GUIDE TO THE 2013 CALIFORNIA GREEN BUILDING STANDARDS CODE NONRESIDENTIAL

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GUIDE TO THE 2013 CALIFORNIA GREEN BUILDING STANDARDS CODE (NONRESIDENTIAL)

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The BSC's mission is to produce sensible and usable state building standards and administrative regulations that implement or enforce those standards.

The BSC:

- Assists state agencies in producing high-quality amendments.
- Works to repeal unnecessary building regulations and see that ambiguous regulations are more clearly written.
- Assists various constituents and special interest groups in making their needs known to various code-writing departments.
- Administers a public appeal process.
- Educates the public about the state's building code, and helps them to understand and comply with it.
- Ensures a high-quality *California Code of Regulations*, Title 24, with minimal errors.

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Preface

This guide is developed and distributed by the California Building Standards Commission to provide guidance and enhance the code user's understanding of mandatory and voluntary measures for nonresidential applications in the 2013 *California Green Building Standards Code*. The *California Green Building Standards Code* is Part 11 of the *California Code of Regulations*. Part 11 is also known as the *CALGreen Code*. The contents of this guide will provide information as to the application and use of the *California Green Building Standards Code*. It is critical to understand that this code is enforceable throughout California and applies to most new building design and construction beginning on January 1, 2014. Even prior to the development of this guide, the Commission staff conducted introductory training throughout California in recognition of the critical importance of the new requirements meant to encourage green building design and green construction practices.

This guide should be helpful, but it is not a substitute for studying the code itself. An online version of the *CALGreen Code* is available through the California Building Standards Commission website: http://www.bsc.ca.gov/. See page 4 of this guide for information on how to purchase the *CALGreen Code*, other individual parts of Title 24 or the entire 13-part set. The California Building Standards Commission issues updated editions of this guide. This update includes changes that were made during the 2012 Code Adoption Cycle to clarify and amend both mandatory and voluntary standards for the 2013 *CALGreen Code*. The 2013 *CALGreen Code* goes into effect on January 1, 2014. To be certain you have the most recent edition, check the date shown on the cover against the edition date to be shown on the California Building Standards Commission website.

Written comments and suggestions regarding this guide are welcomed in order to make future editions more effective. Address written comments and suggestions to:

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Sacramento, CA 95833

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Executive Summary

The *2013 California Green Building Standards Code* is a code with mandatory and/or voluntary requirements for new residential and nonresidential buildings (including buildings for retail, office, public schools and hospitals) throughout California. As of July 1, 2012, some mandatory requirements were extended to certain nonresidential additions and alterations. The code is Part 11 of the *California Building Standards Code* in Title 24 of the *California Code of Regulations* and is also known as the *CALGreen Code*. In short, the code is established to reduce construction waste, make buildings more efficient in the use of materials and energy and reduce environmental impact during and after construction.

It is essential that local government recognize this relatively new code and take steps to ensure that building department personnel are properly trained to carry out enforcement activities. In particular, building department personnel performing plan examinations and building inspections are those who will be primarily responsible for enforcing the code. Chapter 7 of the *CALGreen Code* provides a guideline for minimum inspector qualification criteria. Builders and design professionals will be required to incorporate features within the design of buildings and site preparation in order to meet the new requirements. Plans and specifications will need to be supplemented by documentation of conformance with the *CALGreen Code*. The *CALGreen Code* contains requirements for construction site selection, storm water control during construction, construction waste reduction, indoor water use reduction, material selection, natural resource conservation, site irrigation conservation and more.

The code provides certain options or exceptions allowing the designer to determine how best to achieve compliance for a given site or building condition. The code also requires building commissioning, which is a process for the verification that all building systems, such as heating and cooling equipment and lighting systems, are functioning at their maximum efficiency.

State law in *Health and Safety Code* Sections 17958.5 and 18941.5(b) allows a city, county, or city and county to adopt more restrictive green building standards than those provided in the *CALGreen Code*. Such local standards along with a finding of need based on local climatic, geological or topographical conditions must be filed with the California Building Standards Commission to become effective. Requirements for filing local ordinances establishing more restrictive green building require-

ments are explained in Section 101.7 of the *CALGreen Code*. Otherwise, the *CALGreen Code* is effective throughout the state.

This guide was developed as a means for providing an introduction to the *CALGreen Code*. The technical information in Parts 2, 3 and 4 pertain to buildings that are subject to adoptions by the California Building Standards Commission as explained on page 20 of this guide. In-depth study of the *CALGreen Code* is recommended in order for design professionals, builders and code enforcement personnel to become proficient. Other sources of information and training may include the following organizations:

- Department of Housing and Community Development (http://www.hcd.ca.gov/codes/)
- Division of the State Architect (http://www.dsa.dgs.ca.gov/default.htm)
- Office of Statewide Health Planning and Development (http://www.oshpd.ca.gov/)
- CALBO- California Building Officials (http://www.calbo.org)
- International Code Council, local chapters (http://www.iccsafe.org)
- Green Technology (http://www.green-technology.org/)
- California Building Industry Association (http://www.cbia.org/go/cbia/)
- American Institute of Architects (http://www.aia.org/index.htm)

PART

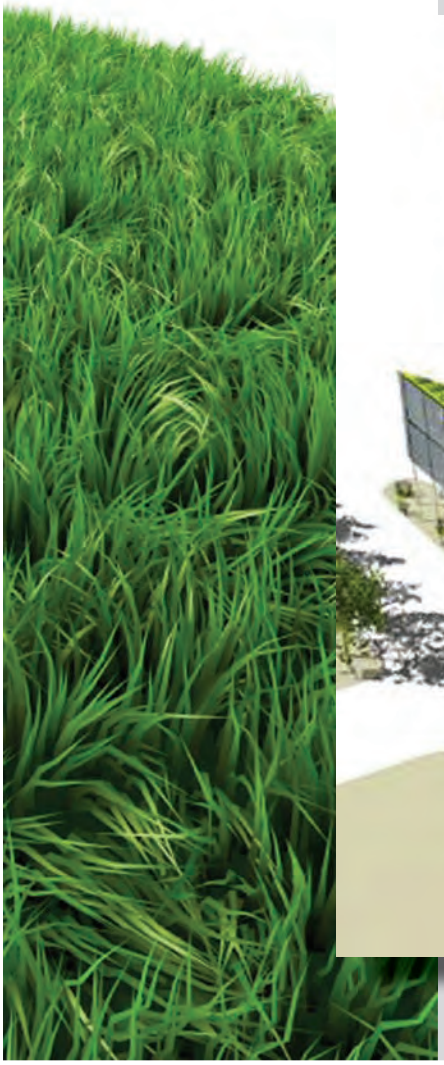
1

Introduction and Application

Introduction to the *CALGreen Code*

Identifying Requirements for Specific Buildings

Introduction of the Chapters in the *CALGreen Code*



Introduction to the *CALGreen Code*

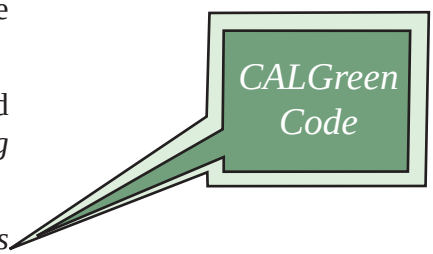
The location of the *CALGreen Code*

The *CALGreen Code* is Part 11 of the *California Building Standards Code* in Title 24 of the California Code of Regulations. The full name of Part 11 is the *California Green Building Standards Code*, but in short it is known as the *CALGreen Code*, or just CALGreen.

On January 1, 2011, the 2010 edition of the *CALGreen Code* went into effect throughout California. The 2008 edition, the first edition of the *CALGreen Code*, contained only voluntary standards. The current 2013 edition contains both mandatory and voluntary standards applying to the design and construction of buildings and construction site management. The organization of the 2013 edition of the *California Building Standards Code* in Title 24 is:

- Part 1, *California Building Standards Administrative Code*;
- Part 2, Volumes 1 and 2, which is named the *California Building Code* and is based on the 2012 *International Building Code*® (IBC®);

- Part 2.5, which is named the *California Residential Code* and is based on the 2012 *International Residential Code*® (IRC®);
- Part 3, which is named the *California Electrical Code* and is based on the 2011 *National Electrical Code*®;
- Part 4, which is named the *California Mechanical Code* and is based on the 2012 *Uniform Mechanical Code*® (UMC®);
- Part 5, which is named the *California Plumbing Code* and is based on the 2012 *Uniform Plumbing Code*® (UPC®);
- Part 6, which is named the *California Energy Code*;
- Part 7, currently vacant;
- Part 8, which is named the *California Historical Building Code*;
- Part 9, which is named the *California Fire Code* and is based on the 2012 *International Fire Code*® (IFC®);
- Part 10, which is named the *California Existing Building Code* and is based on provisions from the 2012 *International Existing Building Code*® (IEBC®);
- Part 11, which is named the *California Green Building Standards Code*;
- Part 12, which is named the *California Referenced Standards Code.*



The *California Code of Regulations* contains regulations adopted by various state departments, boards and commissions, under the authority provided in state law. The *California Code of Regulations* is divided into 28 separate titles: Titles 1 through 28. State law requires that buildings throughout California are designed, constructed and maintained in compliance with state regulations, known as building standards, published in Title 24 of the *California Code of Regulations* by the California Building Standards Commission.

Much of Title 24 is available through the website of the California Building Standards Commission at http://www.bsc.ca.gov/ . To learn more about the *California Building Standards Code* in Title 24, including its organization, application and proper use, visit the following California Building Standards Commission website link: http://www.documents.dgs.ca.gov/bsc/Title_24/Guide-to-Title-24-2013.pdf. You may print this document for study or staff training purposes. You may read more about the history of Title 24 by selecting the "About Us" tab and the history link.

To purchase any Part of Title 24, or the entire set of the 13 parts, there are several vendors including, but not limited to:

- ICC (http://www.iccsafe.org/Store)
- IAPMO (http://www.iapmostore.org/)
- California Book Express (http://www.constructionbook.com)
- BNI Books (http://www.bnibooks.com)
- NFPA (http://www.nfpa.org)

The purpose of the *CALGreen Code*

The development of the *CALGreen Code* is intended to (1) reduce greenhouse gas emissions from buildings; (2) promote environmentally responsible, cost-effective, healthier places to live and work; (3) reduce energy and water consumption; and (4) respond to the directives by the Governor. The reduction in greenhouse gases has been mandated in recent years by the former administration through executive orders and the passage of the California Global Warming Solutions Act of 2006 (Assembly Bill 32, Chapter 488 of the 2006 Statutes) adding Division 25.5 to the *California Health and Safety Code*. The provisions of AB 32 require a cap on greenhouse gas emissions by 2020, mandatory emissions reporting and an ongoing market-based compliance program. Establishing the *CALGreen Code* is an important step towards more efficient and responsible building design. The California Air Resources Board estimates that the mandatory provisions in this code will reduce greenhouse gases by 3 million metric tons by the year 2020, and this number should increase with the code's new application to nonresidential additions and alterations.

Figure 1: Commercial Construction

Green building legislation proposed in the 2007–2008 legislative session (AB 35 concerning state-owned buildings, AB 888 concerning commercial B-occupancy buildings and AB 1035 concerning residential construction) was vetoed by the governor. In his veto messages, the governor expressed his support for development of green building standards, but that they should not be statutory, conflict with current safety standards and rely on private entities to set the standards. He directed the California Building Standards Commission to work with state agencies to develop standards for the 2010 codes, gleaned from nationally recognized programs and the input of other state agencies, ensuring an open public adoption process.

The specific authority in law for each of the state agencies taking part in the development of the *CALGreen Code*, including the California Building Standards Commission, is provided in Chapter 1 of that code.

The state agencies that developed *CALGreen Code*

The provisions of the *CALGreen Code* were developed by the California Building Standards Commission, Department of Housing and Community Development, Division of the State Architect and the Office of Statewide Health Planning and Development.

CALGreen Code effective date

The 2013 *California Building Standards Code*, including the *California Green Building Standards Code* (*CALGreen Code*) in Part 11, became effective on January 1, 2014. Supplementary changes adopted and approved in the 2013 Intervening Code Adoption Cycle will become effective on July 1, 2015.

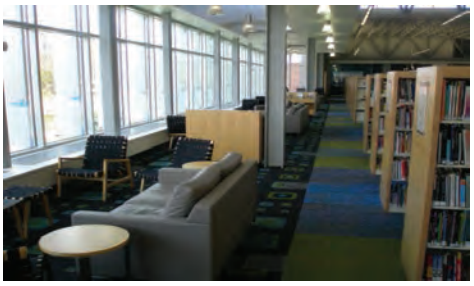


Figure 2: Library

Types of buildings subject to the *CALGreen Code*

Residential-type buildings of three stories and less are subject to the 2013 *CALGreen Code* when constructed new, under a permit issued on or after January 1, 2014. The specific types of residential buildings identified in the *CALGreen Code* include motels, hotels, apartments, one- and two-family dwellings and several others listed in Section 104 of that code. Nonresidential buildings subject to the mandatory provisions of the *CALGreen Code* include state-owned buildings and state university and community college buildings, privately owned buildings used for retail, office and medical services and others listed in Section 103. The Office of Statewide Health Planning and Development has adopted voluntary provisions that may be applied to hospitals and medical care buildings as explained in Section 106 of the *CALGreen Code*. The Division of the State Architect has adopted mandatory and voluntary provisions of the *CALGreen Code* that apply to public schools. Read more about the application of the *CALGreen Code* beginning on Page 11.

The meaning of Tier 1 and Tier 2 requirements

Tier 1 and Tier 2 relate to green measures that are voluntary and not mandatory. A building said to contain Tier 2 measures will have achieved green efficiencies greater than a Tier 1 complying building. Buildings having achieved either Tier 1 or Tier 2 will have achieved more green efficiencies than a building complying solely with the mandatory green measures.

More restrictive local green building standards

The mandatory provisions of the *CALGreen Code* set the minimum standard throughout California effective on and after January 1, 2014. However, a city, county, or city and county may enact local ordinances establishing more restrictive green standards as reasonably necessary because of local climatic, geological, topographical or environmental conditions. Consult Section 101.7 of the *CALGreen Code* for the legal references and the means to establish a local ordinance and make required filings with the California Building Standards Commission.

Special Inspection for *CALGreen Code* requirements

Special inspection and special inspectors may be required by the local building department. Refer to Chapter 7 of the *CALGreen Code* for details. Additionally, Chapter 7 contains requirements for installers of heating, ventilation and air-conditioning systems and equipment in new residential construction.

Use of compliance worksheets

CALGreen Code Section 102 establishes requirements for documenting conformance. Chapter 8 offers sample forms and worksheets that may be used to document conpliance with water use reduction and waste management planning. As of July 1, 2015, those sample forms for waste management planning will be omitted from the code; they will remain in this guide, along with those for commissioning and other provisions included in the previous edition. The local building department may require these worksheets, or may establish other forms to be completed and accompany plans and submittal at project completion. Applicants for building permits should check with the local building department to determine the requirement. As the need arises, the California Building Standards Commission can develop more sample compliance forms to be included in future editions of this guide.

Enforcement of the *CALGreen Code*

The responsibility for enforcing the *CALGreen Code* is the same as for the balance of Title 24. New buildings subject to plan review, permits and inspections by the local building department are subject to the *CALGreen Code* requirements and enforcement as of January 1, 2014. Certain additions and alterations must comply on or after July 1, 2015. State-owned buildings will continue to be subject to enforcement by the state.

Figure 3: Inspectors

CALGreen Code training availability

At the time this guide was published, numerous *CALGreen Code* training opportunities were offered by the proposing agencies. Look to private organizations listed on Page 3 for training offerings. In addition to this guide, the California Building Standards Commission is offering training in the form of seminars.

Identifying Requirements for Specific Buildings

Residential Buildings

Section 104 of the *CALGreen Code* states that the Department of Housing and Community Development has adopted provisions of the code for residential structures. Sections 101.3.1(3) and 104 list the types of residential structures subject to the HCD adoptions. That includes hotels, motels, apartments, condominiums, one- and two-family dwellings and more, up to three stories.

> **Note:** "Low-rise residential buildings" used in Section 101.3.1(3) is defined in Section 202 as being three stories or less.

A Matrix Adoption Table is provided at the beginning of each chapter or division of the *CALGreen Code* to identify adoptions by the state agencies. The abbreviation "HCD 1" is used within the Matrix Adoption Tables to identify HCD's adoptions. In the 2013 *CALGreen Code*, HCD adopts the mandatory provisions of Chapter 4 and the voluntary measures in Appendix A4. Other HCD adoptions are identified in the Matrix Adoption Tables for the various chapters of the *CALGreen Code*.

Note: If training is needed on the use of the Matrix Adoption Tables, open and print the training document available at the California Building Standards Commission link http://www.documents.dgs.ca.gov/bsc/Title_24/Guide-to-Title-24-2013.pdf. You may print this training document for study or staff training purposes.

Figure 4: Residential Structure

Privately Owned Nonresidential

Sections 101.3.1 and 103 of the *CALGreen Code* explain that the California Building Standards Commission has adopted provisions of the code for state-owned buildings and for privately owned nonresidential structures. A Matrix Adoption Table is provided at the beginning of each chapter or division of the *CALGreen Code* to identify adoptions by the state agencies. The abbreviation "BSC" is used within the Matrix Adoption Tables to identify adoptions by the California Building Standards Commission. Accordingly, when an "X" appears in the column under the heading "BSC," it means the section number or numbers listed on the left side of the table are adopted for application to nonresidential structures. "Privately owned nonresidential buildings" is meant to include buildings of Group A Occupancy (assembly), Group B Occupancy (offices), Group M Occupancy (retail) and other common occupancies.

A good question at this point is: Why is the California Building Standards Commission adopting green building standards for privately owned nonresidential buildings? The answer lies in state law. *Health and Safety Code* Section 18930.5 provides authority to the California Building Standards Commission to adopt green building standards if no other state agency has specific authority to do so. The Department of Housing and Community Development, Division of the State Architect and Office of Statewide Health Planning and Development have authority to develop green building standards for specific building types or uses. None of these state agencies has the authority to adopt green building standards for privately owned buildings of a Group A, B or M Occupancy that is not a public school, state building or medical facility. Therefore, the California Building Standards Commission has exercised the authority provided in *Health and Safety Code* Section 18930.5 to adopt green building standards with application to privately owned nonresidential buildings not already subject to the authority of another state

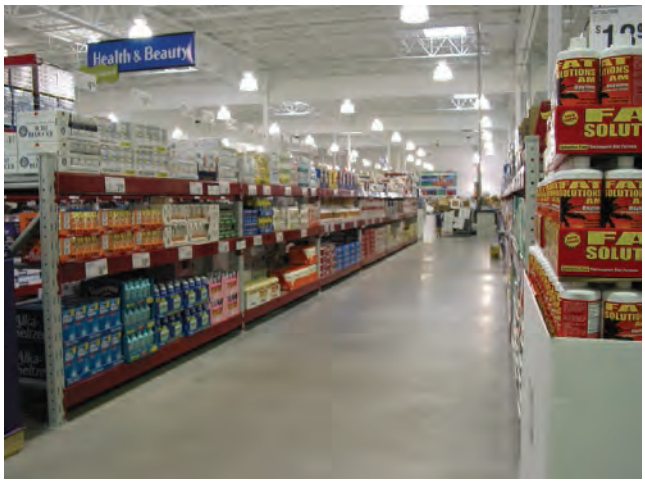


Figure 5: Retail

agency.

Mandatory adoptions for nonresidential buildings are located in Chapter 5 of the *CALGreen Code*. Voluntary measures in Appendix A5 adopted by the California Building Standards Commission are identified in the Matrix Adoption Table at the beginning of the appendix.

Public Schools

Section 105 of the *CALGreen Code* explains that the Division of the State Architect has adopted provisions in the code for application to public elementary, secondary and community college buildings. The adoptions are identified by an "X" in the column under the abbreviation "DSA-SS" in the Matrix Adoption Tables located before each chapter of the code (see Section 105 for more detail).

Mandatory DSA-SS adoptions for public schools are in Chapter 5 of the *CALGreen Code*. DSA-SS adopted voluntary measures are in Appendix A5.

Medical Facilities

Section 106 of the *CALGreen Code* explains that the Office of Statewide Health Planning and Development has adopted provisions in the code for application to specific types of buildings providing medical services. Examples include general acute care hospitals, skilled nursing facilities, intermediate care facilities and correctional treatment centers.

At this time, OSHPD adoptions for medical facilities are found in Appendix Chapter A6.1 of the *CALGreen Code*, which are voluntary standards. The adoptions are identified by an "X" in the column under the abbreviation "OSHPD 1, 2 or 4" in the Matrix Adoption Table located at the beginning of the appendix chapter (see Section 106 for more detail).

Introduction of the Chapters within the *CALGreen Code*

Chapter 1

Chapter 1 provides important administrative requirements and clarifications that apply throughout the *CALGreen Code*. Most importantly, Sections 103, 104, 105 and 106 identify the application of the adoptions by the state agencies as discussed previously, as well as sections that address local authority. Study Chapter 1 carefully to gain an understanding of the application of the *CALGreen Code* requirements. Chapter 1 amendments clarify the authority of the Commission for green building standards. Amendments were made to Sections 101.3.1 and 103 citing the authority granted the Commission by *Health and Safety Code* Section 18930.5.

Chapter 2

Chapter 2 provides definitions for terms used in the *CALGreen Code*. Definitions are important for correct application of requirements.

Note: all defined terms and definitions from the various chapters have been relocated to Chapter 2 with the defined term left in the respective chapter as a reference.

Chapter 3

Chapter 3 provides clarifications that are general in nature and apply throughout the *CALGreen Code*. An example is how to apply requirements to a building with mixed uses or to a project that is constructed in phases. Voluntary measures are addressed, including those in tiers adopted by the Department of Housing and Community Development, the California Building Standards Commission and the Office of Statewide Health Planning and Development.

CHAPTER 3
GREEN BUILDING
GENERAL

301.1 Scope. Buildings shall be designed to include the green building measures specified as mandatory in the application checklists contained in this code. Voluntary green building measures are also included in the application checklists and may be included in the design and construction of structures covered by this code, but are not required unless adopted by a city, county, or city and county as specified in Section 101.7.

301.3 Nonresidential additions and alterations. [BSC] The provisions of individual sections of Chapter 5 apply to newly constructed buildings, building additions of 1,000 square feet or greater, and/or building alterations with a permit valuation of $200,000 or above (for occupancies within the authority of California Building Standards Commission). Code sections relevant to additions and alterations shall only apply to the portions of the building being added or altered within the scope of the permitted work.

A code section will be designated by a banner to indicate where the code section only applies to newly constructed buildings [N] or to additions and/or alterations [A]. When the code section applies to both, no banner will be used.

SECTION 302
MIXED OCCUPANCY BUILDINGS

302.1 Mixed occupancy buildings.

SECTION 303
PHASED PROJECTS

303.1 Phased projects.

303.1.1 Tenant improvements. The provisions of this code shall apply only to the initial tenant or occupant improvements to a project.

SECTION 304
VOLUNTARY TIERS

304.1 Purpose. Voluntary tiers are intended to further encourage building practices that improve public health, safety and general welfare by promoting the use of building concepts which minimize the building's impact on the environment and promote a more sustainable design.

304.1.1 Tiers. The provisions of Divisions A4.6 and A5.6 outline means, in the form of voluntary tiers, for achieving enhanced construction levels by incorporating additional measures for residential and nonresidential new construction. Voluntary tiers may be adopted by local governments and, when adopted, enforced by local enforcing agencies. Buildings complying with tiers specified for each occupancy contain additional prerequisite and elective green building measures necessary to meet the threshold of each tier. See Section 101.7 of this code for procedures and requirements related to local amendments, additions or deletions, including changes to energy standards.

[BSC & HCD] Where there are practical difficulties involved in complying with the threshold levels of a tier, the enforcing agency may grant modifications for individual cases. The enforcing agency shall first find that a special individual reason makes the strict letter of the tier impractical and that modification is in conformance with the intent and purpose of the measure. The details of any action granting modification shall be recorded and entered in the files of the enforcing agency.

Chapter 4

Chapter 4 is divided into five separate divisions and contains adoptions by the California Department of Housing and Community Development with application to residential structures as explained in Section 104 of the *CALGreen Code*. The Matrix Adoption Table for Chapter 4 is shown on the following page.

CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE
CHAPTER 4 – RESIDENTIAL MANDATORY MEASURES

Adopting agency	BSC	SFM	HCD			DSA		OSHPD				CSA	DPH	AGR	DWR	CEC	CA	SL	SLC
			1	2	1-AC	AC	SS	1	2	3	4								
Adopt entire CA chapter			X																
Adopt entire chapter as amended (amended sections listed below)																			
Adopt only those sections that are listed below																			
Chapter/Section																			

The "X" under the column heading HCD 1 is located opposite "Adopt Entire CA chapter." Thus, HCD has adopted the entire Chapter 4. The abbreviation CA means California Amendment. There are no other "X" symbols in this table, thus no other state agency adopts this chapter. Accordingly, the provisions will apply to only residential structures subject to HCD 1 as explained in Section 104 of the *CALGreen Code*.

Chapter 4 regulatory subjects for residential buildings are:

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

Chapter 5

Chapter 5 is divided into five divisions and contains adoptions by the California Building Standards Commission and the Division of the State Architect. The adopted sections of this chapter by these agencies are identified in the Matrix Adoption Table at the beginning of each division of the chapter. New to Chapter 5 for the 2013 *CALGreen Code* is the inclusion of provisions for Additions and Alterations to Existing Nonresidential Buildings. These provisions were originally placed in Chapter 5, Disision 5.7 in the 2010 intervening code cycle. During the 2012 triennial code adopting cycle the Additions and Alterations provisions were distributed into their respective applicable divisions. As a result, Division 5.7 is no longer necessary.

There are six Matrix Adoption Tables; one for each division of the chapter. This is necessary because of the differing adoptions by the state agencies and thus differing applications to buildings. The application of the adoptions by these agencies was discussed previously and is identified in Sections 103 and 105 of Chapter 1 of the *CALGreen Code* (see the Matrix Adoption Table on the following page for Division 1 of Chapter 5 for an example of *CALGreen* application).

CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE
CHAPTER 5 – NONRESIDENTIAL MANDATORY MEASURES
DIVISION 1 – PLANNING AND DESIGN

Adopting agency			HCD			DSA		OSHPD											
	BSC	SFM	1	2	1-AC	AC	SS	1	2	3	4	CSA	DPH	AGR	DWR	CEC	CA	SL	SLC
Adopt entire CA chapter	X																		
Adopt entire chapter as amended (amended sections listed below)																			
Adopt only those sections that are listed below							X												
Chapter/Section																			
5.101							X												
5.102 Definitions							X												
5.106.8							X												
5.106.10							X												

This "X" symbol under in the column heading BSC is opposite "Adopt Entire CA Chapter." That means the Building Standards Commission has adopted the entire chapter. Accordingly, the chapter will apply to buildings subject to the BSC jurisdiction as explained in Section 103 of the *CALGreen Code*.

The other "X" symbols in this table appear in the DSA-SS column. However, as shown above, the DSA-SS only adopts those section numbers to the left of the "X" symbols. DSA-SS does not adopt the entire division. Section 105 of the *CALGreen Code* explains that DSA-SS adoptions apply to public schools.

The Matrix Adoption Table for Division 5.4 of Chapter 5 is shown below.

CALIFORNIA GREEN BUILDING STANDARDS CODE – MATRIX ADOPTION TABLE
CHAPTER 5 – NONRESIDENTIAL MANDATORY MEASURES
DIVISION 5.4 – MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

Adopting agency	BSC	SFM	HCD			DSA		OSHPD				CSA	DPH	AGR	DWR	CEC	CA	SL	SLC
			1	2	1-AC	AC	SS	1	2	3	4								
Adopt entire CA chapter	X																		
Adopt entire chapter as amended (amended sections listed below)																			
Adopt only those sections that are listed below							X												
Chapter/Section																			
5.401.1							X												
5.402.1 Definitions							X												
5.402.1 ADJUST							X												
5.402.1 BALANCE							X												
5.402.1 TEST							X												
5.407							X												
5.408.1–5.408.3							X												
5.410.1							X												
5.410.1.1							X												

This table shows that BSC adopts the entire Division 5.4 of Chapter 5. It shows that DSA-SS adopts selected sections of Division 5.4 and not the entire division.

The two Matrix Adoption Tables for Chapter 5 shown above identify adoptions by only BSC and DSA-SS. Accordingly, the chapter has no application to residential buildings subject to HCD 1, or to medical buildings subject to OSHPD 1, 2 or 4.

Chapter 5 regulatory subjects for nonresidential buildings are:

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

Chapter 6

Chapter 6 provides a listing of standards adopted by reference and applicable to any building subject to the *CALGreen Code*. This chapter has been expanded by the commission to include a reference to IESNA.

Chapter 7

Chapter 7 provides minimum qualifications for installers of HVAC equipment in residential buildings and standards for special inspection and was not amended this code cycle by the commission.

Requirements may vary for different types of buildings, so take notice of the state agency adopting the requirements. Not all code provisions apply to all building types. Therefore, watch for the state agency abbreviation (HCD 1, BSC, DSA-SS,) in order to identify the application of the code requirement.

Chapter 8

Chapter 8 contains compliance forms and worksheets that may be used to document compliance with the *CALGreen Code* and water use worksheets to calculate compliance with mandatory and voluntary water measures. The sample forms have been updated for the 2013 *CALGreen Code*.

Appendix A4

Appendix A4 provides voluntary measures for residential buildings. Adoptions are by HCD 1 as shown in the Matrix Adoption Table for this appendix. By its adoption, the Department of Housing and Community Development makes available voluntary measures, including the tiers, for local jurisdictions to adopt and for designers to employ voluntarily.

Appendix A5

Appendix A5 is divided into six divisions and provides voluntary measures for nonresidential buildings with adoptions by BSC and DSA-SS as shown in the Matrix Adoption Tables for each of the divisions of Appendix A5. Still, the provisions are voluntary and not mandatory. Local adoption and voluntary use of these provisions are the same as for Appendix A4, except that local adoption is not available for public schools under the authority of the Division of the State Architect (DSA-SS). Changes effective January 1, 2014 to Appendix A5 voluntary standards for nonresidential buildings are described in more detail in Part 2 of this Guide

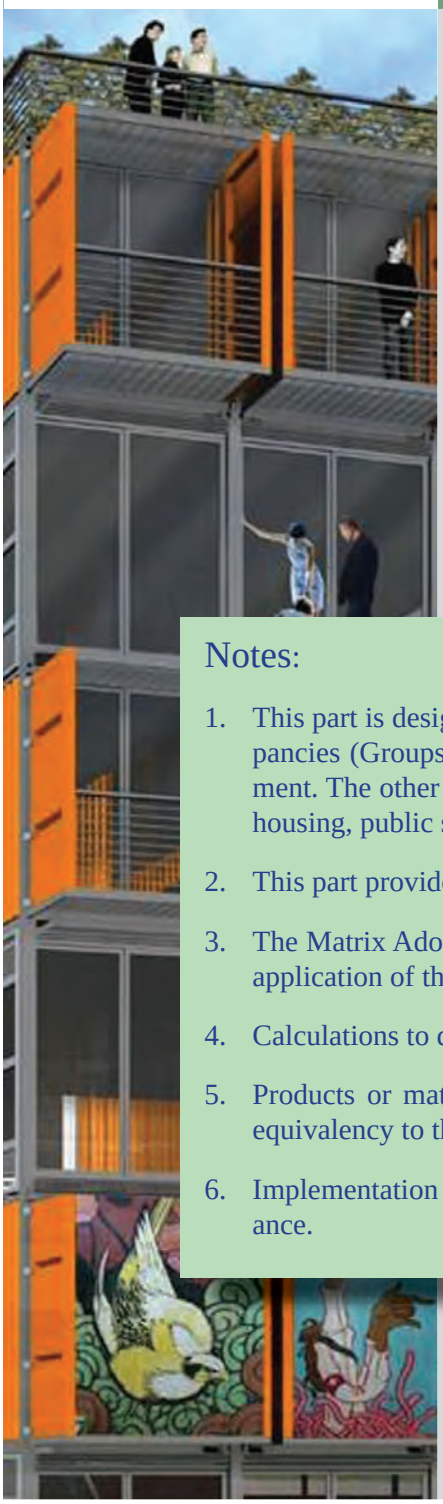
Appendix A5 voluntary measures are as follows:

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

PART

2

Technical Application to Nonresidential Buildings



CALGreen Chapter 1: **Administration**

CALGreen Chapter 5: **Division 5.1, Planning and Design**

Division 5.2, Energy Efficiency

Division 5.3, Water Efficiency and Conservation

Division 5.4, Material Conservation and Resource Efficiency

Division 5.5, Environmental Quality

Notes:

1. This part is designed to explain provisions of the *CALGreen Code* that apply to common occupancies (Groups A, B, M) subject to building code enforcement by the local building department. The other adopting agencies (HCD, DSA and OSHPD) may provide specific training on housing, public schools and medical buildings separately.
2. This part provides a reprint of only those *CALGreen Code* sections needing explanation.
3. The Matrix Adoption Tables for Chapter 5 are not reprinted here. To identify the adoption and application of the code provisions, refer to the Matrix Adoption Tables in the *CALGreen Code*.
4. Calculations to determine numbers of items shall be rounded up to the nearest whole number.
5. Products or materials substituted after permit issuance shall be self-certified or verified for equivalency to those specified.
6. Implementation of local ordinances relative to this code may require alternate means of compliance.

CALGreen Chapter 1 Administration

Note:

This guide is updated to include changes to the *CALGreen Code,* which was modified during the 2012 regular code adoption cycle with an effective date of January 1, 2014.

SECTION 101
GENERAL

101.3.1 State-regulated buildings, structures and applications, and 103 Building Standards Commission.

This guide intends to assist the user in applying green building standards to all occupancies, including newly constructed privately owned nonresidential structures, newly constructed state-owned buildings, state universities and all other occupancies where no state agency has authority; and where applicable, occupancies regulated by the Division of the State Architect (DSA), including public schools and community colleges.

Examples of privately owned nonresidential structures include, but are not limited to, new buildings or portions of new buildings classified by the following occupancies:

Assembly Group A—Motion picture theaters, concert halls, banquet halls, nightclubs, restaurants, bowling allies, community halls, courtrooms, libraries, museums, arenas, amusement parks and stadiums.

Business Group B—Banks, barber and beauty shops, civic administration, motor vehicle showrooms, post offices, print shops, professional services offices, radio and television stations.

Educational Group E—Privately funded educational purpose buildings for more than six students at one time through the 12th grade and day care for more than six children 2 years and older.

Factory Group F—Building or structure used for factory industrial uses, moderate-hazard occupancy, such as food processing and dry cleaning; and low-hazard manufacturing, such as of brick and ice.

High-Hazard Group H—Building or structure used for manufacturing and storing high-hazard materials.

Institutional Group I—Building or structure used for certain medical care, the care of children and the physically disabled, assisted living facilities, child care facilities and adult care facilities.

Laboratory Group L—Laboratories with limited storage of hazardous materials as defined in the *California Building Code* (CBC).

Mercantile Group M—Department stores, drug stores, markets, motor fuel-dispensing stations, retail and wholesale stores and sales rooms.

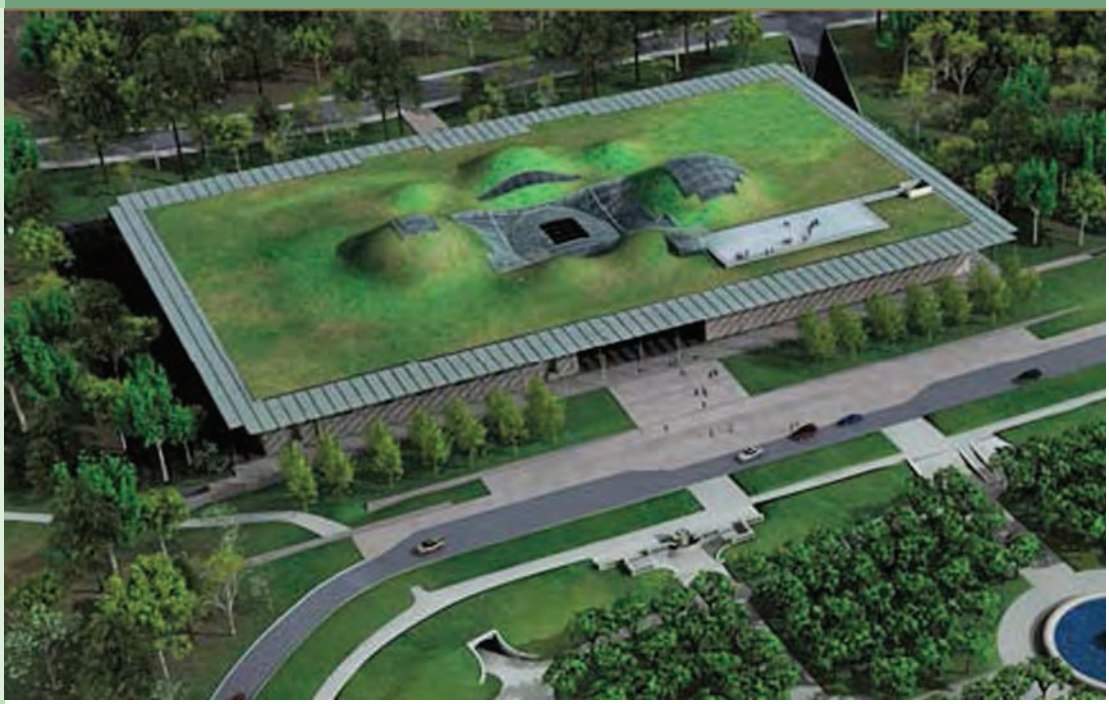
Storage Group S—Storage of moderate-hazard materials like furnishings and building materials and storage of low-hazard noncombustible materials such as food, bottles and cans and cement.

Utility and Miscellaneous Group U—Accessory or miscellaneous buildings, as applicable.

Refer to 2013 CBC Chapter 3 “Use and Occupancy Classification” for complete lists of uses for these occupancy groups.

NONRESIDENTIAL MANDATORY MEASURES

CALGreen Chapter 5 Division 5.1, Planning and Design



SECTION 5.101
GENERAL

5.101.1 Scope. The provisions of this chapter outline planning, design and development methods that include environmentally responsible site selection, building design, building siting and development to protect, restore and enhance the environmental quality of the site and respect the integrity of adjacent properties.

SECTION 5.102
DEFINITIONS

Note: All definitions in Chapter 5 have been have been moved to Chapter 2.

SECTION 5.103
SITE SELECTION
(Reserved)

SECTION 5.104
SITE PRESERVATION
(Reserved)

SECTION 5.105
DECONSTRUCTION AND REUSE OF EXISTING STRUCTURES
(Reserved)

SECTION 5.106
SITE DEVELOPMENT

5.106.1 Storm water soil loss prevention plan. Newly constructed projects and additions which disturb less than one acre of land shall prevent the pollution of stormwater runoff from the construction activities through one or more of the following measures:

5.106.1.1 Local ordinance. Comply with a lawfully enacted stormwater management and/or erosion control ordinance.

5.106.1.2. Best management practices (BMP). Prevent the loss of soil through wind or water erosion by implementing an effective combination of erosion and sediment control and good housekeeping BMP.

1. Soil loss BMP that should be considered for implementation as appropriate for each project include, but are not limited to, the following:

   a. Scheduling construction activity.
   b. Preservation of natural features, vegetation and soil.
   c. Drainage swales or lined ditches to control stormwater flow.
   d. Mulching or hydroseeding to stablilize disturbed soils.
   e. Erosion control to protect slopes.
   f. Protection of storm drain inlets (gravel bags or catch basin inserts).
   g. Perimeter sediment control (perimeter silt fence, fiber rolls).
   h. Sediment trap or sediment basin to retain sediment on site.
   i. Stabilized construction exits.
   j. Wind erosion control.
   k. Other soil loss BMP acceptable to the enforcing agency.

Figure 6: Soil Erosion Control

2. Good housekeeping BMP to manage construction equipment, materials and wastes that should be considered for implementation as appropriate for each project include, but are not limited to, the following:

   a. Material handling and waste management.
   b. Building materials stockpile management.
   c. Management of washout areas (concrete, paints, stucco, etc.).
   d. Control of vehicle/equipment fueling to contractor's staging area.
   e. Vehicle and equipment cleaning performed off site.
   f. Spill prevention and control.
   g. Other housekeeping BMP acceptable to the enforcing agency.

Intent:

The intent of this code provision is to prevent the discharge of surface water pollutants, dust and sediment from the project site into receiving waters to maintain water and air quality, using recognized soil loss and housekeeping best management practices (BMP).

This provision applies to newly constructed projects and additions that disturb less than one acre of land.

Change for 2013: This code section has been amended to also apply to additions.

Existing law or regulation:

For projects that are one acre or larger in size, please refer to the California Water Code and Federal Water Pollution Control Act.

Compliance method:

Design team: Without the need to prepare a formal plan, the design team must be able to demonstrate to a plans examiner the method to comply with the regulations. Options are to describe in plans and/or specifications one of the following:

- How a local stormwater management ordinance is being met;
- The BMP that will be employed, specific to the site and season of construction;
- A stormwater pollution management plan;
- Delegation of stormwater control measures to the contractor for his or her separate submittal to the enforcing agency prior to commencement of excavation and grading; or
- Other descriptive means acceptable to the enforcing agency.

Contractor: No grading should be done until site- and season-specific soil loss and housekeeping stormwater BMP have been approved by the enforcing agency. The contractor should employ the design BMP and any others needed as situations arise. He or she should conduct site inspections before, during and after each extended storm event to identify conditions that may contribute to erosion and sediment problems or any other pollutant discharges. If additional control measures are needed, he or she should implement them immediately.

> **Note:** A sample checklist of BMPs and self-certification forms may be found in Part 4 of this guide.

Enforcement:

Plan intake: The reviewer and/or plan checker should make sure the storm-water pollution prevention BMP are either included with the construction documents (plans and/or specifications) or submitted separately and meet these regulations or local requirements.

On-site enforcement: The inspector should check the erosion and sediment controls for conformance with the BMP during the normal inspection process, or a separate inspection may be deemed appropriate by the enforcing agency. Additional site inspections may be required during extended storm events to verify mitigation measures.

5.106.4 Bicycle parking. For buildings within the authority of California Building Standards Commission as specified in Section 103, comply with Section 5.106.4.1. For buildings within the authority of the Division of the State Architect pursuant to Section 105, comply with Section 5.106.4.2.

5.106.4.1 Bicycle parking. [BSC] Comply with Sections 5.106.4.1.1 and 5.106.4.1.2; or meet the applicable local ordinance, whichever is stricter.

5.106.4.1.1 Short-term bicycle parking. [BSC] If the new project or an addition or alteration 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 new visitor motorized vehicle parking spaces being added, with a minimum of one two-bike capacity rack.

Exception: Additions or alterations which add nine or less visitor vehicular parking spaces

5.106.4.1.2 Long-term bicycle parking. For new buildings with over 10 tenant-occupants or for additions or alterations that add 10 or more tenant vehicular parking spaces, provide secure bicycle parking for 5 percent of the tenant vehicular parking spaces being added, with a minimum of one space. Acceptable parking facilities shall be convenient from the street and shall meet one of the following:

1. Covered, lockable enclosures with permanently anchored racks for bicycles;
2. Lockable bicycle rooms with permanently anchored racks; or
3. Lockable, permanently anchored bicycle lockers.

Note: Additional information on recommended bicycle accommodations may be obtained from Sacramento Area Bicycle Advocates.

Intent:

Figure 7: Bicycle Parking

The intent of this code provision is to ensure that newly constructed projects or additions and alterations provide short-term and/or long-term bicycle parking accommodations to promote the use of bicycles as an alternate means of transportation in an attempt to reduce greenhouse gas emissions.

Change for 2013: This code section has been amended to also apply to additions and alterations. Exceptions were added for both short-term and long-term bicycle parking.

Existing law or regulation:

There is NO current law or regulation for this code provision. However, there are some jurisdictions that have adopted local ordinances.

Compliance method:

Short-term bicycle parking:

Construction documents (plans and specifications and/or site plan) should reflect the location of the required number of short-term, permanently anchored bicycle parking racks for 5 percent of visitor motorized vehicle parking capacity, with a minimum of one two-bike capacity rack. Determine if the exception for additions and alterations applies.

Long-term bicycle parking:

1. Determine which of the three options will be used to comply or identify an alternate method(s). Determine if the code section applies to additions and alterations.

2. Construction documents (plans and specifications and/or site plan) should reflect the method and location of the required number of long-term, secured bicycle parking facilities based on 5 percent of motorized vehicle parking capacity, with a minimum of one space.

   Note: If the applicant is seeking a parking capacity reduction under Section A5.106.6, or the local jurisdiction has a zoning ordinance for reduced parking, use the parking requirements that apply before the reduction is taken or outside any special zone in the calculations. This is to recognize that, with reduced parking capacity, more people are likely to ride bicycles.

Suggestion:

Provide a calculation table or a note on the plans showing the total number of required short-term spaces by multiplying the anticipated visitor parking spaces by 5 percent and for long-term spaces by multiplying the total vehicular parking required spaces by 5 percent.

Examples:

Short-term: Visitor parking capacity at 42 × 5 percent = 2.1. Provide racks for three bicycles.

Long-term: Total vehicular parking capacity at 216 × 5 percent = 10.8. Provide 11 spaces.

If specifying lockers, consider using six two-bicycle lockers.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and confirm that the correct number of bicycle parking racks and/or secured areas are included with the drawings and meet the requirements.

On-site enforcement: The inspector should review the permit set of plans to verify that all required bicycle parking requirements as shown on the plans have been provided and installed.

5.106.5.2 Designated parking. In new projects or additions or alterations that add 10 or more vehicular parking spaces, provide designated parking for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as follows:

TABLE 5.106.5.2

TOTAL NUMBER OF PARKING SPACES	NUMBER OF REQUIRED SPACES
0–9	0
10–25	1
26–50	3
51–75	6
76–100	8
101–150	11
151–200	16
201 and over	At least 8 percent of total

5.106.5.2.1 Parking stall marking. Paint, in the paint used for stall striping, the following characters such that the lower edge of the last word aligns with the end of the stall striping and is visible beneath a parked vehicle:

CLEAN AIR/VANPOOL/EV

Note: Vehicles bearing Clean Air Vehicle stickers from expired HOV lane programs may be considered eligible for designated parking spaces.

Intent:

This code provision is to ensure that newly constructed projects or additions or alterations provide designated parking for clean air vehicles (low-emitting, fuel-efficient and carpool/vanpool vehicles), which gives reserved parking to those who drive clean air vehicles. The intent is to promote the use of clean air vehicles in an attempt to conserve natural resources and reduce greenhouse gas emissions.

Change for 2013: This code section has been amended to also apply to additions and alterations. Also Table 5.106.5.2 has been reprinted from the code for clarity.

Existing law or regulation:

There is NO current law or regulation for this code provision. However, there are some jurisdictions that have adopted ordinances.

Compliance method:

Design team: Construction documents (site plan) should reflect the location of the required number of designated parking stalls with the marking "CLEAN AIR/VANPOOL/EV" toward the back of the stall, similar to an accessible symbol, so that the writing can be seen when a clean air vehicle is parked. Lettering should be at least 8 inches high. The parking stalls can be located anywhere on the site without preferential location.

Suggestion:

The plans should reflect the total number of required vehicular spaces and refer to Table 5.106.5.2 to ensure that the correct number of designated parking stalls is being provided. Include all parking spaces in the calculation. As approved by the enforcing agency, some compact stalls may also be marked for clean air vehicles.

Examples:

1. **55 total parking spaces:** based on Table 5.106.5.2. Provide six clean air vehicle spaces which fall within the range.

2. 240 total parking spaces: based on Table 5.106.5.2, calculate 240 × 8 percent = 19.2. Provide 20 clean air vehicle spaces.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and confirm that the correct number and configuration of "CLEAN AIRVANPOOL/EV" parking stalls are included on the drawings.

On-site enforcement: The inspector should review the permit set of plans to verify that the correct number of clear air vehicle parking stalls have been provided and marked.

5.106.8 Light pollution reduction. [N] Outdoor lighting systems shall be designed and installed to comply with the following:

1. The minimum requirements in the *California Energy Code* for Lighting Zones 1-4 as defined in Chapter 10 of the *California Administrative Code*; and

2. Backlight, Uplight and Glare (BUG) ratings as defined in IES TM-15-11; and

3. Allowable BUG ratings not exceeding those shown in Table 5.106.8, or

Comply with a local ordinance lawfully enacted pursuant to Section 101.7, whichever is more stringent.

Exceptions: [N]

1. Luminaires that qualify as exceptions in Section 140.7 of the *California Energy Code*.

2. Emergency lighting.

Note: [N] See also *California Building Code*, Chapter 12, Section 1205.6 for college campus lighting requirements for parking facilities and walkways.

TABLE 5.106.8 [N]
MAXIMUM ALLOWABLE BACKLIGHT, UPLIGHT AND GLARE (BUG) RATINGS[1,2]

ALLOWABLE RATING	LIGHTING ZONE 1	LIGHTING ZONE 2	LIGHTING ZONE 3	LIGHTING ZONE 4
Maximum Allowable Backlight Rating[3]				
Luminaire greater than 2 mounting heights (MH) from property line	No Limit	No Limit	No Limit	No Limit
Luminaire back hemisphere is 1 – 2 MH from property line	B2	B3	B4	B4
Luminaire back hemisphere is 0.5 – 1 MH from property line	B1	B2	B3	B3
Luminaire back hemisphere is less than 0.5 MH from property line	B0	B0	B1	B2
Maximum Allowable Uplight Rating				
For area lighting[4]	U0	U0	U0	U0
For all other outdoor lighting, including decorative luminaires	U1	U2	U3	U4
Maximum Allowable Glare Rating[5]				
Luminaire greater than 2 MH from property line	G1	G2	G3	G4
Luminaire front hemisphere is 1 – 2 MH from property line	G0	G1	G1	G2
Luminaire front hemisphere is 0.5 – 1 MH from property line	G0	G0	G1	G1
Luminaire back hemisphere is less than 0.5 MH from property line	G0	G0	G0	G1

1. IESNA Lighting Zones 0 and 5 are not applicable; refer to Lighting Zones as defined in the *California Energy Code* and Chapter 10 of the *California Administrative Code*.

2. For property lines that abut public walkways, bikeways, plazas and parking lots, the property line may be considered to be 5 feet beyond the actual property line for purpose of determining compliance with this section. For property lines that abut public roadways and public transit corridors, the property line may be considered to be the centerline of the public roadway or public transit corridor for the purpose of determining compliance with this section.

3. If the nearest property line is less than or equal to two mounting heights from the back hemisphere of the luminaire distribution, the applicable reduced Backlight rating shall be met.

4. General lighting luminaires in areas such as outdoor parking, sales or storage lots shall meet these reduced ratings. Decorative luminaires located in these areas shall meet U-value limits for "all other outdoor lighting."

5. If the nearest property line is less than or equal to two mounting heights from the front hemisphere of the luminaire distribution, the applicable reduced Glare rating shall be met.

Intent:

The intent of this code provision is to ensure that [N] newly constructed projects reduce the amount of light and glare from both interior and exterior light sources leaving the site. This is to minimize light pollution in order to maintain our dark skies.

Change for 2013: This section clarifies that the code section only applies to newly constructed projects by adding [N] banner.

Existing law or regulation:

There are several existing codes that are being referenced in this provision, as follows:

1. Lighting power requirements in the *California Energy Code*, CCR, Title 24, Part 6.
2. Lighting zones characteristics and Lighting Zones 1–4 as defined in Chapter 10 of the *California Administrative Code*, CCR Title 24, Part 1.
3. *California Building Code*, CCR Title 24, Part 2, Section 1205.6, exception regarding campus lighting for parking and walkways.

4. The latest standards of the Illuminating Engineers Society in TM-15-11.

Compliance method:

FIRST:

Comply with California Energy Commission regulations in Parts 1 and 6 cited above. Those standards form a basis upon which to build for the purpose of light pollution reduction in addition to energy efficiency. The provisions in Part 1 provide a weighted approach to the project site location, with a project located in the middle of a big city allowed more light to escape than a project at a rural or urban location. Part 6 addresses power and energy efficiency of outdoor lighting. There are exceptions for certain occupancies for lighting power requirements, and generally, they would apply to this provision, but voluntary compliance with any or all of the items is encouraged.

THEN:

To comply with this provision, either:

1. Consult and comply with a local dark skies ordinance, if more stringent than these regulations.

2. Specify exterior lighting fixtures that meet IESNA TM-15-11 regarding backlight, uplight and glare. Rating may not exceed those values shown in Table 5.106.8.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents, including exterior light sources, to confirm compliance with Parts 1, 2 and 6; review the electrical plans and specifications for complying building and exterior lighting, including photometric data for perimeter site lighting fixtures; and review specifications for any controls to be installed on the project.

On-site enforcement: The inspector should review the permit set of plans to verify that all lighting and power calculations and specified products are installed as designed on the approved construction documents.

5.106.10 Grading and paving. Construction plans shall indicate how site grading or a drainage system will manage all surface water flows to keep water from entering buildings. 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 buildings and aid in groundwater recharge.

Exception: Additions and alterations not altering the drainage path.

Intent:

The intent of this code provision is to ensure that newly constructed project sites are planned and developed to keep surface water from entering the building, to extend the longevity of the exterior building walls and to keep moisture from entering the exterior wall and perimeter slabs (see exception for additions and alterations).

Change for 2013: This code section has been amended to also apply to additions and alterations. See exception for additions and alterations that do not alter the drainage path.

Figure 8: Site Grading and Paving

Existing law or regulation:

There is NO current law or regulation for this code provision. However, there are some code sections in the *California Building Code* (for example, Section 1805.3.4 Foundation elevation) that address sloping grades away from buildings but do not address how all surface water flows will be managed on site.

Compliance method:

Show on the construction documents (site plan or grading plan) how site grading and/or a drainage system will manage all surface water flows to keep water from entering the building.

This is particularly critical on sloped sites.

Suggestion:

Show on the grading plan, in addition to draining the water away from the exterior walls, how surface water will be managed on site. Methods include, but are not limited to, those now listed in the regulation.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the grading plan and confirm that there are slopes away from the building and adequate measures to manage surface water flows. In addition, the reviewer should ensure that the plans indicate protection from water intrusion for buildings located on sloped sites or having flood plain requirements.

On-site enforcement: The inspector should review the permit set of plans to verify that all grading and/or drainage systems have been installed as designed on the approved construction documents.

NONRESIDENTIAL MANDATORY MEASURES

Division 5.2, Energy Efficiency

SECTION 5.201
GENERAL

5.201.1 Scope [BSC]. ***California Energy Code*****. [DSA-SS].** For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory building standards.

Intent:

Figure 9: Exterior Wall Insulation

The intent of this code provision is to recognize that the California Energy Commission retains its authority for energy efficiency standards.

Existing law or regulation:

For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory building standards. Local amendments increasing energy efficiency standards beyond those required in the *California Energy Code* may apply,

Compliance method:

Meet the minimum mandatory energy efficiency standards as currently required by the *California Energy Code*, CCR Title 24, Part 6.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans, Title 24 Energy Compliance Forms and specifications as currently done for other portions of the code.

On-site enforcement: The inspector should review the permit set of plans to verify that all energy efficiency standards are met in accordance with the approved plans and specifications.

Division 5.3, Water Efficiency and Conservation

SECTION 5.301
GENERAL

5.301.1 Scope. The provisions of this chapter shall establish the means of conserving water used indoors, outdoors and in wastewater conveyance.

SECTION 5.302
DEFINITIONS

Note: All definitions in Chapter 5 have been have been moved to Chapter 2.

SECTION 5.303
INDOOR WATER USE

5.303.1 Meters. Separate submeters or metering devices shall be installed for the uses described in Sections 5.303.1.1 and 5.303.1.2.

5.303.1.1 New buildings or additions 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 (380 L/day), including, but not limited to, spaces used for laundry or cleaners, restaurant or food service, medical or dental office, laboratory, or beauty salon or barber shop.

2. Where separate submeters for individual building tenants are unfeasible, for water supplied to the following subsystems:

   a. Makeup water for cooling towers where flow through is greater than 500 gpm (30 L/s).

   b. Makeup water for evaporative coolers greater than 6 gpm (0.04 L/s).

   c. Steam and hot-water boilers with energy input more than 500,000 Btu/h (147 kW).

5.303.1.2 Excess consumption. A separate submeter or metering device shall be provided for any tenant within a new building or within an addition that is projected to consume more than 1,000 gal/day.

Intent:

The intent of this code provision is to reduce potable water use in new or altered buildings by making building owners and/or tenants aware of their daily potable water consumption to encourage voluntary reduction. **Note:** Owner billing of tenants based on actual use is not intended, but is not prohibited.

Change for 2013: This code section has been amended to also apply to additions.

Existing law or regulation:

There is NO current law or regulation for this code provision.

Compliance method:

First determine if the new project will require separate meters based on the 50,000-square-foot or excess consumption regulation. If so, then:

1. Determine if your leased, rented or other tenant space within the 50,000-square-foot building (including spaces used for laundry or cleaners, restaurant or food service, medical or dental office, laboratory, or beauty salon or barber shop) is projected to consume more than 100

gallons per day. If so, then provide separate submeters to be installed by the owner or contractor after the main meter supplied by the utility.

2. If any building within a project or space within a building is projected to consume more than 1,000 gallons per day, then provide a separate submeter or metering devices. Examples are car washes and aquariums.

3. If separate meters for tenants is infeasible, for example, in some high-rise projects, separately meter instead any of the applicable systems listed.

Suggestion:

Show separate meters on the plans (Site Utility Plan) and provide specifications for the submeters and/or metering devices.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that separate meters and/or metering devices are specified on the plans when required.

On-site enforcement: The inspector should review the permit set of plans to verify that all separate submeters and/or metering devices are installed in accordance with the approved plans and specifications.

5.303.2 Water reduction. Plumbing fixtures shall meet the maximum flow rate values shown in Table 5.303.2.3.

Exception: Buildings that demonstrate 20-percent overall water use reduction. In this case, a calculation demonstrating a 20-percent reduction in the building "water use baseline," as established in Table 5.303.2.2, shall be provided.

TABLE 5.303.2.2
WATER USE BASELINE[3]

FIXTURE TYPE	BASELINE FLOW RATE	DURATION	DAILY USES	OCCUPANTS[2]
Showerheads	2.0 gpm @ 80 psi	5 min.	1	X[2a]
Lavatory faucets, nonresidential	0.5 gpm @ 60 psi	.25 min.	3	X
Kitchen faucets	2.2 gpm @ 60 psi	4 min.	1	X[2b]
Replacement aerators	2.2 gpm @ 60 psi			X
Wash fountains	2.2 [rim space (in.)/20 gpm @ 60 psi]			X
Metering faucets	0.25 gallons/cycle	.25 min.	3	X
Metering faucets for wash fountains	.25 [rim space (in.)/20 gpm @ 60 psi]	.25 min.		X
Gravity tank-type water closets	1.28 gallons/flush	1 flush	1 male[1] 3 female	X
Flushometer tank water closets	1.28 gallons/flush	1 flush	1 male[1] 3 female	X
Flushometer valve water closets	1.28 gallons/flush	1 flush	1 male[1] 3 female	X
Electromechanical hydraulic water closets	1.28 gallons/flush	1 flush	1 male1 3 female	X
Urinals	0.5 gallon/flush	1 flush	2 male	X

Fixture "Water Use" = Flow rate × Duration × Occupants × Daily uses

1. The daily use number shall be increased to three if urinals are not installed in the room.
2. Refer to Table A, Chapter 4, *California Plumbing Code*, for occupant load factors.
   a. Shower use by occupants depends on the type of use of a building or portion of a building, e.g., total occupant load for a health club, but only a fraction of the occupants in an office building as determined by the anticipated number of users.
   b. Nonresidential kitchen faucet use is determined by the occupant load of the area served by the fixture.
3. Use Worksheet WS-1 to calculate baseline water use.

TABLE 5.303.2.3
WATER REDUCTION FIXTURE FLOW RATES

FIXTURE TYPE	MAXIMUM FLOW RATE
Kitchen faucets	**1.8 gpm @ 60 psi**
Wash fountains	**1.8 [rim space (in.)/20 gpm @ 60 psi]**
Metering faucets	**0.20 gallon/cycle**
Metering faucets for wash fountains	**.20 [rim space (in.)/20 gpm @ 60 psi]**

5.303.2.1 Areas of addition or alteration. For those occupancies within the authority of the California Building Standards Commission as specified in Section 103, the provisions of Section 5.303.2 and Section 5.303.3 shall apply to new fixtures in additions or areas of alteration to the building.

Intent:

The intent of this code provision is to reduce the overall use of potable water within the building. The two methods of compliance are to use either the prescriptive water reduction fixture flow rates from Table 5.303.2.3 or the exception showing 20-percent overall water use reduction in Table 5.303.2.2.

Change for 2013: This is a new code section that defines the maximum allowable flow rates for various fixture types: kitchen faucets, metering faucets and wash basins. Also, a code section has been added for areas of additions or alterations.

Figure 10: Water Closet

Existing law or regulation:

AB 715 (Stats 2007, c. 499) modified the *Health and Safety Code* to allow only high-efficiency toilets and urinals to be sold or installed after January 1, 2014.

Compliance method:

Demonstrate a 20-percent reduction in potable water use by using one of the following methods:

1. **Prescriptive method:** Refer to Table 5.303.2.3 and select the plumbing fixture types with the new reduced flow rates.

OR

2. **Performance method using the exception:** Refer to Table 5.303.2.2 and provide a calculation demonstrating a 20-percent reduction in the building "water use baseline" as established in the table.

Note: For additions and alterations, either the prescriptive or performance method can be applied.

Suggestion:

For the prescriptive method, provide a note on the plans and specify the fixture types that meet the requirement.

For the performance method, provide a plumbing calculation on the plans demonstrating an overall 20-percent water use reduction.

Sample worksheets are included in Chapter 8 of the *CALGreen Code* and in Part 4 of this guide.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that either the prescriptive reduced flow rates for

the listed fixture types are used or that the exception for 20 percent reduction was calculated. For additions or alterations, confirm that the new fixture flow rates comply with the code.

On-site enforcement: The inspector should review the permit set of plans to verify that the specified plumbing fixture types are installed. If the water reduction exception for the performance method was used, the inspector should verify that fixtures or systems used to reduce overall water use by 20 percent have been installed. The inspector may review the fixture specifications to verify compliance or accept a self-certification form.

5.303.3 Water conserving plumbing fixtures and fittings. Plumbing fixtures (water closets and urinals) and fittings (faucets and showerheads) shall comply with the following:

5.303.3.1 Water closets. The effective flush volume of all water closets shall not exceed 1.28 gallons per flush. Tank-type water closets shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Tank-Type Toilets.

Note: The effective flush volume of dual flush toilets is defined as the composite, average flush volume of two reduced flushes and one full flush.

5.303.3.2 Urinals. The effective flush volume of urinals shall not exceed 0.5 gallons per flush.

5.303.3.3 Showerheads.

5.303.3.3.1 Single showerhead. Showerheads shall have a maximum flow rate of not more than 2.0 gallons per minute at 80 psi. Showerheads shall be certified to the performance criteria of the U.S. EPA WaterSense Specification for Showerheads.

5.303.3.3.2 Multiple showerheads serving one shower. When a shower is served by more than one showerhead, the combined flow rate of all showerheads and/or other shower outlets controlled by a single valve shall not exceed 2.0 gallons per minute at 80 psi, or the shower shall be designed to allow only one shower outlet to be in operation at a time.

Note: A hand-held shower shall be considered a showerhead.

Intent:

The intent of this code provision is to define the maximum allowable flow rates for plumbing fixtures and fittings, which include water closets, urinals and showerheads.

Change for 2013: These sections are reformatted and BSC is defining the maximum allowable flow rates for plumbing fixtures and fittings that

align with AB 715 (Stats 2007, c. 499) and the Department of Housing and Community Development (HCD).

Existing Law or Regulation:

AB 715 (Stats 2007, c. 499) modified the *Health and Safety Code* to allow only high-efficiency toilets and urinals to be sold or installed after January 1, 2014.

Compliance Method:

Specify plumbing fixtures: water closets and urinals that:

- Do not exceed the maximum flow rates specified above.

Specify plumbing fittings: showerheads that:

- Do not exceed the maximum flow rate of not more than 2.0 gallons per minute at 80 pounds per square inch. If specifying multiple showerheads serving one shower, verify that the combined flow rates and controls meet the requirements listed above.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and confirm that water-conserving plumbing fixtures and fittings specified do not exceed the code-required maximum flow rates and that showerheads or multiple showerheads specified also meet the flow rates and controls as listed above.

On-site enforcement: The inspector should review the permit set of plans to verify that the water conserving plumbing fixtures and fittings specified on the plans are installed.

5.303.4 Wastewater reduction. [N] Each building shall reduce by 20 percent wastewater by one of the following methods:

1. [BSC, DSA-SS] The installation of water-conserving fixtures (water closets, urinals) meeting the criteria established in Section 5.303.2 or 5.303.3.

2. [BSC] Utilizing nonpotable water systems [captured rainwater, graywater, and municipally treated wastewater (recycled water) complying with the current edition of the *California Plumbing Code* or other methods described in Section A5.304.8].

Intent:

The intent of this code provision is to reduce wastewater discharge, both potable and nonpotable, into the municipal sewer system, thereby reducing energy used in sewage treatment.

Change for 2013: A banner [N] has been added that clarifies that this provision applies to new [N] projects only and some section references have been updated.

Existing law or regulation:

Chapters 16 and 17 of the *California Plumbing Code* (CPC) regulate residential graywater and rainwater catchment for nonresidential recycled water systems.

Compliance Method:

Demonstrate a 20-percent wastewater reduction by using one of the following methods:

1. Comply with the water use reduction provision of Section 5.303.2 or 5.303.3 listed above.

2. Where available and/or permitted by the local jurisdiction, utilize nonpotable water systems (captured rainwater, graywater and municipally treated wastewater [recycled water]).

3. Use waterless urinals.

4. Irrigate landscape with graywater from fixtures or appliances in accordance with 2013 CPC Chapter 16.

Suggestion:

Provide a note on the plans stating the method of compliance to be used. Specify appropriate fixtures and/or show plumbing calculations. If using nonpotable water systems, detail on the plans.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and confirm that either the water reduction fixture flow rates and/or water-conserving plumbing fixtures and fittings (prescriptive or performance) method has been submitted and check for the 20-percent wastewater reduction compliance. Or, if the nonpotable water systems method will be used, confirm availability and compliance with local ordinance.

On-site enforcement: The inspector should review the permit set of plans to verify that the specified water reduction fixture flow rates and/or water-conserving plumbing fixtures and fittings are installed. If the performance method was used, the inspector will verify that the 20-percent wastewater reduction as approved has been followed. If a nonpotable water system is installed, the inspector will confirm that it meets local ordinances and operates properly.

5.303.6 Standards for plumbing fixtures and fittings. Standards for plumbing fixtures and fittings. Plumbing fixtures and fittings shall be installed in accordance with the *California Plumbing Code*, and shall meet the applicable standards referenced in Table 1401.1 of the *California Plumbing Code* and in Chapter 6 of this code.

Intent:

The intent of this code provision is to provide specifications for plumbing fixtures and fittings by referencing the 2013 *California Plumbing Code*.

Change for 2013: Table 5.303.6, Standards for plumbing fixtures and fittings, is repealed in *CALGreen* and a reference to the standards has been added to the 2013 *California Plumbing Code*.

Existing law or regulation:

AB 715 (Stats. 2007, c. 499) modified the *Health and Safety Code* to specify standards for high-efficiency toilets and urinals. AB 1953 (Stats. 2006, c. 853) changed the code to redefine "lead free plumbing" to reduce the amount of lead allowed in potable water fittings and fixtures effective January 1, 2010. (AB 1953 is referenced in Section 604.10 of the *California Plumbing Code*.) Subsequent legislation in SB 1334 (Stats. 2008, c. 580) and SB 1395 (Stats. 2008, c. 581) required that products be certified as to lead levels by an ANSI-accredited third party.

Compliance method:

Specify plumbing fixtures and fittings to meet the referenced standards in the 2013 *California Plumbing Code* and other sections listed above.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that plumbing fixtures and fittings specified meet the referenced standards listed.

On-site enforcement: The inspector should review the permit set of plans to verify that the specified fixtures and fittings that meet the referenced standards have been installed.

SECTION 5.304
OUTDOOR WATER USE

5.304.1 Water budget. A water budget shall be developed for landscape irrigation use installed in conjunction with a new building or an addition or alteration that conforms to the local water efficient landscape ordinance or to the California Department of Water Resources Model Water Efficient Landscape Ordinance where no local ordinance is applicable.

Note: Prescriptive measures to assist in compliance with the water budget are listed in Sections 492.5 through 492.8, 492.10 and 492.11 of the ordinance, which may be found at: http://www.water.ca.gov/wateruseefficiency/docs/WaterOrdSec492.cfm

Intent:

The intent of this code provision is to reduce the overall outdoor potable water use by requiring that a water budget be developed for landscape irrigation.

Change for 2013: This code section has been amended also to apply to additions and alterations.

Existing law or regulation:

The California Department of Water Resources has adopted a Model Water Efficient Landscape Ordinance (MLO), which requires that a water budget be developed that is currently in effect. There are some local jurisdictions that have adopted water-efficient landscape ordinances that may be more restrictive.

Compliance method:

Develop a water budget using one of the following methods:

1. Check with your local jurisdiction to confirm whether a local water efficient landscape ordinance is in place and, if so, develop a water budget for landscape irrigation that conforms to the local ordinance.

OR

2. Develop a water budget for landscape irrigation use that conforms to the California Department of Water Resources Model Water Efficient Landscape Ordinance for landscaped areas 2,500 square feet or more.

Note: Prescriptive measures and compliance forms to assist in compliance with the water budget are listed in Sections 492.5 through 492.8, 492.10 and 492.11 of the ordinance, which may be found at: http://www.water.ca.gov/wateruseefficiency/docs/WaterOrdSec492.cfm

An example of a water budget calculation is shown below.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for calculations to confirm that a water budget is developed by using either the local ordinance and/or the California Department of Water Resources Model Water Efficient Landscape Ordinance.

On-site enforcement: The inspector should review the permit set of plans and calculations to verify that the approved water budget as specified is followed during construction. The MLO or local ordinance compliance forms may serve this purpose.

Example of water budget calculation

1 The water budget is first calculated by determining the maximum applied water allowance (MAWA), which is in turn established in part by the project's location. The rate of evapotranspiration from the soil and plant tissues increases with higher temperature and lower humidity.

The project's maximum applied water allowance shall be calculated using this equation:

$$MAWA = (ETo)\ (0.62)\ [(0.7 \times LA) + (0.3 \times SLA)]$$

where:

MAWA = Maximum applied water allowance (gallons per year).

ETo = Reference evapotranspiration from Appendix A (inches per year).

0.7 = ET adjustment factor (ETAF).[1]

LA = Landscaped area includes special landscape area (square feet).

0.62 = Conversion factor (to gallons per square foot).

SLA = Portion of the landscape area identified as special landscape area (square feet).[2]

0.3 = The additional ET adjustment factor for special landscape area (1.0 – 0.7 = 0.3).

Maximum applied water allowance is expressed in gallons per year.

Example calculation for a Sacramento landscape project with 10,000 square feet of landscape area, including a 1,000-square-foot demonstration vegetable garden:

$$MAWA = (51.9 \text{ inches})\ (0.62)\ [(0.7 \times 10{,}000 \text{ square feet}) + (0.3 \times 1{,}000 \text{ square feet})] = 234{,}899 \text{ gallons per year.}$$

[1] ETAF is based on a mixed landscape of plants with different water needs modified by the efficiency of the irrigation system (IE). This plant factor (PF) in MAWA is assumed to be 50% of ETo. ETAF is .5 PF × .71 IE, or 70% of ETo.

[2] SLA is defined in the Model Water Efficient Landscape Ordinance (MLO) as an area devoted to edible plants, recreational areas or areas served by recycled water.

2. The water budget for the project is then established by calculating the estimated total water use (ETWU) and comparing that with the MAWA. ETWU for all hydrozones shall not exceed MAWA.

The project's estimated total water use is calculated using the following formula:

$$ETWU = (ETo)(0.62)\left(\frac{PF \times HA}{IE} + SLA\right)$$

where:

ETWU = Estimated total water use per year (gallons per year).

ETo = Reference evapotranspiration (inches per year).

PF = Plant factor from WUCOLS.[3]

HA = Hydrozone area [high, medium and low water use areas] (square feet).

SLA = Special landscape area (square feet).

0.62 = Conversion factor (to gallons per square foot).

IE = Irrigation efficiency (minimum 0.71).

Sample Hydrozone Table for Calculating ETWU for the Sacramento Project:

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)	Area (HA) (square feet)	PF X HA (square feet)
1	High	0.7	1000	700
2	Medium	0.5	4000	2000
3	Low	0.3	4000	1200
			Sum	3900
4	SLA	1.0	1000	1000

ETWU = (51.9) (0.62) (3900/.71 + 1000) = 208,930 gallons per year, within the MAWA of 234,899 gallons per year.

3 WUCOLS is the water use classification of landscape species published by the UC Cooperative Extension, DWR and the Bureau of Reclamation, 2000, and uses the range of water use values shown in this table:

Plant Water Use Type	Plant Factor
Low	0 – 0.3
Medium	0.4 – 0.6
High	0.7 – 1.0
SLA	1.00

Notes: WUCOLS may be accessed from DWR's website at: http://www.water.ca.gov/wateruseefficiency/docs/wucols00.pdf

A MAWA and ETWU calculator in Excel format is also available on DWR's website at:
http://www.water.ca.gov/wateruseefficiency/docs/WaterBudget101.xls

5.304.2 Outdoor potable water use. For new water service or for addition or alteration requiring upgraded water service for landscaped areas between 1,000 square feet but not more than 5,000 square feet (the level at which Water Code §535 applies), separate submeters or metering devices shall be installed for outdoor potable water use.

Intent:

The intent of this code provision is to reduce outdoor potable water use for new water service for landscaped areas between 1,000 square feet and 5,000 square feet by making building owners and/or tenants aware of their daily outdoor potable water consumption for landscaping. Additionally, it allows the consumer to monitor water use to identify spikes that may occur due to leaks in irrigation systems. Water loss attributed to leaks can be substantial.

Note: In the 2010 code, CBSC identified more clearly the landscape areas subject to the provisions. Clarification was made that the requirement is for submeters or metering devices, not separate meter connections by water purveyors, which can be very expensive. However, local jurisdictions that promote or require separate meters point out that they do not charge sewer impact fees on the outdoor water use, but those savings may be small for the subject landscaped areas.

Change for 2013: This code section has been amended to also apply to additions and alterations.

Existing law or regulation:

AB 1881 (Stats. 2006, c. 559) currently requires that a separate water meter be installed by the water purveyor for new water service serving more than 5,000 square feet of irrigated landscape. There might be some local jurisdictions that have adopted ordinances that may be more restrictive.

Compliance method:

1. First determine if the new project or addition or alteration will require separate metering based on the 1,000- to 5,000-square-foot landscape area.

2. If so, then owner or contractor shall install a submeter after the main meter for outdoor potable water use.

Suggestion:

Show separate meters and submeters on the plans (site utility plan) and specifications.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents to confirm that a separate submeter for landscape irrigation was provided.

On-site enforcement: The inspector should review the permit set of plans to verify that separate meters are installed as specified on the approved construction documents.

5.304.3 Irrigation design. In new nonresidential construction or building addition or alteration with between 1,000 but not more than 2,500 square feet of cumulative landscaped area (the level at which the MWELO applies), 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.

Note: More information regarding irrigation controller function and specifications is available from the Irrigation Association.

Intent:

Figure 11: Lawn Irrigation

The intent of this code provision is to reduce outdoor potable water use for new construction landscaped areas between 1,000 square feet but not more than 2,500 square feet by requiring the installation of irrigation controllers and sensors that are weather or soil-moisture based.

Change for 2013: This code section has been amended to also apply to additions and alterations.

Existing law or regulation:

The California Department of Water Resources has adopted a Model Water Efficient Landscape Ordinance (MLO) that requires that irrigation control-

lers utilize either evapotranspiration or soil moisture sensor data for landscape areas 2,500 square feet or more. There might be some local jurisdictions that have adopted ordinances.

Compliance method:

First determine if the new project landscape area is between 1,000 to 2,500 square feet.

If so, then:

Determine which type of controller is going to be installed (weather based versus soil-moisture based).

If specifying a weather-based controller, make sure that it either has an integral rain sensor or provide a separate sensor.

Install all components of the irrigation control system in accordance with the manufacturer's instructions.

> **Note:** More information regarding irrigation controller function and specifications is available from the Irrigation Association at http://www.irrigation.org

Suggestion:

Show on the plans (landscaping plan) and specifications the irrigation controllers and sensors and design criteria outlined in Section 492.7 of the MLO.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents to confirm that irrigation controllers and sensors are weather or soil-moisture based.

On-site enforcement: The inspector should review the permit set of plans to verify that irrigation controllers and sensors as specified on the approved construction documents are installed according to the manufacturer's instructions and as shown on the irrigation design plan. The inspector may accept a certification form as a method of compliance, including any forms used for compliance with MLO or local ordinance.

SECTION 5.305
WATER REUSE SYSTEMS
(Reserved)

Division 5.4, Material Conservation and Resource Efficiency

SECTION 5.401
GENERAL

5.401.1 Scope. The provisions of this chapter shall outline means of achieving material conservation and resource efficiency through protection of buildings from exterior moisture, construction waste diversion, employment of techniques to reduce pollution through recycling of materials and building commissioning or testing and adjusting.

SECTION 5.402
DEFINITIONS

Note: All definitions in Chapter 5 have been have been moved to Chapter 2.

SECTION 5.403
FOUNDATION SYSTEMS
(Reserved)

SECTION 5.404
EFFICIENT FRAMING TECHNIQUES
(Reserved)

SECTION 5.405
MATERIAL SOURCES
(Reserved)

SECTION 5.406
ENHANCED DURABILITY AND REDUCED MAINTENANCE
(Reserved)

SECTION 5.407
WATER RESISTANCE AND MOISTURE MANAGEMENT

SECTION 5.408
CONSTRUCTION WASTE MANAGEMENT, DISPOSAL AND RECYCLING

5.407.1 Weather protection. Provide a weather-resistant exterior wall and foundation envelope as required by *California Building Code* Section 1403.2 (Weather Protection) and *California Energy Code* Section 150 (Mandatory Features and Devices), manufacturer's installation instructions or local ordinance, whichever is more stringent.

Intent:

The intent of this code provision is to provide a weather-resistant exterior wall and foundation envelope as currently required by the *California Building Codes*. This measure is to spotlight those existing code provisions and increase the integrity and longevity of the structure.

Change for 2013: No change.

Existing law or regulation:

Currently this code provision is regulated by *California Building Code*, Section 1403.2 (Weather Protection) and *California Energy Code*, Section 150, (Mandatory Features and Devices for low-rise residential) and some local ordinances.

Compliance method:

Design team: Determine local conditions that may affect the amount of moisture that might penetrate the envelope due to weather, wind-driven rain or exposure to salt spray, etc. For example, the protection measures in Section 150 of the *California Energy Code* are required for Climate Zones 14 and 16 in the mountains. Design and detail exterior wall systems to

Figure 12: Foundation Insulation

reflect local findings, specifying appropriate materials and vapor retardance. Show on the plans and specifications.

Suggestion:

Pay particular attention to openings and changes of material in detailing exterior wall systems.

Contractor: Install any exterior wall system in accordance with architectural details and manufacturer's instructions.

Suggestion:

Systems like exterior insulation and finish systems, if not installed to manufacturer's instructions, have the potential for moisture penetration and condensation that may lead to mold, structural failure and increased liability.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents to confirm that the exterior wall and foundation envelope meets the *California Building Code,* Section 1403.2 (Weather Protection) and *California Energy Code,* Section 150 (Mandatory Features and Devices for low-rise residential) and/or that local ordinances are being met.

On-site enforcement: The inspector should review the permit set of plans to verify that the exterior wall and foundation envelope is installed in accordance with the approved plans and specifications. .

Figure 13: New Green Roof Being Installed

5.407.2 Moisture control. Employ moisture control measures by the following methods.

5.407.2.1 Sprinklers. Design and maintain landscape irrigation systems to prevent spray on structures.

5.407.2.2 Entries and openings. Design exterior entries and/or openings subject to foot traffic or wind-driven rain to prevent water intrusion into buildings as follows:

5.407.2.2.1 Exterior door protection. Primary exterior entries shall be covered to prevent water intrusion by using nonabsorbent floor and wall finishes within at least 2 feet around and perpendicular to such openings plus at least one of the following:

1. An installed awning at least 4 feet in depth.

2. The door is protected by a roof overhang at least 4 feet in depth.

3. The door is recessed at least 4 feet.

4. Other methods which provide equivalent protection.

5.407.2.2.2 Flashing. Install flashings integrated with a drainage plane.

Intent:

The intent of this code provision is to minimize the amount of moisture entering the building; at the exterior entries and openings from wind-driven rain and at exterior walls from poorly designed sprinkler systems.

Change for 2013: The code has been updated to convert the notes and make them a mandatory requirement for compliance.

Existing law or regulation:

There is NO current law or regulation for this code provision.

Compliance method:

For sprinklers: Design irrigation systems to prevent spray on structures by specifying sprinkler heads that are adjacent to or near exterior walls to have a maximum degree head rotation or spray pattern that ensures protection of the building exterior.

For entries and openings:

1. Specify nonabsorbent flooring material at the interior landing surface a minimum of 2 feet in the direction of travel and at wall finishes adjacent to the door opening on the sides and at the top. If 2 feet is not available above the opening, wall finishes may terminate at the ceiling,

2. Show compliance with one of the four listed requirements above, and

3. Install flashings integrated with a drainage plane.

Suggestion:

Show on the plans (landscaping plan, site plan and floor plans) and specifications the sprinkler design and design features that meet the requirements.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that the sprinkler design and design features and methods at entries and openings are included in the submitted plans. Also, verify that flashings are integrated with the drainage plane.

On-site enforcement: The inspector should review the permit set of plans to verify that the sprinkler design and design features and methods at entries and openings and flashing as specified on the approved plans and specifications are installed in accordance with specifications.

SECTION 5.408
CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING

5.408.1 Construction waste diversion. Recycle and/or salvage for reuse a minimum of 50 percent of the nonhazardous construction and demolition waste in accordance with Section 5.408.1.1, 5.408.1.2 or 5.408.1.3; or meet a local construction and demolition waste management ordinance, whichever is more stringent.

5.408.1.1 Construction waste management plan. Where a local jurisdiction does not have a construction and demolition waste management ordinance that is more stringent, submit a construction waste management plan that:

1. Identifies the construction and demolition waste materials to be diverted from disposal by efficient usage, recycling, reuse on the project or salvage for future use or sale.
2. Determines if construction and demolition waste materials will be sorted on-site (source-separated) or bulk mixed (single stream).
3. Identifies diversion facilities where construction and demolition waste material collected will be taken.
4. Specifies that the amount of construction waste and demolition materials diverted shall be calculated by weight or volume, but not by both.

5.408.1.2 Waste management company. Utilize a waste management company that can provide verifiable documentation that the percentage of construction and demolition waste material diverted from the landfill complies with this section.

Note: The owner or contractor shall make the determination if the construction and demolition waste material will be diverted by a waste management company.

Exceptions to 5.408.1.1 and 5.408.1.2:

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.

3. Demolition waste meeting local ordinance or calculated in consideration of local recycling facilities and markets.

5.408.1.3 Waste stream reduction alternative. The combined weight of new construction disposal that does not exceed 2 pounds per square foot of building area may be deemed to meet the 50-percent minimum requirement as approved by the enforcing agency.

5.408.1.4 Documentation. Documentation shall be provided to the enforcing agency which demonstrates compliance with Sections 5.408.1.1 through 5.408.1.3. The waste management plan shall be updated as necessary and shall be accessible during construction for examination by the enforcing agency.

Notes:

1. Sample forms found in "*Guide to the California Green Building Standards Code (Nonresidential)*" located at: http://www.bsc.ca.gov/Home/CALGreen.aspx 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 the California Department of Resources Recycling and Recovery (CalRecycle).

Intent:

Because construction waste makes up about 27 percent of the waste stream in California, this code provision is reducing the amount of waste from new construction that would be sent to landfills, thereby extending the life of the landfills. Its purpose also is to encourage material resource efficiency through reuse and recycling of construction waste products.

Change for 2013: This code section has been amended to also apply to demolition debris. Editorial changes were made to Exception 3 and Section 5.408.2, Isolated job sites, was repealed.

Existing law or regulation:

AB 939 (Stats. 1989, c. 1095) mandated a 50-percent diversion of all waste by 2000, but the *CALGreen* regulation targets 50 percent of new construction waste that makes up a smaller percentage of the total waste stream. There are some local jurisdictions with ordinances in place that have requirements for this provision.

Compliance method:

1. Determine if a local construction waste management ordinance is in place in your jurisdiction and comply with the more stringent requirement.

2. Determine what local hauling and recycling facilities are available in your area to establish the most economically feasible option for recycle and/or salvage of construction debris. If there are no facilities in your area, use Exception 2 and work with the local enforcing agency to establish an acceptable alternate.

3. If applicable to the project, e.g., where walls are framed off-site or panelized wall systems are employed that reduce site waste significantly, the waste stream alternative may be appropriate. Document the weight of total waste compared to the building area, which may considered the gross square footage of each floor and the roof as approved by the enforcing agency.

4. Include the following materials for recycling: carpet, wood, aggregate, paint, shingles, wallboard or any other materials that have recyclable value. For more information on various materials, visit the C&D Publications link on the CALRecycle website, the construction waste management (CWM) worksheet provided in Part 4 of this guide, or recycle as required by local ordinance.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans, specifications and/or forms to confirm that a construction waste management plan has been included with the plan submittal or that Exception 2 has been approved by the enforcing agency.

On-site enforcement: The inspector should review the approved construction waste management plan or Exception 2 to verify that the plan is being followed or that an exception is being used. The inspector may ask for haul tags and/or reports from the contractor to verify compliance with the 50-percent waste reduction. Verification by documentation from a waste management company or recycling facility is acceptable.

Suggestion:

Building departments are strongly urged to work with their jurisdictions' recycling coordinators to determine if local conditions warrant exemptions and to identify appropriate means of alternate compliance.

5.408.3 Excavated soil and land clearing debris. [BSC] 100 percent of trees, stumps, rocks and associated vegetation and soils resulting

primarily from land clearing shall be reused or recycled. For a phased project, such material may be stockpiled on site until the storage site is developed.

Exception: Reuse, either on- or off-site, of vegetation or soil contaminated by disease or pest infestation.

Notes:

1. If contamination by disease or pest infestation is suspected, contact the County Agricultural Commissioner and follow its direction for recycling or disposal of the material. (http://www.cdfa.ca.gov/exec/county/countymap/)

2. For a map of known pest and/or disease quarantine zones, consult with the California Department of Food and Agriculture. (http://www.cdfa.ca.gov)

Figure 14: Stockpiled Excavation Material

Intent:

The intent of this code provision is to reduce the high volume, bulky land clearing materials from filling up the landfills and to encourage the market for nonhazardous land clearing debris. It is not meant to apply to clearing of contaminated sites for purposes such as brownfield remediation.

Change for 2013: No change.

Existing law or regulation:

There is NO current law or regulation for this code provision. However, there are some local jurisdictions that have ordinances in place that have requirements for this provision.

Compliance method:

1. Determine if a local construction ordinance is in place in your jurisdiction and comply with the more stringent requirement or as accepted by the local enforcing agency.

2. Look for local markets and salvage opportunity for reuse of clearing debris.

3. For phased developments and other long-term projects, the materials may be stored on site until project completion.

Suggestion:

The need to salvage or recycle land clearing debris can be reduced by site planning that maintains such features as trees and rocks in the project where feasible.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and look for the appropriate note on the plans (civil plan), WMP or CWM Worksheet that describes the method of disposal of land clearing debris.

On-site enforcement: The inspector should review the permit set of plans and verify that the excavated soil and land clearing debris are being reused or recycled as specified on the plans.

SECTION 5.409
LIFE CYCLE ASSESSMENT
(Reserved)

SECTION 5.410
BUILDING MAINTENANCE AND OPERATION

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, including (at a minimum) paper, corrugated cardboard, glass, plastics and metals, or meet a lawfully enacted local recycling ordinance, if more restrictive.

5.410.1.1 Additions. [A] All additions conducted within a 12-month period under single or multiple permits, resulting in an increase of 30 percent or more in floor area, shall provide recycling areas on site.

Exception: Additions within a tenant space resulting in less than a 30-percent increase in the tenant space floor area.

5.410.1.2 Sample ordinance. Space allocation for recycling areas shall comply with Chapter 18, Part 3, Division 30 of the *Public Resources Code*. Chapter 18 is known as the California Solid Waste Reuse and Recycling Access Act of 1991 (Act).

Note: A sample ordinance for use by local agencies may be found in Appendix A of the document at the CalRecycle's web site.

Intent:

The intent of this code provision is to direct attention to existing law to provide areas for recycling by occupants, including collection and loading of recyclable materials.

Change for 2013: This code section also applies to certain additions with some exceptions added.

Figure 15: Recycling by Occupants

Existing law or regulation:

Currently there is a requirement for a model ordinance in Chapter 18, Part 3, Division 30, of the *Public Resources Code*. Chapter 18 is known as the California Solid Waste Reuse and Recycling Access Act of 1991 (Act) that can be used for statewide application.

Compliance method:

For additions, determine if code provision is applicable. If so, then:

1. Determine if a local recycling ordinance is in place in your jurisdiction and comply. If no ordinance, then use the model recycling ordinance.
2. Show on the plans (site and/or floor plans) readily accessible areas and signage for those areas that serve the entire building for recycling of nonhazardous materials by occupants.
3. In accordance with the model ordinance, recycling areas shall be secure; be protected from the elements, such as rain; and be adequately separated from occupied spaces for protection against impacts such as noise, odor and pests.
4. Where feasible, recycling areas should be located adjacent to solid waste collection areas.

Note: A sample ordinance for use by local agencies may be found in Appendix A of the document at the CalRecycle website.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and confirm that the appropriate recycling areas and signage for those areas have been provided on the plans.

On-site enforcement: The inspector should review the permit set of plans to verify that the recycling areas and signage for those areas on the plans and specifications are installed.

5.410.2 Commissioning. [N] 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 or owner representative's project requirements.
2. Basis of design.
3. Commissioning measures shown in the construction documents.
4. Commissioning plan.
5. Functional performance testing.
6. Documentation and training.
7. Commissioning report.

Exceptions:

1. Dry storage warehouses of any size.
2. Areas under 10,000 square feet used for offices or other conditioned accessory spaces within dry storage warehouses.
3. Tenant improvements under 10,000 square feet as described in Section 303.1.1.
4. Commissioning requirements for energy systems covered by the 2013 *California Energy Code*.

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 section 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.

Change for 2013: A clarification banner [N] has been added that clarifies that this provision applies to new [N] projects only. Also, a reference to the

energy code has been added as an exception for dry storage warehouses. For compliance with energy-related items in Exception 4, review appropriate *California Energy Code* sections

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. Exceptions are allowed for dry storage warehouses of any size; conditioned spaces under 10,000 square feet accessory to them and for tenant improvements under 10,000 square feet within a larger space.

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 a third-party commissioning provider, an experienced member of the design team or an 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 the 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 subcontractor. 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.

5.410.2.1 Owner's or Owner representative's Project Requirements (OPR). [N] 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 [Refer to 2013 *California Energy Code*, Section 120.8(b)].
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 predesign 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.

Change for 2013: A banner [N] has been added that clarifies that this provision applies to new [N] projects only. Also, provisions for energy-related items in commissioning have been repealed in *CALGreen* and are being referenced to the *California Energy Code* with the appropriate code section reference. For compliance with energy-related items, review appropriate *California Energy Code* sections.

Existing law or regulation:

Currently there is 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, CO_2 monitoring, xeriscaping, etc.

2. *Energy efficiency goals* – Refer to 2013 *California Energy Code*, Section 120.8(b).

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 life span 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 and 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 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 his or her 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's representative attesting that the OPR has been completed and approved by the owner.

See (Part 4) for forms and templates.

5.410.2.2 Basis of Design (BOD). [N] 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. The Basis of Design document shall cover the following systems:

1. Heating, ventilation, air conditioning [HVAC) systems and controls. (Refer to 2013 *California Energy Code*, Section 120.8(c)].

2. Indoor lighting system and controls [Refer to 2013 *California Energy Code*, Section 120.8(c)].

3. Water heating system [Refer to 2013 *California Energy Code*, Section 120.8(c)].
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.

Change for 2013: A banner [N] has been added that clarifies that this code section applies to new [N] projects only. Also, provisions for energy-related items in commissioning have been repealed in *CALGreen* and are being referenced to the *California Energy Code* with the appropriate code section. For compliance with energy-related items, review appropriate *California Energy Code* sections.

Existing law or regulation:

Currently there is 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 [Refer to 2013 *California Energy Code*, Section 120.8(c)].
2. Indoor lighting system and controls. [Refer to 2013 *California Energy Code*, Section 120.8(c)].
3. Water heating system. [Refer to 2013 *California Energy Code*, Section 120.8(c)].
4. Renewable energy systems:
    a) Provide narrative description of system—type, performance, control type, energy savings and payback period.
    b) Describe reason for system selection—why chosen system is better than alternatives, issues such as performance, effi-

ciency, reliability, flexibility, simplicity, expandability, cost, payback period, utility company incentives, owner preference.

c) Sequence of operation—operating schedules, setpoints and storage capacity.

d) Describe how system meets the OPR.

5. Landscape irrigation systems:

a) Provide narrative description of system—type, performance and 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 and setpoints.

d) Describe how system meets the OPR.

6. Water reuse systems:

a) Provide narrative description of system—type, performance, capacity and 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 his or her 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.

5.410.2.3 Commissioning plan. [N] 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 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.

Change for 2013: A banner [N] has been added that clarifies that this provision applies to new [N] projects only.

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, subcontractors 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 his or her 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's representative attesting that the Cx Plan has been completed.

See (Part 4) for forms and templates.

Figure 16: Verification of Systems

5.410.2.4 Functional performance testing. [N] 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, equip-

ment, 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 (Section 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.

Change for 2013: A banner [N] has been added that clarifies that this provision applies to new [N] projects only.

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 the *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 be 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 his or her discretion, the building official confirms demonstrated compliance during on-site 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's representative or commissioning coordinator attesting that the functional performance tests have been completed and any deficiencies corrected.

See (Part 4) for forms and templates.

5.410.2.5 Documentation and training. [N] 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.

5.410.2.5.1 Systems manual. [N] 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 and 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, if applicable.

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 and 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.

Change for 2013: A banner [N] has been added that clarifies that this provision applies to new [N] projects only.

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 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 and equipment.

c) Project history:

i. Project requirements.

– Owner's project requirements (OPR).

– Basis of Design (BOD).

ii. Project undocumented events.

iii. Record drawings and documents.

iv. Final control drawings and schematics.

v. Final control sequences.

vi. Construction documents - Location or delivery information:

– Mechanical and electrical drawings.

– Specifications.

– Submittals.

– Project change orders and information.

d) Current requirements:

i. Building operating schedules.

ii. Space temperature, humidity, and pressure, CO_2 setpoints.

iii. Summer and winter setback schedules.

iv. Chilled and 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 and 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 provided by contractor.

b) General site operating procedures:

i. Instructions for changes in major system operating schedules.

ii. Instructions for changes in major system holiday and 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 and log.

ii. Building control system sensor calibration schedule and log.

e) Operation and Maintenance Manuals – Location or delivery information.

4. Major systems

a) HVAC systems and 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 and controls:

i. Lighting control panels.

ii. Occupancy sensors.

iii. Daylight harvesting systems.

c) Renewable energy systems:

i. Photovoltaic panels and inverters.

ii. Wind powered electrical generators and 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 his or her discretion, the building official confirms demonstrated compliance during on-site enforcement by:

a. Receipt of a copy of the systems manual, or

b. Receipt of a form signed by the owner or owner's representative attesting that the systems manual has been completed.

See (Part 4) for forms and templates.

5.410.2.5.2 Systems operations training. [N] A program for 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 program is developed to provide training to the appropriate maintenance staff for each equipment type and/or system and that this 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.

Note: In the 2010 code, the language of Section 5.410.5.2 was simplified for flexibility of compliance and to recognize that buildings not immediately leased or occupied may not have an imminent need for trained maintenance personnel. Requiring a plan for training, and not the training itself, is appropriate for these situations occurring in a down economy.

Change for 2013: A clarification banner [N] has been added that clarifies that this provision applies to new [N] projects only.

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 (on-site, 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 and 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 Systems Manual.
b) Review elements of Systems Manual.
c) Explain how to update and add revisions to Systems 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 his or her discretion, the building official confirms demonstrated compliance during on-site 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's 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's representative attesting that the written training program has been provided.

See (Part 4) for forms and templates.

5.410.2.6 Commissioning report. [N] A report of commissioning process activities undertaken through the design and 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.

Change for 2013: A banner [N] has been added that clarifies that this provision applies to new [N] projects only.

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, including:
   a) Outstanding deficiencies and plans for resolution.
   b) Plans for seasonal testing scheduled for a later date.
3. System performance test results and evaluations.
4. Summary of training process scheduled and completed.
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 his or her discretion, the building official confirms demonstrated compliance during on-site enforcement by:

a) Receipt of a copy of the commissioning report, or

b) Receipt of a form signed by the owner or owner's representative attesting that the Cx report has been completed.

See (Part 4) for forms and templates.

5.410.4 Testing and adjusting. Testing and adjusting of systems shall be required for new buildings less than 10,000 square feet or new systems to serve an addition or alteration subject to Section 303.1.

5.410.4.1 (Reserved)

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, 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 applicable standards on each system as determined by the enforcing agency.

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, balance the system in accordance with the procedures defined by the Testing Adjusting and Balancing Bureau National Standards; the National Environmental Balancing Bureau Procedural Standards; Associated Air Balance Council National Standards or as approved by the enforcing agency.

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 as improve the indoor air quality for occupants. Additionally, testing and adjusting building systems can prolong the life of the systems and maximize the equipment's intended design parameters.

Change for 2013: This code section also applies to new systems to serve an addition or alteration.

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.

Division 5.5, Environmental Quality

SECTION 5.503
FIREPLACES

5.503.1 General. Install only a direct-vent sealed-combustion gas or sealed wood-burning fireplace, or a sealed woodstove or pellet stove, and refer to residential requirements in the *California Energy Code*, Title 24, Part 6, Subchapter 7, Section 150. Woodstoves, pellet stoves and fireplaces shall comply with applicable local ordinances.

5.503.1.1 Woodstoves. Woodstoves and pellet stoves shall comply with U.S. EPA Phase II emission limits where applicable.

Intent:

Although limited in nonresidential applications, this code provision is intended to prevent the use of indoor air for combustion and to prevent contaminated air and any unused fuel from escaping the sealed fireplace to maintain indoor air quality and increased energy efficiency.

Change for 2013:

Frequently asked Questions

Q: Does *CALGreen* restrict wood-burning masonry fireplaces? What about other types of wood-burning fireplaces, such as factory-built fireplaces?

A: No. Wood-burning fireplaces, whether site-built masonry or factory-built, are not restricted or prohibited by BSC. Any restriction in their use would emanate through a local air district. Structural requirements, clearances, etc., for fireplaces installed in nonresidential buildings are found in Title 24, Part 2, the *California Building Code*. Title 24, Part 6, the *California Energy Code* also maintains minimum requirements that relate to energy efficiency.

Q: If *CALGreen* allows a certain type of fireplace or wood-burning appliance to be used, can it be installed even though local regulations may prohibit or restrict the use of the fireplaces?

A: No. If a legally adopted regulation prohibits the installation and use of wood-burning fireplaces, woodstoves or other appliances due to air quality or other sufficiently related concern, then *CALGreen* cannot reduce or waive those local rules.

Existing law or regulation:

Currently, the *California Energy Code*, CCR, Title 24, Part 6, Subchapter 7, Section 150, regulates residential fireplaces. There may be a local or regional ordinance in place.

Compliance method:

1. Specify and install a direct-vent gas fireplace
2. Specify and install a pellet or wood stove that meets the US EPA Phase II emission standards.
3. Comply with local or regional ordinance.

Suggestion:

Contractor: Retain product data sheets for on-site verification by the enforcing agency and for the operation and maintenance manual.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that the fireplaces and/or woodstoves meet the direct-vent sealed-combustion and/or US EPA Phase II emission limits.

On-site enforcement: The inspector should review the permit set of plans

and product data sheets to verify that the fireplaces and/or woodstoves as specified on the approved plans and specifications are installed, or are stored on site with the ability to be verified.

SECTION 5.504
POLLUTANT CONTROL

5.504.1.3 Temporary ventilation. The permanent HVAC system shall only be used during construction if necessary to condition the building or areas of addition or alteration within the required temperature range for material and equipment installation. If the HVAC system is used during construction, use return air filters with a Minimum Efficiency Reporting Value (MERV) of 8, based on ASHRAE 52.2 1999, or an average efficiency of 30 percent based on ASHRAE 52.1 1992. Replace all filters immediately prior to occupancy or, if the building is occupied during alteration, at the conclusion of construction .

Intent:

The intent of this provision is to allow limited use of the permanent heating and cooling system during construction and requires the use of air filters with a Minimum Efficiency Reporting Value (MERV) of 8. It is intended to control air pollutants for workers during construction and ensure good air quality for occupants when the building is turned over to the owner. It allows ventilation using air-conditioning systems if necessary, though this practice is noted not to be an optimum choice due to possible damage to equipment that may jeopardize a warranty.

Change for 2013: This code provision was amended to show that this code also applies to areas of addition or alterations.

Existing Law or Regulation:

The *California Energy Code*, CCR, Part 6, contains ventilation standards for conditioned spaces. CCR, Title 8, contains additional regulations for the worker safety.

Compliance Method:

Engineers and designers should include measures intended to promote air quality in the project specifications for ventilation, materials and others, as applicable. The contractor should be responsible for employing them on the job and being able to demonstrate that the practices are being followed if requested by the enforcing agency.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications for directions on ventilation practices to be followed by the contractor.

On-site enforcement: The inspector should review the permit set of plans to verify which air quality practices the contractor is to use on the project and ask for demonstration of their employment during site visits.

5.504.3 Covering of duct openings and protection of mechanical equipment during construction. At the time of rough installation and during storage on the construction site until final startup of the heating, cooling and ventilating 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, water and debris which may enter the system.

Intent:

To enhance HVAC equipment efficiency and indoor air quality at building occupancy by preventing construction debris from building up in the air ducts during construction.

Change for 2013: No change.

Existing Law or Regulation:

The *California Energy Code*, CCR, Part 6, contains ventilation standards for conditioned spaces. CCR, Title 8 contains additional regulations for worker safety.

Compliance Method:

Engineers and designers should include the measures intended to promote air quality in the project specifications for ventilation, materials and others, as applicable. The contractor should be responsible for employing them on the job and being able to demonstrate that the practices are being followed if requested by the enforcing agency.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications for directions on ventilation practices to be followed by the contractor.

On-site enforcement: The inspector should review the permit set of plans to verify which air quality practices the contractor is to use on the project and ask for demonstration of their employment during site visits.

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, and caulks. Adhesives, sealants and caulks used on the project shall meet the requirements of the following standards:

1. Adhesives, adhesive bonding primers, adhesive primers, seal-

ants, 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. 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.

Tables not shown. Refer to code.

5.504.4.3 Paints and coatings. Architectural paints and coatings shall comply with VOC limits in Table 1 of the ARB Architectural Coatings Suggested Control Measure, as shown in Table 5.504.4.3, 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 5.504.4.3 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 5.504.4.3 shall apply.

5.504.4.3.1 Aerosol paints and coatings. Aerosol paints and coatings shall meet the PWMIR 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.

5.504.4.3.2 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

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

1. Carpet and Rug Institute's Green Label Plus Program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as CDPH Standard Method V1.1 or Specification 01350);
3. NSF/ANSI 140 at the Gold level or higher;
4. Scientific Certifications Systems Sustainable Choice; or
5. Compliant with the California Collaborative for High Performance Schools (CA-CHPS) Criteria Interpretation for EQ 2.2 dated July 2012 and listed in the CHPS High Performance Product Database.

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 5.504.4.1.

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 ARB's Air Toxics Control Measure (ATCM) for Composite Wood (17 CCR 93120 et seq.). Those materials not exempted under the ATCM must meet the specified emission limits, as shown in Table 5.504.4.5.

Table not shown. Refer to code.

5.504.4.5.1 Early compliance. Reserved.

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. Product labeled and invoiced as meeting the Composite Wood Products regulation (see CCR, Title 17, Section 93120, *et seq.*).

4. Exterior grade products marked as meeting the PS-1 or PS-2 standards of the Engineered Wood Association, the Australian AS/NZS 2269 or European 636 3S standards.

5. Other methods acceptable to the enforcing agency.

5.504.4.6 Resilient flooring systems. For 80 percent of floor area receiving resilient flooring, installed resilient flooring shall meet at least one of the following:

1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;

2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;

3. Compliant with the California Collaborative for High Performance Schools (CA-CHPS) Criteria Interpretation for EQ 2.2 dated July 2012 and listed in the CHPS High Performance Product Database; or

4. Compliant with CDPH criteria as certified under the Greenguard Children's & Schools Program.

5.504.4.6.1 Verification of compliance. Documentation shall be provided verifying that resilient flooring materials meet the pollutant emission limits.

Intent:

The purpose of these measures is to reduce the volatile organic compounds (VOC) of finish materials commonly installed on a project, which will help improve air quality for the building occupants.

Change for 2013: The reference to the standards for carpet and resilient floor systems were updated and needed standards were added to the approved list. Also, the requirement for resilient floor systems was increased from 50 to 80 percent.

Figure 17: Interior Finishes

Existing law or regulation:

The low-VOC provisions are based on the recommendations, guidelines and regulations of the Air Resources Board cited in each section. Regulations for aerosol adhesives and paints and for composite wood products are found in *California Code of Regulations*, Title 17, as noted above.

Compliance method:

Specify finish materials that meet the limits of VOC shown in the tables for adhesives and sealants, paints and coatings, and composite wood products (particle board and hardboard casework). Flooring products (carpet systems and resilient flooring) shall be specified to meet VOC limit criteria as tested by the listed organizations. Substitutes may be approved by the local enforcing authority if it deems equivalency.

Suggestion:

Contractor: Retain product data sheets for on-site verification by the enforcing agency and for the operation and maintenance manual. Sample compliance forms can be found in Part 4 of this guide.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that the finishes are specified to meet VOC emission limits.

On-site enforcement: The inspector should review the permit set of plans and product data sheets maintained by the contractor to verify finishes specified on the approved plans and specifications are installed, or at least stored on site with the ability to be verified. The inspector may review data on material containers or specifications provided with products or accept a self-certification form.

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 that provides at least a Minimum Efficiency Reporting Value (MERV) of 8. MERV 8 filters shall be installed prior to occupancy, and recommendations for maintenance with filters of the same value shall be included in the operation and maintenance manual.

Exceptions:

1. An ASHRAE 10-percent to 15-percent efficiency filter shall be permitted for an HVAC unit meeting the 2013 *California Energy Code* having 60,000 Btu/h or less capacity per fan coil, if the energy use of the air delivery system is 0.4 W/cfm or less at design air flow.

2. Existing mechanical equipment.

5.504.5.3.1 Labeling. Installed filters shall be clearly labeled by the manufacturer indicating the MERV rating.

Intent:

The intent of this regulation is to filter particulate matter from the air by the use of at least MERV 8-rated filters for improved air quality.

Change for 2013: The exceptions to the MERV 8 requirements were modified to include filters that meet ASHRAE 10-15 percent, which meets the CEC. An exception for existing mechanical equipment was added. Also, all installed filters are now required to be labeled with the MERV rating.

Figure 18: Mechanical Ventilation for Occupied Spaces

Existing law or regulation:

There is NO current law or regulation for this code provision.

Compliance method:

Specify and install prior to occupancy at least MERV 8 filters for the return air grilles.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that the filters are specified to meet MERV 8 and labeling requirements, or that specified equipment qualifies for the exception.

On-site enforcement: The inspector should review the permit set of plans and product data sheets maintained by the contractor to verify that HVAC filtration specified on the approved plans and specifications is installed or is stored on-site with the ability to be verified. The inspector may check a sample of installed filters to verify the MERV rating and labeling requirements.

> **5.504.7 Environmental tobacco smoke (ETS) control.** Where outdoor areas are provided for smoking, prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows and within the building as already prohibited by other laws or regulations; 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. When ordinances, regulations or policies are not in place, post signage to inform building occupants of the prohibitions

Intent:

By prohibiting smoking in buildings, and in those instances where outdoor areas are dedicated for the use of smokers, this provision is intended to improve indoor air quality and to protect nonsmokers from second-hand smoke.

Change for 2013: No change.

Existing law or regulation:

State law prohibits smoking inside most buildings, and many local jurisdictions and college campuses have regulations that require a certain distance that smoking can occur outside a building. AB 1807 (Stats. 1983, c. 1047) is the public policy of the state that emissions of toxic air contaminants should be controlled to levels that prevent harm to the public health.

Compliance method:

Include in the signage specification and post signs that prohibit smoking for an outdoor area within 25 feet of building entries, outdoor air intakes and operable windows where they occur.

Suggestion:

In order to clarify sign placement and smoking area(s), show on one or all of the following plans: site plan, floor plan, elevations and/or detail sheet.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that, if an outdoor smoking area is shown, signage is specified and located.

On-site enforcement: The inspector should review the permit set of plans against the outdoor smoking area and verify signage installed in the field.

5.505.1 Indoor moisture control. Buildings shall meet or exceed the provisions of the *California Building Code*, CCR, Title 24, Part 2, Section 1203 (Ventilation) and Chapter 14 (Exterior Walls). For additional measures not applicable to low-rise residential occupancies, see Section 5.407.2 of this code.

Intent:

The intent is to direct the code user to other parts of Title 24 and this part for those provisions that are intended to reduce the probability of mold and mildew growth and improve air quality.

Change for 2013: No change.

Existing law or regulation:

California Building Code Section 1203 for attic spaces and under-floor ventilation, Chapter 14 for a weather-resistant exterior wall envelope and Section 5.407.2.2, Entries and openings, in this code.

Compliance method:

Design team: Include details on the construction plans addressing issues of moisture control,

Contractor: Understand and install moisture control according to construction documents and manufacturer's installation recommendations.

Note: Vapor control recommendations for different climate zones maybe found at www.buildingscience.com.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that moisture control features that meet Title 24 are specified and detailed.

On-site enforcement: The inspector should review the permit set of plans and confirm that moisture control measures have been incorporated into the building. Collect a copy of the self-certification form if completed and signed by the contractor.

SECTION 5.506
INDOOR AIR QUALITY

5.506.1 Outside air delivery. For mechanically or naturally ventilated spaces in buildings, meet the minimum requirements of Section 120.1 (Requirements For Ventilation) of the 2013 *California Energy Code* or the applicable local code, whichever is more stringent, and Division 1,Chapter 4 of CCR, Title 8.

Intent:

The purpose is to point building designers and contractors to the ventilation requirements in the *California Code of Regulations* that are intended to improve indoor air quality for building occupants.

Change for 2013: 2013 *California Energy Code* section references have been updated.

Existing law or regulation:

The 2013 *California Energy Code*, CCR, Title 24, Part 6, Sections 120.1(a) through 120.1(e) with flow rates as required by Table120.1-A. There is a possibility of a more stringent local ordinance.

Compliance method:

Most engineers and contactors are familiar with following the provisions of the *California Energy Code* that specify requirements for naturally and mechanically ventilated spaces, and may comply with this provision by

using energy code compliance tools currently in place. Title 8 for Cal OSHA may have additional regulations that emphasize air quality for workers in particular environments, which should be followed as required.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that building ventilation is calculated and specified to Title 24, Part 6, and if applicable, Part 8.

On-site enforcement: The inspector should review the permit set of plans against the natural ventilation features and mechanical ventilation systems that are installed on the project, requesting results of any testing of ventilation rates. Adequate preoccupancy building ventilation shall be verified.

5.506.2 Carbon dioxide (CO_2) monitoring. For buildings or additions equipped with demand control ventilation, CO_2 sensors and ventilation controls shall be specified and installed in accordance with the requirements of the 2013 *California Energy Code*, Section 120.1(c)4.

Intent:

When demand control ventilation is required by Part 6, this provision intends to maintain CO_2 levels that are within the range that is safe for human occupancy.

Change for 2013: These requirements were added to building additions and the reference to the *California Energy Code* was updated.

Existing law or regulation:

The current edition of the *California Energy Code*, CCR, Title 24, Part 6, Section 120.1(c)4, identifies the sensors, controls and devices required to keep CO_2 emissions at safe levels.

Compliance method:

Design team: The designer should specify and show calculations and locations for CO_2 sensors in the construction documents. The team familiar with demand control ventilation will be familiar with these requirements.

Contractor: The contractor should install the specified equipment and make sure that it is operating as designed. Again, familiarity with demand control ventilation will be an advantage.

Suggestion:

Contractor: Retain product data sheets for on-site verification by the enforcing agency and for the operation and maintenance manual.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans, specifications and calculations to confirm that sensors are included that meet the requirements of Part 6.

On-site enforcement: The inspector should review the permit set of plans and product data sheets to verify that complying sensors displaying readings are installed in designated locations. He/she should obtain assurance that the readings are recorded as required by Part 6.

SECTION 5.507
ENVIRONMENTAL COMFORT

5.507.4 Acoustical control. Employ building assemblies and components with Sound Transmission Class (STC) values determined in accordance with ASTM E90 and ASTM E413 or Outdoor-Indoor Sound Transmission Class (OITC) determined in accordance with ASTM E1332, using either the prescriptive or performance method in Section 5.507.4.1 or 5.507.4.2.

Exception: Buildings with few or no occupants or where occupants are not likely to be affected by exterior noise, as determined by the enforcement authority, such as factories, stadiums, storage, enclosed parking structures and utility buildings.

Exception [DSA-SS]: See *CALGreen Code* for requirements.

5.507.4.1 Exterior noise transmission. Wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall meet a composite STC rating of at least 50 or a composite OITC rating of no less than 40, with exterior windows of a minimum STC of 40 or OITC of 30 in the following locations:

1. Within the 65 CNEL noise contour of an airport

   Exceptions:

   1. L_{dn} or CNEL for military airports shall be determined by the facility Air Installation Compatible Land Use Zone (AICUZ) plan.
   2. L_{dn} or CNEL for other airports and heliports for which a land use plan has not been developed shall be determined by the local general plan noise element.

2. Within the 65 CNEL or L_{dn} noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway noise source as determined by the Noise Element of the General Plan.

5.507.4.1.1 Noise exposure where noise contours are not readily available. Buildings exposed to a noise level of 65 dB L_{eq}-1-hr during any hour of operation shall have building, addition or alteration exterior wall and roof-ceiling assemblies exposed to the noise source meeting a composite STC rating of at least 45 (or OITC 35), with exterior windows of a minimum STC of 40 (or OITC 30).

5.507.4.2 Performance method. For buildings located as defined in Section 5.507.4.1 or 5.507.4.1.1, wall and roof-ceiling assemblies exposed to the noise source making up the building or addition envelope or altered envelope shall be constructed to provide an interior noise environment attributable to exterior sources that does not exceed an hourly equivalent noise level (L_{eq}-1Hr) of 50 dBA in occupied areas during any hour of operation.

5.507.4.2.1 Site features. Exterior features such as sound walls or earth berms may be utilized as appropriate to the building, addition or alteration project to mitigate sound migration to the interior.

5.507.4.2.2 Documentation of compliance. An acoustical analysis documenting complying interior sound levels shall be prepared by personnel approved by the architect or engineer of record.

5.507.4.3 Interior sound transmission. Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40.

Note: Examples of assemblies and their various STC ratings may be found at the California Office of Noise Control:
http://www.toolbase.org/PDF/CaseStudies/stc_icc_ratings.pdf

Figure 19: Noise Reduction

Intent:

Where buildings are sited in the noisy areas described in this provision, the intent is to keep sound levels low enough to carry out the activities that take place inside the building without the distraction or discomfort of unwanted noise.

Change for 2013: These requirements were added to building additions and alterations or altered envelope.

Existing law or regulation:

There is NO current law or regulation for this code provision for nonresidential buildings. There may be local ordinances that apply in those communities that have noise exposure, such as commercial airports.

Compliance method:

Design team: The designer should determine if this code applies; if so then specify and detail wall and ceiling assemblies and show in the construction documents, showing on plans and/or sections the placement of sound walls and floor/ceilings.

Contractor: The contractor should install the wall and ceiling assemblies as designed.

Suggestion:

Employing the services of an acoustical engineer is another option to assist with compliance. Choose an assembly from the "examples of assemblies" link that meet the corresponding sound ratings class.

> **Note:** Examples of assemblies and their various STC ratings may be found at: http://www.toolbase.org/PDF/CaseStudies/stc_icc_ratings.pdf

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans, specifications and calculations to confirm that STC ratings are included that meet the requirements of this code section.

On-site enforcement: The inspector should review the permit set of plans and product data sheets to verify that complying wall and ceiling assemblies are installed correctly.

SECTION 5.508
OUTDOOR AIR QUALITY

5.508.1 Ozone depletion and greenhouse gas 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 Chlorofluorocarbons (CFCs.) Install HVAC, refrigeration and fire suppression equipment that do not contain CFCs.

5.508.1.2 Halons. Install HVAC, refrigeration and fire suppression equipment that do not contain Halons.

Intent:

This measure eliminates the use of chlorofluorocarbons and Halons in fire suppression, HVAC and refrigeration systems in order to assist in meeting statewide requirements for the reduction of greenhouse gas emissions to 1990 levels and to prevent ozone destruction.

Change for 2013: No Change.

Existing Law or Regulation:

Refrigerants are regulated at the federal level by the Environmental Protection Agency and those containing ozone depleting chemicals are being gradually phased out. In California, the Global Warming Solutions Act of 2006, Assembly Bill 32 (Stats 2006, c. 488), calls for the reduction of greenhouse gas emissions to 1990 levels. Although these damaging compounds have been widely outlawed for most uses, prior to *CALGreen*, these issues were not addressed by the CCR Title 24 building standards.

Compliance Method:

Clearly note in appropriate place(s) in the construction documents and in the equipment specifications that the required total restriction of these compounds has been followed.

Note: Typically, new fire suppression, HVAC and refrigeration systems are designed to operate on a new generation of refrigerants that do not contribute to greenhouse gases; but there is an inventory of CFCs and Halons used for the recharge of existing equipment. Ensure that new equipment is specified and installed, which is usually required in a new project.

Enforcement:

Plan intake: Enforcement provided by plan check and the on-site inspection by the building official should ensure the drawing and installation requirements have been met and that no HVAC, fire suppression or refrigeration systems installed use the above-mentioned environmental contaminants.

On-site enforcement: The inspector should review the permit set of plans and product data sheets to verify that complying equipment is installed. Inspection of this equipment may be combined with verification of building commissioning or testing and adjusting.

5.508.2 Supermarket refrigerant leak reduction. New commercial refrigeration systems shall comply with the provisions of this section when installed in retail food stores 8,000 square feet or more conditioned area, and that utilize either refrigerated display cases, or walk-in coolers or freezers connected to remote compressor units or condensing units. The leak reduction measures apply to refrigeration systems containing high-global-warming potential (high-GWP) refrigerants with a GWP of 150 or greater. New refrigeration systems include both new facilities and replacement of existing refrigeration systems in existing facilities.

Exception: Refrigeration systems containing low-global warming potential (low-GWP) refrigerant with a GWP value less than 150 are not subject to this section. Low-GWP refrigerants are non-ozone-depleting refrigerants that include ammonia, carbon dioxide (CO2), and potentially other refrigerants.

5.508.2.1 Refrigerant piping. Piping compliant with the *California Mechanical Code* shall be installed to be accessible for leak protection and repairs. Piping runs using threaded pipe, copper tubing with an outside diameter (OD) less than ¼ inch, flared tubing connections and short radius elbows shall not be used in refrigerant systems except as noted below.

5.508.2.1.1 Threaded pipe. Threaded connections are permitted at the compressor rack.

5.508.2.1.2 Copper pipe. Copper tubing with an OD less than ¼ inch may be used in systems with a refrigerant charge of 5 pounds. or less.

5.508.2.1.2.1 Anchorage. One-fourth-inch OD tubing shall be securely clamped to a rigid base to keep vibration levels below 8 mils.

5.508.2.1.3 Flared tubing connections. Double-flared tubing connections may be used for pressure controls, valve pilot lines and oil.

Exception. Single-flared tubing connections may be used with a multiring seal coated with industrial sealant suitable for use with refrigerants and tightened in accordance with manufacturer's recommendations.

5.508.2.1.4 Elbows. Short radius elbows are only permitted where space limitations prohibit use of long radius elbows.

5.508.2.2 Valves. Valves and fittings shall comply with the *California Mechanical Code* and as follows.

5.508.2.2.1 Pressure relief valves. For vessels containing high-GWP refrigerant, a rupture disc shall be installed between the outlet of the vessel and the inlet of the pressure relief valve.

5.508.2.2.1.1 Pressure detection. A pressure gauge, pressure transducer or other device shall be installed in the space between the rupture disc and the relief valve inlet to indicate a disc rupture or discharge of the relief valve.

5.508.2.2.2 Access valves. Only Schrader access valves with a brass or steel body are permitted for use.

5.508.2.2.2.1 Valve caps. For systems with a refrigerant charge of 5 pounds or more, valve caps shall be brass or steel and not plastic.

5.508.2.2.2.2 Seal caps. If designed for it, the cap shall have a neoprene O-ring in place.

5.508.2.2.2.2.1 Chain tethers. Chain tethers to fit over the stem are required for valves designed to have seal caps.

Exception. Valves with seal caps that are not removed from the valve during stem operation.

5.508.2.3 Refrigerated service cases. Refrigerated service cases holding food products containing vinegar and salt shall have evaporator coils of corrosion-resistant material, such as stainless steel; or be coated to prevent corrosion from these substances.

5.508.2.3.1. Coil coating. Consideration shall be given the heat transfer efficiency of coil coating to maximize energy efficiency.

5.508.2.4 Refrigerant receivers. Refrigerant receivers with capacities greater than 200 pounds shall be fitted with a device that indicates the level of refrigerant in the receiver.

5.508.2.5 Pressure testing. The system shall be pressure tested during installation prior to evacuation and charging.

5.508.2.5.1 Minimum pressure. The system shall be charged with regulated dry nitrogen and appropriate tracer gas to bring system pressure up to 300 psig minimum.

5.508.2.5.2 Leaks. Check the system for leaks, repair any leaks, and retest for pressure using the same gauge.

5.508.2.5.3 Allowable pressure change. The system shall stand, unaltered, for 24 hours with no more than a +/- one pound pressure change from 300 psig, measured with the same gauge.

5.508.2.6 Evacuation. The system shall be evacuated after pressure testing and prior to charging.

5.508.2.6.1 First vacuum. Pull a system vacuum down to at least 1000 microns (+/- 50 microns), and hold for 30 minutes.

5.508.2.6.2 Second vacuum. Pull a second system vacuum to a minimum of 500 microns, and hold for 30 minutes.

5.508.2.6.3 Third vacuum. Pull a third vacuum down to a minimum of 300 microns, and hold for 24 hours with a maximum drift of 100 microns over a 24-hour period.

Intent:

To reduce supermarket refrigerant leakage of refrigeration systems containing high-global-warming potential (high-GWP) refrigerants with a GWP of 150 or greater. This measure will assist in meeting statewide requirements for the reduction of greenhouse gas emissions to 1990 levels and to prevent ozone destruction.

Change for 2013: This is a new code requirement.

Existing Law or Regulation:

Refrigerants are regulated at the federal level by the Environmental Protection Agency and those containing ozone depleting chemicals are being gradually phased out. In California, the Global Warming Solutions Act of 2006, Assembly Bill 32 (Stats 2006, c. 488), calls for the reduction of greenhouse gas emissions to 1990 levels. Although these damaging compounds have been widely outlawed for most uses, prior to *CALGreen*, these issues were not addressed by the CCR Title 24 building standards.

Compliance Method:

Determine if code section applies: If so, clearly note in appropriate place(s) in the construction documents and specifications that the required leak reduction measures have been followed.

Note: Typically, refrigeration systems are designed to operate on a new generation of refrigerants that do not contribute to greenhouse gases; but there is an inventory of CFCs and Halons used for the recharge of existing equipment.

Enforcement:

Plan intake: Enforcement provided by plan check and the on-site inspection by the building official should ensure the drawing and installation requirements and that the appropriate leak reduction measures have been included on the drawings.

On-site enforcement: The inspector should review the permit set of plans and product data sheets to verify that complying equipment is installed. Inspection of this equipment may be combined with verification of building commissioning or testing and adjusting.

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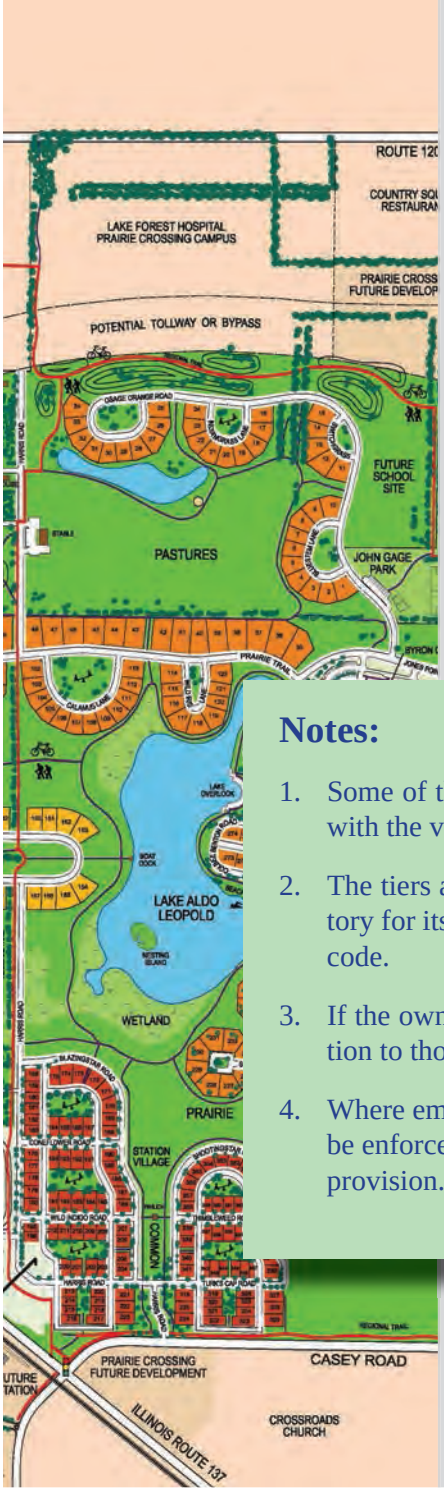
PART

3

CALGreen Appendix A5 Nonresidential Voluntary Measures



Division A5.1: Planning and Design

Division A5.2: Energy Efficiency

Division A5.3: Water Efficiency and Conservation

Division A5.4: Material Conservation and Resource Efficiency

Division A5.5: Environmental Quality

Notes:

1. Some of the voluntary measures described in the following pages are required for compliance with the voluntary tiers, which themselves are explained in Division A5.6.
2. The tiers and other voluntary measures are intended for a local jurisdiction to adopt as mandatory for its city or county. In that case, they are enforced as are the mandatory provisions of the code.
3. If the owner or developer elects to employ measures voluntarily, he or she should direct attention to those being used on the project when applying for a building permit.
4. Where employed voluntarily by a building owner or developer, voluntary measures should also be enforced by local building departments to make sure they are being met as described in each provision.

Division A5.1, Planning and Design

Division A5.6: Voluntary Tiers

SECTION A5.102
DEFINITIONS

Note: All definitions in Chapter 5 have been moved to Chapter 2.

SECTION A5.103
SITE SELECTION

A5.103.1 Community connectivity. Where feasible, locate project on a previously developed site within a $^{1}/_{2}$-mile radius of at least 10 basic services, readily accessible by pedestrians, including, but not limited to, one each of bank, place of worship, convenience grocery, day care, cleaners, fire station, barber shop, hardware store, laundry, library, medical clinic, dental clinic, senior care facility, park, pharmacy, post office, restaurant (two may be counted), school, supermarket, theater, community center, fitness center, museum or farmers market. Other services may be considered on a case-by-case basis.

Intent:

The intent of this code provision is to ensure the reuse of existing sites in developed areas for nonresidential districts to help minimize the impact of new site development on undeveloped lands, local air and water quality, as well as to minimize the greenhouse gas emissions generated from the development of a new site.

Change for 2013: No change.

Existing law or regulation:

There is NO current law or regulation for this code provision. However, some jurisdictions may have "Special Districts" or zoning that may benefit from these provisions. Verify with the local enforcing authority the existence of any special zoning conditions prior to implementation of community connectivity for your project.

Compliance method:

For newly constructed projects only, select a previously developed site with connectivity to the community that can provide pedestrian access to basic services anticipated to be available within a community (examples listed above). In addition, other types of services may be considered on a case-by-case basis to lend greater flexibility to the site selection process. Provide $^1/_2$-mile radius map of the project site area showing the 10 basic services and their proximity to the site for review and approval.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans, specifications and $^1/_2$-mile area map to confirm the appropriate site selection has occurred.

A5.103.2 Brownfield or greyfield site redevelopment or infill area development. If feasible, select for a development a brownfield in accordance with Section A5.103.2.1 or on a greyfield or infill site as defined in Section A5.102.

A5.103.2.1 Brownfield redevelopment. Develop a site documented as contaminated by means of an ASTM E 1903-97 Phase II Environmental Site Assessment or on a site defined as a brownfield by a local, state or federal government agency. The site must be fully remediated in accordance with EPA regulations to the level required of the anticipated land use.

Intent:

The intent of these provisions is to encourage the use of brownfield sites, previously unusable sites due to contamination, or greyfield sites, which

are 50 percent covered with impervious materials. The use of these sites can reduce the impact on undeveloped land and greenhouse gas emissions created from the development of new sites as well as enhance the existing developed area with new construction further helping to minimize urban blight and promote economic growth.

Change for 2013: No change.

Existing law or regulation:

Environmental Protection Agency (EPA) regulations and ASTM E 1903-97 Phase II Environmental Site Assessment apply to brownfields and local ordinances may also be in place.

Compliance method:

Prepare documentation regarding remediation of contaminated sites in accordance with ASTM and EPA assessment process. Confirm with local enforcing agency any zoning requirements or specific local, state or federal limitations related to brownfield or greyfield project sites.

Enforcement:

Verification that remediation has occurred in accordance with appropriate local, state or federal requirements for brownfield or greyfield development.

SECTION A5.104
SITE PRESERVATION

A5.104.1 Reduce development footprint and optimize open space. Optimize open space on the project site in accordance with Section A5.104.1.1, A5.104.1.2 or A5.104.1.3.

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 in the total project site area.

Intent:

The intent of this provision is to optimize the open space on a job site and to encourage the utilization of vegetation within available open spaces. Incorporation of these provisions may result in improving ground water

recharge, open space preservation and wildlife habitat preservation, as well as increasing the carbon sink effect, thus reducing greenhouse gas emissions.

Change for 2013: No Change.

Existing law or regulation:

No known state law exists. However, local zoning ordinances may have an impact on these provisions.

Compliance method:

Provide open space for vegetation via local ordinance and document location and calculations on site or landscape plans.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for the open space areas and calculations.

On-site enforcement: The inspector should review the permit set of plans to confirm that the open space represented in the construction documents is preserved and planted as specified.

SECTION A5.105
DECONSTRUCTION AND REUSE OF EXISTING STRUCTURES

A5.105.1 If feasible, disassemble existing buildings instead of demolishing to allow reuse or recycling of building materials.

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 nonstructural roofing material.
2. Hazardous materials that are remediated as a part of the project.
3. A project with an addition of more than two times the square footage of the existing building.

A5.105.1.2 Existing nonstructural elements. Reuse existing interior nonstructural 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 two 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 as follows. Document the weight or number of the items salvaged.

1. Salvage for reuse on the project items that conform to other provisions of Title 24 in an on-site storage area.
2. Nonconforming items may be salvaged in dedicated collection bins for exempt projects or other uses.

Intent:

The intent of these provisions is to reduce the amount of demolished material from an existing project that would otherwise end up in a landfill. It also encourages the reuse of materials, when possible, by integrating them into the new construction. The reuse of existing materials and the reduction in new material needs are established ways to reduce the amount of fuel for delivery vehicles and the amount of new material needed, resulting in reduced greenhouse gas emissions produced during new building construction.

Change for 2013: No change.

Existing law or regulation:

No known laws or regulations currently exist. Check with local jurisdiction regarding ordinances for these provisions.

Compliance method:

A5.105.1.1 Existing building structure. Document for verification the calculations performed to establish the 75-percent minimum requirement for existing building structural components and show on a demolition, site or building plan.

A5.105.1.2 Existing nonstructural elements. Document for verification the calculations performed to establish that at least 50 percent of the area of the completed building the reuse of existing interior nonstructural elements and show in the plans.

A5.105.1.3 Salvage. Document for verification the calculations performed to establish the salvage weight or number of items salvaged for a given project.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and calculations that show the required percentages of reused existing building elements.

On-site enforcement: The inspector should review the permit set of plans and confirm that the required percentages have been integrated, reused and salvaged as shown.

SECTION A5.106
SITE DEVELOPMENT

A5.106.2 Storm water design. Design storm water runoff rate and quantity in conformance with Section A5.106.2.1 and storm water runoff quality by Section A5.106.2.2 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.

Exceptions: If the site is already greater than 50 percent impervious, implement a storm water management plan resulting in a 25 percent decrease in the rate and quantity.

A5.106.2.2 Storm water runoff quality. Use postconstruction 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).

Intent:

The intent of these provisions is to limit the amount and rate of water runoff to ensure no measurable increase from existing to developed conditions occurs. This will help to prevent the discharge of surface water pollutants from the project site into receiving waters in an attempt to maintain water quality.

These provisions make exception for impervious sites that cannot retain all of the storm water on site.

Additionally, the quality of the water runoff can be increased by incorporating treatment control best management practices (BMPs) through recommendations for project maintenance.

Figure 20: Storm Water Design

Change for 2013: No Change.

Existing law or regulation:

No known laws or regulations currently exist. Check with local jurisdiction regarding ordinances for these provisions.

Compliance method:

The designer should design the site to ensure that storm water runoff quality and rate does not increase from existing conditions. BMPs for storm water treatment control should be employed during construction. Recommendations for continuing treatment control should be included in the operation and maintenance manual.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for BMPs to control the storm water runoff rate, quantity and quality.

On-site enforcement: The inspector should review the permit set of plans and verify that on-site treatment controls meet with design criteria. He or she may check the operations and maintenance manual for recommendations on ongoing compliance.

A5.106.3 Low impact development (LID). Reduce peak runoff in compliance with Section 5.106. 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:

1. Bioretention (rain gardens);
2. Cisterns and rain barrels;
3. Green roof meeting the structural requirements of the building code;
4. Roof leader disconnection;
5. Permeable and porous paving;
6. Vegetative swales and filter strips; tree preservation; and
7. Volume retention suitable for previously developed sites.

A5.106.3.1 Implementation. If applicable, coordinate LID projects with the local Regional Water Quality Control Board, which may issue a permit or otherwise require LID.

Note: Further information on design of specific control measures may be found on U.S. EPA's website, on SWRCB's website and from local boards that require LID.

A5.106.3.2 Greyfield or infill site. Manage 40 percent of the average annual rainfall on the site's impervious surfaces through infiltration, reuse or evapotranspiration.

Intent:

A5.106.3.1 - The intent of these provisions is to encourage low-impact development to reduce peak rain water runoff by utilizing local Regional Water Quality Control Board mitigation measures and/or additional mitigation measures listed above.

A5.106.3.2 – For greyfield or infill sites, the intent is to manage rainfall on the site's impervious surfaces at a lower rate than for undeveloped sites.

Change for 2013: No change.

Existing law or regulation:

Verify the existence of local Regional Water Quality Control Board mitigation measures required for LID.

Compliance method:

Design specific control measures in accordance with EPA requirements of local Regional Water Control Board requirements for implementation on a LID site.

Show site design documents that demonstrate control measures for rainfall for undeveloped sites using mitigation measures listed above or from other referenced sources.

For greyfield or infill sites with impervious surfaces, indicate that at least 40 percent of annual rainfall is to be managed on site.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents to confirm compliance measures have been incorporated in the site design.

On-site enforcement: The inspector should review the permit set of plans and verify that on-site control measures meet with design criteria.

A5.106.4 Reserved

A5.106.4.1 Reserved

A5.106.4.2 Reserved

A5.106.4.3 Changing rooms. For buildings with over 10 tenant-occupants, provide changing/shower facilities for tenant-occupants only

in accordance with Table A5.106.4.3 or document arrangements with nearby changing/shower facilities.

TABLE A5.106.4.3

NUMBER OF TENANT-OCCUPANTS	SHOWER/CHANGING FACILITIES REQUIRED[2]	2-TIER (12" X 15" X 72") PERSONAL EFFECTS LOCKERS[1,2] REQUIRED
0–10	0	0
11–50	1 unisex shower	2
51–100	1 unisex shower	3
101–200	1 shower stall per gender	4
Over 200	1 shower stall per gender for each 200 additional tenant-occupants	One 2-tier locker for each 50 additional tenant-occupants

1. One 2-tier locker serves two people. Lockers shall be lockable with either padlock or combination lock.
2. Tenant spaces housing more than 10 tenant-occupants within buildings sharing common toilet facilities need not comply; however, such common shower facilities shall accommodate the total number of tenant-occupants served by the toilets and include a minimum of one unisex shower and two 2-tier lockers.

Note: Additional information on recommended bicycle accommodations may be obtained from Sacramento Area Bicycle Advocates.

Intent:

Changing rooms are included with the intent of enhancing the mandatory long-term bicycle parking requirements by providing changing rooms and showers for tenant-occupants to further encourage alternate means of transportation. The goals are to reduce energy use and greenhouse emissions associated with motorized transportation and provide for the comfort of building occupants.

Change for 2013: No change.

Existing law or regulation:

Check with local jurisdiction regarding local ordinances. For projects of the University of California, consult the University of California Policy on Sustainable Practices.

Compliance method:

Provide plans and specifications for the project that show the changing rooms and amenities required in accordance with Table A5.106.4.3.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents to confirm compliance measures for changing rooms/shower facilities.

On-site enforcement: The inspector should review the permit set of plans and verify that on-site changing rooms/shower facilities meet with design criteria.

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 or A5.106.5.1.2.

A5.106.5.1.1. Tier 1 10 percent of total spaces. [BSC] Provide 10 percent of total designated parking spaces for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as follows:

[Table A5.106.5.1.1 not shown for clarity – see Code].

A5.106.5.1.2. Tier 2 Provide 12 percent of total designated parking spaces for any combination of low-emitting, fuel-efficient, and carpool/van pool vehicles as follows:

[Table A5.106.5.1.1 not shown for clarity – see Code].

A5.106.5.1.3 Parking stall marking. Paint, in the paint used for stall striping, the following characters such that the lower edge of the last word aligns with the end of the stall striping and is visible beneath a parked vehicle:

CLEAN AIR/VANPOOL/EV

Note: Vehicles bearing Clean Air Vehicle stickers from expired HOV lane programs may be considered eligible for designated parking spaces.

Intent:

These code provisions are to encourage newly constructed projects to provide enhanced designated, reserved parking for clean air vehicles (low-emitting, fuel-efficient, and carpool/van pool vehicles). The intent is to promote the use of clean air vehicles, conserve natural resources and reduce greenhouse gas emissions. These voluntary levels of compliance at 10 percent and 12 percent are intended to provide "reach" standards to help California meet its energy and greenhouse gas reduction goals.

Change for 2013: No change.

Existing Law or Regulation:

There is NO current law or regulation for this code provision. Check to see if local jurisdiction ordinances exist and incorporate whichever is stricter.

Compliance Method:

On the site plan for the project, provide identification of fuel-efficient parking stall locations, the number of stalls required based on total number of parking spaces and the application method, including the paint type to be used. The size of the characters included in the stall markings should be at least 8 inches high as per the mandatory Section 5.106.5.2.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents to confirm that fuel-efficient parking stall requirements have been incorporated in the site design.

On-site enforcement: The inspector should review the permit set of plans and verify that on-site parking designation meets with design criteria.

A5.106.5.3 Electric vehicle charging. Provide facilities meeting Section 406.9 (Electric Vehicle) of the *California Building Code* and as follows:

A5.106.5.3.1 Single charging space requirements. When only a single charging space is required, install a listed raceway capable of accommodating a dedicated branch circuit. The raceway shall not be less than trade size 1. The raceway shall be securely fastened at the main service or subpanel and shall terminate in close proximity to the proposed location of the charging system into a listed cabinet, box or enclosure.

Exception: Other reinstallation methods approved by the local enforcing agency that provide sufficient conductor sizing and service capacity to install Level 2 electric vehicle supply equipment (EVSE).

A5.106.5.3.2 Multiple charging spaces required. When multiple charging spaces are required, plans shall include the location(s) and type of the EVSE, raceway method(s), wiring schematics and electrical calculations to verify that the electrical system has sufficient capacity to charge simultaneously all the electric vehicles (EV) at all designated EV charging spaces at their full rated amperage. Plan design shall be based on Level 2 EVSE at its maximum operating ampacity. Provide raceways from the electrical service panel to the designated parking areas which are required to be installed at the time of construction.

Note: Utilities and local enforcing agencies may have additional requirements for metering and EVSE installation, and should be consulted during the project design and installation.

A5.106.5.3.3 Tier 1. At least 3 percent of the total parking spaces, but not less than one, shall be capable of supporting installation of future electric vehicle supply equipment (EVSE).

A5.106.5.3.4 Tier 2. At least 5 percent of the total parking spaces, but not less than two, shall be capable of supporting installation of future EVSE.

A5.106.5.3.5 Labeling requirement. A label stating "EV CHARGE CAPABLE" shall be posted in a conspicuous place at the service panel or subpanel and the EV charging space.

Intent:

The intent of these provisions is to encourage the use of electric vehicles as an alternate means of transportation. These vehicles can help to reduce the amount of greenhouse gas emission released into the environment and can assist in reducing personal transportation expenses.

Change for 2013: New code sections have been added.

Existing Law or Regulation:

The *California Building Code* has provisions in Chapter 4 regarding electric vehicle charging requirements. Check to see if local jurisdiction ordinances exist and incorporate whichever is stricter.

Compliance Method:

Include on the site plan and electrical plans the number of stalls required to have electric vehicle charging stations and the installation method, including the type of wiring to be used and the amperage required for that condition.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents to confirm compliance with the electrical vehicle recharging measures.

On-site enforcement: The inspector should review the permit set of plans and verify that on-site electrical vehicle charging stations have been installed on the site or parking garage in accordance with design criteria.

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.

Note: Strategies for programs may be obtained from local TMAs.

Intent:

The intent of these provisions is to provide vehicle parking to meet local zoning requirements but that reduces the on-site area needed to accommodate the required number of parking spaces.

Change for 2013: No change.

Existing Law or Regulation:

There is NO current law or regulation for this code provision. However, verify if local jurisdiction ordinances or TMAs (Transportation Management Authorities) exist.

Compliance Method:

Include on the site plans location and configuration of parking spaces, which could include on-street parking, a mix of standard and compact spaces or other approved strategies. Plans may include a reference to the local TMA program that may be used to reduce parking demand. If a TMA program is cited, include it in the operation and maintenance manual for reference by future building occupants.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents to confirm compliance measures have been incorporated in the site design as they relate to the parking capacity requirements and local zoning ordinances.

On-site enforcement: The inspector should review the permit set of plans and verify that the reduced parking capacity strategies shown in the design have been carried out in construction. He or she may check the operation and maintenance manual if TMA programs are recommended for compliance.

A5.106.7 Exterior wall shading. Meet requirements in the current edition of the *California Energy Code* and comply with either Section A5.106.7.1 or A5.106.7.2 for wall surfaces. If using vegetative shade, plant species documented to reach desired coverage within 5 years of building occupancy.

A5.106.7.1 Fenestration. Provide vegetative or man-made shading devices for all fenestration on east-, south-, and west-facing walls.

A5.106.7.1.1 East and west walls. Shading devices shall have 30-percent coverage to a height of 20 feet or to the top of the exterior wall, whichever is less. Calculate shade coverage on the summer solstice at 10 AM for east-facing walls and at 3 PM for west-facing walls.

A5.106.7.1.2 South walls. Shading devices shall have 60-percent coverage to a height of 20 feet or to the top of the exterior wall, whichever is less.

A5.106.7.2 Opaque wall areas. Use wall surfacing with minimum SRI 25 (aged), for 75 percent of opaque wall areas.

Exception: Use of vegetated shade in Wildland-Urban Interface Areas as defined in Chapter 7A (Materials and Construction Methods for Exterior Wildfire Exposure) of the California Building Code shall meet the requirements of that chapter.

Note: If not available from the manufacturer, aged SRI value calculations may be found at the California Energy Commission's website at www.energy.ca.gov.

Intent:

The intent of these provisions is to reduce the amount of heat gain from solar exposure. During certain times of the year the exterior surfaces of a structure are subject to increased solar exposure. The reduction in heat gain through windows can be significantly reduced by exterior shading of the windows. Also, increasing the reflectance of opaque walls is intended to reduce the heat island effect for the area.

Change for 2013: No change.

Figure 21: Exterior Shading

Existing Law or Regulation:

California Energy Code, Part 6, Title 24, *California Code of Regulations* regulates the energy efficiency of the building envelope.

Compliance Method:

Include in the landscape design and plant specifications species of plants that meet the shading requirements for exterior wall surfaces. Additionally, man-made shading devices can be specified for exterior wall applications. Energy compliance forms and software programs may serve as documentation of the efficacy of exterior shading and/or solar reflectance.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents to confirm compliance measures have been incorporated in the building and site design.

On-site enforcement The inspector should review the permit set of plans and verify that man-made or vegetative shading devices are installed as designed and confirm that any exposed opaque walls are compliant with specified SRI values.

A5.106.11 Heat island effect. Reduce nonroof heat islands by Section A5.106.11.1 and roof heat islands by Section A5.106.11.2.

A5.106.11.1 Hardscape alternatives. Use one or a combination of strategies 1 and 2 for 50 percent of site hardscape or put 50 percent of parking underground.

1. Use light colored materials with an initial solar reflectance value of at least .30 as determined in accordance with American Society for Testing and Materials (ASTM) Standards E1918 or C1549.

2. Use open-grid pavement system or pervious or permeable pavement system.

A5.106.11.2 Cool roof for reduction of heat island effect. Use roofing materials having a minimum aged solar reflectance and thermal emittance complying with Sections A5.106.11.2.1 and A5.106.11.2.2 or a minimum aged Solar Reflectance Index (SRI) complying with Section A5.106.11.2.3 and as shown in Table A5.106.11.2.2 for Tier 1 or Table A5.106.11.2.3 for Tier 2.

Exceptions:

1. Roof constructions that have a thermal mass over the roof membrane, including areas of vegetated (green) roofs, weighing at least 25 pounds per square foot.

2. Roof area covered by building integrated solar photovoltaic and building integrated solar thermal panels.

A5.106.11.2.1 Solar reflectance. Roofing materials shall have a minimum aged solar reflectance equal to or greater than the values specified in Table A5.106.11.2.2 for Tier 1 and Table A5.106.11.2.3 for Tier 2.

If Cool Roof Rating Council (CRRC) testing for aged reflectance is not available for any roofing products, the aged value shall be determined using the CRRC certified initial value using the equation $\rho_{aged} = [0.2 + ß\ [\rho_{initial} – 0.2]$, where $\rho_{initial}$ = the initial solar reflectance and soiling resistance, ß, listed by product type in Table A5.106.11.2.1.

Solar reflectance may also be certified by other supervisory entities approved by the Energy Commission pursuant to Title 24, Part 1, *California Administrative Code*.

A5.106.11.2.2 Thermal emittance. Roofing materials shall have a CRRC initial or aged thermal emittance as determined in accordance with ASTM E 408 or C 1371 equal to or greater than those specified in Table A5.106.11.2.2 for Tier 1 and Table A5.106.11.2.3 for Tier 2.

Thermal emittance may also be certified by other supervisory entities approved by the Energy Commission pursuant to Title 24, Part 1, *California Administrative Code*.

A5.106.11.2.3 Solar reflectance index alternative. Solar Reflectance Index (SRI) equal to or greater than the values specified in Table A5.106.11.2.2 for Tier 1 and Table A5.106.11.2.3 for Tier 2 may be used as an alternative to compliance with the aged solar reflectance values and thermal emittance.

SRI values used to comply with this section shall be calculated using the Solar Reflectance Index (SRI) Calculation Worksheet (SRI-WS) developed by the California Energy Commission or in compliance with ASTM E 1980-01 as specified in the *California Energy Code*, Section 118(i)3. Solar reflectance values used in the SRI-WS shall be based on the aged reflectance value of the roofing product or the equation in Section A5.106.11.2.1 if the CRRC certified aged solar reflectance are not available. Certified Thermal emittance used in the SRI-WS may be either the initial value or the aged value listed by the CRRC.

Solar reflectance and thermal emittance may also be certified by other supervisory entities approved by the Commission pursuant to Title 24, Part 1, *California Administrative Code*.

Note: The Solar Reflectance Index Calculation Worksheet (SRI-WS) is available by contacting the Energy Standard Hotline at 1-800-772-3300, website at http://www.energy.ca.gov or by email at Title24@energy.state.ca.us

Figure 22: Reduction of Heat Island Effect

A5.106.11.3 Verification of compliance. If no documentation is available, an inspection shall be conducted to ensure roofing materials meet cool roof aged solar reflectance and thermal emittance or SRI values.

[Tables A5.106.11.2.1 and A5.106.11.2.2 are omitted for clarity – see code for changes to values in the tables.]

Intent:

The intent of these provisions is to minimize the creation of nonroof and roof heat islands in new construction to reduce the energy load for building cooling and to moderate atmospheric temperature.

Additionally, cool roof installations are included in Tier 1 and Tier 2 provisions for adoption by cities and counties wishing to go beyond the minimum mandatory requirements for their communities.

Change for 2013: These code sections have been revised to remove the 3-year aged solar reflectance and a new table for soiling resistance has been added. The SRI values for Tier 1 and Tier 2 have been updated and renumbered. Additionally, the references to the cool roof tables have been updated.

Existing Law or Regulation:

California Energy Code, Part 6, Title 24, *California Code of Regulations* regulates the energy efficiency of the building envelope.

Compliance Method:

Show on the site/landscape plan the application of hardscape material with a calculation that represents at least a 50-percent area for alternatives to hardscape material.

For cool roof application include with the energy calculations a Solar Reflective Index Calculation Worksheet (SRI-WS) and specifications for cool roof materials selected to comply with the cool roof provisions shown in Table A1.506.11.2.2 or A1.506.11.2.3.

Suggestion:

Contractor: Maintain product data sheets for roofing materials for on-site verification by the enforcing agency and for the operation and maintenance manual.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for the hardscape design calculations; and energy compliance forms and specifications for compliance with the cool roof provisions.

On-site enforcement: The inspector should review the permit set of plans and verify that hardscape alternatives are constructed as calculated. He or she should check product data sheets for the roofing materials for compliance with cool roof values. If no documentation is available, he or she should inspect the project to ensure materials selected meet the SRI values.

Division A5.2, Energy Efficiency

SECTION A5.203
PERFORMANCE APPROACH

A5.203.1 Energy efficiency. Nonresidential, high-rise residential and hotel/motel buildings that include lighting and/or mechanical systems shall comply with Sections A5.203.1.1 and either A5.203.1.2.1 or A5.203.1.2.2. Newly constructed buildings, as well as additions and alterations, are included in the scope of these sections. Buildings permitted without lighting or mechanical systems shall comply with Section A5.203.1.1 but are not required to comply with Section A5.203.1.1.2 or A5.203.1.2.

A5.203.1.1 Tier 1 and Tier 2 prerequisites. Each of the following efficiency measures is required for all applicable components of the building project.

A5.203.1.1.1 Outdoor lighting. Newly installed outdoor lighting power shall be no greater than 90 percent of the Title 24, Part 6 calculated value of allowed outdoor lighting power.

A5.203.1.1.2 Service water heating in restaurants. Newly constructed restaurants 8,000 square feet or greater and with service water heaters rated 75,000 Btu/h or greater shall install a solar water-heating system with a minimum solar savings fraction of 0.15.

Exceptions:

1. Buildings with a natural gas service water heater with a minimum of 95-percent thermal efficiency.

2. Buildings where greater than 75 percent of the total roof area has annual solar access that is less than 70 percent. Solar access is the ratio of solar insolation, including shade, to the solar insolation without shade. Shading from obstructions located on the roof or any other part of the building shall not be included in the determination of annual solar access.

A5.203.1.1.3 Functional areas where compliance with residential lighting standards is required. For newly constructed high-rise residential dwelling units and hotel and motel guest rooms, indoor lighting shall comply with the applicable requirements in Appendix A4 Residential Voluntary Measures, Division A4.2 – Energy Efficiency, Section A4.203.1.1.3. For additions and alterations to high-rise residential dwelling units and hotel and motel guest rooms, indoor lighting shall comply with the applicable requirements in Appendix A4 Residential Voluntary Measures, Division A4.2 – Energy Efficiency, Section A4.204.1.1.1.

A5.203.1.2 Performance standard. Comply with one of the advanced efficiency levels indicated below.

A5.203.1.2.1 Tier 1. Buildings complying with the first level of advanced energy efficiency shall have an Energy Budget that is no greater than indicated below, depending on the type of energy systems included in the building project. If the newly constructed building, addition or alteration does not include indoor lighting or mechanical systems, then no additional performance requirements above Title 24, Part 6 are required.

1. For building projects that include indoor lighting or mechanical systems, but not both: No greater than 95 percent of the Title 24, Part 6, Energy Budget for the Proposed Design Building as calculated by compliance software certified by the Energy Commission.

2. For building projects that include indoor lighting and mechanical systems: No greater than 90 percent of the Title 24, Part 6 Energy Budget for the Proposed Design Building as calculated by compliance software certified by the Energy Commission.

A5.203.1.2.2 Tier 2. Buildings complying with the second level of advanced energy efficiency shall have an Energy Budget that is no greater than indicated below, depending on the type of energy systems included in the building project. If the newly constructed building, addition or alteration does not include indoor lighting or mechanical systems, then no additional performance requirements above Title 24, Part 6 are required.

1. For building projects that include indoor lighting or mechanical systems, but not both: No greater than 90 percent of the Title 24, Part 6, Energy Budget for the Proposed Design Building as calculated by compliance software certified by the Energy Commission.

2. For building projects that include indoor lighting and mechanical systems: No greater than 85 percent of the Title 24, Part 6, Energy Budget for the Proposed Design Building as calculated by compliance software certified by the Energy Commission.

Note: For Energy Budget calculations, high-rise residential and hotel/motel buildings are considered nonresidential buildings.

Intent:

The intent of these "reach" standards is to encourage building performance beyond the requirements in the 2013 *California Energy Code*, CCR, Title 24, Part 6. The State 2008 Long Term Energy Efficiency Strategic Plan calls for zero net energy use in newly constructed commercial buildings by 2030, and these reach standards are meant to assist with meeting that goal.

Change for 2013: The California Energy Commission did a rulemaking to amend the 2010 *CALGreen Code* for energy-related voluntary Tier 1 and Tier 2 measures. The CEC also revised the Performance Standard for a Tier 1 and Tier 2 level. Some of the changes include revising the performance standard approach requirements and adding new prerequisites such as outdoor lighting and service water heating in restaurants.

Existing Law or Regulation:

The 2013 *California Energy Code*, CCR, Title 24, Part 6, sets the minimum energy efficiency standards for those buildings under the authority of the California Energy Commission, including most commercial occupancies. Some local jurisdictions have adopted stricter energy efficiency standards with the approval of the Energy Commission.

Compliance Method:

Software used to calculate a building's energy performance for compliance with Part 6 (commonly referred to locally as "Title 24") is also used for

the purposes of achieving improvement. Compliance documents should be submitted with the construction documents in whatever format the enforcing agency requires for basic energy code compliance.

Note: For guidance on the associated voluntary standards included in the tiers for each project, refer to each section's guidelines in this part of the Guide.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications for the energy compliance forms or other documentation for basic energy code compliance. He or she should also verify compliance with the associated voluntary measures (see note above).

On-site enforcement: The inspector should review the permit set of plans and energy compliance documents against what features are installed in the project, including HVAC, windows, insulation, roofing, lighting, controls, etc., to make sure the installations comply. This is similar to what site inspectors or third party inspectors do for basic energy code compliance.

SECTION A5.211
RENEWABLE ENERGY

A5.211.1 On-site renewable energy. Use on-site renewable energy sources such as solar, wind, geothermal, low-impact hydro, biomass and bio-gas for at least 1 percent of the electric power calculated as the product of the building service voltage and the amperage specified by the electrical service overcurrent protection device rating or 1kW, (whichever is greater), in addition to the electrical demand required to meet 1 percent of the natural gas and propane use. The building project's electrical service overcurrent protection device rating shall be calculated in accordance with the 2013 *California Electrical Code*. Natural gas or propane use is calculated in accordance with the 2013 *California Plumbing Code*.

A5.211.1.1 Documentation. Using a calculation method approved by the California Energy Commission, calculate the renewable on-site energy system to meet the requirements of Section A5.211.1, expressed in kW. Factor in net-metering, if offered by local utility, on an annual basis

Intent:

The intent of this provision is to encourage the installation of on-site renewable energy generation that will offset a portion of the building's energy use.

Change for 2013: No change.

Existing law or regulation:

There are no existing laws or regulations that mandate the installation of on-site renewable energy generation. When on-site renewable energy generation is installed, there are portions of numerous existing codes and standards that may be applicable depending on the installed technology.

Compliance method:

Specify and install an on-site renewable energy system with an expected annual energy generation equal to or greater than the calculated requirements. Include system sizing calculations in the construction documents. The output of the on-site renewable energy system shall be metered with either a stand-alone performance meter or inverter-integrated meter for measurement of the system's performance.

Figure 23: Solar Modules

Enforcement:

Plan intake: The reviewer and/or plan checker should verify that an on-site renewable energy system is specified in the construction documents and review the system sizing calculations.

On-site enforcement: The inspector should verify that an on-site renewable energy system, sized as specified in the construction documents, is installed. To the extent possible, he or she should verify that the on-site renewable energy system is functional and producing the expected amount of energy.

A5.211.3 Green power. If offered by local utility provider, participate in a renewable energy portfolio program that provides a minimum of 50-percent electrical power from renewable sources. Maintain documentation through utility billings.

Intent:

The intent of this provision is to encourage the purchase of electricity from a utility that offers a renewable energy portfolio, reducing dependency on carbon-based fuel for energy generation and associated greenhouse gas emissions.

Changes for 2013: No change.

Existing law or regulation:

There may be regulations for utilities to follow for their portfolios or pricing

mechanisms for consumer protection, but there are no building energy standards relative to this concept.

Compliance method:

Indicate in the electrical plans and/or specifications the intent to enroll in the renewable energy portfolio of the local utility to purchase electricity at least at the 50-percent renewables level. As construction draws to a close, the intent should be recorded in the operation and maintenance manual as a recommended practice in the operation of the building beyond certificate of occupancy.

Suggestion:

If enrolled during construction, the contractor should make available for the enforcing agency utility billings showing the program details.

Enforcement:

Plan intake: If the permittee expresses the intent to participate in the utility's renewable energy portfolio for the purchase of electricity, the reviewer and/or plan checker should review the plans and specifications for the documentation.

On-site enforcement: The inspector should review the permit set of plans, check any utility electricity billings documenting enrollment in a renewable energy program, and check the operation and maintenance manual for recommendations to continue with the program.

SECTION A5.212
ELEVATORS, ESCALATORS AND OTHER EQUIPMENT

A5.212.1 Elevators and escalators. In buildings with more than one elevator or two escalators, provide systems and controls to reduce the energy demand of elevators and escalators as follows. Document systems operation and controls in the project specifications and commissioning plan.

A5.212.1.1 Elevators. Traction elevators shall have a regenerative drive system that feeds electrical power back into the building grid when the elevator is in motion.

A5.212.1.1.1 Car lights and fan. A parked elevator shall turn off its car lights and fan automatically until the elevator is called for use.

A5.212.1.2 Escalators. An escalator shall have a VVVF motor drive system that is fully regenerative when the escalator is in motion.

A5.212.1.4 Controls. Controls that reduce energy demand shall meet requirements of CCR, Title 8, Chapter 4, Subchapter 6 and

shall not interrupt emergency operations for elevators required in CCR, Title 24, Part 2, *California Building Code*.

Intent:

The intent of this provision is to encourage, within the parameters established by Title 8 for elevator and escalator safety and the *California Building Standards Code* for fire regulations concerning vertical conveyances, installation and controls of elevators and escalators to conserve energy. Regenerative drive systems for both elevators and escalators are currently available for a price; in the case of elevators in a high-rise, approximately a 15-percent reduction in energy use could be realized, with a payback of 5 to 7 years.

Note: In the 2010 code, to respond to comments concerning a potential conflict with Title 8 for escalators, CBSC reworked this voluntary section to promote the use of regenerative drive systems in elevators and escalators. These systems are designed to return electricity into the building grid when the conveyances are loaded going down and making use of gravitational force. Somewhat more expensive than those with conventional drives, regenerative drive elevators in high-rise buildings can reduce elevator energy use by about 15 percent and pay back the additional cost in around 5 years.

Change for 2013: No change.

Existing Law or Regulation:

Title 8 contains regulations for elevator and escalator safety, including a reference to ASME A17.1-2004. ASME A17.1, in Section 6.1.4.1, states, "The speed attained by an escalator after start-up shall not be intentionally varied." This could be considered at odds with Section A5.212.1, and unless the permittee has obtained a variance from Title 8, as was the case at LAX in a recent remodel of the people-mover systems, other options for energy savings for escalators may be sought. The *California Building Standards Code* regulates fire and panic safety concerning vertical conveyances and their controls, including use of elevators for fire access as required in an emergency.

Compliance Method:

Where appropriate for the use intended, specify traction elevators and/or escalators that feature energy-saving mechanisms and controls that meet Title 8 and Title 24 and feature regenerative drive systems. If submitted on a deferred approval basis, actual elevator and/or escalator product data should be made available to the enforcing agency.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for elevator and/or escalator specifications that include

features for energy savings and that meet Title 8 and Title 24. He or she should request product data and specifications for elevators and/or escalator information submitted separately as a deferred approval.

On-site enforcement: The inspector should review the permit set of plans and/or deferred approval submittal to make sure that the elevators and/or escalators and controls specified are installed as intended. Typically, elevators and escalators are inspected by the Department of Industrial Relations, Division of Occupational Safety & Health in addition to any building inspections.

SECTION A5.213
ENERGY EFFICIENT STEEL FRAMING

A5.213.1 Steel framing. Design steel framing for maximum energy efficiency. Techniques for avoiding thermal bridging in the envelope include:

1. Exterior rigid insulation;
2. Punching large holes in the stud web without affecting the structural integrity of the stud;
3. Spacing the studs as far as possible while maintaining the structural integrity of the structure; and
4. Detailed design of intersections of wall openings and building intersections of floors, walls and roofs.

Intent:

The intent of this provision is to provide means to reduce the thermal bridging of materials in contact with steel framing and to conserve the amount of steel used in a steel framing system.

Change for 2013: No change.

Existing Law or Regulation:

Structural standards for building framing and for steel in particular are found in CCR, Title 24, Part 2, the *California Building Code*, and building energy efficiency standards are found in Part 6, the *California Energy Code*.

Compliance Method:

Within the structural parameters of the *California Building Code* and the energy efficiency standards of the *California Energy Code*, specify material-efficient steel framing for those projects framed in steel. Reflect framing, assembly and intersections details, and material specifications in the construction documents. Where it is feasible, install exterior rigid

insulation to avoid the transmission of heat through the steel framing. It is possible that rigid insulation cannot span widely spaced framing members, so a choice of techniques may need to be made.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications for energy efficiency measures taken with the steel framing system and for compliance with Parts 2 and 6 of Title 24.

On-site enforcement: The inspector should review the permit set of plans and/or energy compliance documents to make sure that the energy efficiency measures shown in the documents are included on the project. A framing inspection may reveal any steel material conservation measures, and an additional inspection to examine envelope and detailing may be advisable.

Division A5.3, Water Efficiency and Conservation

SECTION A5.303
INDOOR WATER USE

A5.303.2.3.1 Tier 1 – 30-percent savings. [BSC] 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. 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 30-percent reduction in potable water use shall be demonstrated by one of the following methods.

1. Prescriptive method. Each plumbing fixture and fitting shall not exceed the maximum flow rate at greater than or equal to 30-percent reduction as specified in Table A5.303.2.3.1, or

2. Performance method. A calculation demonstrating a 30-percent reduction in the building "water use baseline" as established in Table 5.303.2.2 shall be provided.

A5.303.2.3.2 Tier 2 – 35-percent savings. A schedule of plumbing fixtures and fixture fittings that will reduce the overall use of potable water within

the building by 35 percent shall be provided. A calculation demonstrating a 35-percent reduction in the building "water use baseline" as established in Table A5.303.2.2 shall be provided.

A5.303.2.3.3 40-percent 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. A calculation demonstrating a 40-percent reduction in the building "water use baseline" as established in Table A5.303.2.2 shall be provided.

[Tables A5.303.2.2 and A5.303.2.3.1 are not shown for clarity – see discussion on mandatory Section 5.303.2 above for footnotes added to the tables.]

Intent:

The intent of these code provisions is to enhance indoor potable water use reduction beyond the mandatory reduced flow rates and compliance with the exception for 20-percent water use reduction found in Section 5.303.2. California's water supply is unpredictable and likely to be stretched by future population growth and drought periods. The provisions also address the energy demands of treating potable water and moving it around the state. A 30-percent reduction is required for the achievement of Tier 1 compliance, and a 35-percent reduction for Tier 2.

Note: In the 2010 code, CBSC modified these sections and tables in response to comments from CARB and to coordinate language with HCD. Changes include clarifications to prescriptive and performance measures and identification of baseline flow rates in the tables, correction of the duration of a nonresidential shower in the table, addition of a reference to national standards for fixtures not regulated by the Energy Commission in Title 20 and coordination of footnotes with tables in Chapters 5 and 8. The changes provide consistency among the sections for indoor water use reduction.

Change for 2013: Minor editorial changes to the Intent and corrected reference to Table A5.303.2.3.1.

Existing Law or Regulation:

Section 5.303.2 of this code mandates a 20-percent reduction in indoor potable water use through either a prescriptive or performance approach, and there may be a local ordinance in place otherwise for a reduction in water usage.

Compliance Method:

1. Specify each fixture or fitting to meet the 30-percent reduction shown on Table A5.303.2.3.1

OR

2. Performance method: As in the 20-percent reduction method, a calculation is performed to demonstrate overall 30, 35 or 40 percent savings using Table A5.303.2.2.

Note: It may prove difficult to locate fixtures needed in a project that have reduced flows beyond the 20-percent level; for example, commercial lavatory faucets, widely available at 0.5 gpm, are not widely available in an 0.4 gpm flow rate (20-percent savings), though aerators are available that can reduce flows to .35 gpm. The performance method may be a preferable path of compliance, where, for example, waterless urinals or 1-pint urinals are installed, or recycled water is available for flushing.

Sample worksheets are included in Part 4 of this guide.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that either the prescriptive or performance method has been submitted and check for the 30-percent water reduction compliance. If the performance method is used, review the water calculations showing the 30-, 35- or 40-percent reduction.

On-site enforcement: The inspector should review the permit set of plans to verify that the specified water 30-percent efficient plumbing fixtures and fixture fittings are installed. If the performance method was used, the inspector will verify that fixtures or systems used to reduce overall water use by 30, 35 or 40 percent have been installed. The inspector may review the fixture specifications to verify compliance or accept a self-certification form.

Nonpotable water systems for indoor use. Utilizing nonpotable water systems (such as captured rainwater, treated gray water and recycled water) intended to supply water closets, urinals, and other allowed uses, may be used in the calculations demonstrating the 30-, 35- or 40-percent reduction. The nonpotable water systems shall comply with the current edition of the *California Plumbing Code*.

Intent:

The intent of this code provision is to enhance indoor potable water use reduction by utilizing nonpotable water systems (such as captured rainwater, treated gray water and recycled water) intended to supply water closets, urinals and other allowed uses.

Change for 2013: This is a new code section. CBSC adopted and amended the 2012 *Uniform Plumbing Code* to add gray water and rainwater catchment provisions for nonresidential occupancies in the 2013 *California Plumbing Code*. The 2013 *California Plumbing Code* may be used to assist in complying with this section.

Existing Law or Regulation:

Section 5.303.2 of this code mandates reduced flow rates or gives an exception for a 20-percent reduction in indoor potable water use through a performance approach. If a tier is adopted by your city or county, a 30- or 35-percent reduction will likely be required, and there may be a local ordinance in place otherwise for a reduction in water usage.

Compliance Method:

Comply with the 2013 *California Plumbing Code* requirements for the use of dual plumbed water systems.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to verify that the dual plumbing standards in the 2013 *California Plumbing Code*, Chapter 16, are used in the design.

On-site enforcement: The inspector should review the permit set of plans to verify that the specified nonpotable water system for indoor use is installed.

A5.303.3 Appliances and fixtures for commercial application. Appliances and fixtures shall meet the following:

1. Clothes washers shall have a maximum Water Factor (WF) that will reduce the use of water by 10 percent below the California Energy Commissions' WF standards for commercial clothes washers located in Title 20 of the California Code of Regulations.

2. Dishwashers shall meet the following water use standards:

   a. Residential—ENERGY STAR

      i. Standard Dishwashers – 4.25 gallons per cycle.

      ii Compact Dishwashers – 3.5 gallons per cycle.

   b. Commercial—refer to Table A5.303.3.

3. Ice makers shall be air cooled.

4. Food steamers shall be connectionless or boilerless.

5. [BSC] The use and installation of water softeners that discharge to the community sewer system may be limited or prohibited by local agencies if certain conditions are met.

6. Combination ovens shall not consume more than 10 gph (38 L/h) in the full operational mode.

7. Commercial pre-rinse spray valves manufactured on or after January 1, 2006 shall function at equal to or less than 1.6 gpm (0.10 L/s) at 60 psi (414 kPa) and

   a. Be capable of cleaning 60 plates in an average time of not more than 30 seconds per plate.

   b. Be equipped with an integral automatic shutoff.

   c. Operate at static pressure of at least 30 psi (207 kPa) when designed for a flow rate of 1.3 gpm (0.08 L/s) or less.

TABLE A5.303.3
COMMERCIAL DISHWASHER WATER USE

TYPE	HIGH-TEMPERATURE–MAXIMUM GALLONS PER RACK	CHEMICAL–MAXIMUM GALLONS PER RACK
Conveyer	0.70 (2.6 L)	0.62 (4.4 L)
Door	0.95 (3.6 L)	1.16 (2.6 L) [BSC] 2.26 (8.6 L) [DSA-SS]
Undercounter	0.90 (3.4 L)	0.98 (3.7 L)

Intent:

The intent of this code provision is to enhance indoor potable water use reduction when a project includes water-using appliances supplied as part of the construction contract, not just plumbing fixtures. It may also be used to assist in compliance with the mandatory requirement of 20-percent reduction in Section 5.303.2, the tiers, or the 40-percent reduction.

Existing law or regulation:

Section 5.303.2 of this code mandates reduced flow rates or gives an exception for a 20-percent reduction in indoor potable water use through a performance approach. If a tier is adopted by your city or county, a 30- or 35-percent reduction will likely be required, and there may be a local ordinance in place otherwise for a reduction in water usage.

Compliance method:

Show in the construction documents the appliance specifications meeting these criteria. If substitutions are made during construction, provide documentation that the substituted appliances also meet them.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to check for appliance specifications to meet the criteria. Any deferred approvals should be checked for compliance.

On-site enforcement: The inspector should review the permit set of plans to verify that the specified water-using appliances are installed. The inspector may review the fixture specifications or approved substitutions to verify compliance or accept a self-certification form.

A5.303.5 Dual plumbing. New buildings and facilities shall be dual plumbed for potable and recycled water systems for toilet flushing when recycled water is available as determined by the enforcement authority.

Intent:

The intent of this code provision is to reduce indoor potable water use when recycled water is available in the community.

Change for 2013: CBSC adopted and amended the 2012 *Uniform Plumbing Code* to add graywater and rainwater catchment provisions for nonresidential occupancies for inclusion into the 2013 *California Plumbing Code*. The 2013 *California Plumbing Code* may be used to assist in complying with this section.

Existing law or regulation:

Section 5.303.2 of this code mandates reduced flow rates or gives an exception for a 20-percent reduction in indoor potable water use through a performance approach. If a tier is adopted by your city or county, a 30- or 35-percent reduction will likely be required, and there may be a local ordinance in place otherwise for a reduction in water usage. Chapter 16 of the 2013 *California Plumbing Code* regulates the installation of dual plumbing systems for potable and recycled water.

Compliance method:

Comply with the 2013 *California Plumbing Code* requirements for the use of dual plumbed water systems.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to verify that the dual plumbing standards in the 2013 *California Plumbing Code*, Chapter 16, are used in the design.

On-site enforcement: The inspector should review the permit set of plans to verify that the dual piping is installed and labeled as specified and in accordance with the plumbing code. If recycled water is immediately intended for use in the project, and not just pre-plumbed, the inspector should witness any testing of the system as required by the *California Plumbing Code* and collect the results of any tests.

SECTION A5.304
OUTDOOR WATER USE

A5.304.2.1 Outdoor potable water use. For new water service not subject to the provisions of *Water Code* Section 535, separate meters or submeters shall be installed for indoor and outdoor potable water use for landscaped areas between 500 square feet but not more than 1,000 square feet (the level at which Section 5.304.2 applies).

Intent:

The intent of this code provision is to enhance outdoor potable water use reduction beyond the mandatory requirement in Section 5.304.2 for separate meters for landscaped areas between 1,000 and 5,000 square feet, the level at which *Water Code* applies.

Change for 2013: Editorial changes to the intent, existing law and compliance method.

Existing law or regulation:

AB 1881 (Stats. 2006, c. 559) *Water Code* Section 535, currently requires that a separate water meter be installed by the water purveyor for new water service serving more than 5,000 square feet of irrigated landscape. Section 5.304.2 of the code mandates separate meters and submeters for landscape areas between 1,000 and 5,000 square feet. There might be some local jurisdictions that have adopted ordinances that may be more restrictive.

Compliance Method:

1. First determine if the new project is anticipated to have 500 square feet but no more than 1,000 square feet of landscape area.
2. If so then: owner or contractor shall install a submeter after the main meter for outdoor potable water use

Suggestion:

Show separate meters and submeters on the plans (site utility plan) and specifications.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents to confirm that a separate submeter was provided for landscape irrigation.

On-site enforcement: The inspector should review the permit set of plans to verify that separate meters are installed as specified on the approved construction documents.

A5.304.4 Potable water reduction. Provide water efficient landscape irrigation design that reduces the use of potable water beyond the initial requirements for plant installation and establishment in accordance with Section A5.304.4.1 or A5.304.4.2. Calculations for the reduction shall be based on the water budget developed pursuant to Section 5.304.1.

A5.304.4.1 Tier 1. Reduce the use of potable water to a quantity that does not exceed 60 percent of ETo times the landscape area.

A5.304.4.2 Tier 2. Reduce the use of potable water to a quantity that does not exceed 55 percent of ETo times the landscape area.

Note: Methods used to accomplish the requirements of this section must be designed to the requirements of the *California Building Standards Code* and shall include, but not be limited to, the following:

1. Plant coefficient.
2. Irrigation efficiency and distribution uniformity.
3. Use of captured rainwater.
4. Use of recycled water.
5. Water treated for irrigation purposes and conveyed by a water district or public entity.
6. Use of graywater.

A5.304.4.3 Verification of compliance. A calculation demonstrating the applicable potable water use reduction required by this section shall be provided

Intent:

The intent of these code provisions is to reduce the use of potable water for landscape irrigation beyond the mandatory requirements of the water budget in Section 5.304.1. The idea is to recognize that water is a scarce resource in California and take opportunities to reduce use whenever feasible. For this reason, these provisions are made part of the tier structure, which if adopted at the local level, will become minimum mandatory requirements for that community.

Change for 2013: CBSC adopted and amended the 2012 *Uniform Plumbing Code* to add gray water and rainwater catchment provisions for nonresidential occupancies into the 2013 *California Plumbing Code*. The 2013 *California Plumbing Code* may be used to assist in complying with this section.

Existing law or regulation:

California Code of Regulations, Title 23, Division 2, Chapter 2.7, is the Department of Water Resources Model Water Efficient Landscape Ordi-

nance (MLO) that contains provisions and calculations to establish water budgets for irrigation. Local jurisdictions may also have adopted landscape irrigation ordinances. As noted above, Section 5.304.1 of the *CALGreen Code* requires that each new nonresidential project establish a water budget in accordance with the MLO or local ordinance.

Compliance method:

The basic water budget calculation sets up a base rate factor of evapotranspiration (ETo). It is made up of a mix of plant types that yield a plant factor (PF) multiplied by the efficiency of a typical landscape irrigation system (IE). The resulting number is the ETo adjustment factor (ETAF), which is 0.70 of the ETo for the project area.

Tier 1 goes one better by establishing the percentage of ETo, or ETAF, at 60 percent, 10 percent more restrictive than the base water budget. Likewise, Tier 2, at 55 percent, drops the percentage of water budget ETo by 15 percent. These ETAFs are substituted for the one in the water budget formula to comply with Tier 1 or Tier 2.

Note: The guidelines for Section 5.304.1 in this guide include sample calculations for the water budget that may also be followed for these tier calculations.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for calculations to confirm that a water budget using the reduced ETo factor is developed by using either the local ordinance and/or the California Department of Water Resources Model Water Efficient Landscape Ordinance.

On-site enforcement: The inspector should review the permit set of plans and calculations to verify that the approved water budget as specified is followed during construction. The MLO or local ordinance compliance forms may serve this purpose.

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 must be designed to the requirements of the *California Building Standards Code* and shall include, but not be limited to, the following:

1. Plant coefficient.
2. Irrigation efficiency and distribution uniformity.
3. Use of captured rainwater.

4. Use of recycled water.
5. Water treated for irrigation purposes and conveyed by a water district or public entity.
6. Use of graywater.

Intent:

The intent of these code provisions is to eliminate the use of potable water for landscape irrigation altogether. It emphasizes preserving the resource for human and wildlife consumption and for growing food exclusively.

Change for 2013: CBSC adopted and amended the 2012 *Uniform Plumbing Code* to add graywater and rainwater catchment provisions for nonresidential occupancies in the 2013 *California Plumbing Code*. The code reference has been updated to refer to the current *California Plumbing Code* and may be used to assist in complying with this section.

Existing law or regulation:

The *California Plumbing Code* includes provisions for the installation of graywater systems. The *Water Code* contains many sections that encourage the safe use of recycled water for landscape irrigation and in buildings. The California Department of Public Health, the Department of Water Resources, the State Water Resources Control Board, and the nine California regional water boards regulate the treatment and use of recycled water. In Title 23 of the *California Code of Regulations*, the State Water Resources Control Board sets policy for recycled water projects.

Compliance method:

There are three basic ways with which to comply with this provision:

1. Specify landscaping plant species that do not require irrigation beyond their establishment; for example, cacti, other dry-climate native shrubs and trees. Show the names and locations of the plants on the landscape plan.
2. Provide a graywater irrigation system complying with 2013 *California Plumbing Code* or a recycled water system meeting state standards, where provided by the locality, as acceptable to the local jurisdiction. Detail in construction documents.
3. Use a combination of landscaping that requires no water beyond plant establishment and other landscape materials such as paving, decomposed granite, gravel or mulch. Indicate these on landscape plans and in specifications.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for landscape plans and specifications for landscape materials. He or she should make sure that any alternate source of water for irrigation meets applicable local, regional or state standards.

On-site enforcement: The inspector should review the permit set of plans for the landscaping or alternative source of irrigation water and make sure that landscaping materials and/or irrigation sources are installed as shown in the plans.

A5.304.6 Restoration of areas disturbed by construction. Restore all landscape areas disturbed during construction by planting with local adaptive and/or noninvasive vegetation.

A5.304.7 Previously developed sites. On previously developed or graded sites restore or protect at least 50 percent of the site area with adaptive and/or noninvasive vegetation. Projects complying with Section A5.106.3, Item 3, may apply vegetated roof surface to this calculation if the roof plants meet the definition of adaptive and noninvasive.

Exception: Area of the building footprint is excluded from the calculation.

Intent:

The intent of these code provisions is to reduce the use of potable water for landscape irrigation through restoring disturbed or previously developed sites with locally adaptive, including native, vegetation. It is meant to assist with control of erosion and stormwater pollution during and after construction. It also seeks to reduce the possibility of the spread of invasive exotic vegetation that have a tendency to overrun their ecosystems, reducing diversity of flora and fauna.

Change for 2013: No change.

Existing law or regulation:

CCR, Title 3, contains Department of Food and Agriculture regulations for invasive plants. Various laws in California's Fish and Game, Food and Agriculture, Harbors and Navigation, and Public Resources Codes address invasive plant and animal species, such as control of species carried in ships' ballast water and of stands of tamarisk, a highly invasive plant species.

Section 5.106.1 of the code and state and local regulations address stormwater pollution prevention, and this voluntary provision can assist with loss of soil due to erosion for the purposes of keeping receiving waters clean.

Compliance method:

Site plans or landscape plans may be used to show where plants are intended to go as construction on the building project winds down. The 50-percent area calculations for previously developed sites can be shown on the site plan and, if applicable, on the roof plan. Any areas that are disturbed by accessing the building project, installing utilities, or stockpiling of earth for fill, for example, can be remediated using this provision.

Judicial siting of temporary facilities for the contractor's field office, utilities, sanitary facilities and public access to the project site to disturb as little as possible of the area can assist with compliance with this provision. Restoring these areas as completion nears with the recommended vegetation should be shown on site or on the landscaping plans.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for landscape plans and specifications for landscape materials. In the case of previously developed sites, he or she should check the calculations for 50-percent coverage with recommended plantings.

On-site enforcement: The inspector should review the permit set of plans for the landscaping and make sure that the plants specified are installed in the locations as shown, checking to make sure that disturbed or previously developed or graded areas are covered.

A5.304.8 Graywater irrigation system. Install a graywater collection system for onsite subsurface irrigation using graywater collected from bathtubs, showers, bathroom wash basins and laundry water. See 2013 *California Plumbing Code*.

Intent:

The intent of these code provisions is to eliminate the use of potable water for landscape irrigation. It emphasizes preserving the resource for human and wildlife consumption and for growing food exclusively.

Change for 2013: CBSC adopted and amended the 2012 *Uniform Plumbing Code* to add graywater provisions for nonresidential occupancies in the 2013 *California Plumbing Code*. The code reference has been updated to refer to the current *California Plumbing Code*.

Existing law or regulation:

The *California Plumbing Code* includes provisions for the installation of graywater systems. There may be local prohibitions or requirements for the use of gray water.

Compliance method:

Provide a gray-water irrigation system complying with the 2013 *California Plumbing Code* as acceptable to the local jurisdiction. Detail in construction documents on a gray-water system piping plan and specifications for system components.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for the gray-water system piping plan and the component specifications. The reviewer and or plan checker should make sure that the gray-water system for irrigation meets applicable local, regional or state standards.

On-site enforcement: The inspector should review the permit set of plans for the graywater system and make sure that the system is installed as shown in the drawings, using the specified components.

SECTION A5.305
WATER REUSE

A5.305.1 Nonpotable water systems. Nonpotable water systems for indoor and outdoor use shall comply with the current edition of the *California Plumbing Code*.

Intent:

Promote the use of nonpotable water systems to conserve potable water and to reference the *California Plumbing Code* for the requirements.

Change for 2013: This is a new code section.

Existing Law or Regulation:

The 2013 *California Plumbing Code* includes provisions for the installation of nonpotable systems. There may be local prohibitions or requirements for the use of nonpotable water systems.

Compliance Method:

Provide a nonpotable water system complying with 2013 *California Plumbing Code* as acceptable to the local jurisdiction. Detail in construction documents the nonpotable water system piping plan and specifications for system components.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for the nonpotable system piping plan and the component specifications. The reviewer should make sure that the nonpotable system for irrigation meets applicable local, regional or state standards.

On-site enforcement: The inspector should review the permit set of plans for the nonpotable system and make sure that the system is installed as shown in the drawings, using the specified components.

A5.305.2 Irrigation systems. Irrigation systems regulated by a local water efficient landscape ordinance or by the California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELO) shall use recycled water.

Intent:

Promote the use of recycled water to conserve potable water for landscape irrigation installations.

Change for 2013: This is a new code section.

Existing Law or Regulation:

There is NO current law or regulation for this code provision.

Compliance Method:

Provide recycled water for the irrigation system complying with California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELO) and as acceptable to the local jurisdiction. Detail in construction documents on a recycled water system piping plan and specifications for system components.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for the graywater system piping plan and the component specifications. The reviewer should make sure that the graywater system for irrigation meets applicable local, regional or state standards.

On-site enforcement: The inspector should review the permit set of plans for the graywater system and make sure that the system is installed as shown in the drawings, using the specified components.

Division A5.4, Material Conservation and Resource Efficiency

SECTION A5.404
EFFICIENT FRAMING TECHNIQUES

A5.404.1 Wood framing. Employ advanced wood framing techniques, or OVE, as recommended by the U.S. Department of Energy's Office of Building Technology, State and Community Programs and as permitted by the enforcing agency.

A5.404.1.1 Structural or fire-resistance integrity. The OVE selected shall not conflict with structural framing methods or fire-rated assemblies required by the *California Building Code*.

A5.404.1.2 Framing specifications. Advanced framing techniques include the following:

1. Building design using 2-foot modules,
2. Spacing wall studs up to 24 inches on center,
3. Spacing floor and roof framing members up to 24 inches on center,

4. Using 2-stud corner framing and drywall clips or scrap lumber for drywall backing,
5. Eliminating solid headers in non-load-bearing walls,
6. Using in-line framing, aligning floor, wall and roof framing members vertically for direct transfer of loads, and
7. Using single lumber headers and top plates, where appropriate.

Note: Additional information can be obtained at the following website: www.buildingscience.com.

Intent:

The intent of this measure is to decrease the quantity of wood needed to achieve structural framing standards that meet or exceed Title 24 wood framing requirements.

A framing plan can do more than just lay out studs, openings, floor and roof joists, etc. There are opportunities to value engineer the floor system to obtain a proper joist count, to ensure all plumbing and HVAC is coordinated with the floor framing and to ensure that the "stack framing" concept is followed on the job site. Most importantly, all these issues are resolved on paper prior to casting the foundation.

Change for 2013: No change.

Existing law or regulation:

There is NO current law or regulation for this code provision.

Compliance method:

Incorporate as many OVE innovations and techniques to increase the overall efficiency of materials and energy required to achieve equivalent results to standard construction practices.

Detailing drawings down to the level of individual framing members will make the plan reviewers' and inspectors' jobs easier. OVE includes more than just the arrangement of wood framing members.

Other categories

- Dimensional design and layout.
- Material selection and purchase.
- Delivery and on-site storage.
- Framing techniques (including an innovative new shear panel).
- Waste and disposal – an innovative structural use of wood waste.

[Use (SEE) stud per www.buildingscience.com —Advanced Framing: Using Wood Efficiently from Optimizing Design to Minimizing the Dumpster) See Section A5.408 for Tier Requirements].

Note: OVE techniques may require alternate material specifications such as drywall thickness, insulation thickness, sheathing thickness and nailing spacing and size. Further information may be found at: www.buildingscience.com, www.eere.energy.gov or any other source developed to meet Title 24 Building Standards.

Enforcement:

Plan intake: The reviewer will review the plans in order to verify that any OVE measures are done in accordance with the innovative developing practices employed and other requirements of Title 24.

On-site enforcement: The inspector should review the permit set of plans and make sure all measures taken toward this goal are satisfied as drawn and specified. The level of inspection will likely be in proportion to the level of details specified in the construction documents.

SECTION A5.405
MATERIAL SOURCES

A5.405.1 Regional materials. Compared to other products in a given product category, 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.

1. For those materials locally manufactured, select materials manufactured using low embodied energy or those that will result in net energy savings over their useful life.
2. Regional materials shall make up at least 10 percent, based on cost, of total materials value.
3. If regional materials make up only part of a product, their values are calculated as percentages based on weight.
4. Provide documentation of the origin, net projected energy savings, and value of regional materials.

Intent:

The intent of this code provision is to conserve the energy associated with the transportation of building materials over long distances to the job site.

Change for 2013: No change.

Existing law or regulation:

There is NO current law or regulation for this code provision.

Compliance method:

Identify the available sources of material products and choose the most sustainable and cost-effective source within 500 miles of the project site or within California. Show in the construction documents those intended to be obtained locally for 10 percent of the materials' cost. Keep receipts and records of material supply sources to present to the enforcing agency for verification that at least 10 percent of building materials, based on cost, are from a source within 500 miles of the project site or from within California.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for the building products specified that are locally available and the projected calculation of 10 percent of the materials' value.

On-site enforcement: Using receipts and records supplied by the building contractor, the inspector should verify that 10 percent of the materials' value has been acquired from a source within 500 miles of project location.

Section: A5.405.2 Bio-based materials. Select bio-based building materials and products made from solid wood, engineered wood, bamboo, wool, cotton, cork, straw, natural fibers, products made from crops (soy-based, corn-based) and other bio-based materials with at least 50 percent bio-based content.

A5.405.2.1 Certified wood. 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 10-year cycle for at least 2.5 percent of total materials value, based on estimated cost.

Intent:

The intent of this code provision is to promote sustainable building practices by using self-regenerating materials wherever possible; as opposed to finite and limited source materials.

Change for 2013: No change.

Existing law or regulation:

There is NO current law or regulation for this code provision.

Compliance method:

Show in the construction documents bio-based materials intended to be used in the project for 2.5 percent of the materials' estimated cost. Retain

all certification accompanying the bio-based, certified and rapidly renewable component sources for verification by the enforcing agency for these conservation measures.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for the bio-based materials specified and calculations for 2.5 percent of the materials' estimated value.

On-site enforcement: The inspector should verify, using receipts and certifications provided by the contractor, what portion of the materials used meet the requirements of the bio-based resource conservation measures.

A5.405.3 Reused materials. Use salvaged, refurbished, refinished or reused materials for a minimum of 5 percent of the total value, based on estimated cost of materials on the project. Provide documentation as to the respective values.

Note: Sources of some reused materials can be found at CalRecycle. See also Appendix A5, Division A5.1 and Section A5.105.1 for on-site materials reuse.

Intent:

The intent of this voluntary code measure is to further conserve materials through the reuse of at least 5 percent of total building materials based on estimated construction cost.

Change for 2013: No change.

Existing law or regulation:

There is NO current law or regulation for this code provision.

Compliance method:

Show in the construction documents reused materials intended to be used in the project for 5 percent of the materials' estimated cost. Retain all documentation accompanying the reused materials for verification by the enforcing agency.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for the reused materials specified and calculations for 5 percent of the estimated materials' value.

On-site enforcement: The inspector should verify through receipts and other product purchase documentation that the percentage of building materials that have been reused replacing the need for those additional "new materials" is 5 percent or greater of the overall material usage.

A5.405.4 Recycled content. Use materials, equivalent in performance to virgin materials with a total (combined) recycled content value (RCV) of:

Tier 1. [BSC] The RCV shall not be less than 10 percent of the total material cost of the project.

Required Total RCV (dollars) = Total Material Cost (dollars) x 10 percent **(Equation A5.4-1)**

Tier 2. [BSC] The RCV shall not be less than 15 percent of the total material cost of the project.

Required Total RCV (dollars) = Total Material Cost (dollars) x 15 percent **(Equation A5.4-2)**

For the purposes of this section materials used as components of the structural frame shall not be used to calculate recycled content. The structural frame includes the load bearing structural elements such as wall studs, plates, sills, columns, beams, girders, joists, rafters, and trusses.

Notes:

1. Sample forms that allow user input and automatic calculation are located at http://www.hcd.ca.gov/CALGreen.html and may be used to simplify documenting compliance with this section and for calculating recycled content value of materials or assembly products.

2. Sources and recycled content of some recycled materials can be obtained from CalRecycle if not provided by the manufacturer.

A5.405.4.1 Total material cost. Total material cost is the total estimated or actual cost of materials and assembly products used in the project. The required total recycled content value for the project (in dollars) shall be determined by Equation A5.4-1 or A5.4-2.

Total material cost shall be calculated by using one of the methods specified below:

1. **Simplified method.** To obtain the total cost of the project, multiply the square footage of the structure by the square foot valuation established by the enforcing agency. The total material cost is 45 percent of the total cost of the project. Use Equations A5.4-3A or A5.4-3B to determine total material costs using the simplified method.

Total material costs =

Project square footage x square foot valuation x 45 percent **(Equation A5.4-3A)**

Total estimated or actual cost of project x 45 percent **(Equation A5.4-3B)**

2. **Detailed method.** To obtain the total cost of the project, add the estimated and/or actual costs of materials used for the project including the structure (steel, concrete, wood or masonry); the enclosure (roof, windows, doors and exterior walls); the interior walls, ceilings and finishes (gypsum board, ceiling tiles, etc.). The total estimated and/or actual costs shall not include fees, labor and installation costs, overhead, appliances, equipment, furniture or furnishings.

A4.405.4.2 Determination of total recycled content value (RCV). Total RCV may be determined either by dollars or percentage as noted below:

1. **Total recycled content value for the project (in dollars)**. This is the sum of the recycled content value of the materials and/or assemblies considered and shall be determined by Equation A5.4-4. The result of this calculation may be directly compared to Equations A5.4-1 and A5.4-2 to determine compliance with Tier 1 or Tier 2 prerequisites.

Total Recycled Content Value (dollars) = $(RCV_M + RCV_A)$ **(Equation A5.4-4)**

2. **Total recycled content value for the project (by percentage).** This is expressed as a percentage of the total material cost and shall be determined by Equation A5.4-4 and Equation A5.4-5. The result of this calculation may be directly compared for compliance with Tier 1 (10 percent) or Tier 2 (15 percent) prerequisites.

Total Recycled Content Value (percent) =

[Total Recycled Content Value (dollars) ÷ Total Material Cost (dollars)] x 100 **(Equation A5.4-5)**

A5.405.4.3 Determination of recycled content value of materials (RCV_M). The recycled content value of each material (RCVM) is calculated by multiplying the cost of material, as defined by the recycled content. See Equations A5.4-6 and A5.4-7.

RCV_M (dollars) = Material cost (dollars) x RC_M (percent) **(Equation A5.4-6)**

RC_M (percent) = Post-consumer content percentage + (½) Preconsumer content percentage **(Equation A5.4-7)**

Notes:

1. If the postconsumer and preconsumer recycled content is provided in pounds, Equation A5.4-7 may be used, but the final result (in pounds) must be multiplied by 100 to show RC_M as a percentage.

2. If the manufacturer does not separately identify the preconsumer and postconsumer recycled content of a material but reports it as a total single percentage, one-half of the total shall be considered preconsumer and one half shall be considered postconsumer recycled material.

A5.405.4.4. Determination of recycled content value of assemblies – (RCV_A). Recycled content value of assemblies is calculated by multiplying the total cost of assembly by the total recycled content of the assembly (RC_A), and shall be determined by Equation A5.4-8.

RCV_A (dollars) = Assembly cost (dollars) x Total RC_A (percent) **(Equation A5.4.8)**

If not provided by the manufacturer, Total RC_A (percent) is the sum (∑) of the Proportional Recycled Content (PRC_M) of each material in the assembly. RC_A shall be determined by Equation A5.4-9.

$RC_A = \sum PRC_M$ **(Equation A5.4-9)**

PRC_M of each material may be calculated by one of two methods using the following formulas:

Method 1: Recycled content (Postconsumer and Preconsumer) of each material provided in percentages

PRC_M (percent) = Weight of material (percent) x RC_M (percent) **(Equation A5.4-10)**

Weight of material (percent) = [Weight of material (lbs) ÷ Weight of assembly (lbs)] x 100 **(Equation A5.4-11)**

RC_M (percent) = Post-consumer content percentage + (½) Preconsumer content percentage. **(See Equation A5.4-7)**

Method 2: Recycled content (Postconsumer and Preconsumer) provided in pounds

PRC_M (percent) = [RC_M (lbs) ÷ Weight of material (lbs)] x 100 **(Equation A5.4-12)**

RC_M (lbs) = Postconsumer content (lbs) + (½) Preconsumer content (lbs) **(Equation A5.4-13)**

Note: If the manufacturer does not separately identify the preconsumer and postconsumer recycled content of a material but reports it as a total single percentage, one-half of the total shall be considered preconsumer and one-half shall be considered postconsumer recycled material.

A5.405.4.5. Alternate method for concrete. When Supplementary Cementitious Materials (SCMs), such as fly ash or ground blast furnace slag cement, are used in concrete, an alternate method of calculating and reporting recycled content in concrete products shall be permitted. When determining the recycled content value, the percent recycled content shall be multiplied by the cost of the cementitious materials only, not the total cost of the concrete.

Intent:

The purpose of this code measure is to reduce the use of virgin materials in favor of a percentage of the materials to meet varying levels of pre- or postconsumer recycled content values (RVC). These voluntary levels of compliance at 10 percent and 15 percent are intended to provide "reach" standards to help California meet its energy and greenhouse gas reduction goals.

Note: In the 2010 code, the amendments provided a revised structure for meeting Tier 1 and Tier 2 requirements when utilizing materials with recycled content on projects. Sections addressing recycled content value were modified in coordination with the Department Housing and Community Development (HCD). The amendments and new language provide additional clarity for determining recycled content and recycled content value for construction materials and assemblies. These changes were the product of an initial proposal by CBSC to clarify the meaning and calculation of Recycled Content Value in response to questions at trainings throughout the state. HCD further developed the standards and created worksheets, referenced at the beginning of the sections, to assist with calculations.

Change for 2013: No change.

Existing law or regulation:

There is NO current law or regulation for this code provision.

Compliance method:

The target values are in terms of estimated cost, and cost is determined by the weight of the recycled content. By comparing the cost as determined by the weight, the total RCV (defined in Section A5.402) is calculated and tier levels are achieved accordingly. Show in the construction documents the recycled materials and calculations for 10 percent or 15 percent of estimated materials cost.

Note: Sources and recycled content of some recycled materials can be found at CalRecycle.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for the reused materials specified and calculations for 10 percent or 15 percent of estimated materials value.

On-site enforcement: The inspector should verify through documentation supplied by the contractor the actual RCV of the materials used and the tier level achieved at either 10 percent or 15 percent.

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. Cement shall comply with one of the following standards:

1. Portland cement shall meet ASTM C 150, *Standard Specification for Portland Cement*
2. Blended cement shall meet ASTM C 595, *Standard Specification for Blended Hydraulic Cement* or
3. Other Hydraulic Cements shall meet ASTM C 1157, *Standard Performance Specification for Hydraulic Cement.*

A5.405.5.2 Concrete. Unless otherwise directed by the Engineer of Record, use concrete manufactured with cementitious materials in accordance with Sections A5.405.5.2.1 and A5.405.5.2.1.1, as approved by the enforcing agency.

A5.405.5.2.1 Supplementary cementitious materials (SCMs). Use concrete made with one or more supplementary cementitious materials (SCM) conforming to the following standards::

1. Fly ash conforming to ASTM C 618, *Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete*.
2. Slag cement (GGBFS) conforming to ASTM C 989, *Specification for Slag Cement for Use in Concrete and Mortars*.
3. Silica fume conforming to ASTM C 1240, *Specification for Silica Fume Used in Cementitious Mixtures*.
4. Natural pozzolan conforming to ASTM C 618, *Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete*.
5. Blended supplementary cementitious materials conforming to ASTM C 1697, *Standard Specification for Blended Supplementary Cementitious Materials*. The amount of each SCM in the blend will be used separately in calculating

Equation A5.4-1. If Class C fly ash is used in the blend, it will be considered to be "SL" for the purposes of satisfying the equation.

6. Ultra-fine fly ash (UFFA) conforming to ASTM C 618, *Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete*, and the following chemical and physical requirements:

[Table of values for UFFA is omitted for clarity – see code]

7. Metakaolin conforming to ASTM C 618, Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete, the following chemical and physical requirements:

[Table of values for metakaolin is omitted for clarity – see code]

8. Other materials with comparable or superior environmental benefits, as approved by the Engineer of Record and enforcing authority.

A5.405.5.2.1.1 Mix design equation. Use any combination of one or more SCM, satisfying Equation A5.4-1. When ASTM C 595 or ASTM C 1157 cement is used, the amount of SCM in these cements shall be used in calculating Equation A5.4-1.

Exception: Minimums in mix designs approved by the Engineer of Record may be lower where high early strength is needed for concrete products or to meet an accelerated project schedule.

$F/25 + SL/50 + UF/12 \geq 1$ **Equation A5.4-1**

where:

F = Fly ash, natural pozzolan, or other approved SCM, as a percent of total cementitious material for concrete on the project.

SL = GGBFS, as a percent of total cementitious material for concrete on the project.

UF = Silica fume, metakaolin or UFFA, as a percent of total cementitious material for concrete on the project.

Figure 24: Placing Concrete

Intent:

The intent of these measures encourages the use of alternate supplementary cementitious materials (SCMs) (which would otherwise be industrial byproducts that would make their way into the waste stream) as a replacement for the energy-intensive transformation of limestone and clay to cement in the manufacture of

concrete. Using ASTM standards listed above, see Equation A5.4-1 and the Exception to determine minimum portions of the various SCMs that may be substituted for cement.

Note: In the 2010 code, CBSC amended this section based on comments from the California-Nevada Cement Association (CNCA) on the 2010 standards. Changes updated standards references, eliminated all references to CalTrans specifications and provided consistency of terms throughout the sections.

Change for 2013: No change.

Existing law or regulation:

There is NO current law or regulation for this code provision.

Compliance method:

Design team: Show in the engineering specification the concrete mix designs intended to be used on the project contain the required amount of SCMs. Total SCMs including *F, SL* and/or *UF* (as defined on the previous page) may be added in any combination that satisfies ASTM standards listed in this code section and Equation A5.4-1 where the total minimum SCMs for amount of concrete being mixed is one (1).

Example use of Equation A5.4-1:

For a batch of concrete that requires 400 pounds of cementitious materials with a 50-percent addition of cement and 50 prcent SCMs

Using Equation A5.4-1 - $F/25 + SL/50 + UF/12 \geq 1$;
adding 80 lb of *F* or 20% and
120 lb of *SL* or 30% then

$$20/25 + 30/50 + 0/12 = 8 + .6 = 1.4 \text{ which is} \geq 1\text{; so mix is OK}$$

Contractor: Place concrete for the specified uses that complies with the engineer's mix design and minimum amount of SCMs.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the engineer's specifications for the minimum SCMs and for any calculations. (All concrete used on the project must also meet the structural provisions of the *California Building Code*.)

On-site enforcement: The building inspector should verify mix designs of concrete in accordance with industry standards for substitution of SCMs as prescribed in Sections A5.405.2.1.1 through A5.405.5.

A5.405.5.3 Additional means of compliance. Any of the following measures shall be permitted to be employed for the production of cement or concrete, depending on their availability and suitability, in conjunction with Section A5.405.5.2.

A5.405.5.3.1 Cement. The following measures shall be permitted to be used in the manufacture of cement.

A5.405.5.3.1.1 Alternative fuels. The use of alternative fuels where permitted by state or local air quality standards.

A5.405.5.3.1.2 Alternative power. Alternate electric power generated at the cement plant and/or green power purchased from the utility meeting the requirements of A5.211.

A5.405.5.3.2 Concrete. The following measures shall be permitted to be used in the manufacture of concrete, .

A5.405.5.3.2.1 Alternative energy. Renewable or alternative energy meeting the requirements of Section A5.211.

A5.405.5.3.2.2 Recycled aggregates. Concrete made with one or more of the following materials:

1. Blast furnace slag as a lightweight aggregate in unreinforced concrete.
2. Recycled concrete that meets grading requirements of ASTM C 33, *Standard Specification for Concrete Aggregates*.
3. Other materials with comparable or superior environmental benefits, as approved by the engineer and enforcing authority.

A5.405.5.3.2.3 Mixing water. Water recycled by the local water purveyor or water reclaimed from manufacturing processes and conforming to ASTM C1602, *Standard Specification for Mixing Water Used in the Production of Hydraulic Cement* Concrete.

A5.405.5.3.2.4 High-strength concrete. Concrete elements designed to reduce their total size compared to standard 3,000 psi concrete, thereby reducing the total volume of cement, aggregate and water used on the project, as approved by the Engineer of Record.

Intent:

These measures encourage the use of alternative energy sources, mined aggregate replacement and an alternative to potable water in the manufacture of concrete in addition to the provisions of Sections A5.405.5 through A5.405.2.1.1 in an overall approach of conserving energy and materials in order to achieve resource efficiency.

Note: In the 2010 code, CBSC amended these sections in response to comments from CNCA, mainly for clarity and consistency of terminology. Section A5.405.5.3.2.4 was added to recognize cement saving through use of smaller high-strength concrete members.

Change for 2013: No change.

Existing law or regulation:

There is NO current law or regulation for this code provision.

Compliance method:

Use any combination of the alternative materials and manufacturing methods listed above. Show in the construction documents. Contractor should keep all receipts and paperwork to show the enforcing agency which alternate methods of compliance were used in manufacture of cement or concrete.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for any cement or concrete alternates employed in addition to the provisions in Sections A5.405.2.1.1 through A5.405.5.

On-site enforcement: The building inspector should verify documentation of cement or concrete alternatives employed on the project.

SECTION A5.406
ENHANCED DURABILITY AND REDUCED MAINTENANCE

A5.406.1 Choice of materials. Compared to other products in a given product category, choose materials proven to be characterized by one or more of the following.

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. For those with surface protection, choose materials that do not require frequent applications of toxic or malodorous finishes.

Intent:

The intent of this code provision is to reduce the consumption of resources by specifying the use of those materials shown to have a longer service life; reduced maintenance materials that require a minimum of other material maintenance and materials that are able to be cycled cradle to cradle rather than cradle to grave (recyclability). It is a conservation measure to create structures that are more durable and require less maintenance in order to increase the service life of the entire building. This approach requires

consideration of all materials and equipment to work together to increase the usable service life of a building.

Change for 2013: No change.

Existing law or regulation:

There is NO current law or regulation for this code provision.

Compliance method:

Compliance with this voluntary measure relies mainly with the designer and his or her selection and specification of materials. The building contractor shall retain all receipts, written verification or other documentation that verifies the service life of materials selected from this category. In order to comply with this provision in a meaningful way, it is important to carry the concept of materials and equipment that have an inherent quality (i.e., increased service life) throughout the project. For example, the selection and use of color-impregnated exterior cement plaster versus wood exterior finish reduces maintenance and increases service life. Using masonry walls, with a nonservice life increase in the roof and window systems, would not meet the intent of this voluntary regulation. If you choose to create a building with enhanced durability and reduced maintenance, the lifespan of all systems and components must have a reasonably balanced durability.

Enforcement:

The enforcement of this voluntary requirement will require life cycle analysis information to evolve to a level that proves the durability of systems have lifespan ratings or warrantees in order to evaluate overall building durability. Until that time, the assessed durability will be more subjective. Objectivity in this pursuit is the goal. That is achievable at this time by choosing a 50-year roof rather than one with a 15-year warranty or lifespan.

Plan intake: The reviewer and/or plan checker should review the construction documents to ensure that any materials from this section, if used, can be verified and meet the requirements listed above.

On-site enforcement: The building inspector should verify documentation of all enhanced materials specified and verify those materials have been installed.

SECTION A5.408
CONSTRUCTION WASTE REDUCTION, DISPOSAL, AND RECYCLING

A5.408.3.1 Enhanced construction waste reduction – Tier 1. Divert to recycle or salvage at least 65 percent of nonhazardous construction and demolition waste generated at the site.

A5.408.3.1.1 Enhanced construction waste reduction – Tier 2[BSC]. Divert to recycle or salvage at least 80 percent of nonhazardous construction and demolition waste generated at the site.

A5.408.3.1.2 Verification of compliance. A copy of the completed waste management report or documentation of certification of the waste management company utilized shall be provided.

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.
3. Demolition waste meeting local ordinance or calculated in consideration of local recycling facilities and markets.

Intent:

This code provision is to go beyond the mandatory 50-percent salvage of all nonhazardous, "new" construction waste; for Tier 1—65 percent and for Tier 2—80 percent or as required by local ordinance, whichever is more restrictive; reducing the amount of construction waste from new construction that would be sent to the landfills, thereby extending the life of the landfills. Its purpose is also to encourage material resource efficiency through reuse and recycling of construction waste products.

Change for 2013: Tier 2 was amended to add demolition waste and Exception 3 was revised.

Existing law or regulation:

AB 939 (Stats. 1989, c. 1095) mandated a 50-percent diversion of all waste by 2000, but the *CALGreen* regulation targets 50 percent of new construction waste that makes up a smaller percentage of the total waste stream. There are some local jurisdictions that have ordinances in place with more restrictive requirements for this provision.

Compliance method:

Complete waste management report in order to verify that you are meeting Tier 1 or Tier 2, whichever level of material conservation is chosen.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for the level of enhanced construction waste reduction called for by the designer and make sure a report is called for showing the level indicated.

On-site enforcement: The building inspector should verify documentation according to the available report or equivalent documentation to show that at least 65 percent (to meet Tier 1) or 80 percent (to meet Tier 2) of construction waste is reused/recycled if option A5.408.3.1 is chosen as a conservation measure.

SECTION A5.409
LIFE CYCLE ASSESSMENT

A4.409.1 General. Life cycle assessment shall be ISO 14044 compliant. The service life of the building and materials assemblies shall not be less than 60 years unless designated in the construction documents as having a shorter service life as approved by the enforcing agency.

A5.409.2 Whole building life cycle assessment. Conduct a whole building life assessment, including operating energy, showing that the building project achieves at least a 10 percent improvement for at least three of the impacts listed in Section A5.409.2.2, one of which shall be climate change, compared to a reference building of similar size, function, complexity and operating energy performance, and meeting the 2013 *California Energy Code* at a minimum.

A5.409.2.1 Building components. The building envelope, structural elements, including footings and foundations, interior ceilings, walls, and floors; and exterior finishes shall be considered in the assessment.

Exceptions:

1. Plumbing, mechanical and electrical systems and controls; fire and smoke detection and alarm systems and controls; and conveying systems.
2. Interior finishes are not required to be included.

Notes:

1. Software for calculating whole building life cycle assessments includes those found at the Athena Institute website (Impact Estimator software), the PE International website (GaBi software), and the PRe Consultants website (SimaPro software).
2. Interior finishes, if included, may be assessed using the NIST BEES tool.

A5.409.2.2 Impacts to be considered. Select from the following impacts in the assessment:

1. Climate change (greenhouse gases).
2. Fossil fuel depletion.

3. Stratospheric ozone depletion.
4. Acidification of land and water sources.
5. Eutrophication.
6. Photochemical oxidants (smog).

A5.409.3 Materials and system assemblies. If whole building analysis of the project is not elected, select a minimum of 50 percent of materials or assemblies based on life cycle assessment of at least three for the impacts listed in Section A5.409.2.3, one of which shall be climate change.

Note: Software for calculating life cycle assessments for assemblies and materials may be found at the Athena Institute web site and the NIST BEES website.

A5.409.4 Substitution for prescriptive standards. Performance of a life cycle assessment completed in accordance with Section A5.409.2 may be substituted for other prescriptive Material Conservation and Resource Efficiency provisions of Division A5.4, including those made mandatory through local adoption of Tier 1 or Tier 2 in Division A5.6.

A5.409.5 Verification of compliance. Documentation of compliance shall be provided as follows:

1. The assessment is performed in accordance with ISO 14044.
2. The project meets the requirements of other parts of Title 24.
3. A copy of the analysis shall be made available to the enforcement authority.
4. A copy of the analysis and any maintenance or training recommendations shall be included in the operation and maintenance manual.

Intent:

The intent of this code provision is to indirectly conserve energy and resources by creating buildings with a longer life cycle. If one building lasts 100 years and a similar occupancy building lasts a mere 30 years, the energy and resources to rebuild that particular building will be saved twice by merely increasing its usefulness (life cycle) by a factor of 3.

Note: In the 2010 code, CBSC renumbered, reformatted and revised this voluntary section in response to changes initially proposed by CNCA. Changes emphasized standards for whole building life cycle assessment (LCA) as a preferred option to assessment of individual building assemblies or components. It included the impacts to be measured for a target of 10-percent improvement in environmental performance compared to a referenced building. A subsection, A5.409.3, provided an option for LCA of materials and system assemblies if whole building LCA is not elected. LCA

is a relatively new tool for measurement of environmental performance of buildings, and the options are intended to introduce it to code users at whatever level they feel comfortable.

Change for 2013: Minor change; the reference to the *California Energy Code* was updated to reflect the current code cycle.

Existing law or regulation:

Data is being created and collected on all types of materials and systems by the organizations named above. For long span life cycle analysis, clearly the collection of this data needs to continue over several generations. Only then can the cost along with the life cycle be quantified, so a more objective data set will exist for the "most" efficient materials and systems for a given use.

Compliance method:

The generation of cost to life cycle analysis is in its early stages. This type of analysis is by definition a very lengthy process. Until the energy and resources to produce a material or product is fully quantified, then objectively joined to the life cycle of the materials and products, an accurate overall efficiency may be placed on the cost to life cycle ratio, which will help designers make the best choices for specified materials and products. There are software programs available that can be used to calculate LCA, some of which are noted in this code section.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the construction documents for buildings using the increased durability inherent in materials and products intended to create a longer life cycle; a data base should be instituted to keep information on the projected life cycle vs. actual life cycle will be the means by which such types of buildings have a superior overall energy and resource efficiency when compared to less durable construction materials, methods and products.

On-site enforcement: The building inspector should verify that all applicable standards are met in the quality of construction of buildings designed to be more durable.

Division A5.5, Environmental Quality

SECTION A5.504
POLLUTANT CONTROL

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 (Requirements for Ventilation) of the *California Energy Code*, CCR, Title 24, Part 6, and Chapter 4 of CCR, Title 8, and as follows:

1. Ventilation during construction shall be achieved through openings in the building shell using fans to produce a minimum of three air changes per hour.

2. If the building is occupied during demolition or construction, meet or exceed the recommended Control Measures of the Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 1995, Chapter 3.

3. The permanent HVAC system shall only be used during construction if necessary to condition the building within the required temperature range for material and equipment installation. If the HVAC system is used during construction, use return air filters with a Minimum Efficiency Reporting Value (MERV) of 8, based on ASHRAE 52.2-1999, or an average efficiency of 30 percent based on ASHRAE 52.1-1992. Replace all filters immediately prior to occupancy.

4. During dust-producing operations, protect supply and return HVAC system openings from dust.

A5.504.1.2 Additional IAQ measures. Employ additional measures as follows:

1. When using generators to generate temporary power, use generators meeting the requirements of CCR, Title 13, Chapter 9, or local ordinance, whichever is more stringent.

2. Protect on-site absorbent materials from moisture. Remove and replace any materials with evidence of mold, mildew or moisture infiltration.

3. Store odorous and high VOC-emitting materials off site, without packaging, for a sufficient period to allow odors and VOCs to disperse.

4. When possible, once materials are on the jobsite, install odorous and high VOC-emitting materials prior to those that are porous or fibrous.

5. Clean oil and dust from ducts prior to use.

Intent:

The intent of this voluntary provision is to promote practices to maintain healthy air quality during the construction process to protect workers' health and leave the building prepared for occupancy.

Section A5.504.1.1 addresses means of ventilating the building while protecting HVAC systems from contamination. It allows ventilation using air-conditioning systems if necessary, though this practice is noted not to be an optimum choice due to possible damage to equipment that may jeopardize a warranty.

Section A5.504.1.2 directs the user to additional practices for the use of materials on the project to make sure they are aired or dried, installed to prevent cross-contamination and cleaned prior to certification of occupancy. Use of clean generators is promoted for those urban areas where noxious fumes may affect adjacent neighbors.

Change for 2013: No change.

Existing law or regulation:

The *California Energy Code*, CCR, Part 6, contains ventilation standards for conditioned spaces. CCR, Title 8, contains additional regulations for the protection of worker safety.

Compliance method:

Engineers and designers should include the measures intended to promote air quality in the project specifications for ventilation, materials and others, as applicable. The contractor should be responsible for employing them on the job and being able to demonstrate that the practices are being followed if requested by the enforcing agency.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications for directions on ventilation practices to be followed by the contractor.

On-site enforcement: The inspector should review the permit set of plans to verify which air quality practices the contractor is to use on the project and ask for demonstration of their employment during site visits.

A5.504.2 IAQ postconstruction. After all interior finishes have been installed, flush out the building by supplying continuous ventilation with all air handling units at their maximum outdoor air rate and all supply fans at their maximum position and rate for at least 14 days.

1. During this time, maintain an internal temperature of at least 60°F, and relative humidity no higher than 60 percent. If extenuating circumstances make these temperature and humidity limits unachievable, the flush-out may be conducted under conditions as close as possible to these limits, provided that documentation of the extenuating circumstances is provided in writing.

2. Occupancy may start after 4 days, provided flush-out continues for the full 14 days. During occupied times, the thermal comfort conditions of Title 24 must be met.

3. For buildings that rely on natural ventilation, exhaust fans and floor fans must be used to improve air mixing and removal during the 14-day flush-out, and windows should remain open.

4. Do not “bake out” the building by increasing the temperature of the space.

5. If continuous ventilation is not possible, flush-out air must total the equivalent of 14 days of maximum outdoor air. The equiva-

lent of 14 days of maximum outdoor air (the target air volume) shall be calculated by multiplying the maximum feasible air flow rate (in ft^3/m) by 14 days (20,160 minutes). The air volumes for each period of ventilation are then calculated and summed and the flush-out continues until the total equals the target air volume.

Intent:

The intent of this voluntary provision is to promote practices to insure healthy air quality at the close of construction, after all finishes are installed, to protect occupant health after Certification of Occupancy or Temporary Occupancy. It spells out the means of flushing out air contaminated by pollution from materials and construction activities. It is intended to allow early occupancy when needed by an owner by providing flush-out recommendations for that situation.

Change for 2013: Minor change; the reference to the Energy Code was updated to reflect the current code cycle.

Existing law or regulation:

The *California Energy Code*, CCR, Part 6, contains ventilation standards for conditioned spaces. CCR, Title 8, contains additional regulations for the protection of worker safety.

Compliance method:

Engineers and designers should include the requirements for flush-out, including by mechanical or outside air, contingency plans, early occupancy, etc., in the project specifications for ventilation and others, as applicable. The contractor should be responsible for employing them on the job and being able to demonstrate that the practices are being followed if requested by the enforcing agency. Extenuating circumstances should be documented in writing, and the contractor should be able to verify the dates or volume equivalencies of the 14-day flush-out period.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications for directions on flush-out practices to be followed by the contractor.

On-site enforcement: The inspector should review the permit set of plans to verify which flush-out practices the contractor is to use on the project and ask for documentation of their employment at the conclusion of the construction process.

A5.504.2.1 IAQ testing. If the engineer determines that building flush-out pursuant to Section A5.504.2 is not feasible, 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).

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 (4-PCH), if fabrics and carpets with styrene butadiene rubber (SBR) latex backing, are installed: 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 following elements:

1. The contaminant sampling and averaging times and the measurement methods should be sufficient to achieve a Limit of Detection that is below the maximum allowable concentrations.
2. Testing should be conducted with the HVAC system operated at the minimum design outdoor air ventilation rate.
3. Air samplers and monitors should be located near likely sources of formaldehyde and other volatile organic compounds, at a height of 3 to 6 feet from the floor, and well away from walls and air diffusers.
4. The test protocols should be justified with documentation to show that appropriate sampling methods and times were used.

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.

Note: U.S. EPA-recognized testing protocols may be found on the Air Resources Board website.

Intent:

The intent of this voluntary provision is to provide a testing alternative to building flush-out to promote practices to ensure healthy air quality at the close of construction. It spells out test protocols, allowable levels of pollutants and retesting requirements, if needed. Testing can be more expensive than building flush-out, but it is noted that, with CALGreen's requirements for low VOC-emitting materials, pollutant levels from finishes may be low; testing could target those areas of potential problems if building flush-out is determined by the engineer to be infeasible.

Change for 2013: No change.

Existing law or regulation:

The *California Energy Code*, CCR, Part 6, contains ventilation standards for conditioned spaces. CCR, Title 8, contains additional regulations for the protection of worker safety.

Compliance method:

Engineers and designers should include the requirements for testing of pollutant levels of air and materials in the project specifications for ventilation and others, as applicable. Materials to be tested and test methods and protocols should be included. As determined in the contract for construction, a testing laboratory or other qualified personnel should be engaged to conduct IAQ tests according to the protocols. If test results show excessive concentrations, retesting should be carried out until compliance is achieved. Test methods and results should be made available to the enforcement agency.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications for the engineer's testing alternative to building flush-out.

On-site enforcement: The inspector should review the permit set of plans to verify that testing is to be employed on the project and ask for documentation of test methods and results at the conclusion of the construction process.

A5.504.4.5.1 No added formaldehyde, Tier 1. Use composite wood products approved by the California Air Resources Board (ARB) as no-added formaldehyde (NAF) based resins or ultra-low emitting formaldehyde (ULEF) resins.

Notes:

1. See Title 17, Section 93120.3(c) and (d), respectively.

2. Documentation must be provided verifying that materials are certified to meet the pollutant emission limits. A list of manufacturers and their NAF and ULEF certified materials is provided at: http://www.arb.ca.gov/toxics/compwood/naf_ulef/listofnaf_ulef.htm

Intent:

The intent of this voluntary provision is to encourage the use of no-added formaldehyde (NAF) based resins or ultra-low emitting formaldehyde (ULEF) resins.

Change for 2013: Section A5.504.4.5.1, Early compliance with formaldehyde limits Tier 1, was repealed and this code section was renumbered and changed from a Tier 2 measure to a Tier 1 measure. Also, the CARB website for no-formaldehyde-emitting products has been added.

Existing Law or Regulation:

The California Air Resources Board (CARB) adopted regulations for low-formaldehyde-emitting composite wood products in CCR, Title 17. Those products and emission limits are reprinted in Section 5.504.4.5. A list of approved no-added formaldehyde (NAF) based resins or ultra-low emitting formaldehyde (ULEF) resins products can be found on the website listed above.

Compliance Method:

Specify no-formaldehyde-emitting composite wood products on the plans or in the project specifications and show documentation verifying that materials are certified to meet the pollutant emission limits from the CARB website noted in the code.

Suggestion:

Contractor: Retain product data sheets for on-site verification by the enforcing agency and for the operation and maintenance manual.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that the composite wood products and/or resins are specified to meet the requirements in the CARB approved list noted on the website.

On-site enforcement: The inspector should review the permit set of plans and product data sheets to verify that composite wood products specified on the approved plans and specifications are installed, or at least stored on site with the ability to be verified.

A5.504.4.7 Resilient flooring systems, Tier 1 [BSC]. For 90 percent of floor area receiving resilient flooring, install resilient flooring that is:

1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
3. Defined in the 2009 Collaborative for High Performance Schools (CHPS) criteria and listed on its High Performance Database; or
4. Compliant with CDPH criteria as certified under the Greenguard Children's & Schools Program.

A5.504.4.7.1 Resilient flooring systems, Tier 2 [BSC]. For 100 percent of floor area receiving resilient flooring, install resilient flooring that is:

1. Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program;
2. Compliant with the VOC-emission limits and testing requirements specified in the California Department of Public Health's 2010 Standard Method for the Testing and Evaluation Chambers, Version 1.1, February 2010;
3. Defined in the 2009 Collaborative for High Performance Schools (CHPS) criteria and listed on is High Performance Database; or
4. Compliant with CDPH criteria as certified under the Greenguard Children's & Schools Program.

Exception: Allowance may be permitted in Tier 2 for up to 5-percent specialty purpose flooring.

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, Tier 1. [BSC] Comply with the following standards:

1. Chapters 12-13 (Standards for Insulating Material) in Title 24, Part 12, the *California Referenced Standards Code*.
2. The VOC-emission limits defined in 2009 CHPS criteria and listed on its High Performance Products Database.

3. California Department of Public Health 2010 Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as Specification 01350.)

A5.504.4.8.1 Thermal insulation, Tier 2 [BSC]. Thermal insulation, No-added Formaldehyde. Install thermal insulation which complies with Tier 1 plus does not contain any added formaldehyde.

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, the *California Building Code* and with the VOC-emission limits defined in the 2009 CHPS criteria and listed on its High Performance Products Database.

A5.504.4.9.1 Verification of compliance. Documentation shall be provided verifying that acoustical finish materials meet the pollutant emission limits.

Intent:

The purpose of these measures is to reduce the volatile organic compounds (VOC) of finish materials commonly installed on a project, which will help improve air quality for the building occupants. These regulations exceed the mandatory provisions in Chapter 5, Division 5.5, as "reach" standards and are components of the tier structure in Division A5.6.

Note: In the 2010 code, these voluntary reach standards were modified at the recommendation of CARB and CDPH to update referenced standards to provide clarity for the code user. The changes are also intended to provide clarity to the code user concerning the Tier 1 and Tier 2 criteria.

Change for 2013: The reference to the standards for carpet and resilient floor systems were updated and some new standards were added to the approved list to align with the mandatory code. Also, the requirement for resilient floor systems was increased to 90 percent for Tier 1 and 100 percent for Tier 2.

Existing law or regulation:

The low-VOC provisions are based on the recommendations, guidelines and regulations of the Air Resources Board cited in each section. Regulations for aerosol adhesives and paints and for composite wood products are found in the *California Code of Regulations*, Title 17, as noted above.

Compliance method:

Specify finish materials that meet the limits of VOC criteria as tested by the listed organizations. Substitutes may be approved by the local enforcing authority if it deems equivalency.

Notes: Some compliant products may be found on the following websites:

1. CHPS Low-emitting Materials List may be found at:
   www.chpsregistry.com/live
   or http://www.chps.net/dev/Drupal/node/381

2. Products certified under the Greenguard Children & Schools program and compliant with CHPS criteria may be found at:
   http://www.greenguard.org/Default.aspx?tabid=135.

Suggestion:

Contractor: Retain product data sheets for on-site verification by the enforcing agency and for the operation and maintenance manual. Sample compliance forms can be found in Part 4 of this guide.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that the finishes are specified to meet VOC emission limits.

On-site enforcement: The inspector should review the permit set of plans and product data sheets maintained by the contractor to verify finishes specified on the approved plans and specifications are installed, or at least stored on site with the ability to be verified. The inspector may review specifications provided with products or accept self-certification form.

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.

1. Qualifying entryways are those that serve as regular entry points for building users.

2. Acceptable entryway systems include, but are not limited to, permanently installed grates, grilles, or slotted systems that allow cleaning underneath.

3. Roll-out mats are acceptable only when maintained regularly by janitorial contractors as documented in service contract, or by in-house staff as documented by written policies and procedures.

Intent:

The purpose of these measures is to reduce the amount of pollutants brought into a building at points of entry from people's shoes or rain-soaked apparel. This keeps the air and finish surfaces free of contaminants that may be tracked into regularly occupied spaces and is intended to maintain good air quality for building occupants.

Change for 2013: No change.

Existing law or regulation:

There is NO current law or regulation for this code provision.

Compliance method:

Specify entrance mats that are permanently fixed and cleanable from debris. The specifications should include a maintenance schedule to be followed after certification of occupancy.

Roll out mats are not recommended, usually not considered contract furnishings and with maintenance an uncertain prospect. If specified, however, recommend a maintenance schedule to be followed after occupancy.

Suggestion:

Contractor: Retain product data sheets and recommended maintenance for on-site verification by the enforcing agency and for the operation and maintenance manual.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that the entrance mats are included and that a maintenance schedule is recommended to be included in the specifications.

On-site enforcement: The inspector should review the permit set of plans and product data sheets maintained by the contractor to verify mats specified on the approved plans and specifications are installed, or at least stored on site with the ability to be verified. The inspector may review specifications and maintenance recommendations provided with products or accept self-certification from the contractor.

A5.504.5.2 Isolation of pollutant sources. In rooms where activities produce hazardous fumes or chemicals, such as garages, janitorial or laundry rooms and copy or printing rooms, exhaust them and isolate them from their adjacent rooms.

1. Exhaust each space with no air recirculation in accordance with ASHRAE 62.1, Table 6-4 to create negative pressure with respect to adjacent spaces with the doors to the room closed.
2. For each space, provide self-closing doors and deck to deck partitions or a hard ceiling.
3. Install low-noise, vented range hoods for all cooking appliances and in laboratory or other chemical mixing areas.

Intent:

The purpose of these measures is to reduce occupant exposure to hazardous fumes or chemicals in specific areas or rooms where those fumes or chemicals may be present such as garages, janitorial or laundry rooms and copy or printing rooms.

Change for 2013: No change.

Existing Law or Regulation:

There is NO current law or regulation for this code provision.

Compliance Method:

Show compliance with the applicable listed requirements in the code.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that the applicable listed requirements are shown on the plans.

On-site enforcement: The inspector should review the permit set of plans and specifications for compliance with the approved plans.

A5.504.5.3.1 Filters, Tier 1. 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 Minimum Efficiency Reporting Value (MERV) of 11.

A5.504.5.3.1.1 Filters, Tier 2. 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 Minimum Efficiency Reporting Value (MERV) of 13.

Intent:

The intent of this regulation is to filter particulate matter from the air by the use of at least MERV 8-rated filters for improved air quality.

Change for 2013: No change to the Tier 1 MERV 11 requirements but a Tier 2 MERV 13 has been added to the code as a Tier 2 option.

Existing Law or Regulation:

There is NO current law or regulation for this code provision.

Compliance Method:

Specify and install prior to occupancy at least MERV 11 filters for Tier 1 and MERV 13 for Tier 2 return air grilles.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to confirm that the filters are specified to meet Tier 1 or Tier 2 MERV ratings.

On-site enforcement: The inspector should review the permit set of plans and product data sheets maintained by the contractor to verify that HVAC filtration specified on the approved plans and specifications installed, or is stored on site with the ability to be verified. The inspector may check a sample of installed filters to verify the MERV rating.

SECTION A5.507
ENVIRONMENTAL COMFORT

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 *California Energy Code* in accordance with 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.

1. Occupants shall have control over at least one of the factors of air temperature, radiant temperature, air speed and humidity as described in ASHRAE 55-2004.

2. Occupants inside 20 feet of the plane of and within 10 feet either side of operable windows can substitute windows to control thermal comfort. The areas of operable window must meet the requirements of Section 121 (Requirement for Ventilation) of the *California Energy Code*

A5.507.1.2 Multi-occupant spaces. Provide lighting and thermal comfort system controls for all shared multi-occupant spaces, such as classrooms and conference rooms.

Intent:

The purpose of these measures is to allow building occupants a measure of control within their workspaces as to lighting levels and thermal comfort, including multioccupant spaces where they can reach consensus on ambient lighting and temperature, humidity and air speed. Though scant research exists to support claims of higher productivity or attendance for workers who have control of lighting and thermal comfort, the goal is increase their workplace satisfaction and reap whatever benefits there may be for themselves and their employers.

Change for 2013: No change.

Existing law or regulation:

The *California Energy Code*, CCR, Title 24, Part 6, regulates energy use associated with lighting, air conditioning and ventilation of conditioned spaces. ASHRAE 55 contains standards for thermal comfort.

Compliance method:

Provide, in plans and specifications, lighting locations, fixture types and access to daylight for a minimum of 90 percent of occupants. Show means of thermal control, such as thermostats, directional air registers and proximity to solar gain for a minimum of 50 percent of occupants. Contract furnishings for control of light and heat through windows may be shown. Make sure that compliance with the *California Energy Code* is maintained.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to verify the lighting and thermal control means are shown for at least 90 percent and 50 percent of occupants, respectively. Verify energy code compliance is demonstrated.

On-site enforcement: The inspector should review the permit set of plans and/or specifications and verify that lighting and thermal controls are installed as shown and that the building complies with provisions in the *California Energy Code*.

A5.507.2 Daylight. Provide daylit spaces as required for toplighting and sidelighting in the *California Energy Code*. In constructing a design, consider the following:

1. Use of light shelves and reflective room surfaces to maximize daylight penetrating the rooms.
2. Means to eliminate glare and direct sun light, including through skylights.
3. Use of photosensors to turn off electric lighting when daylight is sufficient.
4. Not using diffuse daylighting glazing where views are desired.

A5.507.3 Views. Achieve direct line of sight to the outdoor environment via vision glazing between 2 feet 6 inches and 7 feet 6 inches above finish floor for building occupants in 90 percent of all regularly occupied areas as demonstrated by plan view and section cut diagrams.

A5.507.3.1 Interior office spaces. Entire areas of interior office spaces may be included in the calculation if at least 75 percent 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.

Exceptions to Sections A5.507.2 and A5.507.3: Copy/printing rooms, storage areas, mechanical spaces, restrooms, auditoria and other intermittently or infrequently occupied spaces or spaces where daylight would interfere with use of the space.

Intent:

The purpose of these provisions is to achieve building lighting through the use of daylight and to provide sightlines to outdoor environments whenever possible. This reduces the need for electrical lighting during normal work hours and saves energy. It also creates a pleasant ambience of high-quality light and views, which may have a salutary effect on building occupants, such as reducing eyestrain exacerbated by increasing use of electronic devices in the workplace.

Change for 2013: No change.

Existing law or regulation:

The *California Energy Code*, CCR, Title 24, Part 6, regulates energy use associated with electrical lighting, and with toplighting and sidelighting with daylight.

Compliance method:

Provide, in plans and specifications, means of achieving daylighting and views on the project while minimizing glare and direct sunlight. Wall and ceiling finishes and colors may need to be identified on a finish schedule. Make sure that compliance with the *California Energy Code* is maintained.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to verify the daylighting strategies and line-of-sight calculations employed on the project. Verify energy code compliance is demonstrated.

On-site enforcement: The inspector should review the permit set of plans and/or specifications and verify that daylighting features are installed and view access is provided as shown and that the building complies with provisions in the *California Energy Code*.

SECTION A5.508
OUTDOOR AIR QUALITY

A5.508.1.3 Hydrochlorofluorocarbons (HCFCs). Install HVAC and refrigeration equipment that do not contain HCFCs.

A5.508.1.4 Hydrofluorocarbons (HFCs). Install HVAC com-plying 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.

Intent:

The purpose of these provisions is to reduce voluntarily the use of refrigerants that deplete the ozone layer and contribute to the greenhouse effect. These are gradually being phased out of use by the EPA, but voluntary implementation of these standards can accelerate the process and protect our atmosphere.

Change for 2013: No change.

Existing law or regulation:

The *California Mechanical Code*, CCR, Title 24, Part 4 and *California Fire Code*, CCR, Title 24, Part 9, regulate fire suppression equipment and refrigerants.

Compliance method:

Provide specifications for equipment that uses refrigerants and include the specifications for the refrigerants to be used. Include recommendations in the Operation and Maintenance Manual for replenishment of refrigerants to meet these regulations, since inventory of phased-out refrigerants still exists for maintenance of older equipment.

Suggestion:

Contractor: Retain product data sheets and recommended maintenance for onsite verification by the enforcing agency and for the operation and maintenance manual.

Enforcement:

Plan intake: The reviewer and/or plan checker should review the plans and specifications to verify the equipment and refrigerant types on the project.

On-site enforcement: The inspector should review the permit set of plans and/or specifications and product data sheets and verify that specified equipment and refrigerants are indeed installed on the project.

Division A5.6, Voluntary Tiers

SECTION A5.601
CALGreen TIER 1 AND 2

A5.601.1 Scope. The measures contained in this appendix are not mandatory unless adopted by local government 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 for newly constructed nonresidential buildings as well as additions. 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.

A5.601.2 *CALGreen* Tier 1

A5.601.2.1 Prerequisites. To achieve *CALGreen* tier status, a project must meet all of the mandatory measures in Chapter 5 and, in addition, meet the provisions of this section.

A5.601.2.2 Energy performance. For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory standards.

A5.601.2.3 Tier 1. Comply with the energy efficiency requirements in Section A5.203.1.1 and Section A5.203.1.2.1.

A5.601.2.4 Voluntary measures for *CALGreen* Tier 1. In addition to the provisions of Sections A5.601.2.1 and A5.601.2.3 above, compliance with the following voluntary measures from Appendix A5 is required for Tier 1:

1. From Division A5.1,
   a) Comply with the designated parking requirements for fuel efficient vehicles for a minimum of 10 percent of parking capacity per Section A5.106.5.1 and Table A5.106.5.1.1.
   b) Comply with thermal emittance, solar reflectance, or SRI values for cool roofs in Section A5.106.11.2 and Table A5.106.11.2.1.[1]
   c) Comply with one elective measure selected from this division.
2. From Division A5.3,
   a) Comply with the 30-percent reduction for indoor potable water use in Section A5.303.2.3.1.
   b) Comply with Section A5.304.4.1. for outdoor potable water use not to exceed 60 percent of ETo.
   c) Comply with one elective measure selected from this division.
3. From Division A5.4,[2]
   a) Comply with recycled content of 10 percent of materials based on estimated total cost in Section A5.405.4.
   b) Comply with the 65-percent reduction in construction and demolition waste in Section A5.408.3.1.
   c) Comply with one elective measure selected from this division.
4. From Division A5.5,
   a) Comply with resilient flooring systems for 90 percent of resilient flooring in Section A5.504.4.7.
   b) Comply with thermal insulation meeting 2009 CHPS low-emitting materials list in Section A5.504.4.8.
   c) Comply with one elective measure selected from this division.

5. Comply with one additional elective measure selected from any division.

[1] Cool roof is required for compliance with Tiers 1 and 2 and may be used to meet energy standards in Part 6, exceed energy standards and to mitigate heat island effect.

[2] Life cycle assessment compliant with Section A5.409.4 in this code may be substituted for prescriptive measures from Division A5.4.

A5.601.3 *CALGreen* Tier 2.

A5.601.3.2 Energy performance. For the purposes of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory standards.

A5.601.3.3 Tier 2. Comply with the energy efficiency requirements in Section A5.203.1.1 and Section A5.203.1.2.2.

A5.601.3.4 Voluntary measures for Tier 2. In addition to the provisions of Sections A5.601.3.1 and A5.601.3.3 above, compliance with the following voluntary measures from Appendix A5 and additional elective measures shown in Table A5.601.3.4 is required for Tier 2:

1. From Division A5.1,

   a) Comply with the designated parking requirements for fuel efficient vehicles for a minimum of 12 percent of parking capacity per Section A5.106.5.1 and Table A5.106.5.1.2.

   b) Comply with thermal emittance, solar reflectance or SRI values for cool roofs in Section A5.106.11.2 and Table A5.106.11.2.2.[1]

   c) Comply with three elective measures selected from this division.

2. From Division A5.3,

   a) Comply with the 35-percent reduction for indoor potable water use in Section A5.303.2.3.1.

   b) Comply with Section A5.304.4.1. for outdoor potable water use not to exceed 55 percent of ETo.

   c) Comply with three elective measures selected from this division.

3. From Division A5.4,[2]

   a) Comply with recycled content of 15 percent of materials based on estimated total cost in Section A5.405.4.1.

b) Comply with the 80-percent reduction in construction and demolition waste in Section A5.408.3.1.

c) Comply with three elective measures selected from this division.

4. From Division A5.5,

a) Comply with resilient flooring systems for 100 percent of resilient flooring in Section A5.504.4.7.1.

Exception: Allowance may be permitted in Tier 2 for up to 5-percent specialty purpose flooring.

b) Comply with thermal insulation meeting 2009 CHPS low-emitting materials list and no added formaldehyde in Section A5.504.4.8.1.

c) Comply with three elective measures selected from this division.

5. Comply with three additional elective measures selected from any division.

[1] Cool roof is required for compliance with Tiers 1 and 2 and may be used to meet energy standards in Part 6, exceed energy standards and to mitigate heat island effect.

[2] Life cycle assessment compliant with Section A5.409.4 in this code may be substituted for prescriptive measures from Division A5.4.

A5.601.4 Compliance verification. Compliance with Section A5.601.2 or A5.601.3 shall be as required in Chapter 7 of this code. Compliance documentation shall be made part of the project record as required in Section 5.410.2 or 5.410.3.

Intent:

Tier 1 and Tier 2 are included in the appendix of the *CALGreen Code* for cities, counties, and city and county that wish to adopt more stringent standards than the mandatory measures. Because of the increased energy savings and additional provisions that are required for each tier, these standards are meant to assist the state in achieving its greenhouse gas emission and net zero energy goals. Coupled with the energy efficiency savings, cool roofs and enhanced water use reduction and construction waste diversion are examples of this combined approach.

A city, county, or city and county that wishes to adopt a tier will pass an ordinance, like any other ordinance to adopt an appendix chapter or other local amendment to the *California Building Standards Code*, and must make

appropriate findings. Because the tiers contain energy efficiency standards more rigorous than those required by Part 6, the *California Energy Code*, the local agency must submit its amendment package to the California Energy Commission for approval prior to filing it with the California Building Standards Commission as required by Section 101.7.1 of the *CALGreen Code*.

This edition includes guidelines for all of the voluntary measures, including those required to fulfill each tier. A table that simplifies the narrative language from the tier provisions follows.

Change for 2013: The California Energy Commission amended the 2010 *CALGreen Code* for energy-related voluntary Tier 1 and Tier 2 measures. The performance standard approach requirements were revised and new prerequisites for outdoor lighting and service water heating in restaurants were added. CBSC made some minor changes to include additions and alterations for construction waste reduction in both Tier 1 and Tier 2. Also, BSC increased the percentage of low VOC resilient flooring to be installed for both Tier 1 and Tier 2, with an added exception for specialty purpose flooring. Additionally, Tier 1 and Tier 2 matrix Table A5.601 has been updated to reflect the new code changes.

TABLE A5.601: NONRESIDENTIAL BUILDINGS: GREEN BUILDING STANDARDS CODE PROPOSED PERFORMANCE APPROACH

Note: This table is intended only as an aid in illustrating the nonresidential tier structure

CATEGORY	ENVIRONMENTAL PERFORMANCE GOAL	TIER 1	TIER 2
All	Minimum Mandatory	Meet all of the provisions of Chapter 5	Meet all of the provisions of Chapter 5
Planning and Design	Designated Parking for Fuel Efficient Vehicles	10% of total spaces	12% of total spaces
	Cool Roof to Reduce Heat Island Effect	Roof Slope < 2:12 SRI 64 Roof Slope > 2:12 SRI 16	Roof Slope < 2:12 SRI 78 Roof Slope > 2:12 SRI 30
		1 additional Elective from Division A5.1	3 additional Electives from Division A5.1
Energy Efficiency	Energy Performance [2, 3]	Outdoor lighting power 90% of Part 6 allowance	Outdoor lighting power 90% of Part 6 allowance
		If applicable, solar water-heating system with minimum solar savings fraction of 0.15	If applicable, solar water-heating system with minimum solar savings fraction of 0.15
		If applicable, certain functional areas comply with residential indoor lighting requirements	If applicable, certain functional areas comply with residential indoor lighting requirements
		Energy Budget 95% or 90% of Part 6 calculated value of allowance	Energy Budget 90% or 85% of Part 6 calculated value of allowance
Water Efficiency and Conservation	Indoor Water Use	30% Savings	35% Savings
	Outdoor Water Use	Not to exceed 60% of ETo times the landscape area	Not to exceed 55% of ETo times the landscape area
		1 additional Elective from Division A5.3	3 additional Electives from Division A5.3
Material Conservation and Resource Efficiency4	Construction Waste Reduction	At least 65% reduction	At least 80% reduction
	Recycled Content	Utilize recycled content materials for 10% of total material cost	Utilize recycled content materials for 15% of total material cost
		1 additional Elective from Division A5.4	3 additional Electives from Division A5.4
Environmental Quality	Low-VOC Resilient Flooring	90% of flooring meets VOC limits	100% of flooring meets VOC limits[1]
	Low-VOC Thermal Insulation	Comply with VOC limits	Install no-added formaldehyde insulation and comply with VOC limits
		1 additional Elective from Division A5.5	3 additional Electives from Division A5.5
Additional Measures	Added measures shall be achieved across at least 3 categories	1 Additional Elective	3 Additional Electives
Approximate Total Measures		14	24

1. Exception: Allowance may be permitted in Tier 2 for up to 5-percent specialty purpose flooring.

Exceptions for solar water-heating system requirement:

2. Buildings with a natural gas service water heater with a minimum of 95-percent thermal efficiency.
3. Buildings where greater than 75 percent of the total roof area has annual solar access that is less than 70 percent. Solar access is the ratio of solar insolation including shade to the solar insolation without shade. Shading from obstructions located on the roof or any other part of the building shall not be included in the determination of annual solar access.
4. Life cycle assessment compliant with Section A5.409.4 in this code may be substituted for prescriptive measures from Division A5.4.

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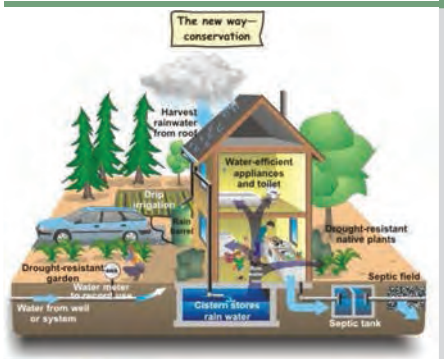
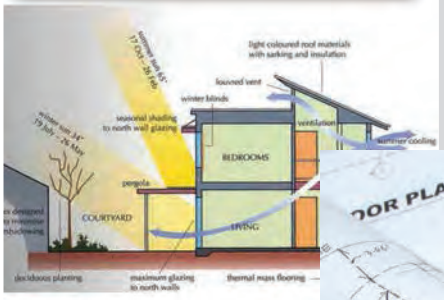
PART

4

Suggested Forms and Templates





SOIL LOSS PREVENTION PLAN CHECKLIST FOR NEW PROJECTS LESS THAN ONE ACRE	CALGreen Std. BSC-5.1-1 10-24-13

Project location:_____Project area:_____

Contact name & title:_____

Telephone:_____Cell phone:_____

Date plan submitted:_____On plans ☐ Separately ☐

BMP NAME	APPLICABLE TO THIS PROJECT	CONTR. INITIAL
EROSION AND SEDIMENT CONTROL BMPs		
Scheduling construction activity	☐	
Preservation of natural features, vegetation and soil	☐	
Drainage swales or lined ditches to control stormwater flow	☐	
Mulching or hydroseeding to stablilize soils	☐	
Erosion control covers to protect slopes	☐	
Protection of storm drain inlets (gravel bags or catch basin inserts)	☐	
Perimeter sediment control (perimeter silt fence, fiber rolls)	☐	
Sediment trap or sediment basin to retain sediment on site	☐	
Stabilized construction exits	☐	
Wind erosion control	☐	
Others (specify):	☐	
	☐	
	☐	
	☐	
HOUSEKEEPING BMPs	☐	
Material handling and waste management	☐	
Building materials stockpile management	☐	
Management of washout areas (concrete, paints, stucco, etc.)	☐	
Control of vehicle/equipment fueling to contractor's staging area	☐	

Vehicle and equipment cleaning performed off site	☐	
Spill prevention and control	☐	
Others (specify)	☐	
	☐	
	☐	
	☐	
	☐	
STORM EVENT INSPECTIONS (If applicable during project construction)		
Date and time	☐	
Date and time	☐	
Date and time	☐	
Date and time	☐	
Date and time	☐	
Date and time	☐	
Date and time	☐	
	☐	
	☐	
	☐	
	☐	

Contractor (Documentation Author's /Responsible Designer's Declaration Statement)

- I certify that this Certificate of Compliance documentation is accurate and complete.
- I certify that the features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 11 of the California Code of Regulations.
- The design features identified on this Certificate of Compliance are consistent with the information documented on other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with the permit application.

Signature:	
Company:	Date:
Address:	License:
City/State/Zip:	Phone:

WORKSHEET (WS-1) BASELINE WATER USE	CALGreen Std. BSC-5.3-1 10-24-13

BASELINE WATER USE CALCULATION TABLE									
FIXTURE TYPE	FLOW-RATE		DURATION		DAILY USES		OCCUPANTS[1,2]		GALLONS PER DAY
Showerheads	2.0 gpm	×	5 min.	×	1	×	Note 2a	=	
Showerheads residential	2.5 gpm	×	8 min.	×	1	×		=	
Lavatory faucets residential	2.2 gpm	×	.25 min.	×	3	×		=	
Lavatory faucets nonresidential	0.5 gpm	×	.25 min.	×	3			=	
Kitchen faucets	2.2 gpm	×	4 min.	×	1	×	Note 2b		
Replacement aerators	2.2 gpm	×		×		×		=	
Wash fountains	2.2 gpm	×		×		×		=	
Metering faucets	0.25 gal/cycle	×		×	3	×		=	
Metering faucets for wash fountains	0.25 gpm	×	.25 min.	×		×		=	
Gravity tank type water closets	1.28 gal/flush	×	1 flush	×	1 male[3] 3 female	×		=	
Flushometer tank water closets	1.28 gal/flush	×	1 flush	×	1 male[3] 3 female	×		=	
Flushometer valve water closets	1.28 gal/flush	×	1 flush	×	1 male[3] 3 female	×		=	
Electromechanical hydraulic water closets	1.28 gal/flush	×	1 flush	×	1 male[3] 3 female	×		=	
Urinals	0.5 gal/flush	×	1 flush	×	2 male	×			
Total daily baseline water use (BWU)								=	
_____(BWU) X .80 = _____Allowable water use									

1. For residential occupancies, the number of occupants shall be based on two persons for the first bedroom, plus one additional person for each additional bedroom.
2. For nonresidential occupancies, refer to Table A, Chapter 4, 2013 California Plumbing Code, for occupant load factors.
   a. Shower use by occupants depends on the type of use of a building or portion of a building, e.g., total occupant load for a health club, but only a fraction of the occupants in an office building as determined by the anticipated number of users.
   b. Nonresidential kitchen faucet use is determined by the occupant load of the area served by the fixture.
3. The daily use number shall be increased to three if urinals are not installed in the room.

Contractor (Documentation Author's /Responsible Designer's Declaration Statement)	
• I certify that this Certificate of Compliance documentation is accurate and complete. • I certify that the features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 11 of the California Code of Regulations. • The design features identified on this Certificate of Compliance are consistent with the information documented on other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with the permit application	
Signature:	
Company:	Date:
Address	License
City/State/Zip	Phone:

WORKSHEET (WS-2) WATER USE REDUCTION	CALGreen Std. BSC-5.3-2 10-24-13

20-PERCENT REDUCTION WATER USE CALCULATION TABLE									
Fixture Type	FLOW RATE[2]		DURATION		DAILY USES		OCCUPANTS[2, 3]		GALLONS PER DAY
Showerheads		×	5 min.	×	1	×	Note 3a	=	
Showerheads residential		×	8 min.	×	1	×		=	
Lavatory faucets residential		×	.25 min.	×	3	×		=	
Lavatory faucets nonresidential[6]		×	.25 min.	×	3	×		=	
Kitchen faucets		×	4 min.	×	1	×	Note 3b	=	
Replacement aerators		×		×		×		=	
Wash fountains		×		×		×		=	
Metering faucets		×	.25 min.	×	3	×		=	
Metering faucets for wash fountains		×	.25 min.	×		×		=	
Gravity tank type water closets		×	1 flush	×	1 male[5] 3 female	×		=	
HET[4] High-efficiency toilet	1.28 gal/flush	×	1 flush	×	1 male[5] 3 female	×		=	
Flushometer tank water closets		×	1 flush	×	1 male[5] 3 female	×		=	
Flushometer valve water closets		×	1 flush	×	1 male[5] 3 female	×		=	
Electromechanical hydraulic water closets		×	1 flush	×	1 male[5] 3 female	×		=	
Urinals		×	1 flush	×	2 male	×		=	
Urinals Nonwater supplied	0.0 gal/flush	×	1 flush	×	2 male	×		=	
Proposed water use								=	
_____(BWU from WS-1) X .80 = _____Allowable water use									

1. The flow rate values shall not exceed the baseline flow rates from the *California Code of Regulations*¸ Title 20, 2010 Appliance Efficiency Regulations (See Table 4.303.2.)
2. For residential occupancies, the number of occupants shall be based on two persons for the first bedroom, plus one additional person for each additional bedroom.
3. For nonresidential occupancies, refer to Table A, Chapter 4, 2013 *California Plumbing Code*, for occupant load factors.
   a. Shower use by occupants depends on the type of use of a building or portion of a building, e.g., total occupant load for a health club, but only a fraction of the occupants in an office building as determined by the anticipated number of users.
   b. Nonresidential kitchen faucet use is determined by the occupant load of the area served by the fixture.
4. 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 112.19.2.

   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.
5. The daily use number shall be increased to three if urinals are not installed in the room.
6. Where complying faucets are unavailable, aerators rated at .35 gpm or other means may be used to achieve reduction.

☐ Plumbing fixtures installed meet the requirements of Section 5.303.6.

Contractor (Documentation Author's /Responsible Designer's Declaration Statement)	
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Signature:	
Company:	Date:
Address	License
City/State/Zip	Phone:

WORKSHEET (WS-3) WATER USE REDUCTION	CALGreen Std. BSC-5.3-3 10-24-13

30-, 35- or 40-Percent REDUCTION WATER USE CALCULATION TABLE									
FIXTURE TYPE	FLOW RATE[2]		DURATION		DAILY USES		OCCUPANTS[2,3,]		GALLONS PER DAY
Showerheads		×	5 min.	×	1	×	Note 3a	=	
Showerheads residential		×	8 min.	×	1	×		=	
Lavatory faucets residential		×	.25 min.	×	3	×		=	
Lavatory faucets nonresidential[6]		×	.25 min.	×	3	×		=	
Kitchen faucets		×	4 min.	×	1	×	Note 3b	=	
Replacement aerators		×		×		×		=	
Wash fountains		×		×		×		=	
Metering faucets		×	.25 min.	×	3	×		=	
Metering faucets for wash fountains		×	.25 min.	×		×		=	
Gravity tank type water closets		×	1 flush	×	1 male[5] 3 female	×		=	
HET[4] High-efficiency toilet	1.12 gal/flush	×	1 flush	×	1 male[5] 3 female	×		=	
Flushometer tank water closets		×	1 flush	×	1 male[5] 3 female	×		=	
Flushometer valve water closets		×	1 flush	×	1 male[5] 3 female	×		=	
Electromechanical hydraulic water closets		×	1 flush	×	1 male[5] 3 female	×		=	
Urinals		×	1 flush	×	2 male	×		=	
Urinals Nonwater supplied	0.0 gal/flush	×	1 flush	×	2 male	×		=	
Proposed water use								=	

30% Reduction_____ (BWU from WS-1) X .70 = _____ Allowable water use
35% Reduction_____ (BWU from WS-1) X .65 = _____ Allowable water use
40% Reduction_____ (BWU from WS-1) X .60 = _____ Allowable water use

1. The flow rate values shall not exceed the baseline flow rates from the *California Code of Regulations,* Title 20, 2010 Appliance Efficiency Regulations (See Table 4.303.2.)
2. For residential occupancies, the number of occupants shall be based on two persons for the first bedroom, plus one additional person for each additional bedroom.
3. For nonresidential occupancies, refer to Table A, Chapter 4, 2013 *California Plumbing Code*, for occupant load factors.
   a. Shower use by occupants depends on the type of use of a building or portion of a building, e.g., total occupant load for a health club, but only a fraction of the occupants in an office building as determined by the anticipated number of users.
   b. Nonresidential kitchen faucet use is determined by the occupant load of the area served by the fixture.
4. 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 112.19.2.

   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.
5. The daily use number shall be increased to three if urinals are not installed in the room.
6. Where complying faucets are unavailable, aerators rated at .35 gpm or other means may be used to achieve reduction

☐ Plumbing fixtures installed meet the requirements of Section 5.303.6.

Contractor (Documentation Author's /Responsible Designer's Declaration Statement)	
• I certify that this Certificate of Compliance documentation is accurate and complete. • I certify that the features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 11 of the California Code of Regulations. • The design features identified on this Certificate of Compliance are consistent with the information documented on other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with the permit application	
Signature:	
Company:	Date:
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City/State/Zip	Phone:

CONSTRUCTION WASTE MANAGEMENT (CWM) PLAN WORKSHEET Note: This sample form may be used to assist in documenting compliance with the waste management plan.	CALGreen Std. BSC-5.4-1 10-24-13

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. Each 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.

CALGreen Std. BSC-5.4-2 10-24-13

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:			

Contractor (Documentation Author's /Responsible Designer's Declaration Statement)	
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Signature:	
Company:	Date:
Address	License
City/State/Zip	Phone:

CONSTRUCTION WASTE MANAGEMENT (CWM) ACKNOWLEDGMENT

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

CALGreen Std. BSC-5.4-3 10-24-13

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

Date	Subcontractor Company Name	Foreman Name	Signature

Contractor (Documentation Author's /Responsible Designer's Declaration Statement)	
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Signature:	
Company:	Date:
Address	License
City/State/Zip	Phone:

CALGreen Compliance Template- Owner's Project Requirements (OPR)	CALGreen Std. BSC-5.4-4 10-24-13

[The Owner's Project Requirements (OPR) is a step of commissioning required for compliance with the 2013 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 nonstandard requirements. E.g., pendant-mounted lighting, illumination requirements, special applications.]*

b) Occupant lighting control requirements: *[List any nonstandard requirements. E.g., multi-mode controls for assembly spaces]*

c) Thermal comfort requirements: *[List any nonstandard temperature or humidity requirements]*

d) Ventilation and filtration requirements: *[List any nonstandard requirements]*

e) Occupancy HVAC control requirements: *[List any nonstandard requirements. E.g. integration with existing control systems]*

f) Acoustic environment requirements: *[List any nonstandard 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)	CALGreen Std. BSC-5.4-5 10-24-13

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. [Refer to the 2013 *California Energy Code*, Section 120.8(b)]	☐
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)	CALGreen Std. BSC-5.4-6 10-24-13

[*Documentation of the Basis of Design (BOD) is a step required for compliance with 2013 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 [Refer to the 2013 *California Energy Code*, Section 120.8(c)]

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 [Refer to the 2013 *California Energy Code*, Section 120.8(c)]

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 [Refer to the 2013 *California Energy Code*, Section 120.8(c)

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	CALGreen Std. BSC-5.4-7 10-24-13

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 type[1]	☐
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	☐

[1]These 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	CALGreen Std. BSC-5.4-8 10-24-13

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 tests[1]	☐
7.	Measurable performance criteria	☐
8.	Cx team information	☐
9.	Cx activities, schedules and responsibilities	☐

[1]These 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	CALGreen Std. BSC-5.4-9 10-24-13

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	CALGreen Std. BSC-5.4-10 10-24-13

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	CALGreen Std. BSC-5.4-11 10-24-13

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	CALGreen Std. BSC-5.4-12 10-24-13

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 postconstruction 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**

FINISH MATERIAL CERTIFICATE – ADHESIVES & SEALANTS Table 5.504.4.1 & Table 5.504.4.2

CALGreen Std. BSC-5.5-1 10-24-13

FINISH	WHERE USED (TYPE)	MANUFACTURER	VOC LIMIT (GPL)[1,2]	SUB-CONTR. INITIAL
ADHESIVES Table 5.504.4.1				
Architectural Applications				
Indoor carpet adhesives			50	
Carpet pad adhesives			50	
Outdoor carpet adhesives			150	
Wood flooring adhesives			100	
Rubber floor adhesives			60	
Subfloor adhesives			50	
Ceramic tile adhesives			65	
VCT and asphalt tile adhesives			50	
Drywall & panel adhesives	Wall Surface		50	
Cove base adhesives	Floor Base		50	
Multi-purpose construction adhesives	Varies		70	
Structural glazing adhesives	Glazing		100	
Single-ply adhesives	Roof		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			250	
Structural wood member			140	
Top and trim adhesive			250	

SUBSTRAIGHT SPECIFIC APPLICATION				
Metal to metal			30	
Plastic foams / porous material			50	
Wood			30	
Fiberglass			80	
SEALANTS Table 5.504.4.2				
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	

1. (GPL) = Grams per liter
2. Where no local or regional air pollution control or quality management district rules are applicable, use the VOC limits in this table.

Contractor (Documentation Author's /Responsible Designer's Declaration Statement)

- I certify that this Certificate of Compliance documentation is accurate and complete.
- I certify that the features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 11 of the California Code of Regulations.
- The design features identified on this Certificate of Compliance are consistent with the information documented on other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with the permit application

Signature:	
Company:	Date:
Address	License
City/State/Zip	Phone:

FINISH MATERIAL CERTIFICATE – ARCHITECTURAL COATINGS Table 5.504.4.3	CALGreen Std. BSC-5.5-2 10-24-13

FINISH	WHERE USED (TYPE)	MANUFACTURER	VOC LIMIT (GPL)[1]	SUB-CONTR. INITIAL
PAINTS & COATINGS				
Flat coatings			50	
Nonflatlat 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 coverings			100	
Form-release compounds			250	
Graphic arts coatings (sign paints)			500	
High-temperature coatings			420	
Industrial maintenance coatings			250	
Low solids coatings[2]			120	
Magnesite cement coatings			450	
Mastic texture coatings			100	
Metallic pigmented coatings			500	
Multicolor coatings			250	
Pretreatment wash primers			420	
Primers, sealers and undercoaters			100	
Reactive penetrating sealers			350	
Recycled coatings			250	
Roof coatings			50	

Rust preventative coatings			250[3]	
Shellacs Clear: Opaque			 730 550	
Specialty primers, sealers and undercoaters			100[3]	
Stains			250	
Stone consolidants			450	
Swimming pool coatings			340	
Traffic marking coatings			100	
Tub and tile refinish coat-ings			420	
Waterproofing membranes			250	
Wood coatings			275	
Wood preservatives			350	
Zinc-rich primers			340	

1. (GPL) = Grams per liter of coating
2. Grams of VOC per liter of coating, including water and including exempt compounds.

Contractor (Documentation Author's /Responsible Designer's Declaration Statement)

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FINISH MATERIAL CERTIFICATE – COMPOSITE WOOD PRODUCTS	CALGreen Std. BSC-5.5-3 10-24-13

FINISH	FORMALDEHYDE LIMITS[1] (Max. emissions in Parts per Million)			SUB-CONTR. INITIAL
Composite wood products				
Hardwood plywood veneer core	0.05			
Hardwood plywood composite core	0.05			
Particle board	0.09			
Medium density fiberboard	0.11			
Thin medium density fiber-board[2]	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 E 1333-96). 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 $^{5}/_{16}$ inches (8 mm).

Contractor (Documentation Author's /Responsible Designer's Declaration Statement)

- I certify that this Certificate of Compliance documentation is accurate and complete.
- I certify that the features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 11 of the California Code of Regulations.
- The design features identified on this Certificate of Compliance are consistent with the information documented on other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with the permit application

Signature:	
Company:	Date:
Address	License
City/State/Zip	Phone:

FINISH MATERIAL CERTIFICATE – FLOORING
(CARPET, CARPET CUSHION & RESILIENT)

CALGreen Std. BSC-5.5-4 10-24-13

FINISH	MANUFACTURER	CERTIFICATION ORGANIZATION	SUB-CONTR. INITIAL
FLOORING			
Carpet 1		Carpet and Rug Institute – Green Label Plus Program	
		CDPH Standard Method or Specification 01350	
		NSF/ANSI 140 – Gold	
		Scientific Certification Systems – Sustainable Choice	
		CA-CHPS	
Carpet 2		Carpet and Rug Institute – Green Label Plus Program	
		CDPH Standard Method or Specification 01350	
		NSF/ANSI 140 – Gold	
		Scientific Certification Systems – Sustainable Choice	
		CA-CHPS	
Carpet cushion 1		Carpet and Rug Institute – Green Label Plus Program	
Carpet cushion 2		Carpet and Rug Institute – Green Label Plus Program	
Resilient flooring 1		RFCI – Floor Score Program	
		CDPH 2010 Standard Method	
		CA-CHPS Product Registry	
		Greenguard Children & Schools Program	
Resilient flooring 2		RFCI – Floor Score Program	
		CDPH 2010 Standard Method	
		CA-CHPS Product Registry	
		Greenguard Children & Schools Program	

Contractor (Documentation Author's /Responsible Designer's Declaration Statement)	
• I certify that this Certificate of Compliance documentation is accurate and complete. • I certify that the features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Parts 11 of the California Code of Regulations. • The design features identified on this Certificate of Compliance are consistent with the information documented on other applicable compliance forms, worksheets, calculations, plans and specifications submitted to the enforcement agency for approval with the permit application	
Signature:	
Company:	Date:
Address	License
City/State/Zip	Phone:

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/FPT-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

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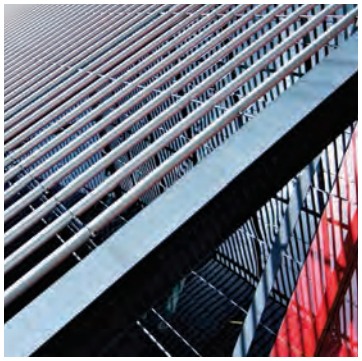

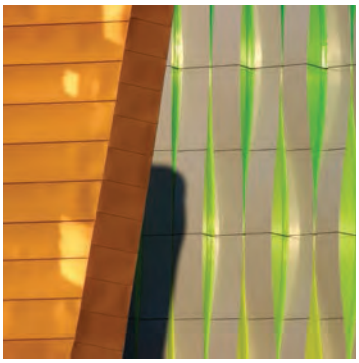

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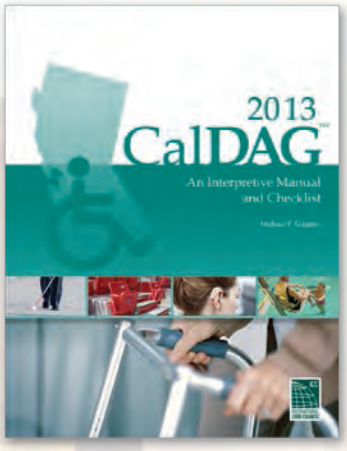

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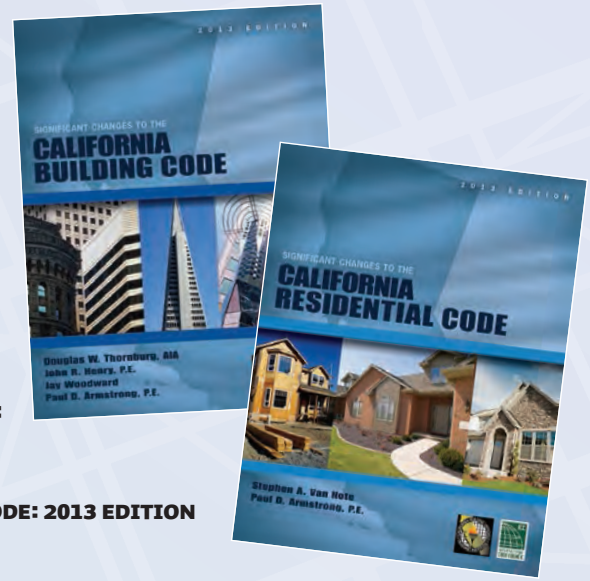

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