NSHP home.

CHAPTER 6. REFERENCED ORGANIZATIONS AND STANDARDS

CALGreen includes references to standards that are used to regulate materials and methods of construction. This chapter of CALGreen provides a reference to various organizations and standards that are noted in CALGreen provisions and cross references to the CALGreen section where the standard is noted or referenced.

As noted in 2010 CALGreen Code Section 101.5, referenced codes and standards are considered part of the requirements of the code to the prescribed extent of each reference. Similar to other building standards codes, if only a reference to a standard is included, but not the complete text of the standard, it may be necessary to access the original standard to clarify code requirements, test methodology, or further details.

CALGreen

CHAPTER 7. INSTALLER AND SPECIAL INSPECTOR QUALIFICATIONS

DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT
2010 CALIFORNIA GREEN BUILDING STANDARDS CODE (CALGreen)

CHAPTER 7. INSTALLER AND SPECIAL INSPECTOR QUALIFICATIONS FOR LOW-RISE RESIDENTIAL PROJECTS

SECTION 702
QUALIFICATIONS

702.1 Installer training [HCD]. HVAC system installers shall be trained and certified in the proper installation of HVAC systems including ducts and equipment by a nationally or regionally recognized training or certification program. Uncertified persons may perform HVAC installations when under the direct supervision and responsibility of a person trained and certified to install HVAC systems or contractor licensed to install HVAC systems. Examples of acceptable HVAC training and certification programs include but are not limited to the following:

1. State certified apprenticeship programs.
2. Public utility training programs.
3. Training programs sponsored by trade, labor or statewide energy consulting or verification organizations.
4. Programs sponsored by manufacturing organizations.
5. Other programs acceptable to the enforcing agency.

COMMENTARY

Purpose:
This section establishes minimum requirements for HVAC installers by requiring appropriate training or supervision. This training/certification list is not a complete list so additional training or certification programs may be appropriate if acceptable to the enforcing agency.

Examples of Acceptable Methods of Implementation and/or Compliance:

- *Certification or training as an HVAC systems installer through a program acceptable to the enforcing agency.*
- *Work is performed under the direct supervision of a person with acceptable training.*
- *See other appropriate installer qualifications in Section 702.1*

Background:
The proper installation of HVAC (heating-venting and air conditioning) systems is important to maximize performance and reduce costs related to improper function and needed repairs. HCD received comments during development of CALGreen that installation of HVAC systems is, in some instances, problematic and not at an acceptable level. In addition, a need was expressed for the types of training that would ensure qualified installers.

702.2 Special inspection [HCD]. When required by the enforcing agency, the owner or the responsible entity acting as the owner's agent shall employ one or more special inspectors to provide inspection or other duties necessary to substantiate compliance with this code. Special inspectors shall demonstrate competence to the satisfaction of the enforcing agency for the particular type of inspection or task to be performed. In addition to other certifications or qualifications acceptable to the enforcing agency, the following certifications or education may be considered by the enforcing agency when evaluating the qualifications of a special inspector.

1. Certification by a national or regional green building program or standard publisher.
2. Certification by a statewide energy consulting or verification organization, such as HERS raters, building performance contractors, and home energy auditors.
3. Successful completion of a third party apprentice training program in the appropriate trade.
4. Other programs acceptable to the enforcing agency.

Notes:
1. Special inspectors shall be independent entities with no financial interest in the materials or the project they are inspecting for compliance with this code.
2. HERS raters are special inspectors certified by the California Energy Commission (CEC) to rate homes in California according to the Home Energy Rating System (HERS).

COMMENTARY

Purpose:
Inspection and verification of installation are necessary to implement the intent of CALGreen. This section was developed to establish minimum requirements for third-party special inspectors acting on behalf of the enforcing agency. This section requires appropriate training, education or completion of other programs acceptable to the enforcing agency.

Examples of Acceptable Methods of Implementation and/or Compliance:
- *Demonstrate competence to the enforcing agency in the discipline being inspected.*
- *Special inspectors cannot have any financial interest in the project.*

Background:
HCD received comments during development of CALGreen that inspection quality is, in some instances, problematic and not at an acceptable level. Stakeholders also expressed a need for guidance on types of training acceptable for special inspectors.

RESIDENTIAL COMPLIANCE FORMS AND WORKSHEETS
http://www.hcd.ca.gov/CALGreen.html

Water Use Calculation Forms (Section 4.303)

- WS 1 – Baseline Water Use — (*Adobe PDF*) or (*Microsoft Word*)
- WS 2 – 20% Reduction Water Use Calculation Table — (*Adobe PDF*) or (*Microsoft Word*)

Construction Waste Management Forms (Section 4.408)

- CW 1 – Construction Waste Management Plan (CWMP) — (*Adobe PDF*) or (*Microsoft Word*)
- CW 2 – Construction Waste Management Worksheet (Volume Method) and Instructions — (*Adobe PDF*) or (*Microsoft Excel*)
  - Instructions — (*Microsoft Word*)
- CW 3 – Construction Waste Management Worksheet (Weight Method) and Instructions — (*Adobe PDF*) or (*Microsoft Excel*)
  - Instructions — (*Microsoft Word*)
- CW 4 – Weight or Volume Summary Worksheet — (*Adobe PDF*) or (*Microsoft Excel*)
- CW 5 – Construction Waste Management Worksheet (4 Lbs. per Sq. Ft.) and Instructions — (*Adobe PDF*) or (*Microsoft Excel*)
  - Instructions — (*Microsoft Word*)
- CW 6 – 4 Lbs. per Sq. Ft. Summary Worksheet — (*Adobe PDF*) or (*Microsoft Excel*)
- CW 7 – Construction Waste Management Plan (CWMP) Acknowledgement — (*Adobe PDF*) or (*Microsoft Excel*)

Building Maintenance and Operation Forms (Section 4.410)

- Operation and Maintenance Manual — (*Adobe PDF*) or (*Microsoft Word*)

Pollutant Control Forms (Section 4.504)

- PC 1 – Adhesives, Sealants and Caulks – Product Information — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 2 – Adhesives, Sealants and Caulks – Room/Location Matrix — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 3 – Adhesives, Sealants and Caulks – Declaration Statement — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 4 – Sample Worksheet — (*Adobe PDF*) or (*Microsoft Excel*)

- PC 5 – Paints and Coatings – Product Information — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 6 – Paints and Coatings – Room/Location Matrix — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 7 – Paints and Coatings – Declaration Statement — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 8 – Sample Worksheet — (*Adobe PDF*) or (*Microsoft Excel*)

- PC 9 – Finish Flooring Materials – Product Information — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 10 – Finish Flooring Materials – Room/Location Matrix — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 11 – Finish Flooring Materials – Declaration Statement — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 12 – Sample Worksheet — (*Adobe PDF*) or (*Microsoft Excel*)

- PC 13 – Composite Wood Products – Product Information — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 14 – Composite Wood Products – Room/Location Matrix — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 15 – Composite Wood Products – Declaration Statement — (*Adobe PDF*) or (*Microsoft Excel*)
- PC 16 – Sample Worksheet — (*Adobe PDF*) or (*Microsoft Excel*)

WORKSHEET (WS-1)
BASELINE WATER USE

BASELINE WATER USE CALCULATION TABLE									
FIXTURE TYPE	**FLOW RATE (gpm)[2]**		**DURATION**		**DAILY USES**		**OCCUPANTS[3,4]**		**GALLONS PER DAY**
Showerheads	2.5	X	5 min.	X	1	X		=	
Showerheads residential	2.5	X	8 min.	X	1	X		=	
Lavatory faucets residential	2.2	X	.25 min.	X	3	X		=	
Lavatory faucets nonresidential	0.5	X	.25 min.	X	3			=	
Kitchen faucets	2.2	X	4 min.	X	1	X		=	
Replacement aerators	2.2	X		X		X		=	
Wash fountains	2.2	X		X		X		=	
Metering faucets	0.25	X	.25 min.	X	3	X		=	
Metering faucets for wash fountains	2.2	X	.25 min.	X		X		=	
Gravity tank type water closets	1.6	X	1 flush	X	1 male[1] 3 female	X		=	
Flushometer tank water closets	1.6	X	1 flush	X	1 male[1] 3 female	X		=	
Flushometer valve water closets	1.6	X	1 flush	X	1 male[1] 3 female	X		=	
Electromechanical hydraulic water closets	1.6	X	1 flush	X	1 male[1] 3 female	X		=	
Urinals	1.0	X	1 flush	X	2 male	X		=	
Total daily baseline water use (BWU)								=	
_____ (BWU) X .80 = _____ Allowable water use									

1. **The daily use number shall be increased to three if urinals are not installed in the room.**
2. **The flow rate is from the CEC Appliance Efficiency Standards, Title 20 *California Code of Regulations*; where a conflict occurs, the CEC standards shall apply.**
3. **For low-rise residential occupancies, the number of occupants shall be based on two persons for the first bedroom, plus one additional person for each additional bedroom.**
4. **For nonresidential occupancies, refer to Table A, Chapter 4, 2010 *California Plumbing Code*, for occupant load factors.**

WORKSHEET (WS-2)
20 PERCENT REDUCTION WATER USE

20 PERCENT REDUCTION WATER USE CALCULATION TABLE									
FIXTURE TYPE	**FLOW RATE (gpm)** [2]		**DURATION**		**DAILY USES**		**OCCUPANTS** [3,4]		**GALLONS PER DAY**
Showerheads		X	5 min.	X	1	X		=	
Showerheads residential		X	8 min.	X	1	X		=	
Lavatory faucets residential		X	.25 min.	X	3	X		=	
Lavatory faucets nonresidential		X	.25 min.	X	3	X		=	
Kitchen faucets		X	4 min.	X	1	X		=	
Replacement aerators		X		X		X		=	
Wash fountains		X		X		X		=	
Metering faucets		X	.25 min.	X	3	X		=	
Metering faucets for wash fountains		X	.25 min.	X		X		=	
Gravity tank type water closets		X	1 flush	X	1 male[1] 3 female	X		=	
HET [5] High efficiency toilet	1.28	X	1 flush	X	1 male[1] 3 female	X		=	
Flushometer tank water closets		X	1 flush	X	1 male[1] 3 female	X		=	
Flushometer valve water closets		X	1 flush	X	1 male[1] 3 female	X		=	
Electromechanical hydraulic water closets		X	1 flush	X	1 male[1] 3 female	X		=	
Urinals		X	1 flush	X	2 male	X			
Urinals nonwater supplied	0.0	X	1 flush	X	2 male	X		=	
Proposed water use								=	
_____ (BWU from WS-1) X .80 = _____ Allowable water use									

1. **The daily use number shall be increased to three if urinals are not installed in the room.**
2. **The flow rate is from the CEC Appliance Efficiency Standards, Title 20 *California Code of Regulations*; where a conflict occurs, the CEC standards shall apply.**
3. **For low-rise residential occupancies, the number of occupants shall be based on two persons for the first bedroom, plus one additional person for each additional bedroom.**
4. **For nonresidential occupancies, refer to Table A, Chapter 4, 2010 *California Plumbing Code*, for occupant load factors.**
5. **Includes single and dual flush water closets with an effective flush of 1.28 gallons or less.**

Single Flush Toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is the average flush volume when tested in accordance with ASME A 112.19.233.2.

Dual Flush Toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is defined as the composite, average flush volume of two reduced flushes and one full flush. Flush volumes will be tested in accordance with ASME A 112.19.2 and ASME A 112.19.14.

Construction Waste Management Plan (CWMP) – CW 1

Project Name: _____

Project Location: _____

Building Permit #: _____ **Project Sq. Ft.:** _____

Contractors Name: _____ **Telephone:** _____

Owners Name: _____ **Telephone:** _____

This construction waste management plan is hereby submitted to comply with Section 4.408.2 of the 2010 California Green Building Standards Code.

The purpose of this plan is to identify and outline the methods to be used as the minimum requirements for a construction waste management plan when the local jurisdiction does not have a construction and demolition waste management ordinance per Section 4.408.2.

1. The method of waste tracking to be used on this project will be: (Check one box)

   ☐ **Volume** ☐ **Weight** ☐ **4 Lbs. per Sq. Ft.** ☐ **Recycling Facility**

2. Construction waste generated on this project for transport to a recycling facility will be: (Check appropriate box)

   ☐ **Site Sorted/Source Separated** ☐ **Mixed (Commingled)**

3. The facility (or facilities) where the construction waste material will be taken is:

   Name of Facility:_____
   Address:_____
   Telephone:_____
   (Attach separate sheet for additional facilities)

4. The following construction methods will be used to reduce the amount of waste generated: (Check all that apply)

   ☐ Efficient design (dimensions of building components are designed to available material sizes or standard sizes).

   ☐ Careful and accurate material ordering.

   ☐ Careful material handling and storage.

   ☐ Panelized or prefabricated construction.

   ☐ Other _____

   ☐ Other _____

5. Waste reduction and recycling strategies shall be discussed at periodic project meetings. Each new [*Contractor*]* that comes onto the site shall be provided with a copy of the CWMP, which shall also be posted in the project office. The [*Project Manager*]* shall also instruct all [*Subcontractors*]* as to the location and proper use of debris boxes for disposal of construction waste materials.

6. Every effort shall be made to use recycling and/or reuse (diversion) measures to reduce the amount of construction waste and other materials sent to landfills. Whenever possible, site-sorted debris boxes shall be used to segregate construction waste materials to maximize the diversion rate.

7. The [*Contractor*]* shall provide debris boxes for site-sorted materials and/or mixed waste for all construction related waste generated on this project. Mixed construction waste shall be taken to a recycling facility that has a diversion rate of at least 50 percent. In the event that a [*Subcontractor*]* provides their own debris box, they shall be responsible for providing the [*Contractor*]* with a monthly report of the total Recycled and Reused (Diverted) and the total Non-Recycled (Disposed) materials to be included in the project's overall waste management/waste reduction program.

8. Any [*Supplier*]* hauling away packaging or waste materials shall notify the [*Contractor*]* of the amount of these materials and how they will be disposed of (reused, recycled, salvaged, or taken to landfill).

9. Identified below are the construction waste materials that will be reused and/or recycled during the course of this project and how they will be diverted:

Material	Diversion Method: (Recycle/Reuse)

(See Construction Waste Management Worksheets for examples of common materials.)

10. The [*Waste Hauler*]* shall track the total amount of construction waste leaving the project by weight or by volume and supply the [*Contractor*]* with copies of tickets or detailed receipts from all loads of construction waste removed from the jobsite.

11. The [*Contractor*]* shall monitor the process of waste management, recycling, and reuse of construction waste materials to ensure compliance with the CWMP during the course of the project.

12. The [*Contractor*]* shall ensure that all supporting documentation which demonstrates compliance with the waste management plan is provided to the local enforcement agency upon completion of the project.

***** Insert title of appropriate party or responsible person, which may include, but not be limited to: *Contractor(s), Subcontractor(s), Project Manager(s), Superintendent(s), Supplier(s), or Waste Hauler(s).*

Construction Waste Management Worksheet (Volume Method) - CW 2

Project Name:		**Date:**	**Page of**
Project Location:		**Completed By:**	
Project Manager:			
Waste Hauler:		**Signature:**	

	A		B		C	D	
	Insert cubic foot or cubic yard totals into proper category below						**Notes:**
Waste Material Type	**Recycled**		**Reused**		**Diverted**	**Non-Recycled (Disposed)**	
Asphalt		+		=			
Asphalt Shingles		+		=			
Brick (broken)		+		=			
Cardboard		+		=			
Carpet/Carpet Pad		+		=			
Concrete		+		=			
Gypsum Board (Drywall)		+		=			
Masonry		+		=			
Metals		+		=			
Pallets		+		=			
Plastic		+		=			
Wood (engineered)		+		=			
Wood (solid sawn)		+		=			
Office Waste		+		=			
Other		+		=			
Other		+		=			
Other		+		=			
Total:		+		=			

Step 1 - Insert volume totals into Columns A, B, and D where appropriate.

Step 2 - Add Column A to Column B and insert total into Column C for total diverted volume.

Step 3 - Add each column down and enter totals in the boxes provided.

If Column C is larger than Column D (on the summary sheet), compliance with 50 percent waste reduction requirement is achieved.

If multiple worksheets are used, transfer column totals from each worksheet to the summary sheet.

For additional instructions and information, please see reverse.

Instructions for Weight or Volume Method:

- Choose which method of construction waste tracking to be used throughout the project. Choose either the Weight Method or the Volume Method, but do not use different methods on the same worksheet.
- To minimize confusion, use the same unit of measure and do not mix pounds and tons, or Cu. Yds. and Cu. Ft. on the same worksheet. It is easiest to stay with the same unit of measure for the entire project to avoid the need for conversions.
- Enter construction waste materials that are to be recycled under Recycled (Column A).
- Enter construction waste materials that are to be reused under Reused (Column B).
- Enter construction waste materials that will not get recycled or reused under Non-Recycled/Disposed (Column D).
- Add amounts from Column A to amounts from Column B and enter the total under Diverted (Column C).
- Add amounts in each Column (A, B, C, and D) and enter these sums into Total boxes.
- If the Diverted amount (Column C) is greater than the Non-Recycled/Disposed amount (Column D), compliance with the construction waste reduction requirement of at least 50 percent per Section 4.408.1 has been achieved.
- When more than one worksheet is used, transfer the data onto the Weight or Volume Summary Worksheet at the completion of the project.

Examples of weights and volumes of some typical construction waste materials*

Material	Range of pounds per cubic yard	Typical pounds per cubic yard	Typical cubic yards per ton
Asphalt roofing material	250-460	360	5.5
Asphalt - paving	1300-2200	1750	1.1
Cardboard	70-135	85	23.5
Concrete	1300-2200	1750	1.1
Gypsum Drywall	315-470	400	5
Metals	220-1940	540	3.7
Wood	200-540	499	5

***** Source: Sacramento Regional Solid Waste Authority

Standard Conversions: 1 cubic yard equals 27 cubic feet
1 ton equals 2000 pounds

Instructions for Weight or Volume Method:

- Choose which method of construction waste tracking to be used throughout the project. Choose either the Weight Method or the Volume Method, but do not use different methods on the same worksheet.
- To minimize confusion, use the same unit of measure and do not mix pounds and tons, or Cu. Yds. and Cu. Ft. on the same worksheet. It is easiest to stay with the same unit of measure for the entire project to avoid the need for conversions.
- Enter construction waste materials that are to be recycled under Recycled (Column A).
- Enter construction waste materials that are to be reused under Reused (Column B).
- Enter construction waste materials that will not get recycled or reused under Non-Recycled/Disposed (Column D).
- Add amounts from Column A to amounts from Column B and enter the total under Diverted (Column C).
- Add amounts in each Column (A, B, C, and D) and enter these sums into Total boxes.
- If the Diverted amount (Column C) is greater than the Non-Recycled/Disposed amount (Column D), compliance with the construction waste reduction requirement of at least 50 percent per Section 4.408.1 has been achieved.
- When more than one worksheet is used, transfer the data onto the Weight or Volume Summary Worksheet at the completion of the project.

Examples of weights and volumes of some typical construction waste materials*

Material	Range of pounds per cubic yard	Typical pounds per cubic yard	Typical cubic yards per ton
Asphalt roofing material	250-460	360	5.5
Asphalt - paving	1300-2200	1750	1.1
Cardboard	70-135	85	23.5
Concrete	1300-2200	1750	1.1
Gypsum Drywall	315-470	400	5
Metals	220-1940	540	3.7
Wood	200-540	499	5

***** Source: Sacramento Regional Solid Waste Authority

Standard Conversions: 1 cubic yard equals 27 cubic feet
1 ton equals 2000 pounds

Construction Waste Management Worksheet (Weight Method) - CW 3

Project Name:		Date:	Page of
Project Location:		Completed By:	
Project Manager:			
Waste Hauler:		Signature:	

	A		B		C	D	
	Insert weight totals into proper category below						Notes:
Waste Material Type	Recycled		Reused		Diverted	Non-Recycled (Disposed)	
Asphalt		+		=			
Asphalt Shingles		+		=			
Brick (broken)		+		=			
Cardboard		+		=			
Carpet/Carpet Pad		+		=			
Concrete		+		=			
Gypsum Board (Drywall)		+		=			
Masonry		+		=			
Metals		+		=			
Pallets		+		=			
Plastic		+		=			
Wood (engineered)		+		=			
Wood (solid sawn)		+		=			
Office Waste		+		=			
Other		+		=			
Other		+		=			
Other		+		=			
Total:		+		=			

Step 1 - Insert weight totals into Columns A, B, and D where appropriate.

Step 2 - Add Column A to Column B and insert total into Column C for total diverted weight.

Step 3 - Add each column down and enter totals in the boxes provided.

If Column C is larger than Column D (on the summary sheet), compliance with 50 percent waste reduction requirement is achieved.

If multiple worksheets are used, transfer column totals from each worksheet to the summary sheet.

For additional instructions and information, please see reverse.

Instructions for Weight or Volume Method:

- Choose which method of construction waste tracking to be used throughout the project. Choose either the Weight Method or the Volume Method, but do not use different methods on the same worksheet.
- To minimize confusion, use the same unit of measure and do not mix pounds and tons, or Cu. Yds. and Cu. Ft. on the same worksheet. It is easiest to stay with the same unit of measure for the entire project to avoid the need for conversions.
- Enter construction waste materials that are to be recycled under Recycled (Column A).
- Enter construction waste materials that are to be reused under Reused (Column B).
- Enter construction waste materials that will not get recycled or reused under Non-Recycled/Disposed (Column D).
- Add amounts from Column A to amounts from Column B and enter the total under Diverted (Column C).
- Add amounts in each Column (A, B, C, and D) and enter these sums into Total boxes.
- If the Diverted amount (Column C) is greater than the Non-Recycled/Disposed amount (Column D), compliance with the construction waste reduction requirement of at least 50 percent per Section 4.408.1 has been achieved.
- When more than one worksheet is used, transfer the data onto the Weight or Volume Summary Worksheet at the completion of the project.

Examples of weights and volumes of some typical construction waste materials*

Material	Range of pounds per cubic yard	Typical pounds per cubic yard	Typical cubic yards per ton
Asphalt roofing material	250-460	360	5.5
Asphalt - paving	1300-2200	1750	1.1
Cardboard	70-135	85	23.5
Concrete	1300-2200	1750	1.1
Gypsum Drywall	315-470	400	5
Metals	220-1940	540	3.7
Wood	200-540	499	5

***** Source: Sacramento Regional Solid Waste Authority

Standard Conversions: 1 cubic yard equals 27 cubic feet
1 ton equals 2000 pounds

Instructions for Weight or Volume Method:

- Choose which method of construction waste tracking to be used throughout the project. Choose either the Weight Method or the Volume Method, but do not use different methods on the same worksheet.
- To minimize confusion, use the same unit of measure and do not mix pounds and tons, or Cu. Yds. and Cu. Ft. on the same worksheet. It is easiest to stay with the same unit of measure for the entire project to avoid the need for conversions.
- Enter construction waste materials that are to be recycled under Recycled (Column A).
- Enter construction waste materials that are to be reused under Reused (Column B).
- Enter construction waste materials that will not get recycled or reused under Non-Recycled/Disposed (Column D).
- Add amounts from Column A to amounts from Column B and enter the total under Diverted (Column C).
- Add amounts in each Column (A, B, C, and D) and enter these sums into Total boxes.
- If the Diverted amount (Column C) is greater than the Non-Recycled/Disposed amount (Column D), compliance with the construction waste reduction requirement of at least 50 percent per Section 4.408.1 has been achieved.
- When more than one worksheet is used, transfer the data onto the Weight or Volume Summary Worksheet at the completion of the project.

Examples of weights and volumes of some typical construction waste materials*

Material	Range of pounds per cubic yard	Typical pounds per cubic yard	Typical cubic yards per ton
Asphalt roofing material	250-460	360	5.5
Asphalt - paving	1300-2200	1750	1.1
Cardboard	70-135	85	23.5
Concrete	1300-2200	1750	1.1
Gypsum Drywall	315-470	400	5
Metals	220-1940	540	3.7
Wood	200-540	499	5

***** Source: Sacramento Regional Solid Waste Authority

Standard Conversions: 1 cubic yard equals 27 cubic feet
1 ton equals 2000 pounds

Weight or Volume Summary Worksheet - CW 4

Project Name:		**Date:**
Project Location:		
Project Manager:		
Waste Hauler:		

Worksheets by page #	C Insert Totals Below Diverted	D Non-Recycled (Disposed)	Compliance Method (check only one box) ☐ Volume ☐ Weight
Worksheet 1			Notes:
Worksheet 2			
Worksheet 3			
Grand Totals:			

Step 1 - **Insert totals from Weight or Volume worksheets in Column C and/or D.**

Step 2 - **Add each Column down and enter grand totals in the boxes provided.**

If Column C is larger than Column D Compliance with the 50% waste reduction requirement is achieved.

Certification:

The signature below represents that the information provided on this form is true and correct and certifies that I have tracked construction waste during the course of this project and that a minimum of 50% of the total waste has been diverted for either reuse or recycling.

Company Name: (general contractor, subcontractor, or homeowner)		
Responsible Person's Name:		Responsible Person's Signature:
CSLB License:	Date Signed:	Position with Company or Title:

Construction Waste Management Worksheet (4 Lbs. per Sq. Ft. Method) - CW 5

Project Name:									**Date:**	**Page of**
Project Location:									**Completed By:**	
Project Manager:										
Waste Hauler:									**Signature:**	
	A		**B**		**C**	**D**		**E**		
	Insert weight (Lbs.) into proper category below					**Total Area of Project* (Square Feet)**		**Total Lbs. per Square Foot**	**Notes:**	
Waste Material Type	**Waste Generated**		**Recycled and/or Reused**		**Net Waste**					
Asphalt		-		=						
Asphalt Shingles		-		=						
Brick (broken)		-		=						
Cardboard		-		=						
Carpet/Carpet Pad		-		=						
Concrete		-		=						
Gypsum Board Drywall		-		=						
Masonry		-		=						
Metals		-		=						
Pallets		-		=						
Plastic		-		=						
Wood (engineered)		-		=						
Wood (solid sawn)		-		=						
Office Waste		-		=						
Other		-		=						
Other		-		=						
Other		-		=						
Total:		-		=		÷		=		

Step 1 - Insert weight totals into Columns A and B where appropriate and total columns.
Step 2 - Subtract Column B total from Column A total and insert difference into Column C total (Net Waste).
Step 3 - Divide Net Waste (Column C) total by Project Area (Column D) to find the net weight of construction waste per Sq. Ft.
Step 4 - Insert result into Column E. If result is 4 lbs. or less per sq. ft., compliance with 50 percent waste reduction requirement is achieved.
For additional instructions and information, please see reverse.
*Area of project also includes garages, breezeways, and attached roof structures (covered patios, etc.)

Instructions for 4 Lbs. per Sq. Ft. Method:

- Enter weight of construction waste materials (in Lbs.) under Waste Generated (Column A).
- Enter construction waste materials (in Lbs.) that are to be recycled or reused under Recycled and/or Reused (Column B).
- Subtract amounts in Column B from amounts in Column A and enter the difference under Net Waste (Column C).
- Add the amounts in each column (A, B, and C) and enter these sums into Total boxes.
- Insert project square footage into Column D Total box.
- Divide Net Waste (Column C) Total by Project Area (Column D) to find the net weight of construction debris/waste per Sq. Ft.
- Insert result into Column E. If the result is 4 lbs. or less per square foot, compliance with the construction waste reduction requirement of at least 50 percent per Section 4.408.1 has been achieved.
- When more than one worksheet is used, transfer the data onto the 4 Lbs. per Sq. Ft. Summary Worksheet at the completion of the project.

Examples of weights and volumes of some typical construction waste materials*

Material	Range of pounds per cubic yard	Typical pounds per cubic yard	Typical cubic yards per ton
Asphalt roofing material	250-460	360	5.5
Asphalt - paving	1300-2200	1750	1.1
Cardboard	70-135	85	23.5
Concrete	1300-2200	1750	1.1
Gypsum Drywall	315-470	400	5
Metals	220-1940	540	3.7
Wood	200-540	499	5

***** Source: Sacramento Regional Solid Waste Authority

Standard Conversions: 1 cubic yard equals 27 cubic feet
1 ton equals 2000 pounds

Instructions for 4 Lbs. per Sq. Ft. Method:

- Enter weight of construction waste materials (in Lbs.) under Waste Generated (Column A).
- Enter construction waste materials (in Lbs.) that are to be recycled or reused under Recycled and/or Reused (Column B).
- Subtract amounts in Column B from amounts in Column A and enter the difference under Net Waste (Column C).
- Add the amounts in each column (A, B, and C) and enter these sums into Total boxes.
- Insert project square footage into Column D Total box.
- Divide Net Waste (Column C) Total by Project Area (Column D) to find the net weight of construction debris/waste per Sq. Ft.
- Insert result into Column E. If the result is 4 lbs. or less per square foot, compliance with the construction waste reduction requirement of at least 50 percent per Section 4.408.1 has been achieved.
- When more than one worksheet is used, transfer the data onto the 4 Lbs. per Sq. Ft. Summary Worksheet at the completion of the project.

Examples of weights and volumes of some typical construction waste materials*

Material	Range of pounds per cubic yard	Typical pounds per cubic yard	Typical cubic yards per ton
Asphalt roofing material	250-460	360	5.5
Asphalt - paving	1300-2200	1750	1.1
Cardboard	70-135	85	23.5
Concrete	1300-2200	1750	1.1
Gypsum Drywall	315-470	400	5
Metals	220-1940	540	3.7
Wood	200-540	499	5

***** Source: Sacramento Regional Solid Waste Authority

Standard Conversions: 1 cubic yard equals 27 cubic feet
1 ton equals 2000 pounds

4 Lbs. per Sq. Ft. Summary Worksheet - CW 6

Project Name:									**Date:**	
Project Location:										
Project Manager:										
Waste Hauler:										
	A		**B**		**C**	**D**		**E**		
	Insert weight (Lbs.) into proper category below					**Total Area of Project* (Square Feet)**		**Total Lbs. per Square Foot**	**Notes:**	
Worksheets by page #	**Waste Generated**		**Recycled and/or Reused**		**Net Waste**					
Worksheet 1		-		=						
Worksheet 2		-		=						
Worksheet 3		-		=						
		-		=						
		-		=						
		-		=						
		-		=						
		-		=						
		-		=						
		-		=						
Grand Total:		-		=		÷		=		

Step 1 - Insert totals from 4 Lb. per Sq. Ft. worksheets into Columns A, B, and C.
Step 2 - Add each column down and enter grand total in boxes provided
Step 3 - Subtract Column B grand total from Column A grand total and insert difference into Column C grand total box.
Step 4 - Divide Column C grand total by the area of the project (Column D) to find the total net construction waste in Lbs. per Sq. Ft.
Step 5 - Insert total into Column E. If total is 4 lbs. or less per sq. ft., compliance with 50 percent waste reduction requirement is achieved.

Certification:

The signature below represents that the information provided on this form is true and correct and certifies that I have tracked construction waste during the course of this project, and that the total net waste generated by this project is 4 lbs. per sq. ft. or less.

Company Name: (general contractor, subcontractor, or homeowner)		
Responsible Person's Name:		Responsible Person's Signature:
CSLB License:	Date Signed:	Position with Company or Title:

Construction Waste Management Plan (CWMP) Acknowledgment - CW 7

Project Name:	
Project Location:	
Project Manager:	
Waste Hauler:	
Facility:	

The project foreman for each subcontractor and their suppliers that will be performing any work on this site will receive and read a copy of the Construction Waste Management Plan.

By signing below, I acknowledge that I have read the CWMP for this project and agree to my responsibilties to follow the procedures in this plan.

Date	Company	Foreman Name	Signature

Operation and Maintenance Manual

In compliance with the California Green Building Standards Code, this Operation and Maintenance Manual shall be available at final inspection and remain with the building throughout the life-cycle of the structure.

This manual has been prepared for the dwelling located at:

Address
City/State/Zip
Builder
Address
City/State/Zip
Phone/Internet

Electricity for this property is provided by:

□ Check if solar or alternate source of electricity is used.

Service Provider
Address
City/State/Zip
Phone/Internet
Alternate Source
*****Information to reduce use of electricity is included.

Water for this property is provided by:

□ Check if well or alternate source of water is used.

Service Provider
Address
City/State/Zip
Phone/Internet
*****Information to reduce consumption of water is included.

***NOTE: The provider of this manual is required to supply information from local utility, water and waste recovery providers on methods to further reduce resource consumption, including recycle programs and locations.**

Sewer for this property is provided by: □ Check if private sewage disposal/septic is used.
Service Provider
Address
City/State/Zip
Phone/Internet
*****Information to reduce demand on sewage system is included.

Fuel Gas for this property is provided by: □ Check if Liquid Propane tank is used.
Service Provider
Address
City/State/Zip
Phone/Internet
*****Information to reduce consumption of fuel gas is included.

***NOTE: The provider of this manual is required to supply information from local utility, water and waste recovery providers on methods to further reduce resource consumption, including recycle programs and locations.**

Garbage/Trash removal for this property is provided by:
Service Provider
Address
City/State/Zip
Phone/Internet
*Information on waste reduction is included.

Recycling for this property is provided by:
Service Provider
Address
City/State/Zip
Phone/Internet
*Information about local recycling programs and their locations is included.

***NOTE: The provider of this manual is required to supply information from local utility, water and waste recovery providers on methods to further reduce resource consumption, including recycle programs and locations.**

Public Transportation

Regional and local public transportation options, including address, phone and web addresses are provided below.

Bus line	Phone/Internet
Light Rail/Train	Phone/Internet
Car Pool/Van Pool	Phone/Internet
Ride Share or Other	

Building Department

Occupancy of this dwelling was authorized by the local enforcing agency.

Local Enforcing Agency
Address
City/State/Zip
Phone

Special Inspection Verification/Certification

Special inspection required by the CALGreen code or by the local enforcing agency shall be verified. Upon completion, a copy of inspection verification and/or certificates of completion shall be included in this manual.

- HVAC system commissioning
- HERS Verification
- Cool roof verification
- Material conservation
- Blower door testing
- Attic Insulation
- Thermal insulation
- Cement reduction
- Other third party requirements

Note: The above listed items are not all-inclusive measures that may need "Special Inspection." Check with the local enforcing agency to verify mandated special inspections and verification requirements.

Fill in any other verifications or certifications below:

Solar Incentive Programs

California Programs

Information about state renewable energy incentive programs, such as the California Solar Initiative, is available through the California Energy Commission or through Go Solar California at the websites below.

- http://www.energy.ca.gov/
- http://gosolarcalifornia.ca.gov

Other Programs

Contact your local government or public utility (provided previously in this manual) for more information regarding energy conservation tips, strategies and public/private partnerships that promote enhanced sustainability and/or save money.

Tax breaks, including rebates, credits or discounts may also be available through the local government, public utilities or the Federal Government, US Department of Energy.

The U.S. Department of Energy website: http://www.energy.gov/yourhome.htm

Water Conserving Landscape

To comply with the California Green Building Standards Code, automatic irrigation system controllers for landscaping installed at the time of final inspection must be weather- or soil moisture-based.

Irrigation Controllers

There are several types of irrigation controllers that base the irrigation schedule on evapotranspiration data. Other irrigation controllers may use a combination of historical data and real-time data feeds from on-site temperature sensors, soil moisture sensors, sunlight intensity indicators or they may use data from weather stations. Weather and/or soil moisture- based controllers represent technological advances in irrigation that enable the proper amount of water required by the landscape plants or postpone irrigation during periods of rain. Utilizing these "smart" controllers is an improvement over irrigating by an arbitrary "run time" where the amount of water needed and the amount of water applied may not be effectively matched.

Landscape Water Use Conservation Methods

There are many methods to reduce the amount of water used in a landscape and still maintain the health, appearance and function of the landscape. Following are a few examples:

- Conform to local or the California Department of Water Resources' model Water Efficient Landscape Ordinance.
- Use water-efficient landscape designs utilizing native and drought tolerant plants and minimize turf areas.
- Use mulch, soil amendments or other soil improvement methods to reduce water loss through evaporation or runoff and to improve water availability for plant use.
- Install efficient irrigation systems and follow a regular maintenance schedule. Adjust irrigation controllers as necessary to accommodate changes in seasons and plant needs.
- Schedule landscape irrigation during early or late hours.
- Stay current on new technologies, strategies or products that promote efficient water use.

Irrigation System Design

Homeowners or a design professional can develop an efficient system design meeting homeowner expectations while also reducing waste and conserving natural resources.

When planning landscaping and irrigation, the following ideas can help:

- Design irrigation systems to be consistent with hydrozones (areas of plants with similar water needs.)
- Minimize the usage of spray heads.
- Install a low consumption irrigation system such as drip or subsurface.
- Use graywater or recycled water when possible.
- Consider rainwater catchment and storage systems.
- Follow the manufacturer’s installation instructions to ensure optimum system efficiency.

Operation and Maintenance Information

This property and structure require periodic maintenance of the grounds, equipment and appliances.

Manufacturer installation, operation and maintenance instructions must be followed for all equipment and appliances.

Examples of these manuals include, but are not limited to:

- HVAC system
- Water heater
- Water saving devices and water reuse systems
- Water pump and/or well
- Water treatment system
- Kitchen appliances
- Garage door and opener
- Whole house fan
- Security alarm system
- Smoke, fire and carbon monoxide alarms
- Landscape irrigation system
- Photovoltaic electrical system
- Septic system

Included or attached to this manual are the installation and maintenance instructions provided by the manufacturer for each specific appliance and/or equipment installed.

Checklist
Proper maintenance will extend the life of a building and the systems installed therein. In addition to specific manufacturer instructions for maintenance and service, the following checklist will assist setting a typical maintenance schedule required for a building.
Weekly
Survey the property, check overall condition
Check landscape irrigation system for leaks and broken heads
Check exterior lighting for burned out bulbs
Monthly
Change return air filters
Check caulking: exterior and interior at plumbing fixtures and at floors (tub, toilet, etc.)
Check exterior drainage and swales
Check exhaust fan and damper door for correct operation
Dust off and test smoke and carbon monoxide detectors for operation
Check plumbing for leaks (bathtubs, dishwasher, sinks, lavatories, showers, laundry hook ups, water heater, toilets and any other plumbing)
Check plants and shrubs – trim to avoid contact with house
Check irrigation sprinklers and adjust as necessary – avoid water spray on building and ensure uniform coverage
Test ground fault circuit interrupter (GFCI) outlets
Semi-Annually
Check clothes dryer vent pipe and remove any lint
Clean out roof gutters and downspouts
Inspect roof system for broken or missing roofing material
Check and clean window weep holes
Check weather stripping
Check outdoor AC condenser unit for obstructions and/or debris, clean unit per manufacturer's recommendation for optimal performance
Check house for evidence of termites and other pests
Check all painted surfaces
Drain water heater to remove sediment
Annually
Change batteries in smoke detectors and carbon monoxide devices
Check condensate drain lines for blockage
Trim trees to avoid contact with house and obstruction of solar panels
Check chimney flue and vents for obstructions and debris

Portions of this Property will Require Routine Maintenance for which There May Not Be a Specific Manual

Grading
The grading around the building is sloped away from the structure, which is not only functional, but a building code requirement enforced during the final inspection. The yard drainage must not drain onto neighboring property or near the building foundation. It is important the owner or tenant maintain this grade or swale to protect the building from moisture. An inspection after any landscaping, construction or a storm is necessary so the swale or grade always directs the flow of water away from the foundation of the building and to storm sewer systems or other appropriate locations approved for the structure.

Gutters
The gutter and downspouts will need periodic maintenance to ensure proper function. The required interval for this maintenance will vary by season; however, gutters and downspouts should be inspected for debris before the rainy season. When trees and other deciduous vegetation shed leaves that drop into the gutters, this will inhibit the flow of water and possibly clog downspouts. The leaves and/or debris must be removed in order for the system to work as designed. The downspouts should direct the storm water away from the foundation at least 5 feet to avoid damage to the structure. Always keep the area clear where the storm water flows out of the downspout. If a clear area is not possible, subsurface drains may need to be installed.

Irrigation
Inspect the landscape irrigation systems weekly for leaking or broken heads.

Frost-Protected Foundation Systems
When the building utilizes a Frost-Protected Shallow Foundation, as allowed by local conditions, the monthly mean temperature of the building must be maintained at a minimum of 64°F (18°C).

Relative Humidity (RH)
RH is the percent of moisture in the air compared to the maximum amount of moisture this air can hold at the same condition. Warm air will hold more moisture than cold air. The design of the HVAC system should include controlling the moisture levels appropriate to the climate. The addition of moisture (humidification) may be required in colder climates during the winter season and removed (dehumidification) during the summer months.

Automatic, computer controlled humidifiers can control the humidity levels, providing enough moisture for a healthy comfortable dwelling and within the limits to prevent window and cold surface condensation. These levels are usually between 30 to 60 percent RH although certain health conditions may dictate benefits at either the higher or lower ranges.

Hygrometer
The hygrometer will show RH. Although the RH will not be exactly the same throughout the structure, one hygrometer is usually sufficient. It should be placed where the humidity symptoms are most obvious (e.g., in the room that you are most concerned about.)

Low Relative Humidity
Below 30 percent RH, people can be uncomfortable and can suffer from dry mucus membranes, which can lead to nosebleeds and infections. In general, low RH is only a problem during the winter months when the outside air contains very little moisture. It is this dry outside air entering through cracks and openings in the building shell that causes the inside air to become dry. The greater the amount of outside air that leaks into the building, the dryer the indoor air becomes. By air-sealing and using energy-efficient construction, uncontrolled air leakage is greatly reduced, a more controlled indoor environment is created, and RH can be maintained at acceptable levels without the use of a humidifier.

Humidifiers require maintenance to avoid becoming breeding grounds for biological contaminants. The effects of bacteria, viruses, fungi, respiratory infections, allergic rhinitis, asthma, and ozone production can be minimized by higher humidity levels. Studies have shown that wintertime operation at 68° F at 70% RH provides the same level of occupant comfort as does 72° F at 30% RH. Lower utility bills and a healthier environment are both benefits of controlled RH.

High Relative Humidity
High RH can lead to occupant discomfort, annoyances, and possibly serious health issues as they relate to bacteria, viruses, fungi, mites (dust mites and mold), allergic rhinitis, asthma, and chemical interactions with mold, dust mites, and other biological pollutants.

The air conditioning system and/or stand-alone dehumidifier are designed to remove moisture (latent load) and decrease the RH levels. Studies show that summertime operation at 78° F at 30% RH provides the same level of occupant comfort as does 74° F at 70% RH. The lower humidity level will provide increased comfort, lower utility bills and lessen the risk of health issues associated with high humidity.

Using exhaust fans in the bathrooms and kitchen can remove much of the moisture that builds up from everyday activities and help keep RH below 50%. Having a humidistat connected to an exhaust fan is required in bathrooms. This is an effective way to control RH in moisture prone areas. When using an adjustable humidistat, the setting should be adjusted according to the season: lower RH in the summer and higher RH in the winter. Another benefit to using kitchen and bathroom exhaust fans is removal of odors and pollutants. These fans can also be part of an active whole house ventilation system for the entire house and help to reduce humidity levels.

ADHESIVES, SEALANTS AND CAULKS - PRODUCT INFORMATION SHEET (PC 1)

1. Insert product information below. 2. Insert Item #'s for each product listed below into appropriate boxes on ROOM/LOCATION MATRIX.
3. Attach product specification sheets for each product used 4. Use additional sheets if necessary.

Item # 1	Description of Product	VOC grams/liter	
Color/Product #:		CALGreen Limit *	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			

Item # 2	Description of Product	VOC grams/liter	
Color/Product #:		CALGreen Limit *	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			

Item # 3	Description of Product	VOC grams/liter	
Color/Product #:		CALGreen Limit *	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			

Item # 4	Description of Product	VOC grams/liter	
Color/Product #:		CALGreen Limit *	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			

* See Section 4.504.2.1(1) and Table 4.504.1 for adhesives, sealants and caulks. See Section 4.504.2.1(2) for aerosol adhesives, sealants and caulks.

ADHESIVES, SEALANTS AND CAULKS - PRODUCT INFORMATION SHEET (PC 1)

1. Insert product information below. 2. Insert Item #'s for each product listed below into appropriate boxes on ROOM/LOCATION MATRIX.
3. Attach product specification sheets for each product used 4. Use additional sheets if necessary.

Item #	Description of Product	VOC grams/liter	
Color/Product #:		CALGreen Limit *	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			
Item #	**Description of Product**	**VOC grams/liter**	
Color/Product #:		CALGreen Limit *	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			
Item #	**Description of Product**	**VOC grams/liter**	
Color/Product #:		CALGreen Limit *	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			
Item #	**Description of Product**	**VOC grams/liter**	
Color/Product #:		CALGreen Limit *	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			

* See Section 4.504.2.1(1) and Table 4.504.1 for adhesives, sealants and caulks. See Section 4.504.2.1(2) for aerosol adhesives, sealants and caulks.

ADHESIVES, SEALANTS AND CAULKS - ROOM/LOCATION MATRIX (PC 2)

1. Insert product Item # (1,2,3, etc.) from PRODUCT INFORMATION SHEET in the boxes below to indicate the type of product used in each room or location. 2. Attach additional sheets if necessary.

LOCATION	Entryway	Kitchen and Pantry	Dining Area 1	Dining Area 2	Formal Livingroom	Informal Livingroom	Den/Office	Bedroom 1 (master)	Bedroom 2	Bedroom 3	Bedroom 4	Bathroom 1	Bathroom 2	Hallway 1	Hallway 2	Utility	Laundry	Garage
ADHESIVE, SEALANT OR CAULK																		
Indoor carpet adhesive																		
Carpet pad adhesive																		
Wood flooring adhesive																		
Subfloor adhesive																		
Ceramic tile adhesive																		
Vinyl composite title and rubber tile adhesive																		
Drywall and panel adhesives																		
Cove base adhesives																		
Other																		
Other																		
Other																		
Other																		
Other																		
Other																		

ADHESIVES, SEALANTS AND CAULKS - ROOM/LOCATION MATRIX (PC 2)

1. Insert product Item # (1,2,3, etc.) from PRODUCT INFORMATION SHEET in the boxes below to indicate the type of product used in each room or location. 2. Attach additional sheets if necessary.

LOCATION																	
ADHESIVE, SEALANT OR CAULK																	
Indoor carpet adhesive																	
Carpet pad adhesive																	
Wood flooring adhesive																	
Subfloor adhesive																	
Ceramic tile adhesive																	
Vinyl composite title and rubber tile adhesive																	
Drywall and panel adhesives																	
Cove base adhesives																	
Other																	
Other																	
Other																	
Other																	
Other																	
Other																	

ADHESIVES, SEALANTS AND CAULKS - DECLARATION STATEMENT (PC 3)

The following section shall be completed by a person with overall responsibility for the planning and design portion of the project.

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided is true and correct.
- I certify that the installed measures, materials, components, or manufactured devices identified on this certificate conform to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcing agency.

Responsible Person's Name:	**Responsible Person's Signature:**
Date Signed:	**Position/Title:**
Notes:	

SAMPLE WORKSHEETS (PC 4)

PAINTS AND COATINGS - PRODUCT INFORMATION SHEET (PC 5)

Page 1 of 1

1. Insert product information below. 2. Insert the Item #'s for each product listed below into the appropriate boxes on ROOM/LOCATION MATRIX. 3. Attach all product specification sheets or labels. 4. Use additional sheets if necessary.

Item #1	Description of Product	VOC grams/liter	
Color/Product #:	Calm White - Flat	CALGreen Limit*	Proposed Product
Series/Collection:	Green California Series - White Base		
Manufacturer:	Paints 4 U	50	0
Other:			

CALGreen Compliant

Item #2	Description of Product	VOC grams/liter	
Color/Product #:	Clean White - Eggshell Enamel	CALGreen Limit*	Proposed Product
Series/Collection:	Green California Series Acrylic		
Manufacturer:	Paints 4 U	100	< 100
Other:			

CALGreen Compliant

* See Section 4.504.2.2 and Table 4.504.3 for paints and coatings. See Section 4.504.2.3 for aerosol paints and coatings.

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PAINTS AND COATINGS - ROOM/LOCATION MATRIX (PC 6)

Page 1 of 1

1. Insert production Item # (1,2,3, etc.) from PRODUCT INFORMATION SHEET in the boxes below to indicate type of finish used in each room or location. 2. Attach additional sheets if necessary.

LOCATION	Entryway	Kitchen and Pantry	Dining Area 1	Dining Area 2	Formal Livingroom	Informal Livingroom	Den/Office	Bedroom 1 (master)	Bedroom 2	Bedroom 3	Bedroom 4	Bathroom 1	Bathroom 2		Hallway 1	Hallway 2	Utility	Laundry	Garage
COATING																			
Flat	1		1	1	1	1	1	1	1	1	1				1	1			1
Nonflat		2										2	2				2	2	

. . .

PAINTS AND COATINGS - PRODUCT INFORMATION SHEET (PC 5)

1. Insert product information below. 2. Insert the Item #'s for each product listed below into the appropriate boxes on ROOM/LOCATION MATRIX.
3. Attach all product specification sheets or labels. 4. Use additional sheets if necessary.

Item #1	Description of Product	VOC grams/liter	
Color/Product #:		CALGreen Limit *	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			
Item #2	**Description of Product**	**VOC grams/liter**	
Color/Product #:		CALGreen Limit *	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			
Item #3	**Description of Product**	**VOC grams/liter**	
Color/Product #:		CALGreen Limit *	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			
Item #4	**Description of Product**	**VOC grams/liter**	
Color/Product #:		CALGreen Limit *	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			

* See Section 4.504.2.2 and Table 4.504.3 for paints and coatings. See Section 4.504.2.3 for aerosol paints and coatings.

PAINTS AND COATINGS - PRODUCT INFORMATION SHEET (PC 5)

1. Insert product information below. 2. Insert the Item #'s for each product listed below into the appropriate boxes on ROOM/LOCATION MATRIX.
3. Attach all product specification sheets or labels. 4. Use additional sheets if necessary.

Item #	**Description of Product**	**VOC grams/liter**	
Color/Product #:		**CALGreen Limit ***	**Proposed Product**
Series/Collection:			
Manufacturer:			
Other:			
Item #	**Description of Product**	**VOC grams/liter**	
Color/Product #:		**CALGreen Limit ***	**Proposed Product**
Series/Collection:			
Manufacturer:			
Other:			
Item #	**Description of Product**	**VOC grams/liter**	
Color/Product #:		**CALGreen Limit ***	**Proposed Product**
Series/Collection:			
Manufacturer:			
Other:			
Item #	**Description of Product**	**VOC grams/liter**	
Color/Product #:		**CALGreen Limit ***	**Proposed Product**
Series/Collection:			
Manufacturer:			
Other:			

* See Section 4.504.2.2 and Table 4.504.3 for paints and coatings. See Section 4.504.2.3 for aerosol paints and coatings.

PAINTS AND COATINGS - ROOM/LOCATION MATRIX (PC 6)

1. Insert product Item # (1,2,3, etc.) from PRODUCT INFORMATION SHEET in the boxes below to indicate the type of finish used in each room or location. 2. Attach additional sheets if necessary.

LOCATION	Entryway	Kitchen and Pantry	Dining Area 1	Dining Area 2	Formal Livingroom	Informal Livingroom	Den/Office	Bedroom 1 (master)	Bedroom 2	Bedroom 3	Bedroom 4	Bathroom 1	Bathroom 2	Hallway 1	Hallway 2	Utility	Laundry	Garage
COATING																		
Flat																		
Nonflat																		
High Gloss																		
Faux Finish																		
Floor coatings																		
Primers/sealers/undercoaters																		
Shellacs																		
Stains																		
Tub and tile refnish coatings																		
Wood Coatings																		
Other																		
Other																		
Other																		
Other																		
Other																		
Other																		

PAINTS AND COATINGS - ROOM/LOCATION MATRIX (PC 6)

1. Insert product Item # (1,2,3, etc.) from PRODUCT INFORMATION SHEET in the boxes below to indicate the type of finish used in each room or location. 2. Attach additional sheets if necessary.

LOCATION / COATING																	
Flat																	
Nonflat																	
High Gloss																	
Faux Finish																	
Floor coatings																	
Primers/sealers/undercoaters																	
Shellacs																	
Stains																	
Tub and tile refnish coatings																	
Wood Coatings																	
Other																	
Other																	
Other																	
Other																	
Other																	
Other																	

PAINTS AND COATINGS - DECLARATION STATEMENT (PC 7)

The following section shall be completed by a person with overall responsibility for the planning and design portion of the project.

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided is true and correct.
- I certify that the installed measures, materials, components, or manufactured devices identified on this certificate conform to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcing agency.

Responsible Person's Name:	**Responsible Person's Signature:**
Date Signed:	**Position/Title:**
Notes:	

SAMPLE WORKSHEETS (PC 8)

PAINTS AND COATINGS - PRODUCT INFORMATION SHEET (PC 5)

Page 1 of 1

1. Insert product information below. 2. Insert the Item #'s for each product listed below into the appropriate boxes on ROOM/LOCATION MATRIX. 3. Attach all product specification sheets or labels. 4. Use additional sheets if necessary.

Item #1	Description of Product	VOC grams/liter	
Color/Product #:	Calm White - Flat	CALGreen Limit*	Proposed Product
Series/Collection:	Green California Series - White Base		
Manufacturer:	Paints 4 U	50	0
Other:			

CALGreen Compliant

Item #2	Description of Product	VOC grams/liter	
Color/Product #:	Clean White - Eggshell Enamel	CALGreen Limit*	Proposed Product
Series/Collection:	Green California Series Acrylic		
Manufacturer:	Paints 4 U	100	< 100
Other:			

CALGreen Compliant

* See Section 4.504.2.2 and Table 4.504.3 for paints and coatings. See Section 4.504.2.3 for aerosol paints and coatings.

. . .

PAINTS AND COATINGS - ROOM/LOCATION MATRIX (PC 6)

Page 1 of 1

1. Insert production Item # (1,2,3, etc.) from PRODUCT INFORMATION SHEET in the boxes below to indicate type of finish used in each room or location. 2. Attach additional sheets if necessary.

LOCATION	Entryway	Kitchen and Pantry	Dining Area 1	Dining Area 2	Formal Livingroom	Informal Livingroom	Den/Office	Bedroom 1 (master)	Bedroom 2	Bedroom 3	Bedroom 4	Bathroom 1	Bathroom 2		Hallway 1	Hallway 2	Utility	Laundry	Garage
COATING																			
Flat	1		1	1	1	1	1	1	1	1	1				1	1			1
Nonflat		2										2	2				2	2	

. . .

FINISH FLOORING MATERIALS * - PRODUCT INFORMATION SHEET (PC 9)

1. Insert product information below. 2. Insert the Item #'s for each product listed below into the appropriate boxes on ROOM/LOCATION MATRIX.
3. Attach all product specification sheets or other documentation to demonstrate compliance or certifications. 4. Use additional sheets if necessary.

Item # 1	Description of Product	Certification Program*
Color/Product #:		☐ CA Spec 01350 ☐ Indoor Advantage Gold
Series/Collection:		☐ (CHPS) ☐ NSF/ANSI 140 Gold Level
Manufacturer:		☐ FloorScore
Other:		☐ Green Label Plus
		☐ GREENGUARD

Item # 2	Description of Product	Certification Program*
Color/Product #:		☐ CA Spec 01350 ☐ Indoor Advantage Gold
Series/Collection:		☐ (CHPS) ☐ NSF/ANSI 140 Gold Level
Manufacturer:		☐ FloorScore
Other:		☐ Green Label Plus
		☐ GREENGUARD

Item # 3	Description of Product	Certification Program*
Color/Product #:		☐ CA Spec 01350 ☐ Indoor Advantage Gold
Series/Collection:		☐ (CHPS) ☐ NSF/ANSI 140 Gold Level
Manufacturer:		☐ FloorScore
Other:		☐ Green Label Plus
		☐ GREENGUARD

Item # 4	Description of Product	Certification Program*
Color/Product #:		☐ CA Spec 01350 ☐ Indoor Advantage Gold
Series/Collection:		☐ (CHPS) ☐ NSF/ANSI 140 Gold Level
Manufacturer:		☐ FloorScore
Other:		☐ Green Label Plus
		☐ GREENGUARD

* Note: See CALGreen and CALGreen Guide Section 4.504.3 for Carpet Systems; Section 4.504.3.1 for Carpet Cushions; Section 4.504.4 for Resilient flooring

FINISH FLOORING MATERIALS * - PRODUCT INFORMATION SHEET (PC 9)

1. Insert product information below. 2. Insert the Item #'s for each product listed below into the appropriate boxes on ROOM/LOCATION MATRIX.
3. Attach all product specification sheets or other documentation to demonstrate compliance or certifications. 4. Use additional sheets if necessary.

Item #	Description of Product	Certification Program*
Color/Product #:		☐ CA Spec 01350 ☐ Indoor Advantage Gold
Series/Collection:		☐ (CHPS) ☐ NSF/ANSI 140 Gold Level
Manufacturer:		☐ FloorScore
Other:		☐ Green Label Plus
		☐ GREENGUARD

Item #	Description of Product	Certification Program*
Color/Product #:		☐ CA Spec 01350 ☐ Indoor Advantage Gold
Series/Collection:		☐ (CHPS) ☐ NSF/ANSI 140 Gold Level
Manufacturer:		☐ FloorScore
Other:		☐ Green Label Plus
		☐ GREENGUARD

Item #	Description of Product	Certification Program*
Color/Product #:		☐ CA Spec 01350 ☐ Indoor Advantage Gold
Series/Collection:		☐ (CHPS) ☐ NSF/ANSI 140 Gold Level
Manufacturer:		☐ FloorScore
Other:		☐ Green Label Plus
		☐ GREENGUARD

Item #	Description of Product	Certification Program*
Color/Product #:		☐ CA Spec 01350 ☐ Indoor Advantage Gold
Series/Collection:		☐ (CHPS) ☐ NSF/ANSI 140 Gold Level
Manufacturer:		☐ FloorScore
Other:		☐ Green Label Plus
		☐ GREENGUARD

* Note: See CALGreen and CALGreen Guide Section 4.504.3 for Carpet Systems; Section 4.504.3.1 for Carpet Cushions; Section 4.504.4 for Resilient flooring

FINISH FLOORING MATERIALS * - ROOM/LOCATION MATRIX (PC 10)

1. Insert product Item # (1,2,3, etc.) from PRODUCT INFORMATION SHEET in the boxes below to indicate the type of finish flooring used in each room or location. 2. Attach additional sheets if necessary.

LOCATION	Entryway	Kitchen and Pantry	Dining Area 1	Dining Area 2	Formal Livingroom	Informal Livingroom	Den/Office	Bedroom 1 (master)	Bedroom 2	Bedroom 3	Bedroom 4	Bathroom 1	Bathroom 2	Hallway 1	Hallway 2	Utility	Laundry	Garage
FLOORING MATERIALS																		
Carpet Systems																		
Carpet Cushion																		
Carpet Adhesive **	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Floor coating ***	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Resilient Flooring																		
Other																		
Other																		

* Composite wood products are shown on worksheets for Composite Wood Products

** Adhesives are shown on worksheets for Adhesives, Sealants and Caulks

*** Floor coatings are shown on worksheets for Architectural Coatings

FINISH FLOORING MATERIALS * - ROOM/LOCATION MATRIX (PC 10)

1. Insert product Item # (1,2,3, etc.) from PRODUCT INFORMATION SHEET in the boxes below to indicate the type of finish flooring used in each room or location. 2. Attach additional sheets if necessary.

LOCATION																		
FLOORING MATERIALS																		
Carpet Systems																		
Carpet Cushion																		
Carpet Adhesive **	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Floor coating ***	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Resilient Flooring																		
Other																		
Other																		

*** Composite wood products are shown on worksheets for Composite Wood Products**

**** Adhesives are shown on worksheets for Adhesives, Sealants and Caulks**

***** Floor coatings are shown on worksheets for Architectural Coatings**

FINISH FLOORING MATERIALS * - DECLARATION STATEMENT (PC 11)

1.Insert Item # (1,2,3, etc.) to indicate type of finish flooring in areas or rooms. Use same numbers for same products.

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided is true and correct.
- I certify that the installed measures, materials, components, or manufactured devices identified on this certificate conform to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcing agency.

Responsible Person's Name:	**Responsible Person's Signature:**
Date Signed:	**Position/Title:**
Notes:	

SAMPLE WORKSHEETS (PC 12)

PAINTS AND COATINGS - PRODUCT INFORMATION SHEET (PC 5)

Page 1 of 1

1. Insert product information below. 2. Insert the Item #'s for each product listed below into the appropriate boxes on ROOM/LOCATION MATRIX. 3. Attach all product specification sheets or labels. 4. Use additional sheets if necessary.

Item #1	Description of Product	VOC grams/liter	
Color/Product #:	Calm White - Flat	CALGreen Limit*	Proposed Product
Series/Collection:	Green California Series - White Base		
Manufacturer:	Paints 4 U	50	0
Other:			

CALGreen Compliant

Item #2	Description of Product	VOC grams/liter	
Color/Product #:	Clean White - Eggshell Enamel	CALGreen Limit*	Proposed Product
Series/Collection:	Green California Series Acrylic		
Manufacturer:	Paints 4 U	100	< 100
Other:			

CALGreen Compliant

* See Section 4.504.2.2 and Table 4.504.3 for paints and coatings. See Section 4.504.2.3 for aerosol paints and coatings.

. . .

PAINTS AND COATINGS - ROOM/LOCATION MATRIX (PC 6)

Page 1 of 1

1. Insert production Item # (1,2,3, etc.) from PRODUCT INFORMATION SHEET in the boxes below to indicate type of finish used in each room or location. 2. Attach additional sheets if necessary.

LOCATION	Entryway	Kitchen and Pantry	Dining Area 1	Dining Area 2	Formal Livingroom	Informal Livingroom	Den/Office	Bedroom 1 (master)	Bedroom 2	Bedroom 3	Bedroom 4	Bathroom 1	Bathroom 2		Hallway 1	Hallway 2	Utility	Laundry	Garage
COATING																			
Flat	1		1	1	1	1	1	1	1	1	1				1	1			1
Nonflat		2										2	2				2	2	

. . .

COMPOSITE WOOD PRODUCTS - PRODUCT INFORMATION SHEET (PC 13)

1. Insert product information below. 2. Insert the Item #'s for each product listed below into the appropriate boxes on ROOM/LOCATION MATRIX. 3. Attach all product specification sheets or labels. 4. Use additional sheets if necessary.

Item #1	Description of Product	Formaldehyde Limits	
Color/Product #:		Current Limit*	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			

Item #2	Description of Product	Formaldehyde Limits	
Color/Product #:		Current Limit*	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			

Item #3	Description of Product	Formaldehyde Limits	
Color/Product #:		Current Limit*	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			

Item #4	Description of Product	Formaldehyde Limits	
Color/Product #:		Current Limit*	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			

* See Table 4.504.5 for current limits

COMPOSITE WOOD PRODUCTS - PRODUCT INFORMATION SHEET (PC 13)

1. Insert product information below. 2. Insert the Item #'s for each product listed below into the appropriate boxes on ROOM/LOCATION MATRIX.
3. Attach all product specification sheets or labels. 4. Use additional sheets if necessary.

Item #	Description of Product	Formaldehyde Limits	
Color/Product #:		Current Limit*	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			
Item #	**Description of Product**	**Formaldehyde Limits**	
Color/Product #:		Current Limit*	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			
Item #	**Description of Product**	**Formaldehyde Limits**	
Color/Product #:		Current Limit*	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			
Item #	**Description of Product**	**Formaldehyde Limits**	
Color/Product #:		Current Limit*	Proposed Product
Series/Collection:			
Manufacturer:			
Other:			

* See Table 4.504.5 for current limits

COMPOSITE WOOD PRODUCTS - ROOM/LOCATION MATRIX (PC 14)

1. Insert product Item # (1,2,3, etc.) from PRODUCT INFORMATION SHEET in the boxes below to indicate the type of composite wood product used in each room or location. 2. Attach additional sheets if necessary.

LOCATION	Entryway	Kitchen and Pantry	Dining Area 1	Dining Area 2	Formal Livingroom	Informal Livingroom	Den/Office	Bedroom 1 (master)	Bedroom 2	Bedroom 3	Bedroom 4	Bathroom 1	Bathroom 2	Hallway 1	Hallway 2	Utility	Laundry	Garage
WOOD PRODUCTS																		
Hardwood Plywood veneer core																		
Hardwood Plywood composite core																		
Particleboard																		
Medium Density Fiberboard																		
Thin medium Density Fiberboard																		
Other																		
Other																		
Other																		
Other																		
Other																		
Other																		

COMPOSITE WOOD PRODUCTS - ROOM/LOCATION MATRIX (PC 14)

1. Insert product Item # (1,2,3, etc.) from PRODUCT INFORMATION SHEET in the boxes below to indicate the type of composite wood product used in each room or location. 2. Attach additional sheets if necessary.

LOCATION / WOOD PRODUCTS																	
Hardwood Plywood veneer core																	
Hardwood Plywood composite core																	
Particleboard																	
Medium Density Fiberboard																	
Thin medium Density Fiberboard																	
Other																	
Other																	
Other																	
Other																	
Other																	
Other																	

COMPOSITE WOOD PRODUCTS - DECLARATION STATEMENT (PC 15)

The following section shall be completed by a person with overall responsibility for the planning and design portion of the project.

DECLARATION STATEMENT

- I certify under penalty of perjury, under the laws of the State of California, the information provided is true and correct.
- I certify that the installed measures, materials, components, or manufactured devices identified on this certificate conform to all applicable codes and regulations, and the installation is consistent with the plans and specifications approved by the enforcing agency.

Responsible Person's Name:	**Responsible Person's Signature:**
Date Signed:	**Position/Title:**
Notes:	

SAMPLE WORKSHEETS (PC 16)

PAINTS AND COATINGS - PRODUCT INFORMATION SHEET (PC 5)

Page 1 of 1

1. Insert product information below. 2. Insert the Item #'s for each product listed below into the appropriate boxes on ROOM/LOCATION MATRIX. 3. Attach all product specification sheets or labels. 4. Use additional sheets if necessary.

Item #1	Description of Product	VOC grams/liter	
Color/Product #:	Calm White - Flat	CALGreen Limit*	Proposed Product
Series/Collection:	Green California Series - White Base		
Manufacturer:	Paints 4 U	50	0
Other:			

CALGreen Compliant

Item #2	Description of Product	VOC grams/liter	
Color/Product #:	Clean White - Eggshell Enamel	CALGreen Limit*	Proposed Product
Series/Collection:	Green California Series Acrylic		
Manufacturer:	Paints 4 U	100	< 100
Other:			

CALGreen Compliant

* See Section 4.504.2.2 and Table 4.504.3 for paints and coatings. See Section 4.504.2.3 for aerosol paints and coatings.

. . .

PAINTS AND COATINGS - ROOM/LOCATION MATRIX (PC 6)

Page 1 of 1

1. Insert production Item # (1,2,3, etc.) from PRODUCT INFORMATION SHEET in the boxes below to indicate type of finish used in each room or location. 2. Attach additional sheets if necessary.

LOCATION	Entryway	Kitchen and Pantry	Dining Area 1	Dining Area 2	Formal Livingroom	Informal Livingroom	Den/Office	Bedroom 1 (master)	Bedroom 2	Bedroom 3	Bedroom 4	Bathroom 1	Bathroom 2		Hallway 1	Hallway 2	Utility	Laundry	Garage
COATING																			
Flat	1		1	1	1	1	1	1	1	1	1				1	1			1
Nonflat		2										2	2				2	2	

. . .

City of Sonoma

NONRESIDENTIAL

2010 CALGreen+Tier 1 Checklist

(Applies to newly constructed nonresidential buildings without sleeping accommodations. **Additions, alterations, repairs and existing structures[1] are not subject to the requirements of CALGreen. Existing site and landscaping improvements that are not otherwise disturbed are also not subject to the requirements of CALGreen.**)

APPENDIX A5

(Revised per City of Sonoma Requirements - Based on CALGreen + Tier 1)

Project Address: _____

Project Name: _____

Project Description: _____

Instructions:

1. The Owner or the Owner's agent shall employ a qualified CALGreen Special Inspector, listed by the City of Sonoma Building Department, to perform CALGreen Special Inspector services and to verify and assure the Owner and the Building Department that all required work described herein is properly planned and implemented in the project.
2. The CALGreen Special Inspector shall not be the design professional or contractor for the project and shall not have a financial interest in the project for which services are being provided except for the cost of providing said services.
3. The CALGreen Special Inspector, in collaboration with the owner and the design professional shall initially complete **Columns 1 and 2** of this checklist, sign and date the **Design Verification** section at the end of this checklist and have the checklist printed on the approved plans for the project.
4. Prior to final inspection by the Building Department, CALGreen Special Inspector shall complete **Column 3** and sign and date **the Implementation Verification** section at the end of this checklist.

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after implementation and prior to final inspection approval*
See Chapter 5 and Appendix A5 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
A5.1 PLANNING AND DESIGN	***All checked items are required for the project***	***Select at least one (1) elective measure from A5.1***	***Select all measures verified in the completed project***
SITE SELECTION		A5.1	
A5.103.1 Community connectivity. Locate project on a previously developed site within a 1/2 mile radius of at least ten basic services, listed in Section A5.103.1.		☐	☐

[1] Where more than seventy-five percent (75%) of all existing walls of an existing structure are demolished or deconstructed the structure shall be treated as a new building (Sonoma Municipal Code Section 14.10.050).

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after implementation and prior to final inspection approval*
See Chapter 5 and Appendix A5 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
A5.103.2 Brownfield or greyfield site redevelopment or infill area development. Select for development a brownfield in accordance with Section A5.103.2.1 or on a greyfield or infill site as defined in Section A5.102. **A5.103.3.1 Brownfield redevelopment.** Develop a site documented as contaminated and fully remediated or on a site defined as a brownfield.		☐	☐
SITE PRESERVATION		A5.1	
A5.104.1.1 Local zoning requirement in place. Exceed the zoning's open space requirement for vegetated open space on the site by 25 percent.		☐	☐
A5.104.1.2 No local zoning requirement in place. Provide vegetated open space area adjacent to the building equal to the building footprint area.		☐	☐
A5.104.1.3 No open space required in zoning ordinance. Provide vegetated open space equal to 20 percent of the total project site area.		☐	☐
DECONSTRUCTION AND REUSE OF EXISTING STRUCTURES		A5.1	
A5.105.1.1 Existing building structure. Maintain at least 75 percent of existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing) based on surface area. **Exceptions:** 1. Window assemblies and non-structural roofing material. 2. Hazardous materials that are remediated as a part of the project. 3. A project with an addition of more than 2 times the square footage of the existing building.		☐	☐
A5.105.1.2 Existing non-structural elements. Reuse existing interior non-structural elements (interior walls, doors, floor coverings and ceiling systems) in at least 50 percent of the area of the completed building (including additions). **Exception:** A project with an addition of more than 2 times the square footage of the existing building.		☐	☐
A5.105.1.3 Salvage. Salvage additional items in good condition such as light fixtures, plumbing fixtures, and doors for reuse on this project in an onsite storage area or for salvage in dedicated collection bins. Document the weight or number of the items salvaged.		☐	☐

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SITE DEVELOPMENT		A5.1	
A5.106.1 Storm water pollution prevention plan. For projects of one acre or less, develop a Storm Water Pollution Prevention Plan (SWPPP) that has been designed, specific to its site, conforming to the State Storm water NPDES Construction Permit or local ordinance, whichever is stricter, as is required for projects over one acre. The plan should cover prevention of soil loss by storm water run-off and/or wind erosion, of sedimentation, and/or of dust/particulate matter air pollution.	☒		☐
A5.106.2 Storm water design. Design storm water runoff rate and quantity in conformance with Section A5.106.3.1 and storm water runoff quality by Section A5.106.3.2, or by local requirements, whichever are stricter.	☒		☐
A5.106.2.1 Storm water runoff rate and quantity. Implement a storm water management plan resulting in no net increase in rate and quantity of storm water runoff from existing to developed conditions.	☒		☐
Exception: If the site is already greater than 50 percent impervious, implement a storm water management plan resulting in a 25 percent decrease in rate and quantity.			
A5.106.2.2 Storm water runoff quality. Use post construction treatment control best management practices (BMPs) to mitigate (infiltrate, filter, or treat) storm water runoff from the 85th percentile 24-hour runoff event (for volume-based BMPs) or the runoff produced by a rain event equal to two times the 85th percentile hourly intensity (for flow-based BMPs).	☒		☐
A5.106.3 Low impact development (LID). Reduce peak runoff in compliance with Section 5.106.3.1. Employ at least two of the following methods or other best management practices to allow rainwater to soak into the ground, evaporate into the air, or collect in storage receptacles for irrigation or other beneficial uses. LID strategies include, but are not limited to those listed in A5.106.4.		☐	☐
1. Bioretention (rain gardens);		☐	☐
2. Cisterns and rain barrels;		☐	☐
3. Green roofs;		☐	☐
4. Roof leader disconnection;		☐	☐
5. Permeable and porous paving;		☐	☐
6. Vegetative swales and filter strips & tree preservation;		☐	☐
7. Volume retention suitable for previously developed sites.		☐	☐

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5.106.4 Bicycle parking and changing rooms.			
5.106.4.1 Short-term bicycle parking. If the project is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5 percent of visitor motorized vehicle parking capacity, with a minimum of one two-bike capacity rack.	☒		☐
5.106.4.2 Long-term bicycle parking. For buildings with over 10 tenant-occupants, provide secure bicycle parking for 5 percent of motorized vehicle parking capacity, with a minimum of one space.	☒		☐
A5.106.4.3 Changing rooms. For buildings with over 10 tenant-occupants, provide changing/shower facilities in accordance with Table A5.106.4.3, or document arrangements with nearby changing/shower facilities.		☐	☐
A5.106.5.1 Designated parking for fuel-efficient vehicles. Provide designated parking for any combination of low-emitting, fuel-efficient, and carpool/van pool vehicles as shown in Table A5.106.5.1.1 for at 10 percent of total spaces. (Tier 1)	☒		☐
A5.106.5.3.1 Electric vehicle supply wiring. For each space required in Table A406.1.6.2.1, provide one 120 VAC 20 amp and one 208/240 V 40 amp, grounded AC outlets or panel capacity and conduit installed for future outlets.		☐	☐
A5.106.6 Parking capacity. Design parking capacity to meet but not exceed minimum local zoning requirements.			
A5.106.6.1 Reduce parking capacity. With the approval of the enforcement authority, employ strategies to reduce on site parking area by			
1. Use of on street parking or compact spaces, illustrated on the site plan, or		☐	☐
2. Implementation and documentation of programs that encourage occupants to carpool, ride share, or use alternate transportation.		☐	☐
5.106.7 Exterior walls. Meet requirements in the current edition of the California Energy Code and select one of the following for wall surfaces:			
1. Provide vegetative or man-made shading devices for east-, south-, and west-facing walls with windows.	☒		☐
2. Use wall surfacing with SRI 25 (aged), for 75 percent of opaque wall areas.	☒		☐

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See Chapter 5 and Appendix A5 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
5.106.8 Light pollution reduction. Comply with lighting power requirements in the California Energy Code and design interior and exterior lighting such that zero direct-beam illumination leaves the building site. Meet or exceed exterior light levels and uniformity ratios for lighting zones 1-4 as defined in Chapter 10 of the California Administrative Code, using the following strategies:	☒		☐
1. Shield all exterior luminaires or use cutoff luminaires.	☒		☐
2. Contain interior lighting within each source.	☒		☐
3. Contain all exterior lighting within property boundaries.	☒		☐
Exception: See Part 2, Chapter 12, Section 1205.6 for campus lighting requirements for parking facilities and walkways.			
A5.106.9 Building orientation. Locate and orient the building as follows:			
1. Long sides facing north and south		☐	☐
2. Protect the building from thermal loss, drafts, and degradation of the building envelope caused by wind and wind-driven materials.		☐	☐
5.106.10 Grading and Paving. The site shall be planned and developed to keep surface water away from buildings. Construction plans shall indicate how site grading or a drainage system will manage all surface water flows.	☒		☐
A5.106.11 Heat island effect. Reduce non-roof heat islands, and roof heat islands as follows:			
A5.106.11.1 Hardscape alternatives. Use one or a combination of strategies 1 through 3 for 50 percent of site hardscape or put 50 percent of parking underground.		☐	☐
1. Provide shade (mature within 5 years of occupancy).		☐	☐
2. Use light colored/ high-albedo materials		☐	☐
3. Use open-grid pavement system.		☐	☐
A5.106.11.2 Cool Roof. Use roofing materials having a Solar Reflectance Index (SRI)[3] equal to or greater than the values shown in Table A5.106.11.2.1 - Tier 1.		☐	☐

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A5.2 ENERGY EFFICIENCY	***All checked items are required for the project***	***No elective measures required from A5.2***	***Select all measures verified in the completed project***
PERFORMANCE REQUIREMENTS			
A5.203.1 Energy performance. Use at least 15 percent less Time-Dependent Valuation (TDV) Energy than the 2008 Title 24 Building Energy Efficiency Standards "budget" building. No calculations are required to demonstrate any specified reduction in CO2 emissions.[2] (Tier 1).	☒		☐
PRESCRIPTIVE MEASURES		A5.2	
A5.204.1 ENERGY STAR equipment and appliances. All equipment and appliances provided by the builder shall be ENERGY STAR labeled if ENERGY STAR is applicable to that equipment or appliance		☐	☐
A5.204.2 Energy monitoring. Provide sub-metering or equivalent combinations of sensor measurements and thermodynamic calculations, if appropriate, to record energy use data for each major energy system in the building.		☐	☐
A5.201.2.1 Data Storage. The data management\s system must be capable of electronically storing energy data and creating user reports showing hourly, daily, monthly and annual energy consumption for each major energy system.		☐	☐
A5.204.2.2 Data Access. Hourly energy use data shall be accessible through a central data management system and must be available daily.		☐	☐
A5.204.3 Demand response. HVAC systems with Direct Digital Control Systems and centralized lighting systems shall include pre-programmed demand response strategies that are automated with either a Demand Response Automation Internet Software Client or dry contact relays.		☐	☐
A5.204.3.1 HVAC. The pre-programmed demand response strategies should be capable of reducing the peak HVAC demand by cooling temperature set point adjustment.		☐	☐
A5.204.3.2 Lighting. The pre-programmed demand response strategies should be capable of reducing the total lighting load by a minimum 30 percent through dimming control or bi-level switching.		☐	☐
A5.204.3.3 Software clients. The software clients will be capable of communicating with a DR Automation Server.		☐	☐

[2] Modified by Section 14.10.050 of the Sonoma Municipal Code

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RENEWABLE ENERGY		A5.2	
A5.211.1 On-site renewable energy. Use on-site renewable energy for at least 1 percent of the electrical service overcurrent protection device rating calculated in accordance with the 2007 California Electrical Code, or 1KW, whichever is greater, in addition to the electrical demand required to meet 1 percent of natural gas and propane use calculated in accordance with the 2007 California Plumbing Code.		☐	☐
A5.211.1.1 Documentation. Calculate renewable on-site system to meet the requirements of Section A5.211.1. Factor in net-metering, if offered by local utility, on an annual basis.		☐	☐
A5.211.3 Green Power. Participate in the local utility's renewable energy portfolio program that provides a minimum of 50 percent electrical power from renewable sources. Maintain documentation through utility billings.		☐	☐
A5.211.4 Pre-wiring for future solar. Install conduit from the building roof or eave to a location within the building identified as suitable for future installation of a charge controller (regulator) and inverter.		☐	☐
A5.211.4.1 Off grid pre-wiring for future solar. If battery storage is anticipated, conduit should run to a location within the building that is stable, weather-proof, insulated against very hot and very cold weather, and isolated from occupied spaces.		☐	☐
ELEVATORS, ESCALATORS, AND OTHER EQUIPMENT		A5.2	
A5.212.1 Elevators and escalators. In buildings with more than one elevator or two escalators, provide controls to reduce the energy demand of elevators and reduce the speed of escalators. Document the controls in the project specifications and commissioning plan.		☐	☐
ENERGY EFFICIENT STEEL FRAMING		A5.2	
A5.213.1 Steel framing. Design for and employ techniques to avoid thermal bridging.		☐	☐

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A5.3 **WATER EFFICIENCY AND CONSERVATION**	***All checked items are required for the project***	***Select at least one (1) elective measure from A5.3***	***Select all measures verified in the completed project***
INDOOR WATER USE		A5.3	
5.303.1 Meters. Separate meters shall be installed for the uses described in Sections 503.1.1 and 503.1.2. below.			
5.303.1.1 For buildings in excess of 50,000 square feet. Separate submeters shall be installed as follows: 1. For each individual leased, rented, or other tenant space within the building projected to consume more than 100 gal/day. 2. For spaces used for laundry or cleaners, restaurant or food service, medical or dental office, laboratory, or beauty salon or barber shop projected to consume more than 100 gal/day	☒		☐
5.303.1.2 Excess consumption. Any building within a project or space within a building that is projected to consume more than 1,000 gal/day.	☒		☐
5.303.2.1 Multiple showerheads serving one shower. When single shower fixtures are served by more than one showerhead, the combined flow rate of all of the showerheads shall not exceed the maximum flow rates specified in the 20 percent reduction column contained in table 5.303.2.3 or the shower shall be designed to only allow one showerhead to be in operation at a time/	☒		☐
A5.303.2.3.1 30% water savings. A schedule of plumbing fixtures and fixture fittings that will reduce the overall use of potable water within the building by 30 percent shall be provided. (Tier 1) (Calculate savings by Water Use Worksheets – WS-1 and WS-3.)	☒		☐
A5.303.2.3.3 40% water savings. A schedule of plumbing fixtures and fixture fittings that will reduce the overall use of potable water within the building by 40 percent shall be provided. (Calculate savings by Water Use Worksheets – WS-1 and WS-3.)		☐	☐
5.303.4 Wastewater reduction. Each building shall reduce the generation of wastewater by one of the following methods: ☐ The installation of water-conserving fixtures; or ☐ Utilizing non-potable water systems	☒		☐ ☐

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A5.303.3 Appliances.			
1. Clothes washers shall have a maximum Water Factor (WF) that will reduce the use of water.		☐	☐
2. Dishwashers shall meet the criteria in A5.303.3(2)(a) and (b).		☐	☐
3. Ice makers shall be air cooled.		☐	☐
4. Food steamers shall be connection-less or boiler-less.		☐	☐
5. The use and installation of water softeners shall be limited or prohibited by local agencies.		☐	☐
A5.303.5 Dual plumbing. New buildings and facilities shall be dual plumbed for potable and recycled water systems.		☐	☐
5.303.6 Plumbing Fixtures and Fittings. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the requirements listed for each type in Items listed in Table 5.303.6.			
1. Water closets (toilets) – flushometer type	☒		☐
2. Water closets (toilets) – tank type	☒		☐
3. Urinals	☒		☐
4. Public lavatory faucets	☒		☐
5. Public metering self-closing faucets	☒		☐
6. Residential bathroom lavatory sink faucets	☒		☐
7. Residential kitchen faucets	☒		☐
8. Residential shower heads	☒		☐
9. Single shower fixtures served by more than one showerhead.	☒		☐
OUTDOOR WATER USE		A5.3	
5.304.1 Water budget. A water budget shall be developed for landscape irrigation use in accordance with Chapter 14.32 of the Sonoma Municipal Code – Water Efficient Landscaping.	☒		☐
5.304.2 Outdoor potable water use. For new water service, separate meters or submeters shall be installed for indoor and outdoor potable water use for landscaped areas.[3]	☒		☐
A5.304.2.1 Outdoor potable water use. For new water service not subject to the provisions of Water Code Section 535 (i.e. single-family residential connections), separate meters or submeters are installed for indoor and outdoor potable water use for landscaped areas between 500 square feet and 1,000 square feet. ***[NOTE: most projects should take this credit given the requirements Section 14.32.050 of the Sonoma Municipal Code.]***		☐	☐

[3] Modified per Section 14.32.050 of the Sonoma Municipal Code

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5.304.3 Irrigation design. In new nonresidential projects with between 1000 and 2500 square feet of landscaped area, install irrigation controllers and sensors which include the following criteria, and meet manufacturer's recommendations. **5.304.3.1 Irrigation controllers.** Automatic irrigation system controllers installed at the time of final inspection shall comply with the following: 1. Controllers shall be weather- or soil moisture-based controllers that automatically adjust irrigation in response to changes in plants' needs as weather conditions change. 2. Weather-based controllers without integral rain sensors or communication systems that account for local rainfall shall have a separate wired or wireless rain sensor which connects or communicates with the controller(s). Soil moisture-based controllers are not required to have rain sensor input.	☒		☐
A5.304.4.1 Potable water reduction. *Provide water efficient landscape irrigation design that reduces the use of potable water in accordance with Chapter 14.32 of the Sonoma Municipal Code. (SMC 14.32)* **A5.304.4.3 Verification of compliance.** A calculation demonstratying the applicable potable water use reduction required by this section shall be provided.	☒ ☒		☐ ☐
A5.304.5 Potable water elimination. Provide a water efficient landscape irrigation design that eliminates the use of potable water beyond the initial requirements for plant installation and establishment. Methods used to accomplish the requirements of this section shall include, but not be limited to, the items listed in A5.304.4.		☐	☐
A5.304.6 Restoration of areas disturbed by construction. Restore all areas disturbed during construction by planting with local native and/or non-invasive vegetation.		☐	☐
A5.304.7 Previously developed sites. On previously developed or graded sites, restore or protect at least 50percent of the site area with native and/or non-invasive vegetation.		☐	☐
A5.304.8 Graywater irrigation system. Install graywater collection system for onsite subsurface irrigation using graywater.		☐	☐

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A5.4 **MATERIAL CONSERVATION AND RESOURCE EFFICIENCY**	***All checked items are required for the project***	***Select at least one (1) elective measure from A5.4***	***Select all measures verified in the completed project***
EFFICIENT FRAMING SYSTEMS		A5.4	
A5.404.1 Wood framing. Employ advanced wood framing techniques, or OVE, as permitted by the enforcing agency.		☐	☐
MATERIAL SOURCES		A5.4	
A5.405.1 Regional materials. Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site, meeting the criteria listed in A5.405.1.		☐	☐
A5.405.2 Bio-based materials. Select bio-based building materials per Section A5.405.2.1 or A5.405.2.2. **A5.405.2.1 Use certified wood products.** Certified wood is an important component of green building strategies and the California Building Standards Commission will continue to develop a standard through the next code cycle. **A5.405.2.2 Rapidly renewable materials.** Use materials made from plants harvested within a ten-year cycle for at least 2.5 percent of total materials value, based on estimated cost.		☐ ☐	☐ ☐
A5.405.3 Reused materials. Use salvaged, refurbished, refinished, or reused materials for at least 5 percent of the total value, based on estimated cost of materials on the project.		☐	☐

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A5.405.5 Cement and concrete. Use cement and concrete made with recycled products and complying with the following sections:			
A5.405.5.1 Cement. Meet the following standards for cement:		☐	☐
1. Portland Cement shall meet ASTM C 150.			
2. Blended Cement shall meet ASTM C 595.			
A5.405.5.2 Concrete. Unless otherwise directed by the engineer, use concrete manufactured with cementitious materials in accordance with Sections A5.405.5.2.1 and A5.405.5.2.2, as approved by the enforcing agency.		☐	☐
A5.405.5.2.1 Supplementary cementitious materials (SCMs). Use concrete made with one or more of the SCMs listed in Section A5.405.5.2.1		☐	☐
A5.405.5.2.1.1 Mix design equation. Use any combination of one or more SCMs, satisfying Equation A4.5-1.		☐	☐
Exception: Minimums for concrete products requiring high early strength may be lower as directed by the engineer.			
A5.405.5.3 Additional means of compliance. Any of the following measures may be employed for the production of cement or concrete, depending on their availability and suitability, in conjunction with A5.405.5.2.			
A5.405.5.3.1 Cement. The following measures may be used in the manufacture of cement.			
A5.405.5.3.1.1 Alternative fuels. Where permitted by state or local air quality standards, use alternative fuels.		☐	☐
A5.405.5.3.1.2 Alternative power. Use alternate electric power generated at the cement plant and/or green power purchased from the utility meeting the requirements of A5.211.		☐	☐
A5.405.5.3.1.3 Alternative ingredients. Use inorganic processing additions and limestone meeting ASTM C 150.		☐	☐
A5.405.5.3.2 Concrete. The following measures may be used in the manufacture of concrete,			
A5.405.5.3.2.1 Alternative energy. Use renewable or alternative energy meeting the requirements of Section A5.211.		☐	☐
A5.405.5.3.2.2 Recycled aggregates. Use concrete made with one or more of the materials listed in Section A5.405.5.3.2.2.		☐	☐
A5.405.5.3.2.3 Mixing water. Use water meeting ASTM C1602, either recycled water provided by the local water purveyor or water reclaimed from manufacturing processes.		☐	☐

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ENHANCED DURABILITY AND REDUCED MAINTENANCE		A5.4	
A5.406.1.1 Service life. Select materials for longevity and minimal deterioration under conditions of use.		☐	☐
A5.406.1.2 Reduced maintenance. Select materials that require little, if any, finishing.		☐	☐
A5.406.1.3 Recyclability. Select materials that can be re-used or recycled at the end of their service life.		☐	☐
WEATHER RESISTANCE AND MOISTURE MANAGEMENT		A5.4	
5.407.1 Weather protection. Provide a weather-resistant exterior wall and foundation envelope as required by California Building Code Section 1403.2 and California Energy Code Section 150, manufacturer's installation instructions, or local ordinance, whichever is more stringent.	☒		☐
5.407.2 Moisture control. Employ moisture control measures by the following methods;			
5.407.2.1 Sprinklers. Prevent irrigation spray on structures.	☒		☐
5.407.2.2 Entries and openings. Design exterior entries and openings to prevent water intrusion into buildings.	☒		☐
CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING		A5.4	
5.408.1 Construction waste diversion. Establish a construction waste management plan or meet local ordinance, whichever is more stringent.	☒		☐
5.408.2 Construction waste management plan. Submit plan per this section to enforcement authority.	☒		☐
5.408.2.1 Documentation. Provide documentation of the waste management plan that meets the requirements listed in section 5.408.2 items 1 thru 4, and the plan is accessible to the enforcement authority.	☒		☐
A5.408.3.1 Enhanced Construction waste. Recycle and/or salvage for reuse a minimum of 65 percent of non-hazardous construction and demolition debris or meet local ordinance, whichever is more stringent. (Tier 1) **Exceptions:** 1. Excavated soil and land-clearing debris. 2. Alternate waste reduction methods developed by working with local agencies if diversion or recycle facilities capable of compliance with this item do not exist.	☒		☐
A5.408.3.1.1 Verification of compliance. A copy of the completed waste management report shall be provided to the Building Department.	☒		☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after implementation and prior to final inspection approval*
See Chapter 5 and Appendix A5 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
5.408.4 Excavated soil and land clearing debris. 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled.	☒		☐
LIFE CYCLE ASSESSMENT		A5.4	
A5.409.1 Materials and system assemblies. Select materials assemblies based on life cycle assessment of their embodied energy and/or green house gas emission potentials. See A5.409.1.1 and A5.409.1.2 for available tools.		☐	☐
BUILDING MAINTENANCE AND OPERATION		A5.4	
5.410.1 Recycling by occupants. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage, and collection of non-hazardous materials for recycling.	☒		☐
5.410.2 Commissioning. For new buildings 10,000 square feet and over, building commissioning for all building systems covered by T24, Part 6, process systems, and renewable energy systems shall be included in the design and construction processes of the building project. Commissioning requirements shall include items listed in 5.410.2.	☒		☐
5.410.2.1 Owner's Project Requirements (OPR). Documented before the design phase of the project begins the OPR shall include items listed in A5.410.4.	☒		☐
5.410.2.2 Basis of Design (BOD). A written explanation of how the design of the building systems meets the OPR shall be completed at the design phase of the building project and updated periodically to cover the systems listed in 5.410.2.2.	☒		☐
5.410.2.3 Commissioning plan. A commissioning plan describing how the project will be commissioned shall be started during the design phase of the building project and shall include as a minimum items listed in 5.410.2.3.	☒		☐
5.410.2.4 Functional performance testing shall demonstrate the correct installation and operation of each component, system, and system-to-system interface per approved plans and specifications.	☒		☐
5.410.2.5 Post construction documentation and training. A Systems Manual and Systems Operations Training are required.	☒		☐
5.410.2.5.1 Systems manual. The Systems Manual shall be delivered to the building owner or representative and the facilities operator and shall include the items listed in 5.410.2.5.1.	☒		☐
5.410.2.5.2 Systems operations training. The training of the appropriate maintenance staff for each equipment type and/or system shall include items listed in 5.410.2.5.2.	☒		☐
5.410.2.6 Commissioning report. A complete report of commissioning process activities undertaken through the design, construction and post-construction phases of the building project shall be completed and provided to the owner or owner's representative.	☒		☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after implementation and prior to final inspection approval*
See Chapter 5 and Appendix A5 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
5.410.4 Testing, adjusting and balancing. Testing, adjusting and balancing of systems shall be required for buildings less than 10,000 square feet.	☒		☐
5.410.4.2 Systems. Develop a written plan of procedures for testing, adjusting and balancing systems. Systems to be included for testing, adjusting and balancing shall include at a minimum, as applicable to the project, the systems listed in 5.410.3.2.	☒		☐
5.410.4.3 Procedures. Perform testing, adjusting and balancing procedures in accordance with industry best practices and applicable national standards on each system.	☒		☐
5.410.4.3.1 HVAC balancing. Before a new space-conditioning system serving a building or space is operated for normal use, the system should be balanced in accordance with the procedures defined by national standards listed in 5.410.3.3.1.	☒		☐
5.410.4.4 Reporting. After completion of testing, adjusting and balancing, provide a final report of testing signed by the individual responsible for performing these services.	☒		☐
5.410.4.5 Operation and maintenance manual. Provide the building owner with detailed operating and maintenance instructions and copies of guaranties/warranties for each system prior to final inspection.	☒		☐
5.410.4.5.1 Inspections and reports. Include a copy of all inspection verification and reports to the enforcing agency.	☒		☐
A5.5 **ENVIRONMENTAL QUALITY**	***All checked items are required for the project***	***Select at least one (1) elective measure from A5.5***	***Select all measures verified in the completed project***
FIREPLACES			
5.503.1. Install only a direct-vent sealed-combustion gas or sealed wood-burning fireplace, or a sealed woodstove, and refer to residential requirements in the California Energy Code, Title 24, Part 6, Subchapter 7, Section 150.	☒		☐
5.503.1.1 Woodstoves. Woodstoves shall comply with US EPA Phase II emission limits.	☒		☐
POLLUTANT CONTROL		A5.5	
A5.504.1 Indoor air quality (IAQ) during construction. Maintain IAQ as provided in Sections A5.504.1.1 and A5.504.1.2.			
A5.504.1.1 Temporary ventilation. Provide temporary ventilation during construction in accordance with Section 121 of the California Energy Code, CCR, Title 24, Part 6, and Chapter 4 of CCR, Title 8, and as listed in Items 1 through 4 in A5.504.1.2.		☐	☐
A5.504.1.2 Additional IAQ measures. Employ additional measures as listed in Items 1 through 5 in A5.504.1.3:		☐	☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after implementation and prior to final inspection approval*
See Chapter 5 and Appendix A5 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
5.504.2 IAQ post-construction. Flush out the building per Section 5.504.2 prior to occupancy or if the building is occupied.		☐	☐
A5.504.2.1 IAQ Testing. A testing alternative may be employed after all interior finishes have been installed, using testing protocols recognized by the United States Environmental Protection Agency (U.S. EPA) and in accordance with Section A5.504.2.1.2. Retest as required in Section A5.504.2.1.3.		☐	☐
A5.504.2.1.1 Maximum levels of contaminants. Allowable levels of contaminant concentrations measured by testing shall not exceed the following: 1. Carbon Monoxide (CO): 9 parts per million, not to exceed outdoor levels by 2 parts per million; 2. Formaldehyde: 27 parts per billion; 3. Particulates (PM10): 50 micrograms per cubic meter; 4. 4-Phenylcyclohexene ($-PCH): 6.5 micrograms per cubic meter; and 5. Total Volatile Organic Compounds (TVOC): 300 micrograms per cubic meter.		☐	☐
A5.504.2.1.2 Test protocols. Testing of indoor air quality should include the elements listed in Items 1 through 4.		☐	☐
A5.504.2.1.3 Noncomplying building areas. For each sampling area of the building exceeding the maximum concentrations specified in Section A5.504.2.1.1, flush out with outside air and retest samples taken from the same area. Repeat the procedures until testing demonstrates compliance		☐	☐
5.504.3 Covering of duct openings and protection of mechanical equipment during construction. At the time of rough installation, or during storage on the construction site and until final startup of the heating and cooling equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheet metal or other methods acceptable to the enforcing agency to reduce the amount of dust or debris which may collect in the system.	☒		☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after implementation and prior to final inspection approval*
See Chapter 5 and Appendix A5 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
5.504.4 Finish material pollutant control. Finish materials shall comply with Sections 5.504.4.1 through 5.504.4.4.			
5.504.4.1 Adhesives, sealants, caulks. Adhesives and sealants used on the project shall meet the requirements of the following standards.			
1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers, and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2.	☒		☐
2. Aerosol adhesives, and smaller unit sizes of adhesives, and sealant or caulking compounds (in units of product, less packaging, which do not weigh more than one pound and do not consist of more than 16 fluid ounces) shall comply with statewide VOC standards and other requirements, including prohibitions on use of certain toxic compounds, of California Code of Regulations, Title 17, commencing with Section 94507.	☒		☐
5.504.4.3 Paints and coatings. Architectural paints and coatings shall comply with Table 5.504.4.3.	☒		☐
5.504.4.3.1 Aerosol Paints and Coatings. Aerosol paints and coatings shall meet the Product-Weighted MIR Limits for ROC in section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances (CCR, Title 17, Section 94520 et seq).	☒		☐
5.504.4.3.2 Verification. Verification of compliance with this section shall be provided as requested by the enforcing agency.	☒		☐
5.504.4.4 Carpet systems. All carpet installed in the building interior shall meet the testing and product requirements of one of the standards listed in 5.504.4.4.	☒		☐
5.504.4.4.1 Carpet cushion. All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute Green Label program.	☒		☐
5.504.4.4.2 Carpet adhesive. All carpet adhesive shall meet the requirements of Table 804.4.1.	☒		☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after implementation and prior to final inspection approval*
See Chapter 5 and Appendix A5 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
5.504.4.5 Composite wood products. Hardwood plywood, particleboard, and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in Table 5.504.4.	☒		☐
A5.504.4.5.1 Early compliance with formaldehyde limits. Where complying composite wood product is readily available for non-residential occupancies, meet Phase 2 requirements before the compliance dates indicated in Table 5.504.4.5 (Tier I), or use composite wood products made with either CARB-approved no-added formaldehyde (NAF) resins or CARB-approved ultra-low emitting formaldehyde (ULEF) resins (Tier II).		☐	☐
5.504.4.5.2 Documentation. Verification of compliance with this section shall be provided as requested by the enforcing agency. Documentation shall include at least one of the following.	☒		☐
1. Product certifications and specifications.			☐
2. Chain of custody certifications.			☐
3. Other methods acceptable to the enforcing agency.			☐
A5.504.4.7 Resilient flooring systems. For 80 percent of floor area receiving resilient flooring, install resilient flooring complying with the VOC-emission limits defined in the 2009 CHPS criteria and listed on its Low-emitting Materials List (or Product Registry) or certified under the FloorScore program of the Resilient Floor Covering Institute. (Tier 1)	☒		☐
A5.504.4.7.2 Verification of compliance. Documentation shall be provided verifying that resilient flooring materials meet the pollutant emission limits.	☒		☐
A5.504.4.8 Thermal Insulation. Comply with Chapter 12-13 in Title 24, Part 12 and with the VOC-emission limits defined in 2009 CHPS criteria and listed on its Low-emitting Materials List. (Tier 1)	☒		☐
A5.504.4.8.2 Verification of compliance. Documentation shall be provided verifying that thermal insulation materials meet the pollutant emission limits.	☒		☐
A5.504.4.9 Acoustical ceilings and wall panels. Comply with Chapter 8 in Title 24, Part 2 and with the VOC-emission limits defined in the 2009 CHPS criteria and listed on its Low-emitting Materials List. (Tier 1)		☐	☐
A5.504.4.9.1 Verification of compliance. Documentation shall be provided verifying that acoustical finish materials meet the pollutant emission limits.		☐	☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after implementation and prior to final inspection approval*
See Chapter 5 and Appendix A5 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
A5.504.5 Hazardous particulates and chemical pollutants. Minimize and control pollutant entry into buildings and cross-contamination of regularly occupied areas.			
A5.504.5.1 Entryway systems. Install permanent entryway systems measuring at least six feet in the primary direction of travel to capture dirt and particulates at entryways directly connected to the outdoors as listed in Items 1 through 3 in A5.504.5.1.		☐	☐
A5.504.5.2 Isolation of pollutant sources. In rooms where activities produce hazardous fumes or chemicals, exhaust them and isolate them from their adjacent rooms as listed in Items 1 through 3 in A5.504.5.2.		☐	☐
5.504.5.3 Filters. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air prior to occupancy that provides at least a MERV of 8.	☒		☐
A5.504.5.3.1 Filters. In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air prior to occupancy that provides at least a MERV of 13.		☐	☐
5.504.7 Environmental tobacco smoke (ETS) control. Prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows where outdoor areas are provided for smoking, and in buildings; or as enforced by ordinances, regulations, or policies of any city, county, city and county, California Community College, campus of the California State University, or campus of the University of California, whichever are more stringent.	☒		☐
INDOOR MOISTURE AND RADON CONTROL		A5.5	
5.505.1 Indoor moisture control. Buildings shall meet or exceed the provisions of California Building Code, CCR, Title 24, Part 2, Sections 1203 and Chapter 14.	☒		☐
AIR QUALITY AND EXHAUST		A5.5	
5.506.1 Outside air delivery. For mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 121 of the California Energy Code, CCR, Title 24, Part 6 and Chapter 4 of CCR, Title 8, or the applicable local code, whichever is more stringent.	☒		☐
5.506.2 Carbon dioxide (CO2) monitoring. For buildings equipped with demand control ventilation, CO2 sensors and ventilation controls shall be specified and installed in accordance with the requirements of the latest edition of the California Energy Code, CCR, Title 24, Part 6, Section 121(c).	☒		☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after implementation and prior to final inspection approval*
See Chapter 5 and Appendix A5 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
ENVIRONMENTAL COMFORT		A5.5	
A5.507.1 Lighting and thermal comfort controls. Provide controls in the workplace as described in Sections A5.507.1.1 and A5.507.1.2.			
A5.507.1.1 Single-occupant spaces. Provide individual controls that meet energy use requirements in the 2007 California Energy Code by Sections A5.507.1.1.1 and A5.507.1.1.2.		☐	☐
A5.507.1.1.1 Lighting. Provide individual task lighting and/or daylighting controls for at least 90 percent of the building occupants.		☐	☐
A5.507.1.1.2 Thermal comfort. Provide individual thermal comfort controls for at least 50 percent of the building occupants by Items 1 and 2 in A5.507.1.1.2.		☐	☐
A5.507.1.2 Multi-occupant spaces. Provide lighting and thermal comfort system controls for all shared multi-occupant spaces.		☐	☐
A5.507.2 Daylight. Provide daylit spaces as required for toplighting and sidelighting in the 2007 California Energy Code. In constructing a design, consider Items 1 through 4 in A5.507.3.		☐	☐
A5.507.3 Views. Achieve direct line of sight to the outdoor environment via vision glazing between 2'6" and 7'6" above finish floor for building occupants in 90 percent of all regularly occupied areas.		☐	☐
A5.507.3.1 Interior office spaces. Entire areas of interior office spaces may be included in the calculation if at least 75percent of each area has direct line of sight to perimeter vision glazing.		☐	☐
A5.507.3.2 Multi-occupant spaces. Include in the calculation the square footage with direct line of sight to perimeter vision glazing.		☐	☐
5.507.4 Acoustical control. Employ building assemblies and components with STC values determined in accordance with ASTM E90 and ASTM E413.	☒		☐
5.507.4.1 Exterior noise transmission. Wall and floor-ceiling assemblies making up the building envelope shall have an STC of at least 50, and exterior windows shall have a minimum STC of 30 for any of the building locations listed in Items 1 through 3 in 5.507.5.1.	☒		☐
5.507.4.2 Interior sound. Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40.	☒		☐

Column 1 **Feature or Measure**	**Column 2** **Project Requirements** *When checked, these items become a part of the approved plans and must be installed or incorporated into the project.*		**Column 3** **Verification** *Complete after implementation and prior to final inspection approval*
See Chapter 5 and Appendix A5 of the 2010 California Green Building Code and Sonoma Municipal Code Chapters 14.10 and 14.32 for complete descriptions of features or measures listed here.	**Mandatory & Tier 1 Prerequisites**	**Tier 1 electives** *Applicant selects required elective measures*	**Verification by a third party CALGreen Special Inspector listed by the City of Sonoma**
OUTDOOR AIR QUALITY		A5.5	
5.508.1 Ozone depletion and global warming reductions. Installations of HVAC, refrigeration, and fire suppression equipment shall comply with Sections 5.508.1.1 and 5.508.1.2.			
5.508.1.1 CFCs. Install HVAC and refrigeration equipment that does not contain CFCs.	☒		☐
5.508.1.2 Halons. Install fire suppression equipment that does not contain Halons.[1]	☒		☐
A5.508.1.3 Hydrochlorofluorocarbons (HCFCs). Install HVAC and refrigeration equipment that does not contain HCFCs.		☐	☐
A5.508.1.4 Hydrofluorocarbons (HFCs). Install HVAC complying with either of the following:			
1. Install HVAC, refrigeration and fire suppression equipment that do not contain HFCs or that do not contain HFCs with a global warming potential greater than 150.		☐	☐
2. Install HVAC and refrigeration equipment that limit the use of HFC refrigerant through the use of a secondary heat transfer fluid with a global warming potential no greater than 1.		☐	☐
ADDITIONAL ELECTIVE MEASURE			
A5.601.2.4.5 Additional elective measure. Pursuant to Tier 1 requirements, select one additional Tier 1 elective measure from any division above. The total number of boxes checked under the Tier 1 electives in Column 2 must be five (5) or more**.**	☒	_____ *Total elective measures checked above*	☐

INSTALLER AND SPECIAL INSPECTOR QUALIFICATIONS	*All checked items are required for the project*		*Select all measures verified in the completed project*
Qualifications			
702.1 HVAC system installers are trained and certified in the proper installation of HVAC systems.	☒		☐
702.2 The CALGreen Special Inspector for this project is listed by the City of Sonoma as an approved CALGreen Special Inspector and is qualified and able to demonstrate competence in the discipline they inspect and verify.	☒		☐
Verifications			
703.1 Verification of compliance with CALGreen+Tier 1 may include construction documents, plans, specifications builder or installer certification, inspection reports, or other methods acceptable to the enforcing agency which show substantial conformance. Implementation verification shall be submitted to the Building Department after implementation of all required measures and prior to final inspection approval.	☒		☐

Green Building Acknowledgments

Project Address: _____

Project Description: _____

Section 1 - Design Verification

Complete all lines of Section 1- "Design Verification" and submit the completed checklist (Columns 1 and 2) with the plans and building permit application to the Building Department.

The owner, design professional and CALGreen special inspector have reviewed the plans and certify that the items checked above are hereby incorporated into the project plans and will be implemented into the project in accordance with the requirements set forth in the 2010 California Green Building Standards Code as amended by Chapter 14.10 of the Sonoma Municipal Code.

_____ _____
Owner's Signature Date

_____
Owner Name *(Please Print)*

_____ _____
Design Professional's Signature Date

_____
Design Professional's Name *(Please Print)*

_____ _____
Signature of Listed Green Building Special Inspector Date

_____ _____
Listed CALGreen Special Inspector's Name *(Please Print)* Phone

_____
CALGreen Special Inspector's E-mail Address

Section 2 - Implementation Verification

Complete, sign and submit the completed checklist, including Column 3, together with all original signatures on Section 2 – "Implementation Verification" to the Building Department prior to Building Department final inspection.

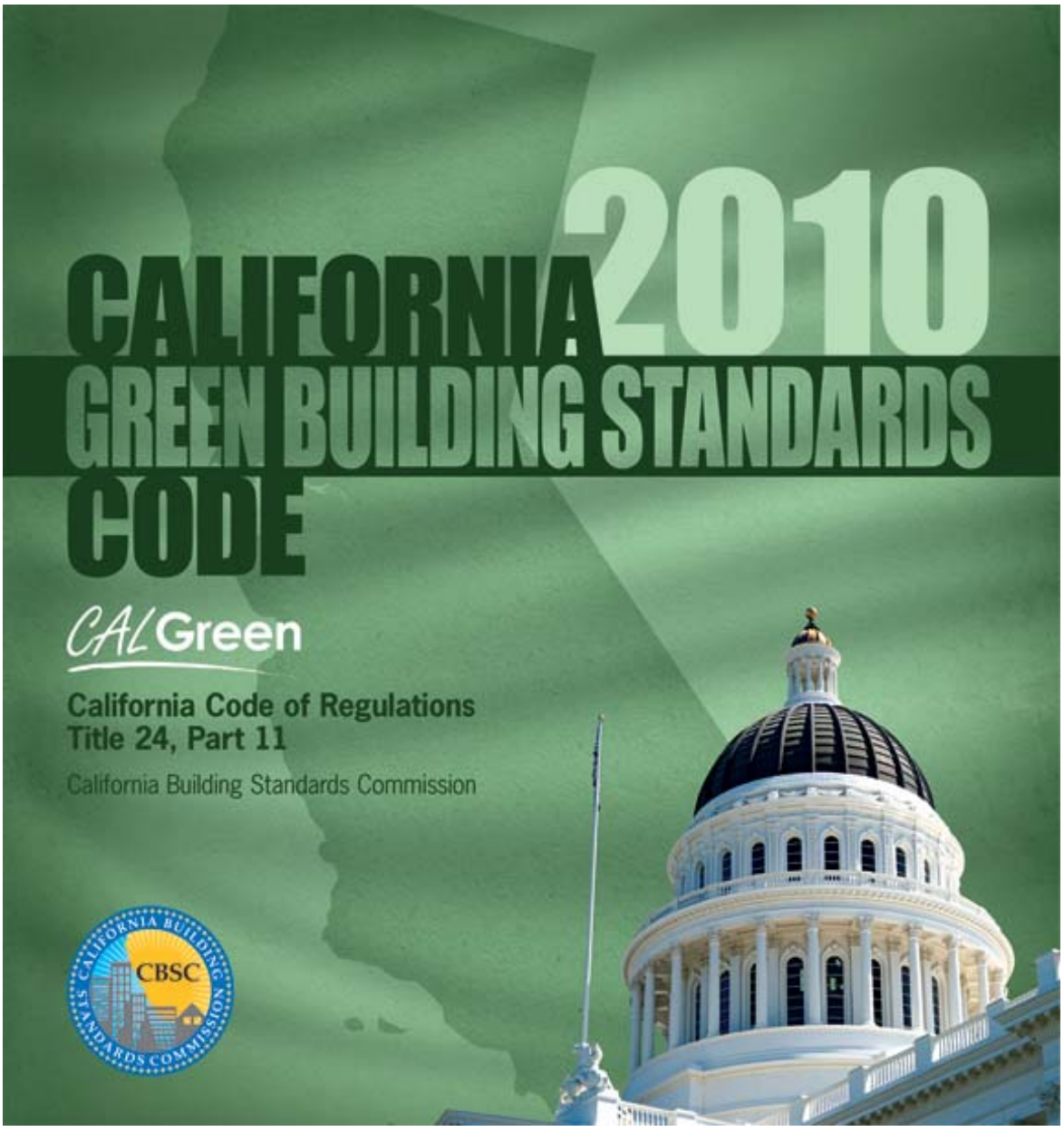
I have inspected the work have received sufficient documentation to verify and certify that the project identified above was constructed in accordance with this Green Building Checklist and in accordance with the requirements set forth in the 2010 California Green Building Standards Code as amended by Chapter 14.10 of the Sonoma Municipal Code.

_____ _____
Listed CALGreen Special Inspector Signature Date

_____ _____
CALGreen Special Inspector's Name *(Please Print)* Phone *(if different than above)*

_____
CALGreen Special Inspector's E-mail Address *(if different than above)*

Guide to the (Non-Residential) California Green Building Standards Code



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Guide to the California Green Building Standards Code – Non-Residential (Commissioning)

CALGreen Section: 5.410.2 Commissioning. For new buildings 10,000 square feet and over, building commissioning shall be included in the design and construction processes of the building project to verify that the building systems and components meet the owner's or owner representative's project requirements. Commissioning shall be performed in accordance with this section by trained personnel with experience on projects of comparable size and complexity. Commissioning requirements shall include:
1. Owner's Project Requirements
2. Basis of Design
3. Commissioning measures shown in the construction documents
4. Commissioning Plan
5. Functional Performance Testing
6. Documentation & Training
7. Commissioning Report

All building systems and components covered by Title 24, Part 6, as well as process equipment and controls, and renewable energy systems shall be included in the scope of the Commissioning Requirements.

Introduction:
The purpose of this code is to improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of concepts that reduce negative and increase positive environmental impacts. Commissioning is a vital element in this effort.

Definitions used in the CALGreen CX Guide:

Acronyms

BOD	Basis of Design
Cx	Commissioning
FPT	Functional Performance Test
HVAC	Heating Ventilating and Air-Conditioning
O&M	Operations and Maintenance
OPR	Owner's Project Requirements

Glossary

Acceptance Criteria - The conditions that must be met for systems or equipment to meet defined expected outcomes.

Commissioning (Cx) - Building commissioning as required in this code involves a quality assurance process that begins during design and continues to occupancy. Commissioning verifies that the new building operates as the owner intended and that building staff are prepared to operate and maintain its systems and equipment.

Owner - The individual or entity holding title to the property on which the building is constructed.

Commissioning Coordinator - The person who coordinates the commissioning process. This can be either a third-party commissioning provider or an experienced member of the design team or owner in-house staff member.

Commissioning Team - The key members of each party involved with the project designated to provide insight and carry out tasks necessary for a successful commissioning project. Team

members may include the commissioning coordinator, owner or owner's representative, building staff, design professionals, contractors or manufacturer's representatives, and testing specialists.

Independent Third-Party Commissioning Professional - A commissioning consultant contracted directly by the owner who is not responsible to, or affiliated with any other member of the design and construction team.

Operation and Maintenance (O&M) Manuals - Documents that provide information necessary for operating and maintaining installed equipment and systems.

Owner Representative – An individual or entity assigned by the owner to act and sign on the owner's behalf.

Process Equipment - Energy-using equipment and components that are not used for HVAC, Electrical, Plumbing and Irrigation operations.
Such devices would include but are not limited to heat transfer, water purifying, air cleaning, air vacuum and air compressing.

Sequence of Operation – A written description of the intended performance and operation of each control element and feature of the equipment and systems.

Selecting Trained Personnel for (Commissioning)
This code requires that "Commissioning shall be performed in accordance with this section by trained personnel with experience on projects of comparable size and complexity." The trained personnel manage and facilitate the commissioning process. The trained personnel develop and implement the commissioning tasks and documentation identified in sections 5.410.2.1 through 5.410.2.7. Trained personnel may include appropriate members of owner staff, contractor and design team as well as independent commissioning professionals.
It is essential that there is a single person designated to lead and manage the commissioning activities. In practice, this individual has been referenced by various identifiers such as commissioning authority, agent, provider, coordinator, lead, etc. In this guide the term "commissioning coordinator" is used.
The designated commissioning coordinator may be an independent third-party commissioning professional, a project design team member (e.g. engineer or architect), an owner's engineer or facility staff, contractor or specialty sub-contractor. Methods of evaluating the designated commissioning coordinator and trained personnel include review of the following:

1. Technical knowledge
2. Relevant experience
3. Potential conflict of interest concerns
4. Professional certifications and training
5. Communication and organizational skills
6. Reference and sample work products

Selection of "trained", qualified personnel is required by this Code. In order to meet this requirement, the commissioning provider should be evaluated via the methods discussed above. In addition, various organizations have training and certification programs that may be a source for identification of qualified commissioning providers.

For information about enforcement and compliance of each commissioning element see sections 5.410.2.1 through 5.410.2.7.

See (Part 4) for forms and templates.

1. Owner's Project Requirements

CALGreen Section: 5.410.2.1 Owner's or Owner representative's Project Requirements (OPR). The expectations and requirements of the building appropriate to its phase shall be documented before the design phase of the project begins. This documentation shall include the following:
1. Environmental and Sustainability Goals
2. Energy Efficiency Goals
3. Indoor Environmental Quality Requirements
4. Project program, including facility functions and hours of operation, and need for after hours operation
5. Equipment and Systems Expectations
6. Building Occupant and O&M Personnel Expectations

Intent:
The Owner's Project Requirements (OPR) documents the functional requirements of a project and expectations of the building use and operation as it relates to systems being commissioned. The document describes the physical and functional building characteristics desired by the owner and establishes performance and acceptance criteria. The OPR is most effective when developed during pre-design and used to develop the Basis of Design (BOD) during the design process. The level of detail and complexity of the OPR will vary according to building use, type and systems.

Existing Law or Regulation:
No existing law or regulation. Review local ordinances for any applicable commissioning OPR requirement.

Compliance Method:
Compliance is demonstrated by the owner or owner's representative developing and/or approving the Owner's Project Requirements (OPR) document and can be defined as follows:

1. *Environmental and Sustainability Goals* – Establish environmental project goals and objectives exceeding the code for the project's sustainability which may include:
    a) CALGreen voluntary measures or Tiers sought, or other specific green building rating system or program credits and/or level of certification sought
    b) Specific environmental or sustainability goals such as water efficiency, water reuse, CO2 monitoring, xeriscaping, etc.
2. *Energy Efficiency Goals* – Establish goals and targets affecting energy efficiency which may include:
    a) Overall energy efficiency less than the California Energy Code performance approach energy budget by __%)
    b) Lighting system efficiency (less than the California Energy Code performance approach energy budget by __%)
    c) HVAC equipment efficiency & characteristics
    d) Any other measures affecting energy efficiency desired by owner
        - Building orientation and siting
        - Daylighting
        - Facade, envelope and fenestration
        - Roof
        - Natural ventilation
        - Onsite renewable power generation and net-zero energy use
        - Landscaping and shading
3. *Indoor Environmental Quality Requirements* - For each program space describe indoor environmental requirements including intended use and anticipated schedule
    a) Lighting
    b) Temperature and humidity
    c) Acoustics
    d) Air quality, ventilation and filtration
    e) Desired adjustability of system controls
    f) Accommodations for after-hours use

g) Other owner requirements including natural ventilation, operable windows, daylight, views, etc.

4. *Project Program, Including facility functions and hours of operation, and need for after hours operation* – Describe primary purpose, program and use of proposed project
   a) Building size, number of stories, construction type, occupancy type and number
   b) Building program areas including intended use and anticipated occupancy schedules
   c) Future expandability and flexibility of spaces
   d) Quality and/or durability of materials and building lifespan desired
   e) Budget or operational constraints
   f) Applicable codes
5. *Equipment and Systems Expectations* – Describe the following for each system commissioned:
   a) Level of quality, reliability, equipment type, automation, flexibility, maintenance and complexity desired
   b) Specific efficiency targets, desired technologies, or preferred manufacturers for building systems, acoustics and vibration
   c) Degree of system integration, automation and functionality for controls; i.e., load shedding, demand response, energy management

6. *Building Occupant and O&M Personnel Expectations* – Describe the following:
   a) How building will be operated and by whom
   b) Level of training and orientation required to understand, operate and use the building systems for building operation and maintenance staff, as well as occupants
   c) Building operation and maintenance staff location and capabilities

See (Part 4) for forms and templates.

Enforcement:

At their discretion, the building official confirms demonstrated compliance at *Plan Intake* by:

a) Receipt of a copy of the OPR document, or
b) Receipt of a form signed by the owner or owner representative attesting that the OPR has been completed and approved by the owner.

See (Part 4) for forms and templates.

2. Basis of Design (BOD)

CALGreen Section: 5.410.2.2 Basis of Design (BOD). A written explanation of how the design of the building systems meets the OPR shall be completed at the design phase of the building project, and updated as necessary during the design and construction phases. The Basis of Design document shall cover the following systems:
1. Heating, Ventilation, Air Conditioning (HVAC) Systems and Controls
2. Indoor Lighting System and Controls
3. Water Heating System
4. Renewable Energy Systems
5. Landscape Irrigation Systems
6. Water Reuse Systems

Intent:
The Basis of Design (BOD) describes the building systems to be commissioned and outlines design assumptions not indicated in the design documents. The design team develops the BOD to describe how the building systems design meets the Owner's Project Requirements (OPR), and why the systems were selected. The BOD is most effective when developed early in the project design and updated as necessary throughout the design process.

Existing Law or Regulation:
No existing law or regulation. Review local ordinances for any applicable commissioning BOD requirement.

Compliance Method:
Compliance requires the completion of the BOD document and should include the following where applicable:

1. *Heating, Ventilation, Air Conditioning (HVAC) Systems and Controls*
    a) Provide narrative description of system – system type, location, control type, efficiency features, outdoor air ventilation strategy, indoor air quality features, environmental benefits, other special features.
    b) Describe reasons for system selection – why chosen system is better than alternatives, issues such as comfort, performance, efficiency, reliability, flexibility, simplicity, cost, owner preference, site constraints, climate, maintenance, acoustics
    c) Provide design criteria including the following:
        - Load calculation method/software
        - Summer outdoor design conditions(__°F drybulb and __°F wetbulb)
        - Winter outdoor design conditions (__°F drybulb and __°F wetbulb)
        - Indoor design conditions (__°F drybulb cooling, __%RH cooling; __°F drybulb heating, __%RH heating)
        - Applicable codes, guidelines, regulations and other references used
        - Load calculation assumptions
    d) Sequence of Operations – operating schedules, setpoints, may refer to plans or specifications if sequence indicated within permit documents
    e) Describe how system meets the OPR
2. *Indoor Lighting System and Controls*
    a) Provide narrative description of system – type of fixtures, lamps, ballasts, controls
    b) Describe reason for system selection – why chosen system better than alternatives, issues such as visual comfort, performance, efficiency, reliability, cost, flexibility, owner preference, color rendering, integration with daylighting, ease of control
    c) Provide design criteria for each type of space including the following:
        - Applicable codes, guidelines, regulations and other references used
        - Illumination design targets (footcandles) and lighting calculation assumptions
    d) Provide lighting power design targets for each type of space
        - Title 24 lighting power allowance and lighting power design target (watts/ft^2)
    e) Describe how system meets the OPR
3. *Water Heating System*
    a) Provide narrative description of system – system type, control type, location, efficiency features, environmental benefits, other special features

b) Describe reason for system selection – why chosen system is better than alternatives, issues such as performance, efficiency, reliability, space constraints, cost, utility company incentives, owner preference, ease of maintenance
c) Water heating load calculations
d) Describe how system meets the OPR

4. *Renewable Energy Systems*
   a) Provide narrative description of system – type, performance, control type, energy savings, payback period
   b) Describe reason for system selection – why chosen system is better than alternatives, issues such as performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, utility company incentives, owner preference,
   c) Sequence of Operation – operating schedules, setpoints, storage capacity
   d) Describe how system meets the OPR
5. *Landscape Irrigation Systems*
   a) Provide narrative description of system – type, performance, water usage
   b) Describe reason for system selection – why chosen system is better than alternatives, issues such as performance, efficiency, reliability, flexibility, expandability, cost, owner preference, simplicity
   c) Sequence of Operation – operating schedules, setpoints
   d) Describe how system meets the OPR
6. *Water Reuse Systems*
   a) Provide narrative description of system – type, performance, capacity, reuse purpose
   b) Describe reason for system selection – why chosen system is better than alternatives, issues such as performance, efficiency, reliability, flexibility, expandability, cost, owner preference, simplicity
   c) Sequence of Operation – operating schedules, setpoints
   d) Describe how system meets the OPR

See (Part 4) for forms and templates.

Enforcement:

At their discretion, the building official confirms demonstrated compliance at *Plan Intake* by:

a) Receipt of a copy of the BOD document, or
b) Receipt of a form signed by the architect, engineer or designer of record, attesting that the BOD has been completed and meets the requirements of the OPR.

See (Part 4) for forms and templates.

3. Commissioning measures shown in the construction documents

CALGreen Section: 5.410.2 Commissioning. For new buildings 10,000 square feet and over, building commissioning shall be included in the design and construction processes…. Commissioning requirements shall include:
1. Owner's Project Requirements
2. Basis of Design
3. Commissioning measures shown in the construction documents
4. Commissioning Plan
5. Functional Performance Testing
6. Documentation & Training
7. Commissioning Report

This section provides details for element 3: *Commissioning measures shown in the construction documents.*

Intent:
Include commissioning measures or requirements in the construction documents (plans and specifications). Commissioning measures or requirements should be clear, detailed and complete to clarify the commissioning process.

Existing Law or Regulation:
Title 24 Part 6 requires that specific functional test procedure forms be included in the construction documents. These test forms create a subset of the broader CalGreen commissioning requirements described herein. Review local ordinances for additional applicable requirements.

Compliance Method:
Compliance is achieved by including commissioning requirements in the project specifications. The commissioning specifications should include the following:

1. Primary (and optionally all) commissioning requirements are included in the general specification division (typically Division 1) and clear cross references of all commissioning requirements to and from the general division are included to ensure all subcontractors are held to them
2. A list of the systems and assemblies covered by the commissioning requirements.
3. Roles and responsibilities of all parties including:
   - General contractor and subcontractors, vendors, construction manager
   - Commissioning provider lead
   - Owner, facility staff
   - Architect and design engineers
   - Including the non-contractor parties in the construction specifications is for information only to provide the contractor with context for their work
   - Include who writes checklists and tests, who reviews and approves test forms, who directs tests, who executes tests, who documents test results and who approves completed tests. These roles may vary by system or assembly.
4. Meeting requirements
5. Commissioning schedule management procedures
6. Issue and non-compliance management procedures
7. Requirements for execution and documentation of installation, checkout and start up, including controls point-to-point checks and calibrations
8. Specific testing requirements by system, including:
   - Monitoring and trending
   - Opposite season or deferred testing requirements, functions and modes to be tested
   - Conditions of test
   - Acceptance criteria, and any allowed sampling
   - Include details of the format and rigor of the test forms required to document test execution
   - Including example forms is recommended
9. Submittal review requirements and approval process.
10. Content, authority and approval process of the commissioning plan.
11. Commissioning documentation and reporting requirements.

12. Facility staff training requirements and verification procedures.
13. O&M manual review and approval procedures.
14. System's manual development and approval requirements and procedures.
15. Definitions section.

See (Part 4) for forms and templates.

Enforcement:

At their discretion, the building official confirms demonstrated compliance at *Plan Intake* by:

a) Receipt of a copy of the commissioning specifications, or
b) Receipt of a form signed by the owner or owner representative or designer of record attesting that the owner-approved commissioning specifications are included in the construction documents.

See (Part 4) for forms and templates.

4. Commissioning plan. Prior to permit issuance a commissioning plan shall be completed to document how the project will be commissioned and shall be started.

CALGreen Section: 5.410.2.3 Commissioning plan. Prior to permit issuance a commissioning plan shall be completed to document how the project will be commissioned and shall be started during the design phase of the building project. The Commissioning Plan shall include the following:

1. General project information
2. Commissioning goals
3. Systems to be commissioned**.** Plans to test systems and components shall include:
   a. An explanation of the original design intent
   b. Equipment and systems to be tested, including the extent of tests
   c. Functions to be tested
   d. Conditions under which the test shall be performed
   e. Measurable criteria for acceptable performance
4. Commissioning team Information
5. Commissioning process activities, schedules and responsibilities. Plans for the completion of commissioning requirements listed in Section 5.410.4.4 through 5.410.4.6 shall be included.

Intent:

The Commissioning Plan (Cx Plan) establishes the commissioning process guideline for the project and commissioning team's level of effort by identifying the required Cx activities to ensure that the Owner's Project Requirements (OPR) and the Basis of Design (BOD) are met. The Cx Plan also includes a commissioning schedule from design to occupancy.

Existing Law or Regulation:

No previous existing State of California laws or regulations. Review local county, city or jurisdiction ordinances for any applicable commissioning planning requirements.

Compliance Method:

Compliance is demonstrated by preparation of a project specific Cx Plan that includes the elements listed in the code section above. The following gives guidance for developing the components of the Commissioning Plan:

1. General project information - Provide project identifying information including but not limited to the following:
- -Project Name, Owner, Location,
- -Building type, Building area,
- -Project Schedule
- -Contact information of individual/company providing the commissioning services

2. Commissioning Goals – Document the commissioning goals, including, but not limited to:
- -Meeting CALGreen code requirements for commissioning
- -Meeting OPR and BOD requirements
- -Carrying out requirements for commissioning activities as specified in plans and specifications

3. Systems to be commissioned – See BOD

a. An explanation of the original design intent - Document the performance objectives and design intent for each system listed to be commissioned in a written narrative
- -Refer to the OPR and BOD documents

b. Equipment and systems to be tested, including the extent of tests
- -Provide a list of equipment and systems to be tested
- -Describe the range and extent of tests to be performed for each system component, and interface between systems

c. Functions to be tested - Provide example functional test procedures to identify the level of testing detail required
- -See (section 5.410.2.4) FPT guidance for more information

d. Conditions under which the test shall be performed - Identify the conditions under which the major operational system functions are to be tested, including:
- -Normal operations and part-load operations
- -Seasonal testing requirements
- -Restart of equipment and systems after power loss
- -System alarm confirmations

e. Measurable criteria for acceptable performance - Include measurable criteria for acceptable performance of each system to be tested

4. Commissioning Team Information - Provide a contact list for all Commissioning team members, including but not limited to:

-Owner, owner's representative
-Architect, Engineers
-Designated commissioning representative
-General contractor, sub-contractors, and construction manager

5. Commissioning process activities, schedules and responsibilities

-Establish prescribed commissioning process steps and activities to be accomplished by the Cx team throughout the design to occupancy
-For each phase of the work, define the roles and responsibilities for each member of the Cx team
-List the required Cx deliverables, reports, forms and verifications expected at each stage of the commissioning effort
-Include the confirmation process for the O&M manual, systems manual and the facility operator and maintenance staff training

See (Part 4) for forms and templates.

Enforcement:

At their discretion, the building official confirms demonstrated compliance at *Plan Intake* by:

a) Receipt of a copy of the Commissioning Plan, or
b) Receipt of a form signed by the owner or owner representative attesting that the Cx Plan has been completed.

See (Part 4) for forms and templates.

5. Functional performance testing

CALGreen Section: 5.410.2.4 Functional performance testing. Functional performance tests shall demonstrate the correct installation and operation of each component, system, and system-to-system interface in accordance with the approved plans and specifications. Functional performance testing reports shall contain information addressing each of the building components tested, the testing methods utilized, and include any readings and adjustments made.

Intent:
Develop and implement the functional performance tests to document, as set forth in the Commissioning Plan, that all components, equipment, systems and system-to-system interfaces were installed as specified, and operate according to the Owner's Project Requirements, Basis of Design, and plans and specifications.

The following systems to be functionally tested are listed in the Basis of Design (5.410.2.2 of the Code):

1. Heating, Ventilation, Air Conditioning (HVAC) Systems and Controls
2. Indoor Lighting System and Controls
3. Water Heating System
4. Renewable Energy Systems
5. Landscape Irrigation Systems
6. Water Reuse Systems

Existing Law or Regulation:
Title 24 Acceptance Testing requirements call for functional testing of some systems and equipment required to be commissioned by CALGreen. Refer to Title 24 and Nonresidential Compliance Manual For California's 2008 Energy Efficiency Standards.
http://www.energy.ca.gov/title24/2008standards/nonresidential_manual.html

Note: CALGreen Functional Performance Tests are not intended to replace the Title 24 Section 6 Acceptance Tests. Instead, the T24 acceptance tests, which focus on energy efficiency, can be part of the broader scope of testing forms and procedures required for CALGreen compliance.

Review local ordinances for any applicable requirements.

Compliance Method:
Compliance is demonstrated by developing and implementing test procedures for each piece of commissioned equipment and interfaces between equipment and systems according to the building-specific Commissioning Plan. Tests should include verification of proper operation of all equipment features, each part of the sequence of operation, overrides, lockouts, safeties, alarms, occupied and unoccupied modes, loss of normal power, exercising a shutdown, startup, low load through full load (as much as is possible) and back, staging and standby functions, scheduling, energy efficiency strategies and loop tuning.

Elements of acceptable test procedures include:

1. *Date and Party* -- Identification of the date of the test and the party conducting the test.
2. *Signature Block* **--** Signature of the designated commissioning lead and the equipment installing contractor attesting that the recorded test results are accurate.
3. *Prerequisites* -- Any conditions or related equipment checkout or testing that needs to be completed before conducting this test.
4. *Precautions* -- Identification of the risks involved to the test team members and the equipment and how to mitigate them.
5. *Instrumentation* **--** Listing of the instrumentation and tools necessary to complete the test.
6. *Reference* – In each procedure item, identify the source for what is being confirmed (e.g., sequence of operation ID, operating feature, specification requirement, etc.).
7. *Test Instructions* **--** Step-by-step instructions of how to complete the test, including functions to test and the conditions under which the tests should performed.
8. *Acceptance Criteria* **--** Measurable pass / fail criteria for each step of the test, as applicable.
9. *Results* **--** Expected system response and space to document the actual response, readings, results and adjustments.
10. *Return to Normal* **--** Instructions that all systems and equipment are to be returned to their as-found state at the conclusion of the tests.

11. *Deficiencies* -- A list of deficiencies and how they were mitigated.

See (Part 4) for forms and templates.

Enforcement:

At their discretion, the building official confirms demonstrated compliance during *Onsite Enforcement* by:

a) Receipt of a copy of completed and signed Functional Performance Tests and corrected deficiencies, or

b) Receipt of a form signed by the owner, owner representative or commissioning coordinator attesting that the Functional Performance Tests have been completed and any deficiencies corrected.

See (Part 4) for forms and templates.

6. Documentation and training

CALGreen Section: 5.410.2.5 Documentation and training. A Systems Manual and Systems Operations Training are required, including Occupational Safety and Health Act (OSHA) requirements in California Code of Regulations (CCR), Title 8, Section 5142, and other related regulations.

See sections* 5.410.2.5.1 and 5.410.2.5.2 *below.

CALGreen Section: 5.410.2.5.1 Systems manual. Documentation of the operational aspects of the building shall be completed within the Systems Manual and delivered to the building owner or representative and facilities operator. The Systems Manual shall include the following:
1. Site information, including facility description, history and current requirements.
2. Site contact information
3. Basic operations & maintenance, including general site operating procedures, basic troubleshooting, recommended maintenance requirements, site events log
4. Major systems
5. Site equipment inventory and maintenance notes
6. A copy of all special inspection verifications required by the enforcing agency or this code
7. Other resources and documentation.

Intent:
The Systems Manual documents information focusing on the operation of the building systems. This document provides information needed to understand, operate, and maintain the equipment and systems and informs those not involved in the design and construction of the building systems. This document is in addition to the record construction drawings, documents, and the Operation & Maintenance (O&M) Manuals supplied by the contractor. The Systems Manual is assembled during the construction phase and available during the contractors' training of the facility staff.

Existing Law or Regulation:
No existing law or regulation. Review local ordinances for any applicable Systems manual requirement.

Compliance Method:
Compliance is demonstrated by providing the Systems Manual. The information in the Systems Manual includes the following information:

1. *Site information, including facility description, history and current requirements*
   a) Site Information
      i. Location of property - Address
      ii. Site acreage
      iii. Local utility information
         -Water service provider
         -Natural/LPG gas service provider
         -Electrical service provider
         -Telecommunications service provider
         -Other service providers
   b) Facility Description
      i. Use/Function
      ii. Square footage
      iii. Occupancy Type
      iv. Construction Type
      v. Basis of design
      vi. Location of major systems & equipment
   c) Project History
      i. Project requirements
         -Owner's Project Requirements (OPR)
         -Basis of Design (BOD)
      ii. Project undocumented events

iii. Record Drawings & Documents
iv. Final control drawings and schematics
v. Final control sequences
vi. Construction documents - Location or delivery information
-Mechanical & electrical drawings
-Specifications
-Submittals
-Project change orders and information

d) Current requirements
i. Building operating schedules
ii. Space temperature, humidity, & pressure, CO2 setpoints
iii. Summer and winter setback schedules
iv. Chilled & hot water temperatures
v. As-built control setpoints and parameters

2. *Site contact information*
a) Owner information
b) Emergency contacts
c) Design Team: Architect, Mechanical, Engineer, Electrical Engineer, etc.
d) Prime Contractor contact information
e) Subcontractor information
f) Equipment supplier contact information

3. *Basic operation & maintenance, including general site operating procedures, basic trouble shooting, recommended maintenance requirements site events log*

a) Basic operation
i. Written narratives of basic equipment operation
ii. Interfaces, interlocks and interaction with other equipment and systems
iii. Initial maintenance provide by contactor

b) General site operating procedures
i. Instructions for changes in major system operating schedules
ii. Instructions for changes in major system holiday & weekend schedules

c) Basic troubleshooting
i. Cite any recommended troubleshooting procedures specific to the major systems and equipment installed in the building.
ii. Manual operation procedures
iii. Standby/Backup operation procedures
iv. Bypass operation procedures
v. Major system power fail resets and restarts
vi. Trend log listing

d) Recommended maintenance events log
i. HVAC air filler replacement schedule & log
ii. Building control system sensor calibration schedule & log

e) Operation & Maintenance Manuals - Location or delivery information

4. *Major systems*
a) HVAC systems & controls
i. Air conditioning equipment (chillers, cooling towers, pumps, heat exchanges, thermal energy storage tanks, etc)
ii. Heating equipment (boilers, pumps, tanks, heat exchanges, etc.)
iii. Air distribution equipment (fans, terminal units, accessories, etc.)
iv. Ventilation equipment (fans, accessories, and controls)
v. Building automation system (workstation, servers, panels, variable frequency drives, local control devices, sensors, actuators, thermostats, etc.)

b) Indoor lighting systems & controls
i. Lighting control panels
ii. Occupancy sensors
iii. Daylight harvesting systems

c) Renewable energy systems
i. Photovoltaic panels & inverters
ii. Wind powered electrical generators & inverters

d) Landscape irrigation systems
i. Water distribution diagrams
ii. Control system

e) Water reuse systems

i. Reclaimed water system for indoor use
ii. Reclaimed water for irrigation use

5. *Site equipment inventory and maintenance notes*
   a) Spare parts inventory
   b) Frequently required parts and supplies
   c) Special equipment required to operate or maintain systems
   d) Special tools required to operate or maintain systems

6. *A copy of all special inspection verifications required by the enforcing agency of this code*
7. *Other resources and documentation*

See (Part 4) for forms and templates.

Enforcement:

At their discretion, the building official confirms demonstrated compliance during *Onsite Enforcement* by:

a. Receipt of a copy of the Systems Manual, or
b. Receipt of a form signed by the owner or owner representative attesting that the System's Manual has been completed.

See (Part 4) fort forms and templates.

CALGreen Section: 5.410.2.5.2 Systems operations training. The training of the appropriate maintenance staff for each equipment type and/or system shall be documented in the commissioning report and shall include the following:
1. System/equipment overview (what it is, what it does and with what other systems and/or equipment it interfaces)
2. Review and demonstration of servicing/preventive maintenance
3. Review of the information in the Systems Manual
4. Review of the record drawings on the system/equipment

Intent:
The systems operation training verifies that a training program is developed to provide training to the appropriate maintenance staff for each equipment type and/or system and that this training program is documented in the commissioning report. The systems operations training program is specified in the project specifications for the major systems listed. The System Manual, Operation and Maintenance (O&M) documentation, and record drawings are prepared and available to the maintenance staff prior to implementation of any training or the development of a written training program. The training program is to be administered when the appropriate maintenance staff is made available to receive training.

Existing Law or Regulation:
No existing law or regulation. Review local ordinances for any applicable Systems Operation Training requirement.

Compliance Method:
The written training program includes: (a) learning goals and objectives for each session, (b) training agenda, topics, and length of instruction for each session, (c) instructor information and qualifications, (d) location of training sessions (onsite, off-site, manufacturer's or vendor's facility), (e) attendance forms, (f) training materials, and (g) description on how the training will be archived for future use.

1. *Systems/equipment overview*
    a) Review OPR and BOD related to the major systems and equipment
    b) Describe system type and configuration
    c) Explain operation all major systems and equipment and how it interfaces with other systems and equipment
    d) Describe operation of critical devices, controls and accessories
    e) Review location of the major systems and equipment
    f) Describe operation of control system for each system, location of critical control elements, and procedures to properly operate control system
    g) Review recommendations for implementation to reduce energy and water use
2. *Review and demonstration of servicing/preventive maintenance*
    a) Explain location or delivery contact of the Operation & Maintenance manuals
    b) Review of all manufacturer's recommended maintenance activities to maintain warranty
    c) Review and demonstrate frequent maintenance activities (air filter replacement, lubrication, fan belt inspection and/or replacement, condenser water treatment, etc.), and suggested schedule.
    d) Review and demonstrate typical servicing procedures and techniques (electrical current, pressure, and flow readings, etc; calibration procedures, point trending, power fail restart procedures, etc.)
    e) Locate, observe and identify major equipment, systems, accessories and controls
    f) Review emergency shut-offs and procedures
3. *Review of the information in the Systems Manual*
    a) Describe use of System Manual
    b) Review elements of System Manual
    c) Explain how to update and add revisions to System Manual

4. *Review record drawings on the systems/equipment*
    a) Explain location or delivery contact of the record drawings
    b) Review record drawings, revisions, and changes to original design drawings.
    c) Review equipment schedules and compare with actual installed systems

See (Part 4) for forms and templates.

Enforcement:

At their discretion, the building official confirms demonstrated compliance during *Onsite Enforcement* by:

1. In the event appropriate maintenance staff is made available to receive training for each equipment type and/or system installed in the building.

    a. Receipt of a copy of the written training program and completed attendance forms, or
    b. Receipt of a form signed by the owner or owner representative attesting that the training program and delivery of training has been completed

2. In the event appropriate maintenance staff are unavailable to receive training for each equipment type and/or system installed in the building.

    a. Receipt of a copy of the training program provided to the owner or owner's representative, or
    b. Receipt of a form signed by the owner or owner representative attesting that the written training program has been provided.

See (Part 4) for forms and templates.

7. Commissioning report

CALGreen Section: 5.410.2.6 Commissioning report. A complete report of commissioning process activities undertaken through the design, construction and reporting recommendations for post-construction phases of the building project shall be completed and provided to the owner or representative.

Intent:
The Commissioning Report documents the commissioning process and test results. The report includes confirmation from the commissioning agent verifying that commissioned systems meet the conditions of the Owner's Project Requirements (OPR), Basis of Design (BOD), and Contract Documents.

Existing Law or Regulation:
No existing law or regulation. Review local ordinances for any applicable Commissioning Report requirement.

Compliance Method:
The Components of the Commissioning Report include the following and are defined as follows:

1. Executive summary of process and results of commissioning program – including observations, conclusions and any outstanding items.
2. History of any system deficiencies and how resolved
   a) Include outstanding deficiencies and plans for resolution
   b) Include plans for seasonal testing scheduled for a later date
3. System performance test results and evaluations
4. Summary of training process completed and scheduled
5. Attach commissioning process documents
   a) Commissioning Plan
   b) Owners Project Requirements (OPR)
   c) Basis of Design (BOD)
   d) Executed installation checklists
   e) Executed Functional Performance Test (FPT) forms
   f) Recommendations for end-of-warranty review activities

See (Part 4) for forms and templates.

Enforcement:
At their discretion, the building official confirms demonstrated compliance during *Onsite Enforcement* by:

a) Receipt of a copy of the Commissioning Report, or
b) Receipt of a form signed by the owner or owner representative attesting that the Cx Report has been completed.

See (Part 4) for forms and templates.

CALGreen Section: 5.410.4 Testing and adjusting. Testing and adjusting of systems shall be required for buildings less than 10,000 square feet.
5.410.4.2 Systems. Develop a written plan of procedures for testing and adjusting systems. Systems to be included for testing and adjusting shall include at a minimum, as applicable to the project:

1. HVAC systems and controls
2. Indoor and outdoor lighting and controls
3. Water heating systems
4. Renewable energy systems
5. Landscape irrigation systems
6. Water reuse systems.

5.410.4.3 Procedures. Perform testing and adjusting procedures in accordance with industry best practices and applicable standards on each system as determined by the building official.
5.410.4.3.1 HVAC balancing. In addition to testing and adjusting, before a new space-conditioning system serving a building or space is operated for normal use, the system shall be balanced in accordance with the procedures defined by the Testing Adjusting and Balancing Bureau National Standards; the National Environmental Balancing Bureau Procedural Standards; or Associated Air Balance Council National Standards or as approved by the building official.
5.410.4.4 Reporting. After completion of testing, adjusting and balancing, provide a final report of testing signed by the individual responsible for performing these services.
5.410.4.5 Operation and maintenance (O & M) manual. Provide the building owner or representative with detailed operating and maintenance instructions and copies of guaranties/warranties for each system. O & M instructions shall be consistent with OSHA requirements in CCR, Title 8, Section 5142, and other related regulations.
5.410.4.5.1 Inspections and reports. Include a copy of all inspection verifications and reports required by the enforcing agency.

Intent:
For construction projects less than 10,000 square feet testing and adjusting the building systems can ensure maximum efficiency of the equipment operation as well improve the indoor air quality for occupants. Additionally, testing and adjusting building system can prolong the life of the systems and maximize the equipment intended design parameters.

Existing Law or Regulation:
There is **NO** current law or regulation for this code provision.

Compliance Method:
Design Team: Specify the systems in the project to be tested and adjusted; the testing team members and their qualifications, and the procedures, including those recommended by the manufacturer, as well as the report forms to be used in testing and adjusting.

Contractor: Maintain evidence of the qualifications of the testing and adjusting team and install the specified building systems in accordance with the plans and specifications. Examine systems for functional deficiencies that cannot be adjusted and report deficiencies discovered before and during testing and adjusting.
Prepare a testing and adjusting plan with step by step procedures and perform testing and adjusting of systems according to those procedures. Remedy any deficiencies that are discovered during testing. For HVAC systems use the balancing procedures defined by the organizations listed in the regulations, and perform additional testing and balancing as required to verify that balanced conditions are being maintained.
Complete testing and adjusting reports as required.
Prepare the O & M manual for turning over to the owner to encourage proper maintenance and optimum performance of the systems after Certificate of Occupancy.

Enforcement:
Plan Intake: Confirm that the testing and adjusting requirements are specified for the applicable building systems.

On-Site Enforcement: The inspector will collect copies of the testing, adjusting and balancing reports after all functional testing has been completed.

Part 4 – Suggested Forms and Templates

CALGreen Compliance Template- Owner's Project Requirements (OPR)

DRAFT CALGreen Std. BSC-5.4-X 10-08-10

[The Owner's Project Requirements (OPR) is a step of commissioning required for compliance with the 2010 CALGREEN Code, section 5.410.2.1, for newly constructed buildings greater than 10,000 sq. ft. This template is a guide to collecting the information recommended for the OPR. The information should be developed by the project team in collaboration with the Owner.]

Owner and User Requirements

a) [Typically already covered in Project Scope as described in the building program. Includes primary purpose, program and use of project. May also describe future expansion needs, flexibility, quality of materials, construction and operation costs.]

Environmental and Sustainability Goals

a) Project shall meet performance requirements required by the owner.
b) Other Owner requirements: *[e.g. Owner priorities among CALGREEN Code or other areas]*

Energy Efficiency Goals

a) Project shall comply with Title 24 building energy efficiency standards, or achieve increased level of efficiency determined by owner.
b) Lighting systems offer cost effective energy savings potential, and lighting fixtures and/or controls shall be selected to exceed Title 24 minimum efficiency requirements by level determined by owner.
c) High efficiency HVAC equipment offers cost effective energy savings, and HVAC equipment shall be selected that exceeds Title 24 minimum efficiency requirements by level determined by owner.
d) Additional energy efficiency measures that provide cost effective energy savings shall be included wherever feasible.
e) Other Owner requirements: *[e.g. orientation, siting, daylighting, cool roof, natural ventilation, landscaping]*

Indoor Environmental Quality Requirements

a) Indoor lighting requirements: *[List any specific non-standard requirements. E.g. pendant-mounted lighting, illumination requirements, special applications.]*
b) Occupant lighting control requirements: *[List any non-standard requirements. E.g. multi-mode controls for assembly spaces]*
c) Thermal comfort requirements: *[List any non-standard temperature or humidity requirements]*
d) Ventilation and filtration requirements: *[List any non-standard requirements]*

e) Occupancy HVAC control requirements: *[List any non-standard requirements. E.g. integration with existing control systems]*

f) Acoustic environment requirements: *[List any non-standard requirements. E.g. local noise sources requiring mitigation, spaces such as classrooms that require low background noise and short reverberation times]*

g) Other Owner requirements: *[E.g. natural ventilation, operable windows, daylight, views]*

Equipment and Systems Expectations

a) Special HVAC equipment requirements: *[E.g. equipment type, quality, reliability, efficiency, control system type, preferred manufacturers, maintenance requirements]*

b) Unacceptable HVAC system types or equipment: *[List if applicable]*

c) Special lighting equipment requirements: *[E.g. list preferred lamp and ballast types that comply with Owner standards if applicable]*

d) Other system requirements:

Building Occupant and O&M Personnel Expectations

Day-to-day HVAC operation by: *[occupants, operating staff]*

Periodic HVAC maintenance performed by: *[building occupants, operating staff, service company, Owner staff, other]*

Lighting system maintenance will be performed by: *[building occupants, operating staff, service company, Owner staff, other]*

Training required for building occupants: *[e.g. demonstration, instruction documents]*

Training required for operating and maintenance staff: *[e.g. demonstration, classroom training, instruction documents]*

Other Owner requirements:

CALGreen Compliance Form- Owner's Project Requirements (OPR)	DRAFT CALGreen Std. BSC-5.4-X 10-08-10

The following form may be required to be printed on the permit set of construction drawings or submitted separately. Italicized text indicates direct or partial quotes from the CALGreen Code.

CALGreen Commissioning Requirement 5.410.2.1-Owner's Project Requirements (OPR)

5.410.2.1 Owner's Project Requirements (OPR). The expectations and requirements of the building appropriate to its phase shall be documented before the design phase of the project begins. The OPR includes the checked elements listed below and have been approved by the Owner or Owner Representative.

	OPR Elements	**Included**
1.	Environmental and Sustainability Goals.	☐
2.	Energy Efficiency Goals.	☐
3.	Indoor Environmental Quality Requirements.	☐
4.	Project program, including facility functions and hours of operation, and need for after hours operation.	☐
5.	Equipment and Systems Expectations.	☐
6.	Building Occupant and O&M Personnel Expectations.	☐

_____ _____

Owner / Owner Representative Signature Date

CALGreen Compliance Template- Basis of Design (BOD)	DRAFT CALGreen Std. BSC-5.4-X 10-08-10

[Documentation of the Basis of Design (BOD) is a step required for compliance with 2010 CALGREEN Code, section 5.410.2.1, for newly constructed buildings greater than 10,000 sq. ft. This template is a guide for use by the design team.]

1. HVAC System

1.1. Narrative Description of System

A. [System type(s), location, control type, efficiency features, outdoor air ventilation strategy, indoor air quality features, noise reduction features, environmental benefits, other special features]

B. [Describe how system meets any special requirements listed in the Owner's Project Requirements document.]

1.2. Reasons for System Selection

A. [Reasons that the selected system is a better choice than alternatives. E.g. comfort performance, efficiency, reliability, flexibility, simplicity, cost, owner preferences, site constraints, climate, availability of maintenance, acoustics]

1.3. Load Calculations

A. Load calculation method/software: _____

B. Summer outdoor design conditions: __°F drybulb, __°F wetbulb

C. Winter outdoor design conditions: __°F drybulb

D. Indoor design conditions: __°F, __%RH cooling; __°F heating

E. Internal heat gain assumptions:

Space	Lighting Load	Plug Load	Occupant Load	Infiltration Load	Other:

F. Calculated cooling loads and system size:

System/ Air Handler ID	Calculated Peak Cooling Load	Selected System Cooling Capacity	Reasons for difference between calculated load and selected system capacity

G. Other load calculation assumptions:

1.4. Sequence of Operations

A. [Operating schedules, setpoints, etc. May refer to plans and/or specifications if sequence of operations is included there.]

2. Indoor Lighting System

2.1. Narrative Description of System

A. Fixture type(s)

B. Lamp and ballast type

C. Control type

D. [Describe how system meets any special requirements listed in the Owner's Project Requirements document.]

2.2. Reasons for System Selection

A. [Reasons that the selected lighting system is a better choice than alternatives. E.g. visual comfort performance, efficiency, reliability, flexibility, simplicity, cost, owner preferences, color rendering, integration with daylighting, ease of maintenance, etc.]

2.3. Lighting Design Criteria

Space ID	Space Type	Illumination Design Target (footcandles)	Source of Target (e.g. IES Standard, Owner Requirement)	Other Lighting Design Criteria: [e.g. CRI, CCT]

2.4. Lighting Power Design Targets

Space Type	Title 24 Lighting Power Allowance (watts/ft^2)	Lighting Power Design Target (watts/ft^2)

3. Water Heating System

3.1. Narrative Description of System

A. [System type(s), location, control type, efficiency features, environmental benefits, other special features]

B. [Describe how system meets any special requirements listed in the Owner's Project Requirements document.]

3.2. Reasons for System Selection

A. [Reasons that the selected water heating system is a better choice than alternatives. E.g. performance, efficiency, reliability, simplicity, space constraints, cost, owner preferences, ease of maintenance, utility company incentives, etc.]

3.3. Water Heating Load Calculations

A. [Describe sizing calculation method, assumptions, and results]

4. Renewable Energy Systems

4.1. Narrative Description of System

A. [System type(s), location, inverter type, control type, performance, efficiency, energy savings, payback period]

B. [Describe how system meets any special requirements listed in the Owner's Project Requirements document.]

4.2. Reasons for System Selection

A. [Reasons that the selected renewable energy systems are a better choice than alternatives. E.g. performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, utility company incentives, owner preference, space constraints, cost, owner preferences, ease of maintenance, etc.]

4.3. Renewable Energy System Generation Calculations

A. [Describe sizing calculation method, assumptions, and results]

5. Landscape Irrigation Systems

5.1. Narrative Description of System

A. [System type(s), location, control type, performance, efficiency, water savings]

B. [Describe how system meets any special requirements listed in the Owner's Project Requirements document.]

5.2. Reasons for System Selection

A. [Reasons that the selected landscape irrigation systems are a better choice than alternatives. E.g. performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, utility company incentives, owner preference, cost, owner preferences, ease of maintenance, etc.]

5.3. Landscape Irrigation System Calculations

A. [Describe sizing calculation method, assumptions, and results]

6. Water Reuse Systems

6.1. Narrative Description of System

A. [System type(s), location, space requirements, equipment requirements, control type, performance, efficiency, potable water savings, payback period]

B. [Describe how system meets any special requirements listed in the Owner's Project Requirements document.]

6.2. Reasons for System Selection

A. [Reasons that the selected water reuse systems are a better choice than alternatives. E.g. performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, utility company incentives, owner preference, space constraints, cost, owner preferences, ease of maintenance, etc.]

6.3. Water Reuse System Calculations

[Describe sizing calculation method, assumptions, and results]

CALGreen Compliance Form- **Commissioning Measures in the Construction Documents**	**DRAFT** **CALGreen** **Std. BSC-5.4-X** **10-08-10**

The following form may be required to be printed on the permit set of construction drawings or submitted separately. Italicized text indicates direct or partial quotes from the CALGreen Code.

CALGreen Commissioning Requirement 5.410.2-Commissioning Measures in the Construction Documents

5.410.2. Commissioning measures shall be shown in the construction documents. The commissioning measures shown in the construction documents include the checked elements listed below and have been approved by the Owner, Owner Representative or Designer of record.

	Commissioning Measure Elements	**Included**
1.	Measures shown in the specifications and cross referenced	☐
2.	List of commissioned equipment and systems	☐
3.	Cx roles and responsibilities of all parties	☐
4.	Meeting requirements	☐
5.	Commissioning schedule management procedures	☐
6.	Procedures for addressing outstanding issues or non-compliance	☐
7.	Requirements for execution and documentation of installation and equipment start up	☐
8.	Specific testing requirements for each system type1	☐
9.	Submittal review and approval requirements	☐
10.	Contents and approval process of the commissioning plan	☐
11.	Cx documentation and reporting requirements	☐
12.	Facility staff training requirements and verification procedures	☐
13.	O&M manual review and approval procedures	☐
14.	Systems manual development and approval procedures	☐
15.	Definitions	☐

1These are not the detailed step-by-step test procedures, but are lists of features, elements, modes and conditions of tests for specific equipment.

_____ _____

Owner / Owner Representative or Designer of Record Signature

Date

CALGreen Compliance Form- **Commissioning Plan**	**DRAFT** **CALGreen** **Std. BSC-5.4-X** **10-08-10**

The following form may be required to be printed on the permit set of construction drawings or submitted separately. Italicized text indicates direct or partial quotes from the CALGreen Code.

CALGreen Commissioning Requirement 5.410.2.3-Commissioning Plan

5.410.2.3 Prior to permit issuance a commissioning plan shall be completed to document how the project will be commissioned and shall be started during the design phase of the building project. The commissioning plan includes the checked elements listed below and has been approved by the Owner or Owner Representative.

	Commissioning Plan Elements	**Included**
1.	General project information	☐
2.	Commissioning goals	☐
4.	An explanation of original design intent	☐
5.	Equipment and systems to be commissioned and tested, including extent of tests	☐
6.	Functions to be tested and conditions of tests1	☐
7.	Measurable performance criteria	☐
8.	Cx team information	☐
9.	Cx activities, schedules and responsibilities	☐

1These are not the detailed step-by-step test procedures, but are lists of features, elements, modes and conditions of tests for specific equipment.

_____ _____

Owner / Owner Representative Signature Date

CALGreen Compliance Form- **Functional Performance Testing**	**DRAFT** **CALGreen** **Std. BSC-5.4-X** **10-08-10**

Italicized text indicates direct or partial quotes from the CALGreen Code.

CALGreen Commissioning Requirement 5.410.2.4-Functional Performance Testing

5.410.2.4 Functional performance tests shall demonstrate the correct installation and operation of each component, system, and system-to-system interface in accordance with the approved plans and specifications. Functional performance testing reports shall contain information addressing each of the building components tested, the testing methods utilized, and include any readings and adjustments made. Test forms have been developed for each piece of commissioned equipment and system and include the checked elements listed below. These tests have been executed with deficiencies corrected.

	Functional Test Elements	**Included**
1.	Date and parties participating	☐
2.	Signature block attesting test is complete and accurate	☐
3.	Prerequisites	☐
4.	Precautions	☐
5.	Instrumentation required	☐
6.	Reference to the source of what is being confirmed (sequences, packaged features, etc.)	☐
7.	Detailed step-by-step test instructions	☐
8.	Acceptance criteria	☐
9.	Results	☐
10.	Confirmation of returning to normal	☐
11.	Deficiency list	☐

_____ _____

Cx Coordinator Signature Date

CALGreen Compliance Form- **Systems Manual**	**DRAFT** **CALGreen** **Std. BSC-5.4-X** **10-08-10**

Italicized text indicates direct or partial quotes from the CALGreen Code.

CALGreen Commissioning Requirement 5.410.2.5.1 Documentation and Training-Systems Manual

5.*410.2.5.1 Systems Manual. Documentation of the operational aspects of the building shall be completed within the Systems Manual and delivered to the building owner or representative and facilities operator. The Systems Manual includes the checked elements listed below.*

	System Manual Elements	**Included**
1.	Site information including facility description, history and current requirements	☐
2.	Site contact information	☐
3.	Basic operations and maintenance and troubleshooting	☐
4.	Systems covered include major systems listed under the BOD.	☐
5.	Site equipment inventory and maintenance notes	☐
6.	Special inspection verifications	☐
7.	Other resources and documentation	☐

_____ _____

Owner or Owner Representative Signature Date

CALGreen Compliance Form- **Training**	**DRAFT** **CALGreen** **Std. BSC-5.4-X** **10-08-10**

Italicized text indicates direct or partial quotes from the CALGreen Code.

CALGreen Commissioning Requirement 5.410.2.5.2 Documentation and Training-Training

5.410.2.5.2 Systems Operations Training. The training of the appropriate maintenance staff for each equipment type and/or system shall be documented in the commissioning report. The written training program includes the checked elements listed below.

	Training Program Elements	**Included**
1.	System/equipment overview (what it is, what it does and with what other systems and/or equipment it interfaces)	☐
2.	Review and demonstration of servicing & preventive maintenance	☐
3.	Review of the information in the Systems Manual	☐
4.	Review of the record drawings on the system/equipment	☐

The Owner or Owner Representative attest that when the appropriate maintenance staff are made available prior to certificate of occupancy that the written training program was executed with these staff. Or, that if appropriate maintenance staff are not available, that the written training program was submitted and approved by the Owner or Owner Representative.

_____ _____

Owner or Owner Representative Signature Date

CALGreen Compliance Form- **Commissioning Report**	**DRAFT** **CALGreen** **Std. BSC-5.4-X** **10-08-10**

Italicized text indicates direct or partial quotes from the CALGreen Code.

CALGreen Commissioning Requirement 5.410.2.6-Commissioning Report

5.410.2.6 Commissioning Report. A complete report of commissioning process activities undertaken through the design, construction and reporting recommendations for post-construction phases of the building project shall be completed and provided to the owner or representative. The commissioning report includes the checked elements listed below and has been approved by the Owner or Owner Representative.

	Commissioning Report Elements	**Included**
1.	Executive summary with conclusions and outstanding issues	☐
2.	History of system deficiencies and resolution	☐
3.	Summary of system functional test results	☐
4.	Summary of training completion	☐
5.	Attachments of Commissioning plan, OPR, BOD, executed (filled in) installation checklists, executed functional tests, recommendations for end-of-warranty review	☐

_____ _____

Owner / Owner Representative Signature Date

Appendix A: Commissioning Project Sample(s) and Additional Forms and Templates

This appendix is supplemental to the Guide to the California Green Building Standards Code – Non-Residential (Commissioning), and is intended to provide additional resources for commissioning.

1. Commissioning sample project(s):
   http://www.documents.dgs.ca.gov/bsc/CALGreen/CX-SAMPLE-PROJECT.pdf

2. Commissioning sample Performance and Functional Testing (FPT) Template:
   http://www.documents.dgs.ca.gov/bsc/CALGreen/FTP-SAMPLE-TEMPLATE.pdf

Appendix B: Additional Commissioning Resources

This appendix is supplemental to the Guide to the California Green Building Standards Code – Non-Residential (Commissioning), and is intended to provide additional resources for commissioning.

Building Commissioning Cost Benefit Assessment report by the Lawrence Berkeley National Laboratory
http://cx.lbl.gov/2009-assessment.html

California Commissioning Collaborative
http://cacx.org