# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

THE CITY OF SIGNAL HILL
WELCOMES YOU TO A REGULAR
PLANNING COMMISSION MEETING
July 18, 2017

The City of Signal Hill appreciates your attendance. Citizen interest provides the Planning Commission with valuable information regarding issues of the community. Meetings are held on the 3rd Tuesday of every month.

Meetings commence at 7:00 p.m. There is a public comment period at the beginning of the regular meeting, as well as the opportunity to comment on each agenda item as it arises. Any meeting may be adjourned to a time and place stated in the order of adjournment.

The agenda is posted 72 hours prior to each meeting on the City's website and outside of City Hall and is available at each meeting. The agenda and related reports are available for review online and at the Community Development office and the Signal Hill Community Center on the Friday afternoon prior to the Commission meeting. Agenda and staff reports are also available at our website at www.cityofsignalhill.org.

During the meeting, the Community Development Director presents agenda items for Commission consideration. The public is allowed to address the Commission on all agenda items. The Chair may take agenda items out of order and will announce when the period for public comment is open on each agenda item. The public may speak to the Commission on items that are not listed on the agenda. This public comment period will be held at the beginning of the public portion of the meeting. You are encouraged (but not required) to complete a speaker card prior to the item being considered, and give the card to a City staff member. The purpose of the card is to ensure speakers are correctly identified in the minutes. However, completion of a speaker card is voluntary, and is not a requirement to address the Commission. The cards are provided at the rear of the Council Chamber. Please direct your comments or questions to the Chair.

Planning Commission Members are compensated $125.00 per meeting.

(1) CALL TO ORDER – 7:00 P.M.

(2) ROLL CALL

CHAIR RICHÁRD
VICE CHAIR PARKER
COMMISSIONER BROOKS
COMMISSIONER FALLON
COMMISSIONER WILSON

(3) PLEDGE OF ALLEGIANCE

(4) PUBLIC BUSINESS FROM THE FLOOR ON ITEMS NOT LISTED ON THIS AGENDA

(5) PRESENTATION

a. Presentation – Beautification Award

Summary: Chair Richárd will present the Q3 Beautification Award to Julie Javier for Courtyard Care Center, the property owner of 1880 Dawson Avenue, for improvements to the landscaping and exterior appearance of the building.

Recommendation: Present the award.

(6) PUBLIC HEARING

a. Public Hearing – 3347 Brayton Avenue Second Request for a Construction Time Limit Extension

Summary: The applicant, Reginald McNulty, is requesting a second and final 100-day extension to complete construction of the single-family dwelling remodel at 3347 Brayton Avenue. He was not able to complete several items in the first extension due to material supply delays.

Recommendation: Approve the second and final 100-day extension.

(7) COMMUNITY DEVELOPMENT DIRECTOR'S REPORTS

a. Director's Report – Crescent Square Revised Model Homes Parking Plan

Summary: The applicant and property owner, Far West Crescent LLC, is requesting Planning Commission approval of a revised parking plan for the model homes at the Crescent Square development. The revision will facilitate an expedited construction schedule which includes building all 23 remaining homes simultaneously, instead of in phases as initially proposed.

Recommendation: Approve the revised parking plan with the condition that the model home parking directional signs have sign permits and do not exceed the maximum height of four feet.

b. Director's Report – Green Building Policy and Solar Upgrades

Summary: Staff will provide a summary of the City's Green Building Policy and showcase two proposed commercial solar projects that are notable in light of the Green Building Policy. The Policy establishes green building practices through implementation of the United States Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) certification standards for municipal buildings and encourages the practices for private buildings.

Recommendation: Receive and file.

c. Director's Report – Vacant Parcel Ordinance (VPO)

Summary: The City is obligated to adopt an ordinance requiring property owners of vacant parcels over 1.0 acre in size to install sediment control devices. The intent of the mandate is to reduce the amount of pollution that is carried by sediment from these sites by wind and rain into the stormwater system. Key provisions of the draft Vacant Parcel Ordinance (VPO) include:

- Property owners are responsible for preparing compliance plans consistent with provisions of a Guidance Manual.
- The deadline to install soil erosion and sediment control devices is currently set as April 24, 2018.
- Devices will be inspected on an annual basis prior to each rainy season to ensure that they are effective and properly maintained.

Recommendations:

1) Provide comments and feedback; and

2) Schedule item for a public hearing at the Planning Commission meeting on August 15, 2017.

d. Director's Report – Study Session on Site Plan and Design Review (SPDR)

Summary: Staff will be presenting the second in a series of Director's Reports regarding tools and procedures to assist the Planning Commission with their duties. This month's study session is on the Site Plan and Design Review (SPDR) process with an emphasis on design review. During the session, staff will engage the Planning Commission in an interactive design exercise.

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Recommendation: Receive and file.

e. Director's Report – Planning Commission Business Cards

Summary: Staff will be ordering business cards for use by Commissioners in relation to their duties and responsibilities as appointed officials.

Recommendation: Receive and file.

(8) CONSENT CALENDAR

The following Consent Calendar items are expected to be routine and non-controversial. Items will be acted upon by the Commission at one time without discussion. Any item may be removed by a Commissioner or member of the audience for discussion.

a. Minutes of the Following Meeting

Regular Meeting of June 20, 2017.

Recommendation: Approve.

b. City Council Follow-up

Summary: Attached for review is a brief summary of the City Council's actions from the last two City Council meetings.

Recommendation: Receive and file.

c. Development Status Report

Summary: Attached for your review is the monthly Development Status Report which highlights current projects.

Recommendation: Receive and file.

d. In the News

Summary: Attached for review are articles compiled by staff that may be of interest to the Commission.

Recommendation: Receive and file.

(9) COMMISSION NEW BUSINESS

COMMISSIONER BROOKS

COMMISSIONER FALLON
COMMISSIONER WILSON
VICE CHAIR PARKER
CHAIR RICHÁRD

(10) ADJOURNMENT

Adjourn tonight's meeting to the next regular meeting to be held Tuesday, August 15, 2017 at 7:00 p.m. in the Council Chambers located at City Hall.

CITIZEN PARTICIPATION

If you need special assistance beyond what is normally provided to participate in City meetings, the City will attempt to accommodate you in every reasonable manner. Please call the City Clerk's office at (562) 989-7305 at least 48 hours prior to the meeting to inform us of your particular needs and to determine if accommodation is feasible.

# July

**5a.**

# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

July 18, 2017

**AGENDA ITEM**

**TO:** **HONORABLE CHAIR**
**AND MEMBERS OF THE PLANNING COMMISSION**

**FROM:** **PHYLLIS THORNE**
**ADMINISTRATIVE ASSISTANT**

**SUBJECT:** **PRESENTATION - BEAUTIFICATION AWARD**

## Summary:

This Beautification Award is being presented to Julie Javier for Courtyard Care Center, the property owner of 1880 Dawson Avenue, for improvements to the landscaping and exterior appearance of the building.

## Recommendation:

Present the Award.

## Background:

Courtyard Care Center is a skilled nursing facility, providing 24-hour nursing care, as well as rehabilitation services. The facility recently repainted the exterior of the building. They also re-landscaped, planting attractive flower beds along the 19th Street side of the building.

Before:

After:

Approved by:

_____

Scott Charney

# July

## 6a.

3347 Brayton Avenue
2nd CTL Extension

# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

## PROCEDURES RELATIVE TO PUBLIC HEARINGS/WORKSHOPS

1. At the request of the Mayor/Chair, the City Clerk/Secretary reports on the Form of Notice given:

   a. Notice was published in the *Signal Tribune* newspaper in accordance with Signal Hill Municipal Code Section 20.52.030(G) on July 7, 2017.
   b. Notice was posted in accordance with Signal Hill Municipal Code Section 1.08.010 at City Hall, Discovery Well Park, Reservoir Park and Signal Hill Park Community Center on July 7, 2017.
   c. Notice was mailed to property owners within a 100' radius on or before July 7, 2017.

2. Mayor/Chair asks for a staff report, which shall be included in written materials presented to the City Council/Commission so that they can be received into evidence by formal motion.

   In addition, the staff report shall include the following:

   a. Summarize the resolution/ordinance;
   b. The specific location of the property, and/or use, the surrounding properties;
   c. The criteria of the Code which applies to the pending application; and
   d. The recommendation of the Council/Commission and/or other legislative body of the City and staff recommendation.

3. Mayor/Chair declares the public hearing open.

4. Mayor/Chair invites those persons who are in favor of the application to speak.

5. Mayor/Chair invites those persons who are in opposition to the application to speak.

6. Applicant or their representative is provided a brief rebuttal period.

7. Mayor/Chair declares the public hearing closed.

8. Discussion by Council/Commission only.

9. City Attorney reads title of resolutions and/or ordinances.

10. City Clerk/Secretary conducts Roll Call vote.

CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

July 18, 2017

**AGENDA ITEM**

**TO:** **HONORABLE CHAIR**
**AND MEMBERS OF THE PLANNING COMMISSION**

**FROM:** **COLLEEN DOAN**
**SENIOR PLANNER**

**SUBJECT:** **PUBLIC HEARING – 3347 BRAYTON AVENUE SECOND REQUEST FOR A CONSTRUCTION TIME LIMIT EXTENSION**

## Summary:

The applicant, Reginald McNulty, is requesting a second and final 100-day extension to complete construction of the single-family dwelling remodel at 3347 Brayton Avenue. He was not able to complete several items in the first extension due to material supply delays.

## Recommendation:

Approve the second and final 100-day extension.

## Strategic Plan Objectives:

Goal No. 5: Ensure an enhanced quality of life for residents of the City.

Goal No. 6: Promote a transparent and open government.

## Background:

On July 12, 2011, the Planning Commission reviewed preliminary plans for the remodel and second unit and found them conforming to all applicable development and design standards.

On August 9, 2011, the Commission conducted a public hearing and approved the plans to enlarge and remodel the front house and garage, and build a second unit over a new garage at the rear of the property.

In 2013, construction of the 3-car garage and second unit was completed, but the applicant requested changes to the plans for the front house to add a second story element and increase the square footage.

On March 10, 2015, at a public workshop, the Planning Commission reviewed revised plans for the front house which now included a second story addition. The Commission recommended that the roofline be revised to integrate the front balcony roofline with the second story and that the project be scheduled for a public hearing.

On April 14, 2015, at a public hearing, the Planning Commission unanimously approved the revised plans for the front house.

On April 15, 2016, the building permit was issued and pursuant to the City's Construction Time Limits Ordinance (CTL) the project was allowed 360 days for completion. The CTL would expire on April 10, 2017.

On March 10, 2017, the applicant submitted a written request for an 80-day CTL extension, based on rain delays. The Ordinance allows the Director of Community Development to approve a 50-day extension following notices being mailed to property owners within a 100' radius and no objections being received (Attachment A).

On March 23, 2017, a public notice of the extension request was mailed to all residents within a 100' radius of the subject property. A ten day comment period was allowed and no objections were received. A staff site visit confirmed that the construction site was safe, and did not pose a nuisance from dust or stormwater runnoff (Attachment B).

On April 10, 2017, the Director of Community Development approved the 50-day extension request (Attachment C).

## Analysis:

### Project Location

The subject site is located on the west side of Brayton Avenue between 33rd Street and Wardlow Road in the North End neighborhood.

## Project Location


Time Frames

Pursuant to Signal Hill Municipal Code (SHMC) Section 20.52.100, "Construction Time Limits – Time to Complete," once a building, grading or demolition permit is issued for a single family residential project greater than 200 square feet in size, the CTL allows 360 days for completion. CTL also allows the possibility of two extensions (Attachment D).

Although the first extension was reviewed and approved by the Director, all second extension requests must be reviewed by the Planning Commission. The Commission has the authority to grant more than 50 days if requested and deemed appropriate.

Final Extension

The applicant is now requesting a second and final extension of 100 days (Attachment E). He believes this extension will allow time to complete the remaining items which include:

- Exterior stonework;
- Installation of a deck railing;
- Landscaping; and
- Cabinetry, flooring and other interior finish work.

The CTL Ordinance states that if the project's CTL has expired prior to approval of an extension, the time frame of the extension shall start on the date the decision letter is mailed to the applicant. This would mean a final 100-day extension would begin on approximately July 20, 2017, and expire on October 28, 2017. Staff estimates that 100 days is an appropriate amount of time for completion of the project.

The Code allows another 30 days after expiration of CTL prior to any additional actions by the City. After that the City could impose fines; however, that would typically only be the case if the project was deemed a nuisance. It is not the intent of CTL to be punitive.

Public Notice

A notice of the final extension request was mailed to property owners within a 100' radius of the property, was published in the Signal Tribune and was posted pursuant to the SHMC and no objections were received (Attachment F).

Criteria

The SHMC establishes "good cause" as the criteria for approving a CTL extension request and notes that the approving authority shall consider each of the following criteria which are considered to be beyond the applicant's control:

- Whether substantial progress has been made;
- Whether the condition of the property presents health or safety hazards;
- Whether the site topography has created delays;
- Whether delays are due to material suppliers or labor problems;
- Whether there has been an earthquake, fire, flood, explosion, act of God, or other circumstances beyond the applicant's control; and
- Whether delays are due to City or other government actions, and/or other unusual circumstances.

The applicant has indicated that the current delay is related to the material suppliers for the kitchen cabinets, but he believes a 100-day extension will better allow him to complete all the interior finish items than a 50-day extension. Staff inspects the site on a regular basis and can confirm that substantial progress has been made and that the site does not pose a health or safety hazard and does not create a nuisance from dust or stormwater runnoff.

Approved:

_____

Scott Charney

Wed 03/10/2017 3:22 PM

Colleen,

I would like consideration for a time extension as it relates to the construction at 3347 Brayton Ave. Due to the rain, I would like to extend 80 days to allow the drywall and hard scape to be completed.

Thanks

Reg

Reginald McNulty, Senior Property Manager
United States General Services Administration
Public Building Services (9P3PSLN)
North Los Angeles Field Office
300 N. Los Angeles Street, Suite 4300
Los Angeles, CA 90012
reginald.mcnulty@gsa.gov
(213) 894-8975 office
(213) 2190210 cell
(213) 894-6629 fax

Attachment A

# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

## NOTICE OF CONSTRUCTION EXTENSION REQUEST

**NOTICE IS HEREBY GIVEN** that a request to extend construction has been filed. The Director of Community Development may approve the request if public comments are not received. The Planning Commission shall be the approving authority if public comments are received.

### CONSTRUCTION TIME LIMIT EXTENSION

**THE PROPERTY OWNER AT 3347 BRAYTON AVENUE HAS FILED AN EXTENSION TO REQUEST 50 ADDITIONAL DAYS TO COMPLETE CONSTRUCTION FOR MODIFICATIONS TO THE SINGLE-FAMILY DWELLING**

**THE PUBLIC IS INVITED** to submit comments, present information, express their opinions or otherwise present evidence on the above matter during the public comment period from March 24, 2017 to April 3, 2017. Comments should be submitted to the project planner listed below.

**COMMENTS MUST BE RECEIVED** by April 3, 2017, otherwise the extension will be granted by the Director of Community Development in accordance with Section 20.52.100.B of the Signal Hill Municipal Code.

**FURTHER INFORMATION** on this item may be obtained at the City of Signal Hill Community Development Department located at 2175 Cherry Avenue, Signal Hill, California, or by emailing Colleen Doan, Senior Planner, at cdoan@cityofsignalhill.org or calling at (562) 989-7344.

***YOU ARE RECEIVING THIS NOTICE BECAUSE YOUR PROPERTY IS WITHIN 100 FEET OF THE CONSTRUCTION SITE.***

Attachment B

# CITY OF SIGNAL HILL

2175 Cherry Avenue • Signal Hill, CA 90755-3799

April 10, 2017

Reginald McNulty
3347 Brayton Ave.
Signal Hill, CA 90755

Subject: Construction Time Limit - 1st Extension

Mr. McNulty,

This letter is to advise you that your request for a 50-day extension to your building permit has been approved by the Community Development Director following no receipt of objection to the extension from our mailed notice.

Your current permit expires on April 10, 2017. The 50-day extension period will begin on April 11, 2016. The new expiration date will be June 4, 2017 at 5:30 p.m. Please be aware that the project is only eligible for one additional 50-day extension. A second request must be decided upon by the Planning Commission. You must notify us in writing of your intent to request a 2nd extension 30 days prior to your new expiration date.

For questions or to schedule inspections contact our Building Inspector at (562) 989-7348.

Regards,

Colleen Doan

Colleen Doan
Senior Planner
cdoan@cityofsignalhill.org
562.989.7344

Attachment C

# CITY OF SIGNAL HILL

2175 Cherry Avenue • Signal Hill, CA 90755-3799

August 12, 2014

**AGENDA ITEM**

**TO:** **HONORABLE CHAIR**
**AND MEMBERS OF THE PLANNING COMMISSION**

**FROM:** **COLLEEN DOAN**
**ASSOCIATE PLANNER**

**SUBJECT:** **DIRECTOR'S REPORT – CONSTRUCTION TIME LIMIT PROCEDURES**

## Summary:

On June 18, 2013, the City Council adopted an ordinance establishing construction time limits for development projects. The time limits are based on project size and type and have provisions for time extensions, fees and penalties. Staff will present an update on the status of implementation and review the procedures for extension requests and compliance.

## Recommendation:

Receive and file.

## Background and Analysis:

The construction time limits (CTL) ordinance was established in response to concerns over construction projects with extended delays in completion and the negative impacts and nuisances associated with long running projects (Attachment A). The purpose of the ordinance is:

1. To encourage project applicants to consider cost, financing and time frames carefully before commencing construction and therefore be prepared to complete the project in a timely manner;
2. To notify neighbors that construction is about to begin, what the project completion deadlines are; and
3. To notify neighbors when extension requests are received and allow the public to comment on the requests.

Attachment D

Attachments to Staff Report
not attached

Current CTL Projects

Since adoption of the ordinance, the following CTL projects have been tracked on the Development Status Reports and notices to neighbors have been mailed:

- Residential - 8
- Commercial – 11

In addition, three projects have been completed and one request for an extension has been administratively approved since no written comments were received.

As a policy staff has also initiated sending construction notices to neighbors for projects that do not qualify for CTL but are substantial enough to warrant notification such as large covered balconies.

Extension Requests

Extension provisions allow for additional time to complete a project. Decisions to grant or deny the request are based on the applicant's demonstration of good cause. Up to two extensions may be requested by the permit holder of the project. Requests must be submitted in writing at least 30 calendar days prior to expiration and must include a written justification for the extension and documentation of financing. Upon receipt of a written extension request, property owners within a 100-foot-radius of the project must be notified (or a 500' radius if the View Policy applies). The notice includes a ten day public comment period during which time any person may submit written comments to the Director of Community Development.

Approving Authority

If no written comments are received within the comment period, the Director of Community Development will be the approving authority for the first extension, however, if one or more written comments are received, the Planning Commission serves as the approving authority. All second requests are reviewed by the Planning Commission. No second request can be approved if the first request was denied.

Extension Criteria

The established criteria for approving an extension are based on reasons that are beyond the project applicant's control. The request justification must demonstrate good cause and the approving authority must consider each of the following:

- Whether substantial progress has been made;
- Whether the condition of the property presents health or safety hazards;
- Whether the site topography has created delays;
- Whether delays are due to material suppliers or labor problems;

- Whether there has been an earthquake, fire, flood, explosion, act of God, or other circumstances beyond the applicant's control; and
- Whether delays are due to City or other government actions, and/or other unusual circumstances.

The applicant's financing circumstances cannot be a factor in determining good cause.

In the case of unusual circumstances or conditions the Planning Commission may grant an extension of time greater than those listed in the ordinance, but the provision is not intended to be exercised on a regular basis. Decisions to deny may be appealed.

Penalties

The intent of establishing penalties is not to be entirely punitive, but to encourage property owners to complete construction within the set time limits. If a project has not been completed within the time limit, penalties may ensue after a 30 day grace period. A penalty of $200 per day may be applied to projects that are not completed within the construction time limits and approved time extensions, with the maximum cumulative penalty totaling $36,000 ($200/day for 180 days). In addition, continuance of construction may constitute a public nuisance and may be abated. Penalties will be assessed and payment deducted from the developer deposit and/or paid in full prior to reissuance of a voided permit or certificate of occupancy.

Approved:

Scott Charney

attachment

**From:** Reginald McNulty
**Sent:** Wednesday, June 28, 2017 1:12 PM
**To:** Colleen Doan
**Cc:** John Hartley
**Subject:** Re: 2nd request for extension of CTL

Colleen,

I'm requesting an additional 100-day extension to finish kitchen cabinets, flooring and railings. The reason for this extension is that first extension did not allow for enough time to complete the work since my kitchen cabinets are a long lead time item.

Again thanks for your consideration.

Reg

Attachment E

# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

## NOTICE OF CONSTRUCTION EXTENSION REQUEST

**NOTICE IS HEREBY GIVEN** that on Tuesday, July 18, 2017, the Planning Commission of the City of Signal Hill will consider a final construction extension request at 7:00 p.m. in the City Council Chamber at City Hall, 2175 Cherry Avenue, Signal Hill, California.

### CONSTRUCTION TIME LIMIT EXTENSION

**THE PROPERTY OWNER AT 3347 BRAYTON AVENUE HAS FILED A REQUEST FOR A 50 DAY EXTENSION TO COMPLETE CONSTRUCTION FOR MODIFICATIONS TO THE SINGLE-FAMILY DWELLING.**

- A 50 DAY EXTENSION WAS PREVIOUSLY GRANTED.
- THE PROJECT IS ELIGBILE FOR A FINAL 50 DAY EXTENSION.

**APPLICANT:** Reginald McNulty, Property Owner

**RECOMMENDATION:** Approve final extension of 50 days.

**THE PUBLIC IS ENCOURAGED** to submit written comments in advance of the meeting to report any nuisances related to construction activity and to attend the meeting to present information, express their opinion or otherwise provide evidence on the above matter.

**COMMENTS MUST BE RECEIVED** by July 17, 2017, in order for the Planning Commission to consider them prior to making a determination.

**IF YOU WISH TO LEGALLY** challenge any action taken by the City on the above matter, you may be limited to raising only those issues you or someone else raised at the public hearing described in this notice, or in written correspondence delivered to the City prior to or at the public hearing.

**FURTHER INFORMATION** on this item may be obtained at the City of Signal Hill Community Development Department located at 2175 Cherry Avenue, Signal Hill, California, or by emailing Colleen Doan, Senior Planner, at cdoan@cityofsignalhill.org or calling at (562) 989-7344.

| | |
|---|---|
| Published in the Signal Tribune newspaper | July 7, 2017 |
| Posted in accordance with S.H.M.C. Section 1.08.010 on or before: | July 7, 2017 |
| Mailed to affected property owners within 100' on or before: | July 7, 2017 |

Attachment F


***YOU ARE RECEIVING THIS NOTICE BECAUSE YOUR PROPERTY IS WITHIN 100 FEET OF THE CONSTRUCTION SITE.***

# July

## 7a.

# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

July 18, 2017

**AGENDA ITEM**

**TO:** **HONORABLE CHAIR**
**AND MEMBERS OF THE PLANNING COMMISSION**

**FROM:** **COLLEEN DOAN**
**SENIOR PLANNER**

**SUBJECT:** **DIRECTOR'S REPORT – CRESCENT SQUARE REVISED MODEL HOMES PARKING PLAN**

## Summary:

The applicant and property owner, Far West Crescent LLC, is requesting Planning Commission approval of a revised parking plan for the model homes at the Crescent Square development. The revision will facilitate an expedited construction schedule which includes building all 23 remaining homes simultaneously, instead of in phases as initially proposed.

## Recommendation:

Approve the revised parking plan with the condition that the model home parking directional signs have sign permits and do not exceed the maximum height of four feet.

## Background:

On August 12, 2014, the Planning Commission approved Site Plan and Design Review 14-04 for the site plan and architectural designs, and also recommended City Council approval of the second addendum to the Town Center West Environmental Impact Report (EIR), Vesting Tentative Tract Map 75294 and Zoning Ordinance Amendment 14-03.

On September 2, 2014, the City Council approved the second addendum to the Town Center West EIR, Vesting Tentative Tract Map 75294 and Zoning Ordinance Amendment 14-03.

In July 2015, the Community Development Director approved a request for a six-month extension of the Site Plan and Design Review approval. Also in July, the City adopted a new Oil Code for properties with abandoned oil wells which allowed the project to move forward.

In January 2016, the City received a request for a second six-month extension of the Site Plan and Design Review.

On February 16, 2016, the Planning Commission approved a second request for a final six-month extension of Site Plan and Design Review 14-04. The applicant had been working on transactional matters and site development documents, and anticipated starting construction by late spring or early summer of 2016.

On June 28, 2016, the property was sold by Summer Hill Homes to Far West Industries (Far West). Based on their knowledge of market preferences and functionality, Far West made minor modifications to the floor plans and elevations and prepared model home plans, which included a parking plan.

On July 19, 2016, the Planning Commission approved a conformity report for the minor modifications to the floor plans and elevations and the model home plan as required by the Signal Hill Municipal Code (Attachment A). The approved model home plan included two model homes with a sales office and a temporary parking lot at the northeast corner of Walnut and Crescent Heights Street on Lots 1, 2 and 3 (as shown in Exhibit 1 of Attachment A). The model parking was located on Lot 1 and included four standard spaces and one ADA accessible space with a path to an exterior ADA accessible restroom. The exterior restroom was to be screened with a 6-foot fence.

On August 16, 2016, the Planning Commission approved the on- and off-site sign plans for the model homes (Attachment B).

## **Analysis:**

At the time the model home plan was approved, the applicant intended to build the remaining homes on both sides of Green House Street, including the lot with the parking as part of the final phase (Phase 3) of construction. It was expected that by the commencement of Phase 3, other street improvements and the guest parking for the project would be completed and that these would accommodate visitors to the model homes.

Due to construction delays, including winter rains and the expectation that the homes will sell rapidly, the applicant wishes to fast-track construction by building out all 23 remaining homes at the same time; therefore, they have proposed an alternate parking plan to accommodate visitors to the model homes during construction.

Revised Parking Plan

Lot 1 is currently serving as the temporary approved parking lot for the model homes, but will ultimately accommodate a home. The applicant estimates that the fast-track build out of the remaining 23 homes will begin within a month, following completion of the internal streets and guest parking, and the installation of curb, gutter and sidewalk on Crescent Heights Street. This will necessitate the relocation of the model home parking from Lot 1.

Following completion of street improvements, the twelve guest parking spaces along Summit Drive and Gaviota Avenue will replace the Lot 1 temporary parking. The sidewalk on Crescent Heights Street will provide access to the model homes. The ADA parking and restroom will be located in the two parking spaces on Green House Street, directly across from the model homes (Attachment C & D).

Revised Sign Plan

In accordance with the Signal Hill Municipal Code (SHMC) Section 20.58.080, "Temporary Signs," the Planning Commission previously approved:

- Two on-site project identification signs; and
- Two off-site directional signs.

The SHMC also allows two Model Home directional signs with a maximum area of six square feet and a maximum height of four feet. The applicant is proposing:

- Two signs to direct model home visitors to the parking areas (3 square feet); and
- Two signs to identify the handicap parking stall (3 square feet) (Attachment E).

The size of all proposed Model Home parking identification signs complies with the Code; however, the height is not noted. A condition of approval will be that the signs not exceed the maximum allowed height. In addition, all signs will require sign permits.

Staff recommends approval of the two additional ADA parking identification signs pursuant to the City's Reasonable Accommodation Procedures Ordinance. The SHMC Chapter 20.65, complies with the Federal Fair Housing Amendments Act of 1988 and California's Fair Employment and Housing Act. The purpose of the Ordinance is to provide people with disabilities and developers of housing for the disabled, reasonable accommodation in rules, policies, practices and procedures as may be necessary to ensure equal access to housing.

Approved by:

_____

Scott Charney

Attachments

# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

July 19, 2016

**AGENDA ITEM**

**TO:** **HONORABLE CHAIR**
**AND MEMBERS OF THE PLANNING COMMISSION**

**FROM:** **SELENA ALANIS**
**ASSOCIATE PLANNER**

**SUBJECT:** **DIRECTOR'S REPORT – CRESCENT SQUARE CONFORMITY REPORT AND MODEL HOME AND SALES OFFICE PLANS**

## Summary:

The new applicant and property owner, Far West Crescent LLC, is requesting Planning Commission review of the modifications to the floor plans, elevations and review of model home plans for the Crescent Square development. Staff reviewed the plan modifications and determined that they do not result in significant changes in the exterior or architectural diversity of the development and do not need review at a public hearing.

## Recommendation:

Approve as submitted.

## Background:

On August 12, 2014, the Planning Commission approved Site Plan and Design Review 14-04 for the site plan and architectural designs. On February 16, 2016, the Planning Commission approved the final extension of Site Plan and Design Review 14-04 for six months (until September 3, 2016). The vote was 5/0.

Attachment A
Attachments other than
Exhibit A not included

## Analysis:

On June 28, 2016, escrow closed and the property was sold by SummerHill Homes to Far West Industries (Far West). Far West has prepared a letter describing who they are and included some development projects that they have worked on (Attachment A). In anticipation of moving the project forward, Far West made modifications to the floor plans and elevations based on their knowledge of market preferences and functionality and prepared model home plans.

Floor Plan and Elevation Modifications – Conformity Report

Site Plan and Design Review 14-04 had two plan types and each floor plan included two options within the development for a Plan 1A, Plan 1B, Plan 2A and Plan 2B.

Far West is proposing to eliminate the optional 4th bedroom in both plan types, so Plan 1A and Plan 2A will be eliminated and both of the plan types will have four bedrooms (Attachments B and C). Additional changes to Plan 2 include: interior modifications of the 1st floor kitchen and great room footprint flipped and 2nd floor master bedroom and master bath footprint flipped; and on the exterior, the front covered balcony will now be standard. The elevators will remain optional for both plan types. The plan types and floor plans will be as follows:

- Plan 1 – 2,852 SF contains: a kitchen, dining room, great room, powder room, four bedrooms, three bathrooms, bonus room, covered balcony, deck and 3-car garage with optional elevator
- Plan 2 – 3,152 SF contains: a kitchen, dining room, great room, powder room, four bedrooms, three bathrooms, bonus room, two covered balconies, and 3-car garage with optional elevator

The elevation style/color/material matrix remains and the applicant understands the Condition of Approval to maintain architectural diversity throughout the development. The site, landscape, maintenance and wall fence plans have been updated to show the flipped building footprint of Plan 2. Far West uses a different paint and material vendors. Therefore, the elevation style/color/material plan have been updated to PPG paint names or new product types, but remain similar to approved colors and materials.

Models

Per Signal Hill Municipal Code, the applicant shall submit operations plans for review and approval by the Planning Commission. Two model homes with a sales office and a temporary parking lot are proposed at the northeast corner of Walnut and Crescent Height Street on Lots 1, 2 and 3 (Attachments D and E). The models will be Plan 1 with colonial features and Plan 2 with craftsman features. There will be 5 parking spaces, including 1 ADA accessible space with a path to an exterior ADA accessible restroom. The exterior restroom will be screened with a 6-foot fence. No signs are being proposed at this time, any directional signs to the sales office will require future Planning Commission approval per Signal Hill Municipal Code 20.58.080 "Temporary Signs."

The sales office will be located in what would be the dining room of Plan 2 and will include a display area that features builder and community specific information. It is anticipated that the office will open in February-March, 2017 and remain open until sales are final. The office will be staffed with one full-time sales person and will be open from 10:00 AM to 5:00 PM Thursday-Monday and closed Tuesday and Wednesday.

Approved by:

_____

Scott Charney

Attachments


## PARKING TABULATION

| DESCRIPTION | QTY |
|---|---|
| GUEST/STAFF PARKING | 4 |
| VAN ACCESSIBLE PARKING | 1 |

Exhibit 1

URBAN ARENA

FAR WEST INDUSTRIES

UA JOB# 16-040
07.01.16

# Crescent Square

Signal Hill, California

CONCEPTUAL LANDSCAPE PLAN

SCALE: 1"=10'-0"

0 5 10 20

# CITY OF SIGNAL HILL

2175 Cherry Avenue • Signal Hill, CA 90755-3799

August 23, 2016

VIA EMAIL winghram@farwestindustries.com and jalvarez@farwestindustries.com

Far West Industries
2922 Daimler Street
Santa Ana, CA 92705

Re: Crescent Square
On-site and Off-site Signs

Dear Mr. Alvarez & Mr. Inghram,

At the August 16, 2016 Planning Commission meeting, the Commission approved the On-site and Off-site Signs for the Crescent Square project.

If you have any questions, please feel free to contact me at (562) 989-7341 or at salanis@cityofsignalhill.org.

Sincerely,

Selena Alanis
Associate Planner

Attachment B

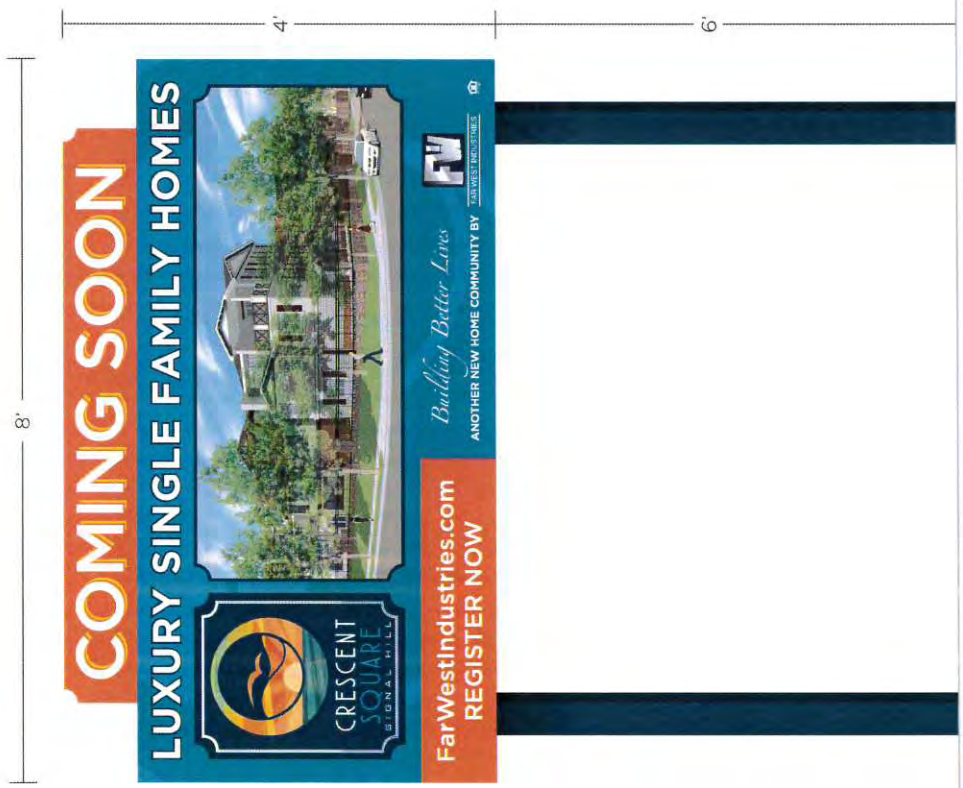
PC Approval: 8/16/16 Model Home Signs

CC Approval: n/a

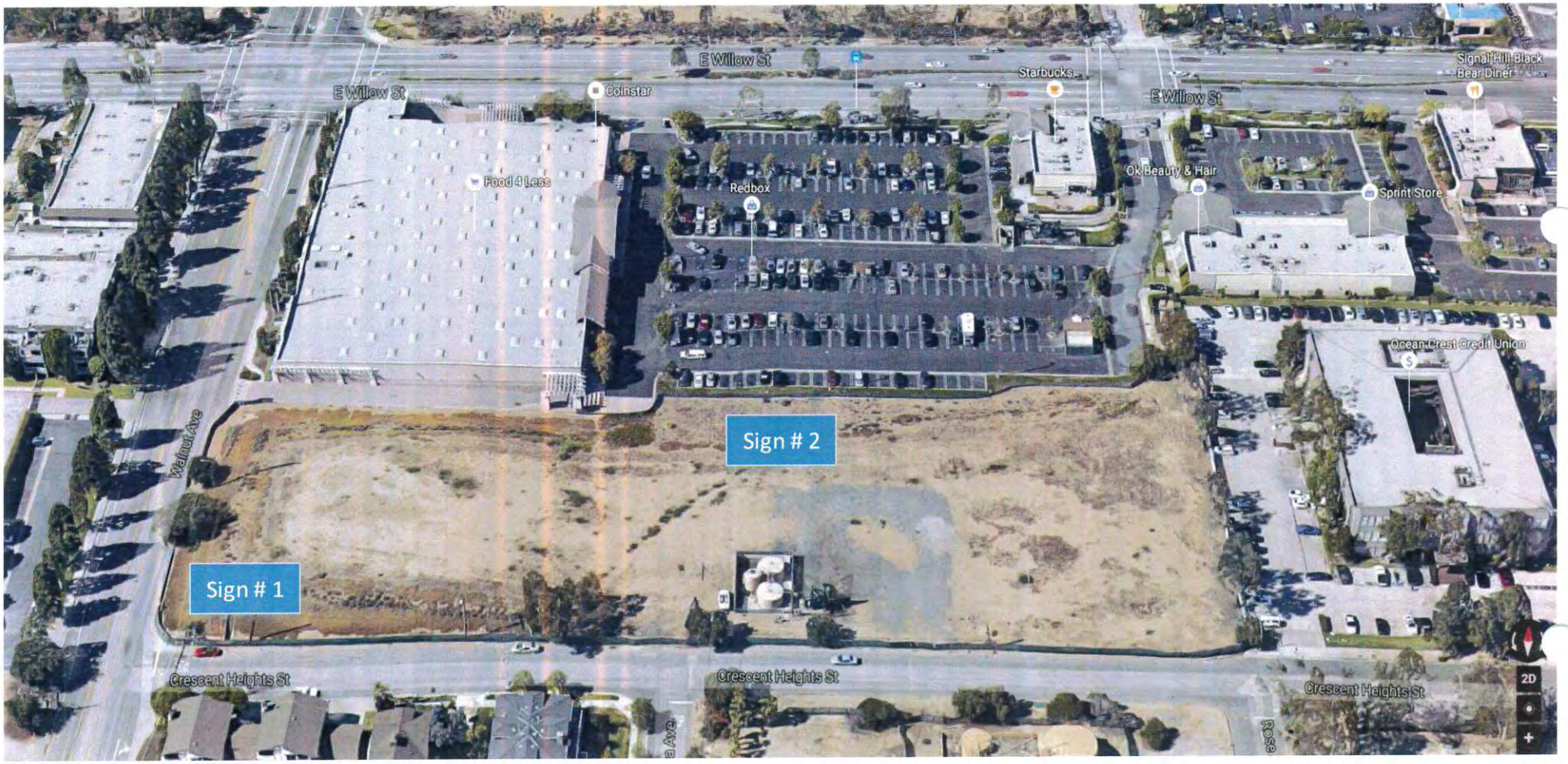
Signature: _____ 8/23/16

Scott Charney, Director — Date

PMA ADVERTISING & PUBLIC RELATIONS, INC



# Crescent Square Tract 72594 – Sign Placement Diagram



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PROJECT: Crescent Heights
COMPANY: Far West
DATE: 8-9-16
FILE NAME: Crescent Heights.cdr
AUTHORIZATION:

COLORS
digital printing



## Coroplast signs

Qty 1 - 3' x 3' 10 mil coroplast directional sign mounted to single 5' black metal stake
- 12" off grade

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|---|---|
| PROJECT | Crescent Heights |
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| DATE | 8-9-16 |
| FILE NAME | Crescent Heights.cdr |
| AUTHORIZATION | |

COLORS
digital printing

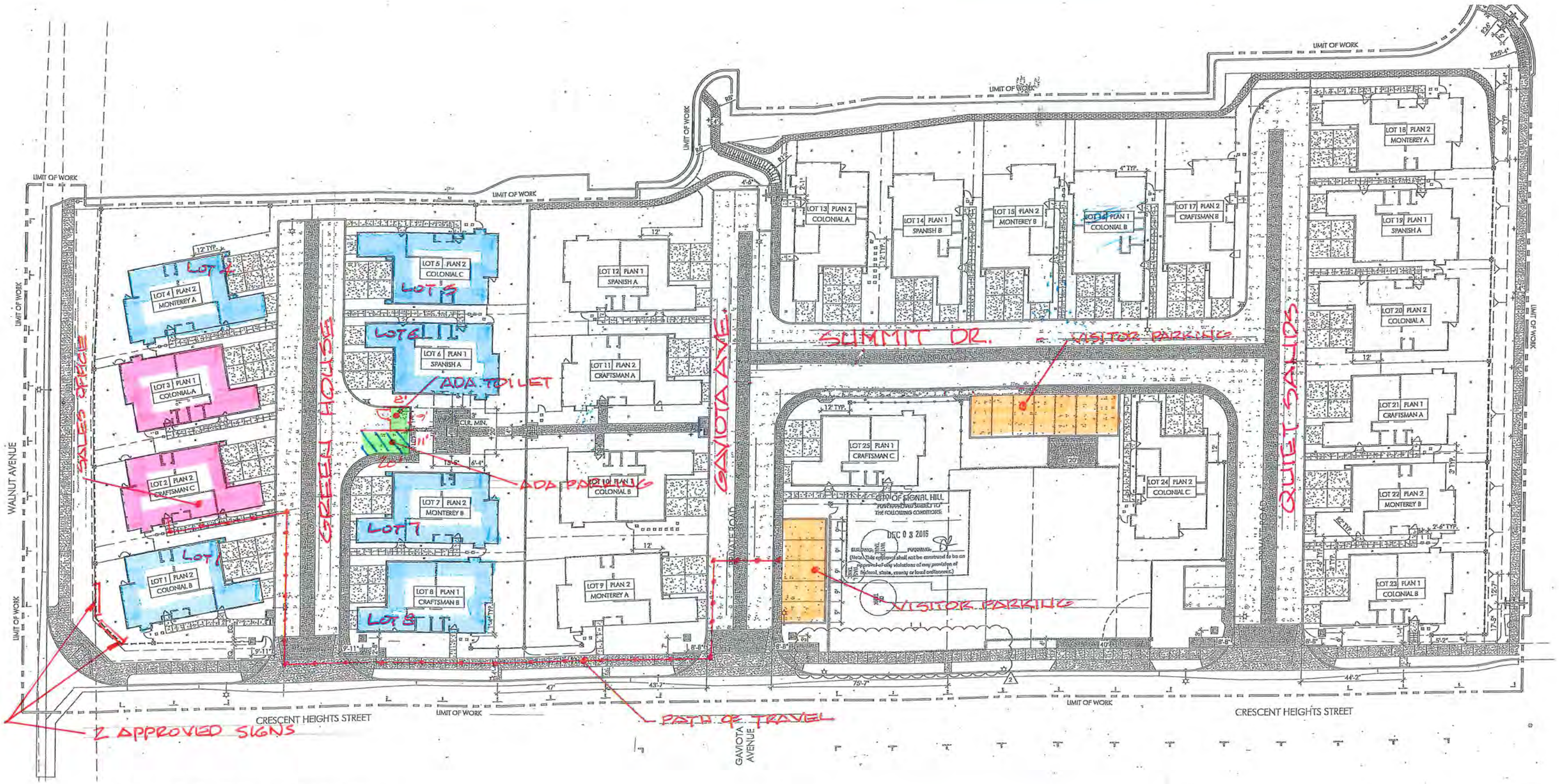


## Coroplast signs

Qty 1 - 3' x 3' 10 mil coroplast directional sign mounted to single 5' black metal stake
- 12" off grade

# Crescent Square – Potential 3X3 Sign Placement

Attachment C




## CRESCENT SQUARE

**Revised parking to accommodate Phase 3 construction while models are open for sales and viewing. Phase 3 will start when Gaviota Ave, Summit Dr. & Quiet Sands are paved and curb, gutter and sidewalks on Crescent Heights St. are installed.**

**Legend**

- **Phase 3 lots**
- **Models**
- **ADA Van & toilet**
- **Guest Parking**

Model Homes Parking Amendent

Hi Colleen,

Following up on your conversation with Scott Lissoy, attached please find a copy of the site plan with the visitor parking indicated as well as the path of travel to the sales office. I believe I have interpreted correctly what you and Scott L. discussed, but if not or if anything needs to be changed or added, please let me know.

Regarding the City's requirements as per 20.52.040, the following is proposed:

a) Location of models and sales office - the sales office and the models (Lots 3 & 4) are shown shaded in pink in the attached plan, as well as Crescent Street and Walnut Ave., the adjacent streets. This plan shows the relationship of the sales/models to the other homes in the development as well as the adjoining surface streets.
b) The location of visitor and employee parking stalls – I have marked 12 parking stalls that will be used to accommodate visitors and employees.
c) Proposed vehicular circulation routes – the private streets will be paved for the use of prospective buyers
d) Proposed pedestrian circulation routes – the pedestrian path of travel is shown on the attached plan
e) Proposed dates for model homes operations – model homes are operational now. We are going forward with construction in all phases, so expected date of completion is by the end of the year
f) Proposed days and hours of operation – the sales office & models will be closed on Wednesdays and Thursdays. The hours of operation are 10:00 AM to 6:00 PM
g) The number of employees expected in the model homes – we will have one sales person with the addition of a host on weekends

Thanks for all your help in making this possible.

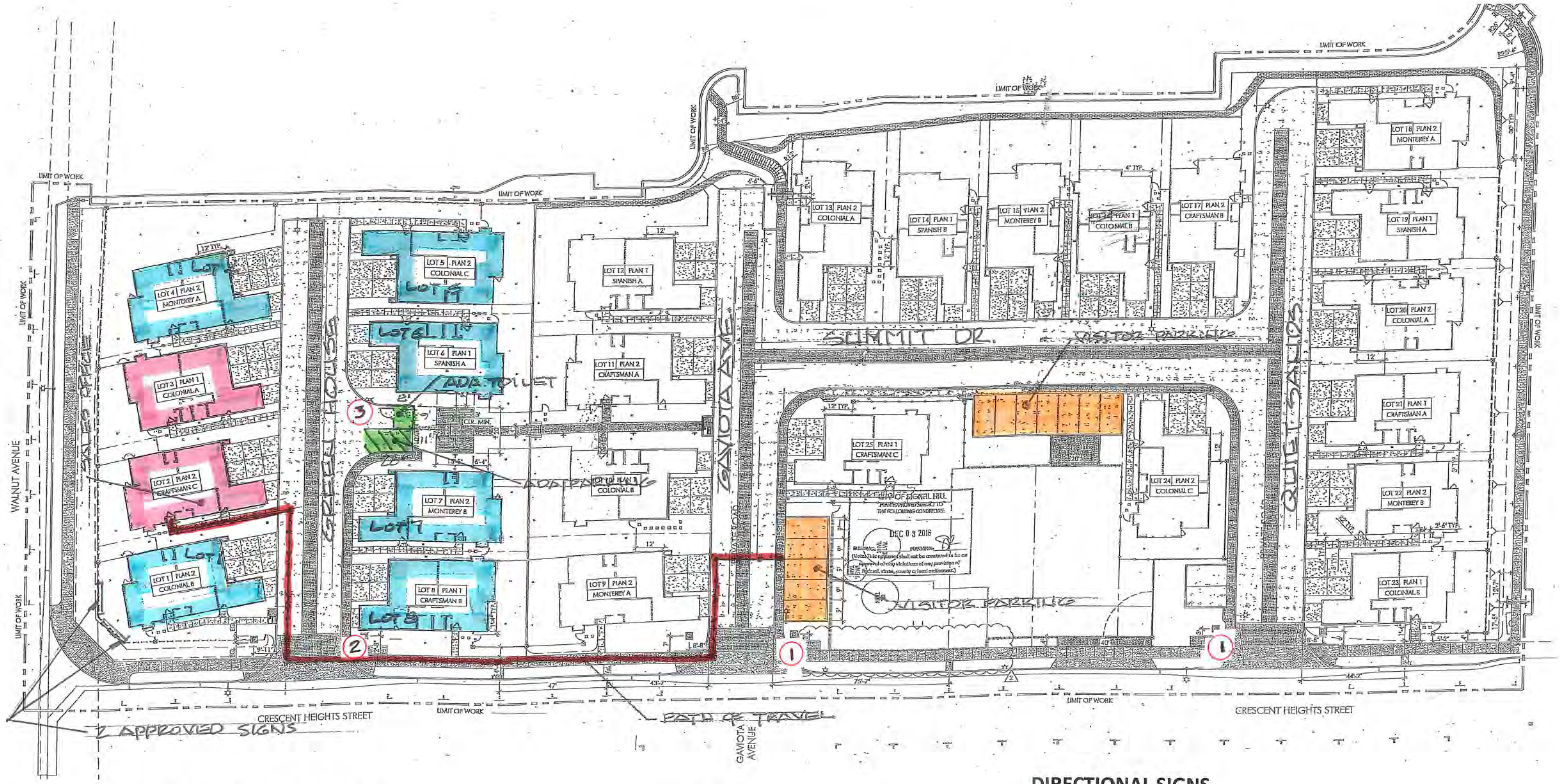
**Jorge Alvarez**
**Vice President of Land Development**
**Far West Industries |2922 Daimler St. | Santa Ana, CA 92705**
**Tel: (949) 224-1970| Fax: (949) 224-1963**
**Email: jalvarez@farwestindustries.com |Web: www.farwestindustries.com**

FAR WEST INDUSTRIES

***Building Better Lives***

Attachment D

Attachment E




## CRESCENT SQUARE

**Revised parking to accommodate Phase 3 construction while models are open for sales and viewing. Phase 3 will start when Gaviota Ave, Summit Dr. & Quiet Sands are paved and curb, gutter and sidewalks on Crescent Heights St. are installed.**

### Legend

- Phase 3 lots
- Models
- ADA Van & toilet
- Guest Parking

### DIRECTIONAL SIGNS

1. – 18" X 24" white w/red letters "GUEST PARKING" w/arrow pointing straight ahead ( 2 signs)
2. - 18" X 24" white w/red letters & ADA symbol w/arrow pointing straight ahead
3. - 18" X 24" white w/red letters & ADA symbol

July

**7b.**

# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

July 18, 2017

**AGENDA ITEM**

**TO:** **HONORABLE CHAIR**
**AND MEMBERS OF THE PLANNING COMMISSION**

**FROM:** **COLLEEN DOAN**
**SENIOR PLANNER**

**SUBJECT:** **DIRECTOR'S REPORT - GREEN BUILDING POLICY AND SOLAR UPGRADES**

## Summary:

Staff will provide a summary of the City's Green Building Policy and showcase two proposed commercial solar projects that are notable in light of the Green Building Policy. The Policy establishes green building practices through implementation of the United States Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) certification standards for municipal buildings and encourages the practices for private buildings.

## Recommendation:

Receive and file.

## Background:

In 2010, the State adopted the first mandatory California Green Building Standards Code (CalGreen). The Code is updated triennially. The most recent update was in 2016 (Attachment A).

In October 2011, the Sustainable City Committee (SCC) determined that a policy should be implemented in response to the City's endeavor of becoming a "Green City" in accordance with Urban Environmental Accord action item #7 and defined locally as:

> Signal Hill Goal: Adopt a policy to meet a minimum LEED Silver standard for the construction of all new municipal buildings.

In March 2012, staff presented options to include in the Policy. Upon discussion, the SCC suggested the following for a draft policy:

- The Policy will apply to all new construction, with a goal of USGBC LEED Silver level rating.
- The Policy will apply to all new additions that are 50% or more of the building's total square feet, and target a USGBC LEED Silver level rating.
- The City may allow exceptions to this Policy on a case by case basis.
- The City shall encourage and provide guidance for the application of sustainable green building practices in the private sector.

In April 2012, the SCC unanimously recommended City Council approval of the Policy.

On May 15, 2012, the City Council approved the Green Building Policy (Attachment B). The policy addresses both municipal and private development as follows:

- Municipal Buildings greater than 2000 square feet shall be designed and built to meet a minimum LEED Silver standard.
- Private Buildings are encouraged, but not required, to incorporate LEED standards.

The Policy does not require buildings to undergo the LEED certification process, even if they are built to the standards. An example of a Municipal project built to LEED Silver standards, but not certified, is the new police building. All development must, at a minimum, comply with the CalGreen Building Standards Code.

## **Analysis:**

Private Sector Sustainability

The intent of the Green Building Policy for private property is to encourage sustainable building practices, when practicable. This is one of the many ways the City encourages sustainability. Another example is the City's Sustainability Award program. Through this program the City has awarded both commercial and residential businesses and property owners for sustainable practices in the areas of:

- Energy efficiency,
- Water Efficient Landscaping; and
- Solar Installations.

Commercial Solar Project

Staff have chosen to showcase the following proposed solar installation projects to the Commission:

- 2501 Cherry Avenue: Installation of solar panels on the roofs of the two existing commercial buildings and over the internal and northerly parking areas (Attachments C and D).
- 701 E. 28th Street: Installation of solar panels over the parking structure and surface parking lot (Attachments E).

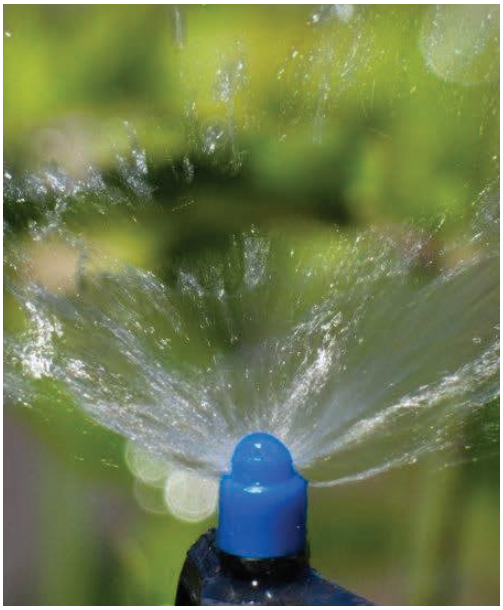
Administrative Site Plan and Design Review

Signal Hill Municipal Code (SHMC) does not require that these projects to be reviewed by the Commission. Under the SHMC, projects of 10, 000 square feet or less are eligible to be reviewed by the Director of Community Development rather than by the Planning Commission. Neither of the two proposed solar projects involve construction of new buildings, or additional gross floor area. However, in light of the Green Building Policy, staff chose to highlight these projects. To date, only a preliminary plan review has been completed.

Approved:

_____
Scott Charney

Attachment

# GUIDE TO THE 2016 CALIFORNIA GREEN BUILDING STANDARDS CODE

*Includes Verification Guidelines*

## NONRESIDENTIAL

CALGreen®

CBSC California Building Standards Commission

ICC International Code Council®


Attachment A

**Guide to the 2016 California Green Building Standards Code**
**Nonresidential**

ISBN: 978-1-60983-664-1

| | |
|---|---|
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| Publications Manager: | Mary Lou Luif |
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Errata on various ICC publications may be available at www.iccsafe.org/errata

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PRINTED IN THE U.S.A.

# Table of Contents

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# Preface

This is the 3rd edition of the *Guide to the California Green Building Standards Code Nonresidential*, which was prepared by the California Building Standards Commission (CBSC). This edition reflects regulatory changes that were made to the *California Green Building Standards Code*, Part 11, Title 24 and includes Verification Guidelines for use by local building departments, builders and designers. The guide is intended to highlight and clarify both mandatory and voluntary nonresidential standards for the 2016 *California Green Building Standards Code* commonly referred to as *CALGreen*. The effective date of the 2016 *CALGreen* Code is Jan. 1, 2017.

Comments and suggestions regarding the 2016 *CALGreen Guide Nonresidential* are welcomed in order to make future editions more beneficial to code users. Written comments may be submitted via email to cbsc@dgs.ca.gov, or regular mail and addressed to:

Mia Marvelli, Executive Director
California Building Standards Commission
2525 Natomas Park Drive, Suite 130
Sacramento, CA 95833-2936

## About the California Building Standards Commission (CBSC)

Established in 1953 by California Building Standards Law, CBSC is a commission within the Department of General Services. Members of the commission are appointed by the governor and confirmed by the state senate, and serve four-year terms.

CBSC's mission is to produce sensible and usable state building standards and administrative regulations that implement or enforce those standards. Specifically, CBSC administers the adoption, approval and implementation processes for the *California Building Standards Code* as follows:

- Manages the regulatory triennial and intervening code adoption cycles, and respective Title 24 publications;
- Coordinates and collaborates with all code-proposing and code-adopting state agencies regarding the code cycles and model code revisions to ensure uniformity throughout California's building standards;
- Demonstrates transparency and public participation throughout the code development processes;
- Administers a public appeal process;
- Educates the public and stakeholders about the building code to ensure understanding and compliance; and
- Develops building standards for state buildings and universities, nonresidential green building standards where no other state agencies have the authority, and others as directed by the legislature and/or executive order.

## About the International Code Council® (ICC)

ICC is a member-focused association. It is dedicated to developing model codes and standards used in the design, build and compliance process to construct safe, sustainable, affordable and resilient structures. Most U.S. communities and many global markets choose the International Codes. ICC Evaluation Service, known as ICC-ES, is the industry leader in performing technical evaluations for code compliance fostering safe and sustainable design and construction.

Headquarters: 500 New Jersey Avenue, NW, 6th Floor, Washington, DC 20001-2070
Regional Offices: Birmingham, AL; Chicago, IL; Los Angeles, CA
1-888-422-7233
www.iccsafe.org

To purchase all or part of the 2016 edition of Title 24 or the 2016 *Guide to the Green Building Standards Code* (nonresidential or residential) contact ICC at 888-ICC-SAFE (888-422-7233) or www.iccsafe.org.

## Title 24, California Code of Regulations

The 2016 *California Building Standards Code*, Title 24, California Code of Regulations consists of the following thirteen parts. The *CALGreen* Code is Part 11 of Title 24.

Part 1 *California Administrative Code*;

Part 2 *California Building Code* Volume 1 and Volume 2 are based on the 2015 *International Building Code*;

Part 2.5 *California Residential Code* is based on the 2015 *International Residential Code*;

Part 3 *California Electrical Code* is based on the 2014 *National Electrical Code*;

Part 4 *California Mechanical Code* is based on the 2015 *Uniform Mechanical Code*;

Part 5 *California Plumbing Code* is based on the 2015 *Uniform Plumbing Code*;

Part 6 *California Energy Code*;

Part 7 Vacant;

Part 8 *California Historical Building Code* is located within Part 2, Volume 2;

Part 9 *California Fire Code* is based on the 2015 *International Fire Code*;

Part 10 *California Existing Building Code* is located within Part 2, Volume 2;

Part 11 *California Green Building Standards Code (CALGreen)*;

Part 12 *California Referenced Standards Code*.

## CBSC Education and Outreach

CBSC offers *CALGreen* training along with a variety of web resources and educational publications. For information on *CALGreen* training contact the commission via email to cbsc@dgs.ca.gov, or complete the Education and Outreach Request form located on the CBSC website: www.bsc.ca.gov/educ/edout.aspx . The following industry organizations may also offer *CALGreen* educational programs:

- International Code Council, local chapters (www.iccsafe.org)
- Green Technology (www.green-technology.org)
- California Building Officials (www.calbo.org)
- American Institute of Architects – California Council (www.aiacc.org)

## History of *CALGreen*

*CALGreen* is the first-in-the-nation mandatory green building standards code. CBSC was directed to develop green building standards in 2007 in an effort to meet the goals of California's landmark initiative AB 32, which established a comprehensive program of cost-effective reductions of greenhouse gases (GHG) to 1990 levels by 2020. A voluntary *CALGreen* Code was published in 2008 and had an effective date of August 2009. The first mandatory measures were adopted in the 2010 triennial code publication, which went into effect in January 2011. CBSC worked closely with the Department of Housing and Community Development, Division of the State Architect and the Office of Statewide Health Planning and Development to establish the new standards. State agency representatives, industry stakeholders and interested parties were enthusiastic contributors to the initial code development process and remain active participants in the progression of *CALGreen* measures.

*CALGreen* was developed to (1) reduce GHG 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 environmental directives of the administration. The reduction in GHG was mandated via executive orders and the passage of the California Global Warming Solutions Act of 2006 (Assembly Bill 32, Chapter 488 of the 2006 Statutes), which added Division 25.5 to the California Health and Safety Code. The provisions of AB 32 require the cap on GHG by 2020, mandatory emissions reporting and an ongoing market-based compliance program. The establishment of the *CALGreen* Code has been an important step toward more efficient and responsible building design. The California Air Resources Board estimates that the mandatory provisions in *CALGreen* will reduce GHG by three million metric tons by the year 2020, and this number should increase due to the continued efforts to minimize the impact buildings have on the environment.

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 or rely on private entities to set the standards. The initial 2008 publication identified Administration, Definitions and Green Building chapters and established the

categories of planning and design, energy efficiency, water efficiency and conservation, material conservation and resource efficiency, environmental air quality, referenced standards, installer and inspector qualifications, and appendices for residential, nonresidential and referenced standards.

The 2010 *CALGreen* Code established chapters for residential and nonresidential mandatory measures. A 20 percent reduction of indoor water use and a 50 percent construction waste reduction were required along with waste management plan requirements. Building commissioning for new buildings 10,000 square feet and over was also introduced along with requirements for temporary construction ventilation and finish materials.

The 2013 *CALGreen* Code clarified and expanded a number of requirements that included nonresidential additions and alterations. New sections were added in the areas of water efficiency and conservation, which included a 20 percent reduction in indoor water use. References to the California Energy and Plumbing Codes were also included. Demolition and recycling requirements were further defined.

*CALGreen* 2016 addresses clean air vehicles and increased requirements for electric vehicle charging infrastructure. A new universal waste code section has been incorporated for additions and alterations. Organic waste is new and includes an exception for rural jurisdictions. Clarification concerning commissioning 'I' and 'L' occupancies, which are not under the Office of Statewide Health Planning and Development or California Energy Commission authority, has been added. Water efficiency and conservation includes a new section for food waste disposers. Outdoor water use remains subject to the water-conserving measures that were amended due to the Model Water Efficient Landscape Ordinance (MWELO) emergency standards in 2015. Pursuant to Executive Order No. B-29-15, addressing California's ongoing emergency drought conditions, state agencies proposed water-related emergency standards that were immediately enforceable in June 2015 and later adopted as amendments to the 2013 *CALGreen* Code. Those amendments have been carried over into the 2016 *CALGreen* Code. For more information concerning the water-related emergency actions see Information Bulletins 15-02, 15-03 and 15-04 on the CBSC website: www.bsc.ca.gov/pubs/bullet.aspx.

## Effective Use of This Guide

This guide is intended to assist code users and local enforcement authorities with nonresidential applications of the 2016 *CALGreen* Code. This edition of the guide corresponds with the chapters in *CALGreen*, Part 11, Title 24. The emphasis, however, is on the nonresidential mandatory requirements located in Chapter 5 and the nonresidential voluntary measures located in Appendix A5. The intent of each code section, along with compliance and enforcement recommendations, is emphasized. The guide is formatted as follows:

- **Code section:** Code sections are reprinted from the 2016 *CALGreen* Code and shown in green text.
- **Intent:** Many of the code sections are followed by intent language for the requirement. In some instances an explanation of other laws or regulations that served as a catalyst for the regulation is included.
- **Change for 2016:** Identifies new code language or amendments made during the development of the 2016 *CALGreen* Code.
- **Compliance method:** The recommended compliance method is identified, which may include:

  Design team information;

  Suggestions; or

  Examples.
- **Enforcement:**

  **Plan intake:** Recommendations for the plan reviewer concerning the construction documents; and

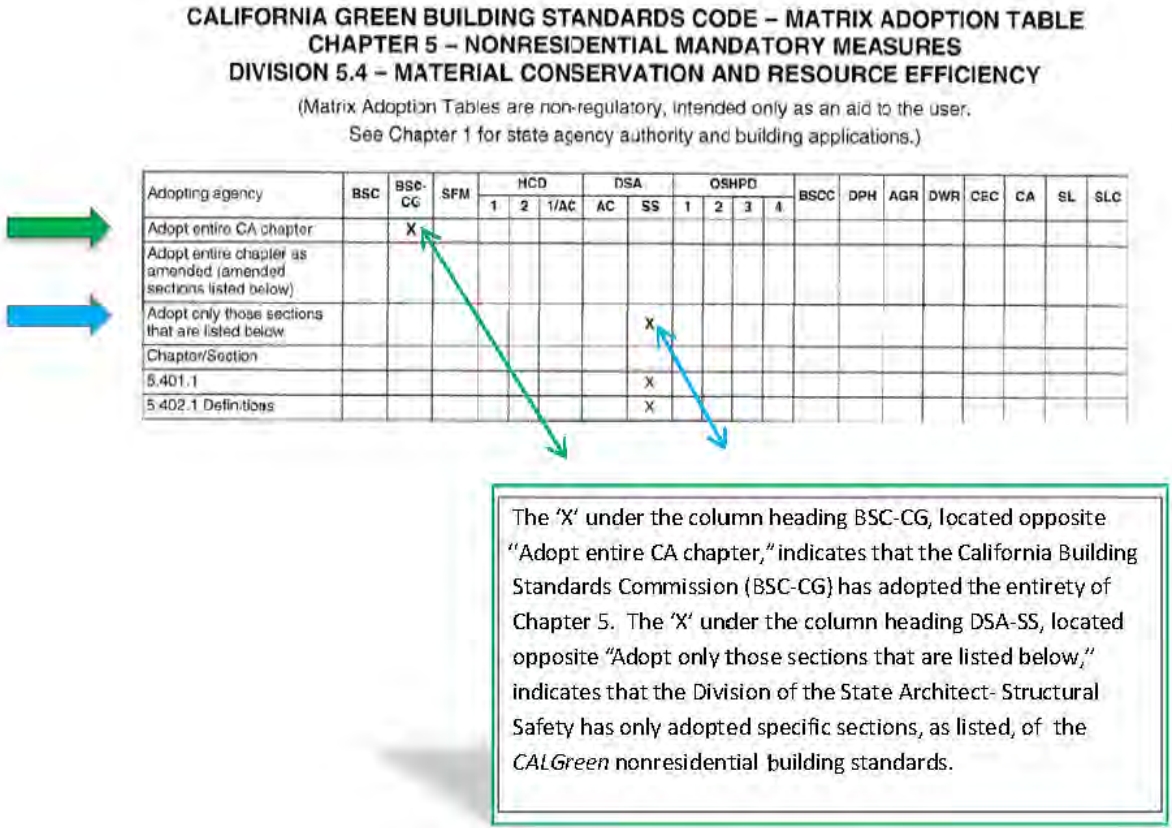
  **On-site enforcement:** Recommendations for the local inspector during construction.

Sections in the *CALGreen* Code marked "Reserved" are not shown in this guide.

## New in 2016

- ***CALGreen* Verification Guidelines**, for use by the enforcing agency and/or code user, are a new addition to the guide and are located in Chapter 8 of this publication. The *CALGreen* Verification Guidelines consist of checklists that are intended to assist building departments with mandatory measures, and Tier 1 and Tier 2 compliance in local jurisdictions. Best practice is to always confer with the local enforcement agency as the checklists may have been modified for that jurisdiction. Otherwise, check the CBSC website for the most current versions of the compliance checklists: www.bsc.ca.gov/Home/CALGreen.aspx.
- A **[BSC-CG]** banner is new for the 2016 code. In accordance with Assembly Bill No. 341 (Chapter 585, Statutes of 2013, Health and Safety Code Section 18940.5), CBSC and other state agencies that

propose green building standards for inclusion in Part 11 were directed, to the extent feasible, to reference or reprint the *California Green Building Standards Code* in other relevant portions of Title 24. To that end, CBSC developed the **[BSC-CG]** banner to indicate *CALGreen* applications for occupancies under its authority. The banner is referenced in this guide and included in the matrix adoption tables used in most parts of Title 24 (see the example that follows).



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

(Matrix Adoption Tables are non-regulatory, intended only as an aid to the user.
See Chapter 1 for state agency authority and building applications.)

| Adopting agency | BSC | BSC-CG | SFM | HCD | | | DSA | | OSHPD | | | | BSCC | 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 | | | | | | | | | | | | |

The 'X' under the column heading BSC-CG, located opposite "Adopt entire CA chapter," indicates that the California Building Standards Commission (BSC-CG) has adopted the entirety of Chapter 5. The 'X' under the column heading DSA-SS, located opposite "Adopt only those sections that are listed below," indicates that the Division of the State Architect- Structural Safety has only adopted specific sections, as listed, of the *CALGreen* nonresidential building standards.

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# CHAPTER 1
# ADMINISTRATION

Chapter 1 provides important administrative and scoping requirements and clarifications that apply throughout *CALGreen* and is similar in style and format to Chapter 1 of other parts of the building standards code. Users should reference the actual code language in *CALGreen* for purposes of implementation and compliance. This chapter also identifies the application and authority for the various state agencies based on occupancies. This chapter should be carefully analyzed to gain a good understanding of application of the *CALGreen* code requirements. *CALGreen* applies to the planning, design, operation, construction, use and occupancy of every newly constructed building or structure on a statewide basis unless otherwise indicated. Additions and alterations buildings are also covered by the scope of *CALGreen*.

*CALGreen* also specifies requirements for applications regulated by the Department of Housing and Community Development (HCD), Division of the State Architect (DSA), California Energy Commission (CEC) and the Office of Statewide Health Planning and Development (OSHPD).

CALGreen®

### 101.1 Title.

The official name and citation for *CALGreen* is the *California Green Building Standards Code, California Code of Regulations* (CCR), Title 24, Part 11. It is intended that it shall also be known as the *CALGreen* Code.

### 101.2 Purpose.

The purpose of the *CALGreen* code is to improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact or positive environmental impact and encouraging sustainable construction practices in the following categories:

1. Planning and design.
2. Energy efficiency.
3. Water efficiency and conservation.
4. Material conservation and resource efficiency.
5. Environmental quality.

Additional intended benefits from the *CALGreen* Code include the following:

- Reducing greenhouse gas emissions from buildings and from building activities;
- Promoting environmentally responsible, cost-effective, healthier places to live and work; and
- Implementing the goals and directives by the governor.

### 101.3 Scope.

*CALGreen* provisions apply to the planning, design, operation, construction, use and occupancy of every newly constructed building or structure, unless otherwise indicated in this code, throughout the State of California.

#### 101.3.1 State-regulated buildings, structures and applications.

This section further specifies the applicability of the *CALGreen* building standards and their occupancies, including newly constructed privately owned nonresidential structures, newly constructed state-owned buildings, state universities and all other buildings where no other state agency has authority, and (where applicable), occupancies regulated by the Division of the State Architect (DSA), including public schools K-12 and community colleges.

The enforcement of *CALGreen* rests with the local jurisdictions except when state agencies have specific authority such as with school or hospital construction. It is essential for local government to recognize the importance and mandatory requirements of *CALGreen* and to take steps to ensure that

building department personnel are properly trained to carry out its enforcement

### 101.4 Appendices.

*CALGreen* appendix chapters are not mandatory unless specifically adopted by a state agency or a local jurisdiction.

### 101.5 Referenced codes and standards.

This section explains that the codes and standards referenced in the *CALGreen* Code shall be considered part of the requirements of the code to the prescribed extent of each such reference. This section lists the various codes in Title 24, eg., building (building code and residential code), electrical, mechanical, plumbing, fire prevention and energy that are referenced in the *CALGreen* Code.

### 101.6 Order of precedence and use.

In the event of any differences between the *CALGreen* Code and standard reference documents, the text of *CALGreen* building standards shall govern. Where a specific provision varies from a general provision, the specific provision shall apply. If the requirements in *CALGreen* conflict with requirements in any other part of the *California Building Standards Code*, the most restrictive shall prevail. If a local enforcing agency amends *CALGreen*, the local amendment, when legally adopted, shall govern. Explanatory notes are informational only and are not enforceable requirements of the *CALGreen* Code.

### 101.7 City, county, or city and county amendments, additions or deletions.

The mandatory provisions of *CALGreen* set the minimum standard throughout California, effective on and after January 1, 2017. 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 building standards, including but not limited to green building standards. Such local ordinances along with a finding of need based on regional climatic, geological or topographical, or environmental conditions must be filed with and accepted by CBSC to become effective and enforceable. Requirements for filing local ordinances establishing more restrictive green building requirements are explained in Section 101.7 of the *CALGreen* Code. Otherwise, the *CALGreen* Code as published prevails throughout the state. Note: for local fire proctetion district amendments, file ratified amendments with HCD. For amendments that address energy efficiency standards, the local jurisdictions must obtain California Energy Commission approval for any energy-related ordinances as defined in *CALGreen* Code Section 101.7 item 4.

For a detailed overview of the local amendment process visit the CBSC Local Ordinance webpage: www.bsc.ca.gov/Rulemaking/LocalCodeOrdinances.aspx. The updated 2016 Local Ordinances webinar, Guide for Local Amendments of Building Standards and other resources are also available.

### 101.8 Alternate materials, designs and methods of construction.

The provisions of the *CALGreen* Code, like other parts of Title 24, allow the use of alternate means and methods of compliance with *CALGreen*. The use of any alternate material, appliance, installation, device, arrangement, methods, design or method of construction not specifically prescribed in this code needs approval by the local jurisdiction as stated in the specified code sections.

### 101.9 Effective date of the *CALGreen* Code.

Only those standards approved by the California Building Standards Commission that are effective at the time an application for a building permit is submitted shall apply to the plans and specifications for, and to the construction performed under, that permit. For the effective dates of the provisions contained in the *CALGreen* Code, see the appropriate application checklist and the History Note page of the *CALGreen* Code.

### 101.10 Mandatory requirements.

The *CALGreen* Code contains both mandatory and voluntary green building measures. Mandatory and voluntary measures are identified in the appropriate application checklist contained in the *CALGreen* Code.

### 101.11 Effective use of this code.

*CALGreen* provides a step-by-step approach in determining if *CALGreen* or a *CALGreen* code section is applicable to a project. The following steps should to be considered in determining if and how *CALGreen* applies to your project:

1. Establish the type of occupancy.
2. Verify which state agency has authority for the established occupancy by reviewing the authorities list in Sections 103 and 106.
3. Once the appropriate angency has been identified, find the chapter that covers the established occupancy. Chapter 5 contains the mandatory requirements for BSC nonresidential occupancies.
4. The Matrix Adoption Tables at the beginning of Chapters 4 and 5 identify the mandatory green building requirements needed to comply with the code for the established occupancy.
5. Voluntary tier measures are contained in Appendix Chapters A4 and A5. A checklist containing each green building measure, both required and voluntary, is provided at the end of each appendix chapter. Each measure listed in the application checklist has a

section number that correlates to a section where more information about the specific measure is available.

6. The application checklist identifies which measures are required by the code and allows code users to check off which voluntary items have been selected to meet the voluntary tier levels if desired or mandated by a city, county, or city and county.

**Additional items to determine when applying this code to a project:**

Determine if the project is considered "new construction."

Determine if the project is "mixed use"—a combination of residential and nonresidential uses.

Determine if the project consists of an addition and/or an alteration to an existing nonresidential building.

If the project is an addition, does the addition add 1,000 square feet or greater?

If the project is an alteration, is the project permit valuation $200,000 or above?

Determine if the project is a new shell building that will be phased for future tenant improvements per *CalGreen* Section 303.1.

Check for local city or county amendments (local ordinances) that may impact your project.

**Based on the project assessment, the following may apply:**

If the occupancy is identified as "nonresidential" and as new construction, then Chapter 5 and Chapter A5 (if adopted at the local level) will apply to the project.

If the project is "mixed use," then refer to *CALGreen* Section 302.1 for scoping provisions.

If the project is an addition and the area is increased by 1,000 sqaure feet or greater, then the applicable *CALGreen* sections apply to the addition based on the scope of the project. Refer to *CALGreen* Section 301.3 for specific scoping provisions.

If the project is an alteration and the project permit valuation is $200,000 or above, then the applicable *CALGreen* sections apply to the alteration based on the scope of the project. Refer to *CALGreen* Section 301.3 for specific scoping provisions.

If the project is a shell, then the applicable *CALGreen* sections apply to the project, based on the scope of the project as described in *CalGreen* Section 303.1 and Section 303.1.1 for initial tenant improvements.

**102.1 Submittal documents**. Construction documents and other data shall be submitted in one or more sets with each application for a permit. Where special conditions exist, the enforcing agency is authorized to require additional construction documents to be prepared by a licensed design professional and may be submitted separately.

**Exception:** The enforcing agency is authorized to waive the submission of construction documents and other data not required to be prepared by a licensed design professional.

**102.2 Information on construction documents.** Construction documents shall be of sufficient clarity to indicate the location, nature and scope of the proposed green building feature and show that it will conform to the provisions of this code, the California Building Standards Code and other relevant laws, ordinances, rules and regulations as determined by the enforcing agency.

**102.3 Verification.** Documentation of conformance for applicable green building measures shall be provided to the enforcing agency. Alternate methods of documentation shall be acceptable when the enforcing agency finds that the proposed alternate documentation is satisfactory to demonstrate substantial conformance with the intent of the proposed green building measure.

## SECTION 103
## BUILDING STANDARDS COMMISSION

**BSC-CG Application:** All occupancies where no state agency has the authority to adopt green building standards applicable to those occupancies.

Below are examples of privately owned nonresidential structures that include, but are not limited to, new buildings or portions of new buildings and additions and alterations as described above classified, as the following occupancies:

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

**Business Group B**—Banks, barber and beauty shops, civic administration offices, 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**—Buildings or structures 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**—Buildings or structures used for manufacturing and storing high-hazard materials.

**Institutional Group I**—Buildings or structures used for 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.

> ***Note:*** *Refer to the 2016 California Building Standards Code Chapter 3 "Use and Occupancy Classification" for complete lists of uses for these occupancy groups.*

Below is a list of state agencies and their authority for *CALGreen*:

## SECTION 104
## DEPARTMENT OF HOUSING AND COMMUNITY DEVELOPMENT

**HCD Application:** Housing construction. Hotels, motels, lodging houses, apartments, dwellings, dormitories, condominiums, shelters for homeless persons, congregate residences, employee housing, factory-built housing and other types of dwellings containing sleeping accommodations with or without common toilet or cooking facilities including accessory buildings, facilities and uses thereto. www.hcd.ca.gov/codes

## SECTION 105
## DIVISION OF THE STATE ARCHITECT

**DSA Application:** Public elementary and secondary schools and community colleges. New building construction and related site work on a new or existing site. www.dgs.ca.gov/dsa/home

## SECTION 106
## OFFICE OF STATEWIDE HEALTH PLANNING AND DEVELOPMENT

**OSHPD 1 Application:** General acute care hospitals and acute psychiatric hospitals, excluding distinct part units or distinct part freestanding building providing skilled nursing or intermediate care services.

**OSHPD 2 Application:** Skilled nursing facilities and intermediate care facilities, including distinct part skilled nursing and intermediate care services on a general acute care or acute psychiatric hospital license, provided either are in a separate unit or a freestanding building.

**OSHPD 4 Application:** Correctional treatment centers. www.oshpd.ca.gov

# CHAPTER 2
# DEFINITIONS

Chapter 2 provides definitions for terms that are used throughout the code. This is consistent with the format in other parts of the *California Building Standards Code*, which have moved definitions from the individual chapters or sections into Chapter 2. For the 2016 *CALGreen*, the chapters or sections will still include references to the defined terms; however, the definitions for the terms are located in Chapter 2.

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

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# CHAPTER 3
# GREEN BUILDING

Chapter 3 provides general information regarding the scope of subsequent *CALGreen* chapters. It also provides scoping clarification for additions and alterations, mixed occupancy buildings and phased projects. Voluntary tiers are addressed, including those adopted by the Department of Housing and Community Development, the California Building Standards Commission and the Office of Statewide Health Planning and Development. An explanation of a new civil code that pertains to plumbing fixture upgrades has been added, as well as new requirements for waste diversion.

**301.3 Nonresidential additions and alterations. [BSC-CG]** 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/

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or alterations **[A]**. When the code section applies to both, no banner will be used.

**Intent:**

The intent of this code section is to clarify that certain additions and alterations must comply with the applicable mandatory portions of *CALGreen*. E.g., building additions of 1,000 square feet or greater and/or building alterations with a permit valuation of $200,000 or above shall comply with *CALGreen*. If the addition and/or the alteration (tenant improvement) does not meet the criteria above, then the project is excempt from *CALGreen*.

Banners **[N]** or **[A]** are used to designate which code sections apply to newly constructed buildings **[N]** or to additions and/or alterations **[A]**. In the absence of the banner, the code section applies to both.

**301.3.1 Nonresidential additions and alterations that cause updates to plumbing fixtures only:**

**Note:** On and after January 1, 2014, certain commercial real property, as defined in *Civil Code* Section 1101.3, shall have its noncompliant plumbing fixtures replaced with appropriate water-conserving plumbing fixtures under specific circumstances. See *Civil Code* Section 1101.1 *et seq*. for definitions, types of commercial real property affected, effective dates, circumstances necessitating replacement of noncompliant plumbing fixtures, and duties and responsibilities for ensuring compliance.

**Intent:**

The intent of this code section is to direct the code user to the newly effective *Civil Code* Section 1101.1, et seq provisions. This reference to the *Civil Code* will alert the code user and local juriusdictions to review the law and verify if the nonresidential additions and alterations project will require updates to the existing plumbing fixtures as required by the *Civil Code*.

**301.3.2 Waste diversion.** The requirements of Section 5.408 shall be required for additions and alterations whenever a permit is required for work.

**Intent:**

The intent of this requirement is to ensure that for additions and alterations where a permit is required, construction waste and demolition debris is diverted from land fills. Additionally the purpose of this section is to encourage material resource efficiency through reuse and recycling of construction waste products.

**Note:** See Chapter 8 of this guide for forms and templates.

**Change for 2016:** Section 301.3.2 has been added to the 2016 *CALGreen* Code as a new requirement.

## SECTION 302
## MIXED OCCUPANCY BUILDINGS

**302.1 Mixed occupancy buildings.** In mixed occupancy buildings, each portion of a building shall comply with the specific green building measures applicable to each specific occupancy.

**Intent:**

The intent of this requirement is to clarify that *CALGreen* requires that each portion of a mixed occupancy building comply with the specific green building measures applicable to that occupancy. Therefore, if a building is a combination of a nonresidential and residential uses, then both the nonresidential and residential code requirements apply to the respective portion of the building based on use.

*CALGreen* requires that each portion of a mixed occupancy building comply with the specific green building measures applicable to that occupancy. Therefore, if a building is a combination of a nonresidential and residential uses, then both the nonresidential and residential code requirements apply to the respective portion of the building based on use.

**Suggestion:** Determine if your project is "mixed use"—a combination of residential and nonresidential uses.

*Example:* A new five-story building with the first level having a nonresidential occupancy retail space with the above four levels consisting of residential occupancies would be considered a mixed occupancy building. *CALGreen* nonresidential provisions would apply to the first level portion of the building for the retail spaces and the residential *CALGreen* provisions would apply to the four-level residential occupancy portion of the building spaces above.

## SECTION 303
## PHASED PROJECTS

**303.1 Phased projects.** For shell buildings and others constructed for future tenant improvements, only those code measures relevant to the building components and systems considered to be new construction (or newly constructed) shall apply.

**303.1.1 Initial tenant improvements.** The provisions of this code shall apply only to the initial tenant improvements to a project. Subsequent tenant improvements shall comply with the scoping provisions in Section 301.3 nonresidential additions and alterations.

**Intent:**

The intent of this requirement is to clarify that *CALGreen* provisions apply to new construction or newly constructed buildings. For shell buildings and others constructed for future tenant improvements, only certain mandatory measures may be pertinent or applicable at the initial construction phase based on the scope of work. However, required *CALGreen* provisions still apply to the initial tenant or occupancy improvements to the shell building to achieve full compliance with *CALGreen*. Thatsaid, the provisions of this code shall apply only to the initial tenant or occupant improvements to a project, and subsequent tenant improvements shall comply with the scoping provisions in *CALGreen* Section 301.3 "Nonresidential additions and alterations."

*Example 1: for phased projects.* A new nonresidential shell building (only) is constructed for future phased tenant improvement development. Pursuant to *CALGreen* Code Section 303.1, only certain *CALGreen* Code provisions for the shell structure based on the scope are applicable initially. Therefore, any building components and systems that are part of the project need to comply with the respective applicable code provisions from the various code divisions, (e.g., the shell building design would need to comply with divisions 5.1 through 5.5). For Division 5.1, the design must comply with site development, bicycle parking, electric vehicle infrastructure, grading and paving, and for Division 5.3, the design must comply for water efficiency. For Division 5.4 the design must comply with any applicable provision for material conservation and resource efficiency measures, and for Division 5.5, the design must comply with environmental quality provisions.

*Example 2: for initial tenant improvements.* The shell building in *Example 1* is now constructed and the first tenant occupant is going to develop a portion of the shell building space. Pursuant to code Section 303.1.1 the *CALGreen* Code applies to the new tenant improvements since they are considered new construction. Any subsequent improvements to that initial tenant space would be considered an addition and/or alteration and subject to the scoping provisions of *CALGreen* Code Section 301.1.

## 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 thresh- old 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.

**Intent:**

The intent of this requirement is to clarify that *CALGreen* has voluntary tiers that are intended to further encourage building practices that improve public health, safety and general welfare by promoting the use of building concepts that minimize the building's impact on the environment and promote a more sustainable design. The voluntary tier measures are found in Chapter A5 and tiers checklists are found in Chapter A6, Division A5.6.

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# CHAPTER 4 RESIDENTIAL MANDATORY MEASURES

Chapter 4 has five divisions and contains measures adopted by the California Department of Housing and Community Development with application to residential structures as explained in Section 104 of the *CALGreen* Code.

Chapter 4 primarily addresses green building standards for residential structures and is not discussed in this guide. For additional information on *CALGreen* Chapter 4, see *Guide to the California Green Building Standards Code (Residential)*, prepared by the Department of Housing and Community Development (www.hcd.ca.gov).

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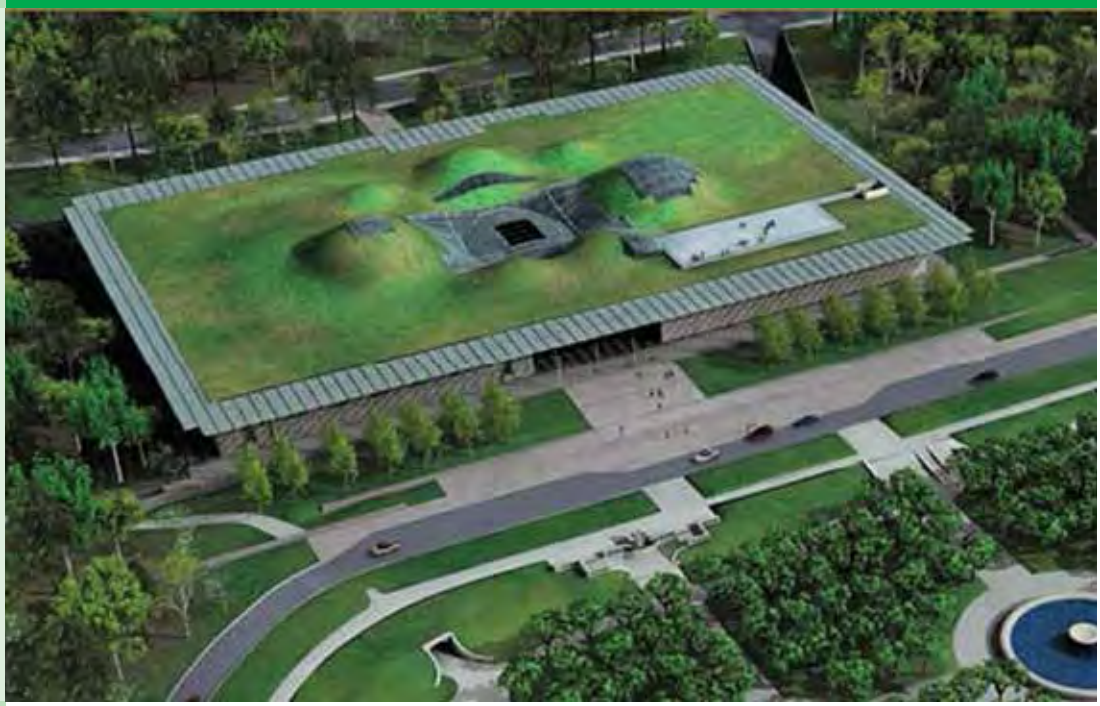
# CHAPTER 5 NONRESIDENTIAL MANDATORY MEASURES



This chapter discusses mandatory requirements for nonresidential structures in the 2016 *CALGreen* Code. Sections and items that include general information (Matrix Adoption Tables, general titles, definition lists, and reserved sections) have been omitted. Certain reference tables have also been omitted.

**Suggestion:** Refer to Chapter 8 for *CALGreen* Verification Guidelines Checklist for mandatory measures.

It is important that code users reference the appropriate version of *CALGreen*, including any errata or supplements from emergency or intervening code adoption cycles. Additionally, code users should be aware of lawfully enacted local amendments (ordinances) that may require more restrictive green building standards.

**Items to consider when reviewing the mandatory provisions in Chapter 5.**

1. This Chapter is designed to explain provisions of the *CALGreen* Code that apply to common nonresidential occupancies (Groups A, B, M) subject to

building code enforcement by the local building department. Mandatory measures that are adopted by DSA and pertain to public elementary and secondary schools and community colleges have been omitted from this chapter.

2. This chapter provides a reprint of only those 2016 *CALGreen* Code sections pertinent for discussion.

3. 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.

# 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 may be found in Chapter 2 of *CALGreen*.

## 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 stabilize 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.

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

Soil Erosion Control

**Intent:**

The intent of this requirement is to prevent the loss of soil through wind or water erosion by implanting an effective combination of erosion and sediment control and good housekeeping best management practices (BMP)

**Note:** A sample checklist of BMPs and self-certification forms are found in Chapter 8 of this guide.

**Compliance method:**

Indicate on the construction documents methods used to comply with the requests listed above. One of the following must be indicated in the construction documents:

- 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
- A descriptive method deemed 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 other control measure as the need arises. The contractor should also conduct site inspections before, during and after each extended storm event in order to identify conditions that may contribute to erosion and sediment problems or any other pollutant discharges. If additional control measures are needed, the contractor should implement them immediately.

## Enforcement:

**Plan intake:** The plan reviewer should make sure that the storm-water pollution prevention BMP meets the regulations or local requirements. The BMP may be included with the construction documents (plans and/or specifications) or submitted separately.

**On-site enforcement:** The inspector should check the erosion and sediment controls for conformance with the BMP during the normal inspection process. 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-CG]** 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.** 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 10 or more 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.

Bicycle Parking

## Intent:

The intent of this code provision is to promote the use of bicycles as an alternative means of transportation by ensuring that newly constructed projects or additions and alterations provide short-term and/or long-term bicycle parking accommodations. This goal aligns with California's aggressive efforts to reduce greenhouse gas emissions, which are intended to improve the state's air quality and promote bicycle use as a means of alternative transportation.

**Change for 2016:** The BSC banner was replaced in Section 5.106.4.1with the new BSC-CG banner, which has been added throughout *CALGreen* as an indicator of *CALGreen* requirements adopted by BSC. The BSC-CG banner applies to all occupancies for which no state agency has the authority or expertise to propose green building standards. Additionally, Section 5.106.4.1.2 has been amended to clarify that the requirements for long term bicycle parking are triggered when there are 10 or more tenant-occupants. Previously the requirement for long-term bicycle parking was triggered when there were over 10 tenant-occupants in a building. The revision aligns with the 10 or more tenant vehicular parking spaces within this code section and also aligns with the requirements for designated parking spaces.

## Compliance method:

**Short-term bicycle parking:**

1. Determine if the exception for additions and alterations applies.
2. 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. The number of bicycle racks is calculated at 5 percent of the visitor motorized vehicle parking spaces, and where applicable, additions and alterations, with a minimum of one two-bike capacity rack.

**Long-term bicycle parking:**

1. Determine if the code section applies to additions and alterations.
2. Determine which of the three options will be used to comply or identify an alternative method(s).
3. 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 for 5 percent of the tenant vehicle parking spaces being added, with a minimum of one bicycle parking facility.

   **Note:** If the code user is seeking a parking capacity reduction under Section A5.106.6 or the local jurisdiction has a zoning ordinance for reduces parking; use the original parking capacity calculation to determine the required number of bicycle racks. This is to ensure that the required number of bicycle racks is not reduced as a result of the tier option selection.

## Suggestion:

Provide a calculation table or a note on the plans showing the total number of required bicycle racks for either short-term or long term bicycle storage.

## Examples:

**Short-term:** Visitor motorized parking spaces at 42 x 5 percent = 2.1.

Provide racks for three bicycles.

**Long-term:** Total tenant vehicular parking spaces at 216 x 5 percent = 10.8.

Provide 11 secure bicycle parking facilities by using one of the three methods allowed in Section 5.106.4.1.2.

If specifying lockers, consider using six two-bicycle lockers for long-term bicycle parking.

## Enforcement:

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

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

**5.106.5.2 Designated parking for clean air vehicles.** 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:

The intent of these requirements is to enhance the appeal of driving clean air vehicles, in an effort to reduce greenhouse gas emissions. This code ensures that newly constructed projects or additions and alterations provide designated parking for clean air vehicles (e.g., low-emitting, fuel-efficient and carpool/vanpool vehicles).

**New for 2016:** The title for Section 5.106.5.2 was revised to clarify that the designated parking requirements of this section apply to clean air vehicles.

## Compliance method:

**Design team:** The construction documents and/or site plan should indicate the location and required number of designated parking stalls. These parking spaces should be marked "CLEAN AIR/VANPOOL/EV." The markings should be visible when a clean air vehicle is parked. In other words, if the front of the vehicle goes into the parking stall first, the markings should be visible at the back end of the vehicle. Lettering should be at least 8 inches high. The CLEAN AIR/VANPOOL/EV parking stalls may be located anywhere on the site and do not require a preferential location.

## Suggestion:

The plans should reflect the total number of required motor vehicle parking spaces. Refer to Table 5.106.5.2 in *CALGreen* to ensure that the correct

number of designated parking stalls is 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. **If a parking lot contains 55 total parking spaces:** based on Table 5.106.5.2. Provide six clean air vehicle spaces, with required stall markings, which fall within the range.
2. **If a parking lot contains 240 total parking spaces:** based on Table 5.106.5.2, calculate 240 X 8 percent = 19.2. Provide 20 clean air vehicle spaces with required stall markings.

### Enforcement:

**Plan intake:** The plan reviewer should review the plans and confirm that the correct number of "CLEAN AIR/VANPOOL/EV" parking stalls is included on the drawings.

**On-site enforcement:** The inspector should verify that the correct number of clean air vehicle parking stalls have been installed and are accurately identified.

**5.106.5.3 Electric vehicle (EV) charging. [N]** Construction shall comply with Section 5.106.5.3.1 or Section 5.106.5.3.2 to facilitate future installation of electric vehicle supply equipment (EVSE). When EVSE(s) is/are installed, it shall be in accordance with the *California Building Code*, the *California Electrical Code* and as follows:

**5.106.5.3.1 Single charging space requirements. [N]** When only a single charging space is required per Table 5.106.5.3.3, a raceway is required to be installed at the time of construction and shall be installed in accordance with the California Electrical Code. Construction plans and specifications shall include, but are not limited to, the following:

1. The type and location of the EVSE.
2. A listed raceway capable of accommodating a 208/240-volt dedicated branch circuit.
3. The raceway shall not be less than trade size 1"
4. The raceway shall originate at a service panel or a subpanel serving the area, and shall terminate in close proximity to the proposed location of the charging equipment and into a listed suitable cabinet, box, enclosure or equivalent.
5. The service panel or subpanel shall have sufficient capacity

to accommodate a minimum 40-amprere dedicated branch circuit for the future installation of the EVSE.

**5.106.5.3.2 Multiple charging space requirements. [N]** When multiple charging spaces are required per Table 5.106.5.3.3 raceway(s) is/are required to be installed at the time of construction and shall be installed in accordance with the California Electrical Code. Construction plans and specifications shall include, but are not limited to, the following:

1. The type and location of the EVSE.
2. The raceway(s) shall originate at a service panel or a subpanel(s) serving the area, and shall terminate in close proximity to the proposed location of the charging equipment and into listed suitable cabinet(s), box(es), enclosure(s) or equivalent.
3. Plan design shall be based upon 40-amprere minimum branch circuits.
4. Electrical calculations shall substantiate the design of the electrical system, to include the rating of equipment and any on-site distribution transformers and have sufficient capacity to simultaneously charge all required EVs at its full rated amperage.
5. The service panel or subpanel(s) shall have sufficient capacity to accommodate the required number of dedicated branch circuit(s) for the future installation of the EVSE.

**5.106.5.3.3 EV charging space calculation. [N]** Table 5.106.5.3.3 shall be used to determine if single or multiple charging space requirements apply for the future installation of EVSE.

**Exceptions:** On a case-by-case basis where the local enforcing agency has determined EV charging and infrastructure is not feasible based upon one or more of the following conditions:

1. Where there is insufficient electrical supply.
2. Where there is evidence suitable to the local enforcing agency substantiating that additional local utility infrastructure design requirements, directly related to the implementation of Section 5.106.5.3, may adversely impact the construction cost of the project.

**TABLE 5.106.5.3.3**

| TOTAL NUMBER OF ACTUAL PARKING SPACES | NUMBER OF REQUIRED EV CHARGING SPACES |
|---|---|
| 0–9 | 0 |
| 10–25 | 1 |
| 26–50 | 2 |
| 51–75 | 4 |
| 76–100 | 5 |
| 101–150 | 7 |
| 151–200 | 10 |
| 201 and over | 6 percent of total[1] |

1. Calculation for spaces shall be rounded up to the nearest whole number.

**5.106.5.3.4 [N] Identification.** The service panel or subpanel(s) circuit directory shall identify the reserved overcurrent protective device space(s) for future EV charging as "EV CAPABLE". The raceway termination location shall be permanently and visibly marked as "EV CAPABLE."

**5.106.5.3.5 [N]** Future charging spaces qualify as designated parking as described in Section 5.106.5.2 Designated parking for clean air vehicles.

**Notes:**

1. The California Department of Transportation adopts and publishes the *California Manual on Uniform Traffic Control Devices* (California MUTCD) to provide uniform standards and specifications for all official traffic control devices in California. Zero-Emission Vehicle Signs and Pavement Markings can be found in the New Policies and Directives number 13-01. www.dot.ca.gov/trafficops/policy/13-01.pdf

2. See Vehicle Code Section 22511 for EV charging spaces signage in off-street parking facilities and for use of EV charging spaces.

3. The Governor's Office of Planning and Research published a Zero-Emission Vehicle Community Readiness Guidebook, which provides helpful information for local governments, residents and businesses. http://opr.ca.gov/docs/ZEV_Guidebook.pdf

## Intent:

The intent of these requirements is to facilitate EV charging capability by installing raceways for future electric vehicle supply equipment (EVSE) at the time of new building construction. Construction plans and specifica-

tions must reflect that the infrastructure will be capable of supporting future electrical demands. Having the infrastructure pre-installed will allow the charging stations to be easily added at a later date. This will aid in achieving an interim goal for infrastructure that will support 1.5 million zero-emissions vehicles (ZEV's) on California roadways by 2025.

**Suggestions:** Anticipate accessibility requirements where EV charging stations are installed per the *California Building Code*, Part 2, Chapter 11B.

**Change for 2016:** This code section has been amended. The percent of parking spaces that must install electric vehicle (EV) charging infrastructure to support future installation of electric vehicle supply equipment (EVSE) has increased from 3 percent to 6 percent and the parking lot size threshold decreased from 51 spaces to 10 spaces.

## Compliance Method:

Include on the site plan the proposed location of the listed suitable cabinet(s), box(es), enclosure(s) or equivalent required for future EV equipment connections. Indicate on the plans the 40-amp minimum service panel capacity with raceway to the approximate location of the future EV charging connections as required in the code Section 5.106.5.3. Use Table 5.106.5.3.3 to determine if single or multiple charging space requirements apply for the future installation of EVSE. Lastly, ensure that the service panel or subpanel(s) circuit directory is properly identified as being "EV CAPABLE" and that the raceway termination location is permanently and visibly marked as "EV CAPABLE."

## Recommendation:

The plans should reflect the EV capacity needed to accommodate the total number of required future EV vehicular charging spaces as required per Table 5.106.5.3.3. Include all parking spaces in the calculation when determining the required EV capacity for future installation.

**Suggestion:** Refer to the access provisions for EVCS in Chapter 11B when designing the EV Capable charging spaces in new parking lots. Designing the EV Capable charging spaces in new parking lots to meet size requirements for accessibility can reduce complications when EV charging stations are installed at a future date.

**Examples:**

1. **Assume 55 total actual parking spaces:** Based on Table 5.106.5.3.3, provide capacity for 4 future EV charging spaces.

2. **Assume 240 total actual parking spaces:** Based on Table 5.106.5.3.3, calculate 240 X 6 percent = 14.4. Provide capacity for 15 future EV charging spaces.

**Enforcement:**

**Plan intake:** The plan reviewer should confirm that the construction documents are compliant with Sections 5.106.5.3.1 or 5.106.5.3.2, and 5.106.5.3.3 and 5.106.3.4 as applicable and that the appropriate EV capacity for future EV connection to the required number of future EV charging spaces per Table 5.106.5.3.3 has been provided. Confirm proper identification at the service panel or subpanel(s) and that the raceway termination location is permanently and visibly marked as "EV CAPABLE."

**On-site enforcement:** The inspector should verify on-site that the service panel and raceway with proper termination have been installed per the approved set of construction documents.

**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.
3. Building facade meeting the requirements in Table 140.7-B of the *California Energy Code*, Part 6.
4. Custom lighting features as allowed by the local enforcing agency, as permitted by Section 101.8 Alternate materials, designs and methods of construction.

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

**Light Fixture**

| TABLE 5.106.8 [N]<br>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:

Light pollution is disruptive to the environment, wildlife and humans. The intent of this requirement is to minimize light pollution in an effort to maintain dark skies and to ensure that newly constructed projects reduce the amount of backlight, uplight, light and glare from not-in-code exterior light sources.

**Change for 2016:** Additional exceptions have been added for facade lighting and custom lighting features.

## Compliance method:

Comply with California Energy Commission regulations in *California Administrative Code* Part1 and *California Energy Code* Part 6 as cited in Section 5.1068(1). Those standards form a basis upon which to build for the purpose of light pollution reduction. 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. Voluntary compliance with any or all of the items is encouraged.

Comply with a local dark skies ordinance, if more stringent than these regulations.

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.

**Plan intake:** The plan reviewer should confirm the following:

- Construction documents, including exterior light sources, comply with Parts 1, *California Building Code* 2 and Part 6 of Title 24;
- Electrical plans and specifications for compliance with building and exterior lighting, including photometric data for perimeter site lighting fixtures; and
- Specifications for any controls to be installed on the project.

**On-site enforcement:** The inspector should verify that all specified lighting products are installed as shown 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 requirement is to ensure that newly constructed project sites, additions and alterations that redefine drainage paths 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 floor systems. (See Chapter 3 for exceptions for additions and alterations.)

**Site Grading and Paving**

**Reference:** Sections in the *California Building Code* (for example, Section 1808.7.4 "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 or grading plan) how 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 redirecting the water away from the exterior walls, how surface water will be managed on site. Methods include, but are not limited to, those 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 verify that all grading and/or drainage systems have been installed as designed on the approved construction documents and that floor elevations are correctly set with respect to adjacent grades.

# Division 5.2, Energy Efficiency

## SECTION 5.201
## GENERAL

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

**Intent:**

The intent of this code requirement is to recognize that the California Energy Commission retains its authority for energy efficiency standards. Additionally, it is to reduce dependency on depleteable energy sources, by improving the efficiency of our buildings. Local amendments increasing energy efficiency standards beyond those required in the *California Energy Code* may apply.

# 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 requirement 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. When the meters are installed, the building operator will have the ability to establish a water consumption baseline to monitor future water use. This will give the building operator the ability to isolate and identify areas within the potable water system that have significant increases in water use due to leaks, overuse, etc.

**Note:** This requirement is not intended to serve as the owners' tool for water usage billing.

## Compliance method:

For Section 5.303.1.1:

1. Determine if the new project is in excess of 50,000 square feet; or
2. If an addition, determine if it is in excess of 50,000 square feet.

If the project meets one of the above-mentioned criteria, then

3. Determine if 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 applicable, indicate on the construction documents the location of the separate submeters to be installed.

**Note:** There are exceptions in Section 5.303.1.1 Item 2 for make-up water for cooling towers, evaporative coolers, and steam and hot water boilers.

For Section 5.303.1.2:

1. Determine if a tenant is projected to consume more than 1,000 gallons per day, and then provide a separate submeter or metering devices. Examples are car washes and aquariums.

## Suggestion:

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

## Enforcement:

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

**On-site enforcement:** The inspector should verify that all separate submeters and/or metering devices are installed in accordance with the approved construction documents.

**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.**

**5.303.3.2.1 Wall-mounted Urinals.** The effective flush volume of wall-mounted urinals shall not exceed 0.5 gallons per flush.

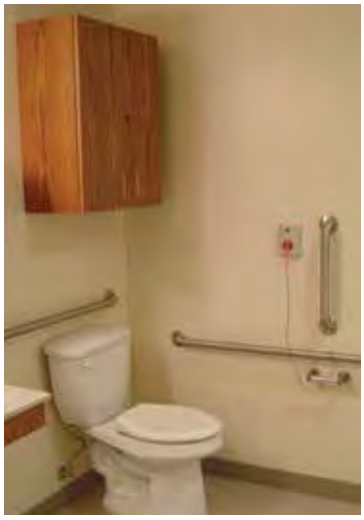
**5.303.3.2.2 Floor-mounted Urinals.** The effective flush volume of floor-mounted urinals shall not exceed 0.5 gallons per flush.

**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.



Water Closet

## Intent:

The intent of this code requirement is to define the maximum allowable flow rates for plumbing fixtures and fittings, which include water closets, urinals and showerheads. The California Energy Commission (CEC) adopts regulations to establish the minimum water flow rates for specified fixtures and fixture fittings in Title 20 of the *California Code of Regulations*.

In 2015, the CEC adopted emergency regulations, as a result of the Governor's Executive Order B-29-15, lowering specified plumbing fixture flow rates in Title 20 of the *California Code of Regulations*. In order to align with these appliance efficiency regulations, the California Building Standards Commission, Department of Housing and Community Development, Division of the State Architect, and Office of Statewide Health Planning and Development promulgated emergency building standards aligning with the plumbing fixture flow rates in Title 20.

**Change for 2016:** Wall-mounted urinal flow rates were reduced from 0.5 to 0.125 gallons per flush and floor-mounted urinals remain at 0.5 gallons per flush.

### Compliance Method:

Specify water closets, urinals and showerheads that meet the prescriptive flow rates.

Specify plumbing fixtures and fittings for showerheads that meet the specified flow rates and code requirements listed above.

### Enforcement:

**Plan intake:** The plan reviewer 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 single showerheads or multiple showerheads specified also meet the flow rates and controls as listed in the code.

**On-site enforcement:** The inspector should verify that the water-conserving plumbing fixtures and fittings specified on the approved plans are installed.

#### 5.303.3.4 Faucets and Fountains

**5.303.3.4.1 Nonresidential Lavatory faucets.** Lavatory faucets shall have a maximum flow rate of not more than 0.5 gallons per minute at 60 psi.

**5.303.3.4.2 Kitchen faucets.** Kitchen faucets shall have a maximum flow rate of not more than 1.8 gallons per minute at 60 psi. Kitchen faucets may temporarily increase the flow above the maximum rate, but not to exceed 2.2 gallons per minute at 60 psi, and must default to a maximum flow rate of 1.8 gallons per minute at 60 psi.

**5.303.3.4.3 Wash fountains.** Wash fountains shall have a maximum flow rate of not more than 1.8 gallons per minute/20 [rim space (inches) at 60 psi].

**5.303.3.4.4 Metering faucets.** Metering faucets shall not deliver more than 0.20 gallons per cycle.

**5.303.3.4.5 Metering faucets for wash fountains.** Metering faucets for wash fountains shall have a maximum flow rate of not more than 0.20 gallons per cycle/20 [rim space (inches) at 60 psi].

**Note:** Where complying faucets are unavailable, aerators or other means may be used to achieve reduction.

**5.303.4 Commercial Kitchen Equipment**

**5.303.4.1 Food Waste Disposers.** Disposers shall either modulate the use of water to no more than 1 gpm when the disposer is not in use (not actively grinding food waste/no-load) or shall automatically shut off after no more than 10 minutes of inactivity. Disposers shall use no more than 8 gpm of water.

**Note:** This code section does not affect local jurisdiction authority to prohibit or require disposer installation.

**5.303.5 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 5.303.3 and 5.303.4 shall apply to new fixtures in additions or areas of alteration to the building.

## Intent:

The intent of this code regulation is to reduce the overall use of potable water within the building. Reduction of water use also results in decreasing the amount of energy needed to transport, process and treat water, thereby contributing to reduction of greenhouse gas emissions. 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.

**Note:** See Chapter 8 for sample forms and templates.

**Change for 2016:** Editorial correction for "metering faucets for wash fountains." The gallons-per-minute verbiage was changed to gallons per-cycle to designate the appropriate flow-rate designation. Additionally, requirements regulating water use in Food Waste Disposers have been added as mandatory requirements in the code.

## Compliance Method:

Indicate on the construction documents the prescriptive water reduction fixture flow rates from Section 5.303.3.4

## Enforcement:

**Plan intake:** The plan reviewer should confirm that the construction docu-

ments show the appropriate reduced flow rates for the listed fixture types.

**On-site enforcement:** The inspector should verify that the specified plumbing fixture is installed. The inspector may review the fixture specifications to verify compliance or accept a self-certification form.

**5.303.6 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 1701.1 of the 2016 *California Plumbing Code* and in Chapter 6 of this code.

### Intent:

The intent of this code requirement is to provide specifications for plumbing fixtures and fittings by referencing the 2016 *California Plumbing Code*. 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.

**Change for 2016:** The reference standards table number has been updated per the 2016 *California Plumbing Code.*

### Compliance method:

Specify plumbing fixtures and fittings that meet the referenced standards in the 2016 *California Plumbing Code* and other sections listed above.

### Enforcement:

**Plan intake:** The plan reviewer should confirm that the construction documents show that the plumbing fixtures and fittings specified meet the referenced standards listed.

**On-site enforcement:** The inspector should verify that the specified fixtures and fittings installed meet the referenced standards listed.

## SECTION 5.304
## OUTDOOR WATER USE

**5.304.1 Scope.** The provisions of Section 5.304 Outdoor Water Use reference the mandatory Model Water Efficiency Landscape Ordinance

(MWELO) contained within Chapter 2.7, Division 2, Title 23, California Code of Regulations.

**5.304.2 Outdoor water use in landscape areas equal to or greater than 500 square feet.** When water is used for outdoor irrigation for new construction projects with an aggregate landscape area equal to or greater than 500 square feet requiring a building or landscape permit, plan check or design review, one of the following shall apply:

1. A local water efficient landscape ordinance that is, based on evidence in the record, at least as effective in conserving water as the updated model ordinance adopted by the Department of Water Resources (DWR) per Government Code Section 65595 (c).
2. The California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELO) commencing with Section 490 of Chapter 2.7, Division 2, Title 23, *California Code of Regulations*.

**5.304.3 Outdoor water use in rehabilitated landscape projects equal to or greater than 2,500 square feet.** Rehabilitated landscape projects with an aggregate landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review shall comply with Section 5.304.2, items 1 or 2.

Sprinkler

## Intent:

The intent of this code requirement is to reduce the overall outdoor water used for irrigation for both new landscaping areas and rehabilitated landscape projects. Compliance can be achieved by either meeting the state's Model Water Efficiency Landscape Ordinance (MWELO) requirements or the local MWELO. In April 2015 the Governor signed Executive Order B-29-15, which required the Department of Water Resources (DWR) to update the Model Water Efficient Landscape Ordinance (MWELO) within Chapter 2.7, Division 2, Title 23, *California Code of Regulations*, which establishes the regulations for outdoor water use for irrigation systems. Also in response to this executive order, the Building Standards Commission (BSC) and other state agencies promulgated emergency *CALGreen* standards to align with appropriate sections of MWELO.

**Change for 2016:** Amendments were made to various sections for Outdoor Water Use to be consistent with the California Department of Water Resources' (DWR) July 15, 2015 revised MWELO regulations contained in

Title 23, specifically Section 490.1 Applicability and Appendix D found in Chapter 8 of *CALGreen*.

### Compliance method:

Sections 5.304.2 and 5.304.3: Comply with Section 5.304.2, items 1 or 2 by either complying with a local water efficient landscape ordinance or The California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELO).

### Enforcement:

**Plan intake:** The plan reviewer should confirm that the construction documents show compliance as follows:

**Sections 5.304.2 and 5.304.3:** Confirm that the plans show compliance with either a local water-efficient landscape ordinance or The California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELO).

**On-site enforcement:** Sections 5.304.2 and 5.304.3: The inspector should verify that the outdoor water use measures shown on the construction documents have been installed. If a local water efficient landscape ordinance is used, verify compliance with the ordinance.

**5.304.4 Outdoor water use in landscape areas of 2,500 square feet or less.** Any project with an aggregate landscape area of 2,500 square feet or less may comply with the performance requirements of MWELO or conform to the prescriptive compliance measures contained in MWELO's Appendix D.

### Intent:

This requirement captures outdoor water used for irrigation in landscape areas of 2,500 square feet or less. Compliance can be achieved by meeting either the performance requirements of MWELO or the perspective compliance measures contained in MWELO's Appendix D found in Chapter 8 of *CALGreen*.

**Change for 2016:** Amendments were made to various sections for Outdoor Water Use to be consistent with the California Department of Water Resources' (DWR) July 15, 2015 revised MWELO regulations.

### Compliance method:

Section 5.304.4: Comply with the performance requirements of MWELO or conform to the prescriptive compliance measures contained in MWELO's Appendix Appendix D of *CALGreen*.

### Enforcement:

**Plan intake:** The plan reviewer should confirm that the construction documents show compliance with the performance requirements of MWELO or conform to the prescriptive compliance measures contained in MWELO's Appendix D.

**On-site enforcement:** The inspector should verify that the outdoor water-use measures shown on the construction documents have been installed. If a local water-efficient landscape ordinance is used, verify compliance with the ordinance.

**5.304.5 Graywater or rainwater use in landscape areas.** For projects using treated or untreated graywater or rainwater captured on site, any lot or parcel within the project that has less than 2,500 square feet of landscape and meets the lot or parcel's landscape water requirement (Estimated Total Water Use) entirely with treated or untreated graywater or through stored rainwater captured on site is subject only to Appendix D section (5).

**Notes:**

1. DWR's Model Water Efficient Landscape Ordinance, definitions and supporting documents are available at the following link: http://water.ca.gov/wateruseefficiency/landscapeordinance/
2. A water budget calculator is available at the following link: http://water.ca.gov/wateruseefficiency/landscapeordinance/
3. The MWELO prescriptive compliance measure Appendix D may be found at the following link: http://water.ca.gov/wateruseefficiency/landscapeordinance/. In addition, a copy of MWELO Appendix D may be found in Chapter 8 of this code.

### Intent:

The intent of this requirement is to allow for the use of greywater or rainwater in landscape areas of 2,500 square feet or less. Compliance can be achieved by simply meeting the requirements found in Appendix D, Section (5).

**Change for 2016:** Amendments were made to various sections for Outdoor Water Use to be consistent with the California Department of Water Resources' (DWR) July 15, 2015 revised MWELO regulations.

### Compliance method:

For landscape areas of 2,500 square feet or less that meet the criteria listed in Section 5.304.5, comply with the prescriptive measures contained in MWELO's Appendix D, Section (5) found in Chapter 8 of *CALGreen*.

## Enforcement:

**Plan intake:** The plan reviewer should confirm that the construction documents show compliance with the prescriptive compliance measures contained in MWELO's Appendix D Sections (5).

**On-site enforcement:** The inspector should verify that the graywater or rainwater system is installed as shown on the construction documents.

# 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, and 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 5.407
## WATER RESISTANCE AND MOISTURE MANAGEMENT

**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 requirement is to provide a weather-resistant exterior wall and foundation envelope as currently required by the *California Building Code*, but go beyond those existing code provisions, increasing the integrity and longevity of the structure.

### Compliance method:

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 that particular locale. For example, vapor retarder protection measures in Section 150 of the *California Energy Code* are required for Climate Zones 14 and 16. Design and detail exterior wall systems to reflect local findings, specifying appropriate materials and vapor retardance. Show on the construction documents.

**Note:** Pay special attention to openings and changes of material in detailing exterior wall systems. 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 decreased longevity.

### Enforcement:

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

**On-site enforcement:** The inspector should verify that the exterior wall and foundation envelope is installed in accordance with the approved construction documents.

**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 requirement is to minimize the amount of unwanted moisture entering and remaining within wall assemblies of the building, to protect from water intrusion at exterior entries and openings from wind-driven rain, and to minimize water damage at exterior walls from possible effects of sprinkler systems.

### Compliance method:

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 or shielding that ensures protection of the building exterior.

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 above the door. 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 for door protection, and
3. Install flashings, integrated with a drainage plane.

### Suggestion:

Show on the construction documents that landscape or irrigation sprinkler design and features that meet the requirements.

### Enforcement:

**Plan intake:** The plan reviewer should confirm on the construction documents that the irrigation sprinkler design, features, and methods at entries and openings are included. Also, verify that flashings are integrated with the drainage plane.

**On-site enforcement:** The inspector should verify the irrigation sprinkler operations and that entries, openings features and flashing/drainage planes are installed in accordance with the approved construction documents.

## SECTION 5.408
## CONSTRUCTION WASTE REDUCTION, DISPOSAL AND RECYCLING

**5.408.1 Construction waste diversion.** Recycle and/or salvage for reuse a minimum of 65 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. Indicates 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 land fill 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 65-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: 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).

Waste Container

## Intent:

Because construction waste makes up about 27 percent of the waste stream in California, this code requirement seeks to reduce the amount of waste from new construction and demolition that would be sent to landfills. Additionally the purpose is to encourage material resource efficiency through reuse and recycling of construction waste products.

**Note:** See Chapter 8 of this guide for forms and templates.

**Change for 2016:** The diversion rate regulation has been increased from 50 percent to 65 percent.

## Compliance method:

1. Determine if a local construction waste management ordinance is in place in the project jurisdiction, and comply with the more stringent requirement.
2. Determine what local hauling and recycling facilities are available in the project area, to establish the most economically feasible option for recycle and/or salvage of construction debris. If there are no facilities in the area, use Exception 2 and work with the local enforcing agency to establish an acceptable alternative.
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 an appropriate option. Document the weight of total waste compared to the building area. The calculation may consider the gross square footage of each floor and roof, as approved by the enforcing agency.
4. Include the following materials for recycling, as included in the project: carpet, wood, aggregate, paint, shingles, wallboard or 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 Chapter 8 of this guide, or recycle as required by local ordinance.
5. Indicate the selected options on the construction documents.

## Enforcement:

**Plan intake:** The plan reviewer should confirm on the construction documents that a construction waste management plan has been included with

the plan submittal, or that Exception 2 has been submitted for enforcing agency approval.

**On-site enforcement:** The inspector should verify that the approved construction waste management plan or Exception 2 document is being followed. The inspector may ask for haul tags and/or reports from the contractor to verify compliance with the 65 percent waste reduction. Verification by documentation from a waste management company or recycling facility is acceptable.

### Suggestion:

Local enforcing agencies are strongly urged to work with their jurisdictions' recycling coordinators to determine if local conditions warrant exceptions, and to identify appropriate means of alternative compliance.

**5.408.2 Universal Waste. [A]** Additions and alterations to a building or tenant space that meet the scoping provisions in Section 301.3 for nonresidential additions and alterations, shall require verification that Universal Waste items such as fluorescent lamps and ballast and mercury containing thermostats as well as other California prohibited Universal Waste materials are disposed of properly and are diverted from landfills. A list of prohibited Universal Waste materials shall be included in the construction documents.

**Note:** Refer to the Universal Waste Rule link at: www.dtsc.ca.gov/LawsRegsPolicies/Regs/upload/OEARA_REGS_UWR_FinalText.pdf

### Intent:

This code provision is intended to ensure that universal waste materials are being disposed properly. The hazardous waste regulations (*California Code Regulations*, Title 22, Division 4.5, Chapter. 11, Section 66261.9) identify seven categories of hazardous waste that can be managed as universal waste. Any unwanted item that falls within one of these waste streams can be handled, transported and recycled following the requirements set forth in the Universal Waste Regulations (UWR) (*California Code Regulations*, Title 22, Division 4.5, Chapter 23)

On February 9, 2004, regulations took effect in California that classified all discarded fluorescent lamps as hazardous waste. This includes even low mercury lamps marketed as "TCLP passing" or "TTLC passing." No one in California is allowed to discard their fluorescent lamps and batteries as nonhazardous solid waste (as ordinary trash).

Under California's Universal Waste Rule households and "conditionally exempt small quantity generators" were allowed to dispose fluorescent lamps, batteries (not lead/acid batteries of the type used in autos), mercury

thermostats and electronic devices to the trash through February 8, 2006, unless the local trash companies or other agencies prohibited it. Large and small quantity handlers are required to ship their waste to another handler, a universal waste transfer station, a recycling facility or a disposal facility.

**Change for 2016:** This is a new code section for the 2016 *CALGreen* Code.

## Compliance method:

1. For additions and alterations, determine if this code section applies by reviewing the scoping provisions in Section 301.3 for nonresidential additions and alterations.
2. If applicable, add a list of prohibited universal waste materials to the construction documents.
3. Provide proof of verification compliance that universal waste items are disposed of properly and are diverted from landfills.
4. Show on the construction documents the list of universal waste materials that need to be diverted from landfill and the type of disposal facility that will accept universal waste.

## Enforcement:

**Plan intake:** The plan reviewer should confirm that the construction documents include a list of prohibited universal waste materials.

**On-site enforcement:** The inspector should verify that the list of universal waste materials shown on the construction documents is being disposed of properly. The inspector may ask for haul tags and/or reports from the contractor to verify compliance with the code. Verification by documentation from a waste management company or recycling facility is acceptable.

Stockpiled Excavation Material

**5.408.3 Excavated soil and land clearing debris.** 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. 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. www.cdfa.ca.gov/exec/county/county_contacts.html

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

### Intent:

The intent of this code requirement is to reduce high-volume site materials from filling up landfills as a result of clearing and to encourage the market for nonhazardous land clearing debris. It is not intended to apply to the clearing of contaminated sites, such as for brownfield remediation.

**Note:** See Chapter 8 of this guide for forms and templates.

### Compliance method:

1. Determine if a local construction ordinance is in place 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.
4. Indicate the selected method of compliance on the construction documents.

Note: Site planning that maintains existing features such as trees and rocks can reduce the amount of land clearing debris.

### Enforcement:

**Plan intake:** The plan reviewer should confirm that the construction documents indicate proper mitigation of land clearing debris.

**On-site enforcement:** The inspector should verify that the excavated soil and land clearing debris are being reused or recycled as specified on the construction documents.

## 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, organic waste, and metals, or meet a lawfully enacted local recycling ordinance, if more restrictive.

**Exception:** Rural jurisdictions that meet and apply for the exemption in Public Resources Code 42649.82 (a)(2)(A) et seq. shall also be exempt from the organic waste portion of this section.

**5.410.1.1 Additions.** 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.


Recycling by Occupants

## Intent:

The intent of this code requirement is to support the existing law to provide areas for recycling by occupants, including collection and loading of recyclable materials. The law requires a model ordinance in the *Public Resources Code*, Chapter 18, Part 3, Division 30. Chapter 18 is known as the California Solid Waste Reuse and Recycling Access Act of 1991 (Act).

**Change for 2016:** This code section was amended to include organic waste for recycling by occupants with an added exception for rural jurisdictions.

## Compliance method:

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

1. Determine if a local recycling ordinance is in place in the jurisdiction and comply, if more stringent. If no ordinance, then use the model recycling ordinance.
2. In the absence of a local ordinance comply with the requirement of the sample ordinance.
3. For additions that increase floor area by 30 percent or more comply with either item 1 or 2.
4. Indicate the selected method of compliance on the construction documents.

5. 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 plan reviewer should confirm that the appropriate recycling areas and signage for those areas have been provided on the construction documents.

**On-site enforcement:** The inspector should verify the recycling areas and signage are allocated and 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. All occupancies other than I-occupancies and L-occupancies shall comply with the *California Energy Code* as prescribed in *California Energy Code* Section 120.8. For I-occupancies which are not regulated by OSHPD or for I-occupancies and L-occupancies which are not regulated by the *California Energy Code* Section 100.0 Scope; all requirements in sections 5.410.2 through 5.410.2.6 shall apply.

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. Unconditioned warehouses of any size.
2. Areas less than10,000 square feet used for offices or other

conditioned accessory spaces within unconditioned warehouses.

3. Tenant improvements less than 10,000 square feet as described in Section 303.1.1.

4. Open parking garages of any size, or open parking garage areas, of any size, within a structure.

**Note:** For the purposes of this section, unconditioned shall mean a building, area, or room which does not provide heating and/or air conditioning.

**Informational Notes:**

1. IAS AC 476 is an accreditation criteria for organizations providing training and/or certification of commissioning personnel. AC 476 is available to the Authority Having Jurisdiction as a reference for qualifications of commissioning personnel. AC 476 does not certify individuals to conduct functional performance tests or to adjust and balance systems.

2. Functional performance testing for heating, ventilation, air conditioning systems and lighting controls must be performed in compliance with the *California Energy Code*.

## Intent:

The intent of this section is to improve public health, safety and general welfare by ensuring that the design and construction of buildings reduce negative environmental impacts and promote occupant comfort. Commissioning ensures that the building functions in the manner intended.

**Note:** See Chapter 8 of this guide for forms and templates.

**Change for 2016:** The leading paragraph has been amended to clarify that "I" and "L" occupancies may need to comply with *CALGreen*.

**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's staff, contractor and design team, as well as independent commissioning professionals.

It is essential that there be a single person designated to lead and manage commissioning activities. In practice, this individual is 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.

### Compliance method:

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.
3. Indoor environmental quality requirements.
4. Project program, including facility functions and hours of operation, and need for afterhours 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 is 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.

**Note:** See Chapter 8 of this guide for forms and templates.

**Change for 2016:** The reference to the California Energy Commission for energy-related items in Owner's Project Requirements has been repealed in *CALGreen*, as the pertinent objectives are now mentioned in the main paragraph of Section 5.410.2.

### Compliance method:

Compliance is demonstrated by the owner or owner's representative developing and/or approving the Owner's Project Requirements (OPR) document form (see Note above). The OPR 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:
   - *CALGreen* voluntary measures or tiers sought, or other specific green building rating system or program credits and/or level of certification sought.
   - Specific environmental or sustainability goals, such as water efficiency, water reuse, CO monitoring, xeriscaping, etc.
2. Energy efficiency goals.
3. Indoor environmental quality requirements. For each program space, describe indoor environmental requirements, including intended use and anticipated schedule:
   - Lighting.
   - Temperature and humidity.
   - Acoustics.
   - Air quality, ventilation and filtration.
   - Desired adjustability of system controls.
   - Accommodations for afterhours use.
   - 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:
   - Building size, number of stories, construction type, occupancy type and number.
   - Building program areas, including intended use and anticipated occupancy schedules.

- Future expandability and flexibility of spaces.
- Quality and/or durability of materials and building life span desired.
- Budget or operational constraints.
- Applicable codes.

5. Equipment and systems expectations. Describe the following for each system commissioned:
   - Level of quality, reliability, equipment type, automation, flexibility, maintenance and complexity desired.
   - Specific efficiency targets desired technologies or preferred manufacturers for building systems, acoustics and vibration.
   - 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:
   - How building will be operated and by whom.
   - Level of training and orientation required to understand, operate and use the building systems for operation and maintenance staff, as well as occupants.
   - Building operation and maintenance staff location and capabilities.

## Enforcement:

**Plan intake:** The plan reviewer should confirm the following in the construction documents:

- The owner's project requirements are provided for the six goals listed in the code;
- Receipt of a copy of the signed OPR document; or
- Receipt of a form signed by the owner or owner's representative attesting that the OPR has been completed and approved by the owner.

**On-site enforcement:** The inspector should verify that the Owner's Project Requirements as attested by the owner or owner's representative are being implemented during construction.

**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.
2. Indoor lighting system and controls.
3. Water heating system

4. Renewable energy systems.
5. Landscape irrigation systems.
6. Water reuse systems.

### Intent:

The Basis of Design (BOD) establishes how the building systems will meet the OPR and outlines design assumptions not indicated in the design documents. The design team develops the BOD to describe 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.

**Note:** See Chapter 8 of this guide for forms and templates.

**Change for 2016:** The reference to the California Energy Commission for energy-related items in the Basis of Design (BOD) has been repealed in *CALGreen*, as the pertinent objectives are now mentioned in the main paragraph of Section 5.410.2.

### Compliance method:

Compliance is demonstrated by the completion of the BOD document and/or approving the BOD document form (see Note above). The BOD should include the following, as applicable:

1. Heating, ventilation, air-conditioning (HVAC) systems and controls.
2. Indoor lighting system and controls.
3. Water heating system.
4. Renewable energy systems:
   - Provide narrative description of system—type, performance, control type, energy savings and payback period.
   - Describe reason for system selection—why chosen system is better than alternatives, issues such as performance, efficiency, reliability, flexibility, simplicity, expandability, cost, payback period, utility company incentives, owner preference.
   - Sequence of operation—operating schedules, set points and storage capacity.
   - Describe how system meets the OPR.
5. Landscape irrigation systems:
   - Provide narrative description of system—type, performance and water usage.
   - Describe reason for system selection—why chosen system is better than alternatives, issues such as performance, efficiency, reliability, flexibility, expandability, cost, owner preference, simplicity.
   - Sequence of operation—operating schedules and set points.

- Describe how system meets the OPR.

6. Water reuse systems:
   - Provide narrative description of system—type, performance, capacity and reuse purpose.
   - Describe reason for system selection—why chosen system is better than alternatives, issues such as performance, efficiency, reliability, flexibility, expandability, cost, owner preference, simplicity.
   - Sequence of operation—operating schedules, set points.
   - Describe how system meets the OPR.

## Enforcement:

Plan intake: The plan reviewer should confirm the following in the construction documents:

- The Basis of Design is provided for every system to be commissioned with an explanation of how the design of the building systems meets the OPR and that BOD contains the required elements listed in the code;
- Receipt of a copy of the signed BOD document; or
- 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.

**On-site enforcement:** The inspector should verify that the Basis of Design criteria as attested by the architect, engineer or designer of record are being implemented during construction.

**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. 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 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) via the Basis of Design (BOD) are met. The Cx Plan also includes a commissioning schedule, covering design to occupancy.

**Note:** See Chapter 8 of this guide for forms and templates.

## Compliance Method:

Compliance is demonstrated by preparation of a project-specific Cx Plan that includes the elements listed in the code section above and/or approving the Cx Plan document form (see Note 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 the following:
   - 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.
   - 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.
   - 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.
   - Functions to be tested. Provide example functional test procedures to identify the level of testing detail required.
     - See (Section 5.410.2.4) Functional Performance Testing guidance for more information.

- 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.
- 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 the following:
   - 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.

## Enforcement:

**Plan intake:** The plan reviewer should confirm the following in the construction documents:

- The commissioning plan contains the required elements listed in the code.
- Receipt of a copy of the commissioning plan; or
- Receipt of a form signed by the owner or owner's representative attesting that the Cx Plan has been completed

**On-site enforcement:** The inspector should verify that the commissioning plan criteria as attested by the architect, engineer or designer of record are being implemented during construction.

**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.

Verification of Systems

## Intent:

Develop and implement the functional performance tests to document, as set forth in the commissioning plan, that all components, equipment, systems and system-to-system interfaces were installed as specified and operate according to the plans and specifications, and are traceable back through the Basis of Design in support of the Owner's Project Requirements.

**Note:** See Chapter 8 of this guide for forms and templates.

**Note:** *CALGreen* functional performance tests are not intended to replace the Title 24, Part 6, acceptance tests. Acceptance tests, which focus on energy efficiency, can be a 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 the 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 the following:**

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, identifies 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.

## Enforcement:

**Plan intake:** FPT is done at the end of construction and before benefial occupancy. The inspector should verify compliance with this requirement.

**On-site enforcement:** The inspector should verify demonstrated compliance during on-site enforcement by:

- Receipt of a copy of completed and signed functional performance tests and corrected deficiencies, or
- 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.

**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.

**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. Description of 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.

**Note:** See Chapter 8 of this guide for forms and templates.

**Compliance method:**

Compliance is demonstrated by providing the Systems Manual as required in the code and/or approving the Systems Manual document form (see Note above). The Systems Manual includes the following information:

1. Site information, including facility description, history and current requirements:

   Site information:
   - Location of property, address.
   - Site acreage.
   - Local utility information.
   - Water service provider.
   - Natural/LPG gas service provider.
   - Electrical service provider.
   - Telecommunications service provider.
   - Other service providers.

   Facility description:
   - Use/function.
   - Square footage.
   - Occupancy type.
   - Construction type.
   - Basis of Design.

- Location of major systems and equipment.

Project history:

- Project requirements.
  - Owner's project requirements (OPR).
  - Basis of Design (BOD).
- Project undocumented events.
- Record drawings and documents.
- Final control drawings and schematics.
- Final control sequences.
- Construction documents, location or delivery information:
  - Mechanical and electrical drawings.
  - Specifications.
  - Submittals.
  - Project change orders and information.

Current requirements:

- Building operating schedules.
- Space temperature, humidity, and pressure, $CO_2$ set points
- Summer and winter setback schedules.
- Chilled and hot water temperatures.
- As-built control set points and parameters.

2. Site contact information:

   - Owner information.
   - Emergency contacts.
   - Design team: architect, mechanical, engineer, electrical engineer, etc.
   - Prime contractor contact information.
   - Subcontractor information.
   - Equipment supplier contact information.

3. Basic operation and maintenance, including general site operating procedures, basic trouble shooting, recommended maintenance requirements site events log:

   - Basic operation:
     - Written narratives of basic equipment operation.
     - Interfaces, interlocks and interaction with other equipment and systems.
     - Initial maintenance provided by contractor.
   - General site operating procedures:
     - Instructions for changes in major system operating schedules.
     - Instructions for changes in major system holiday and weekend schedules.
   - Basic troubleshooting:
     - Cite any recommended troubleshooting procedures specific to the major systems and equipment installed in the building.
     - Manual operation procedures.

- Standby/backup operation procedures.
- Bypass operation procedures.
- Major system powers fail resets and restarts.
- Trend log listing.

• Recommended maintenance events log:
- HVAC air filler replacement schedule and log.
- Building control system sensor calibration schedule and log.
- Operation and Maintenance Manuals
- Location or delivery information.

4. Major systems

• HVAC systems and controls:
- Air-conditioning equipment (chillers, cooling towers, pumps, heat exchanges, thermal energy storage tanks, etc.).
- Heating equipment (boilers, pumps, tanks, heat exchanges, etc.).
- Air distribution equipment (fans, terminal units, accessories, etc.).
- Ventilation equipment (fans, accessories, and controls).
- Building automation system (workstation, servers, panels, variable frequency drives, local control devices, sensors, actuators, thermostats, etc.).

• Indoor lighting systems and controls:
- Lighting control panels.
- Occupancy sensors.
- Daylight harvesting systems.

• Renewable energy systems:
- Photovoltaic panels and inverters.
- Wind powered electrical generators and inverters.

• Landscape irrigation systems:
- Water distribution diagrams.
- Control system.

• Water reuse systems:
- Reclaimed water system for indoor use.
- Reclaimed water for irrigation use.

5. Site equipment inventory and maintenance notes:

• Spare parts inventory.
• Frequently required parts and supplies.
• Special equipment required to operate or maintain systems.
• 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.

## Enforcement:

**Plan intake:** Systems manual documents are provided at the end of construction. The inspector should verify compliance with this requirement.

**On-site enforcement:** The inspector should verify demonstrated compliance during on-site enforcement by:

- Receipt of a copy of the systems manual with confirmation that a copy was provided to the owner, and/or
- Receipt of a form signed by the owner, owner's representative attesting that the systems manual is complete and has been provided to them.

**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:** See Chapter 8 of this guide for forms and templates.

## Compliance method:

Compliance can be achieved by documenting in the commissioning report the systems operations training, for the elements listed in the code, to appropriate staff and approving the systems operations training form (see Note above).

The written training program includes learning goals and objectives for each session; training agenda, topics and length of instruction for each session;

instructor information and qualifications; location of training sessions (on-site, off-site, manufacturer's or vendor's facility); attendance forms; training materials; and description on how the training will be archived for future use.

Systems operations training shall be included in the commissioning report for each equipment type and/or system and shall include the following:

1. Systems/equipment overview:
   - Review OPR and BOD related to the major systems and equipment.
   - Describe system type and configuration.
   - Explain operation of all major systems and equipment and how they interface with other systems and equipment.
   - Describe operation of critical devices, controls and accessories.
   - Review location of the major systems and equipment.
   - Describe operation of control system for each system, location of critical control elements, and procedures to properly operate control system.
   - Review recommendations for implementation to reduce energy and water use.
2. Review and demonstration of servicing/preventive maintenance:
   - Explain location or delivery contact of the operation and maintenance manuals.
   - Review of all manufacturers' recommended maintenance activities to maintain warranties.
   - Review and demonstrate frequent maintenance activities (air filter replacement, lubrication, fan belt inspection and/or replacement, condenser water treatment, etc.), and suggested schedule.
   - Review and demonstrate typical servicing procedures and techniques (electrical current, pressure, and flow readings, etc.; calibration procedures, point trending, power fail restart procedures, etc.).
   - Locate, observe and identify major equipment, systems, accessories and controls.
   - Review emergency shut-offs and procedures.
3. Review of the information in the Systems Manual:
   - Describe use of Systems Manual.
   - Review elements of Systems Manual.
   - Explain how to update and add revisions to Systems Manual.
4. Review record drawings on the systems/equipment:
   - Explain location or delivery contact of the record drawings.
   - Review record drawings, revisions, and changes to original design drawings.
   - Review equipment schedules and compare with actual installed systems.

## Enforcement:

**Plan intake:** Systems operations training is provided at the end of construction. The inspector should verify compliance with this requirement.

**On-site enforcement:** The inspector should verify demonstrated compliance during on-site enforcement by the following:

1. In the event appropriate maintenance staff is made available to receive training for each equipment type and/or system installed in the building.
   - Receipt of a copy of the written training program and completed attendance forms, or
   - 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:
   - Receipt of a copy of the training program provided to the owner or owner's representative, or
   - Receipt of a form signed by the owner or owner's representative attesting that the written training program has been provided.

**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.

**Note:** See Chapter 8 of this guide for forms and templates.

## Compliance method:

The components of the commissioning report should include the following:

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
   - Outstanding deficiencies and plans for resolution.
   - 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:

   - Commissioning plan.
   - Owners Project Requirements (OPR).
   - Basis of Design (BOD).
   - Executed installation checklists.
   - Executed Functional Performance Test (FPT) forms.
   - Recommendations for end-of-warranty review activities.

**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.

**5.410.4.2 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.

## Compliance method:

**Design team:** Specify the systems in the project to be tested and adjusted; the testing team members and their qualifications; the procedures, including those recommended by the manufacturer; and 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 should collect copies of the testing, adjusting and balancing reports after all functional testing has been completed.

# Division 5.5, Environmental Quality

## SECTION 5.501
## GENERAL

**5.401.1 Scope.** The provisions of this chapter shall outline means of reducing the quantity of air contaminants that are odorous, irritating, and/or harmful to the comfort and wellbeing of the building's installers, occupants and neighbors.

## SECTION 5.502
## DEFINITIONS

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

## SECTION 5.503
## FIREPLACES

**5.503.1 Fireplaces.** 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 New Source Performance Standards (NSPS) emission limits as applicable and shall have a permanent label indicating they are certified to meet the emission limits.

**Intent:**

Although limited in use in nonresidential applications, this code requirement is intended to prevent the use of indoor air for combustion and to prevent contaminated air and any unused fuel from escaping a fireplace, maintaining indoor air quality. 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.

## 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 for nonresidential occupancies. 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, of the *California Building Code*. Title 24, Part 6, the *Cali-*

*fornia 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 ordinance 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 local requirements.

### Compliance method:

1. Specify a direct-vent gas fireplace.
2. Specify a pellet or wood stove that meets the US EPA New Source Performance Standards (NSPS) emission standards with emissions limit label.
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 plan reviewer should confirm in the construction documents that fireplaces and/or woodstoves meet the direct-ventsealed-combustion requirements, and/or US EPA New Source Performance Standards (NSPS) emission limits.

**On-site enforcement:** The inspector should verify that fireplaces / woodstoves are installed in accordance with the construction documents and product data sheets.

## SECTION 5.504
## POLLUTANT CONTROL

**5.504.1 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 requirement 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 when necessary, though this practice is noted not to be an optimum choice due to possible damage to equipment that may jeopardize a warranty. 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 in the construction documents the method for protecting the duct openings and mechanical equipment during the construction phase. The contractor is responsible for employing the prescribed methods of compliance and should be able to demonstrate that the practices are being followed during constructrion if requested by the enforcing agency.

### Enforcement:

**Plan intake:** The plan reviewer should confirm that the construction documents show the methods to be implemented to meet the code requirements' listed practices to be followed by the contractor.

**On-site enforcement:** The inspector should verify that duct openings for installed mechanical systems are protected from dust and mechanical equipment.

**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, sheetmetal 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.

### 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 plan reviewer should confirm that the construction documents show directions on proper installation practices to be followed by the contractor.

**On-site enforcement:** The inspector should verify protections of duct openings and mechanical equipment are in place for duct systems and equipment, to be installed during the construction phase.

**5.504.4 Finish material pollutant control.** Finish materials shall comply with Sections 5.504.4.1 through 5.504.4.6.

**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, sealants, sealant primers and caulks shall comply with local or regional air pollution control or air quality management district rules where applicable, or SCAQMD Rule 1168 VOC limits, as shown in Tables 5.504.4.1 and 5.504.4.2. 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 Collaborative for High Performance Schools California (CA-CHPS) Criteria Interpretation for EQ 7.0 and EQ 7.1 (formerly 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.**

**5.504.4.5.3 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 Collaborative for High Performance Schools California (CA-CHPS) Criteria Interpretation for EQ 7.0 and EQ 7.1 (formerly EQ 2.2)dated July 2012 and listed in the CHPS High Performance Product Database; or
4. Products certified under UL GREENGUARD Gold (formerly 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.

Interior Finishes

## Intent:

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

**Note:** See Chapter 8 of this guide for forms and templates.

## 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:

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

## Enforcement:

**Plan intake:** The plan reviewer should confirm that material specifications listed in the construction documents meet VOC emission limits.

**On-site enforcement:** The inspector should verify product data sheets/ containers furnished by the contractor, to verify that finishes specified on the approved plans and specifications are installed, or stored on site. The inspector may verify 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. Specified 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 2016 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 requirement is to filter particulate matter from the air by the use of at least MERV 8-rated filters, thereby improving air quality for building occpaunts.

Mechanical Ventilation for Occupied Spaces

## Compliance method:

Specify and install prior to occupancy at least MERV 8 filters for any return and makeup air systems.

## Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents that filters are specified to meet MERV 8 and labeling requirements or that specified equipment qualifies for the exception.

**On-site enforcement:** The inspector should verify that HVAC filtration specified on the approved construction document is installed or is stored on-site, with proper labeling. 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:

For buildings with smoking prohibitions, and in those instances where outdoor areas are dedicated for the use of smokers, this requirement is

intended to improve indoor air quality and to protect nonsmokers from second-hand smoke. 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 construction documents a signage specification that prohibits smoking for an outdoor area within 25 feet of building entries, outdoor air intakes and operable windows.

### Suggestion:

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

### Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents that, if an outdoor smoking area is shown, signage is specified and located.

**On-site enforcement:** The inspector should review any outdoor smoking areas indicated on the permit set and verify proper signage is installed.

**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 ,in addition to these provisions, intended to reduce the probability of mold and mildew growth, improving air quality for occupants. *California Building Code* Section 1203 for attic spaces and underfloor ventilation, Chapter 14 for a weather-resistant exterior wall envelope and Section 5.407.2.2, “Entries and openings,” in this code.

### Compliance method:

Include details on the construction documents that address moisture control and ventilation.

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 plan reviewer should confirm in the construction documents that moisture control and venting features meet Title 24 and are specified and detailed.

**On-site enforcement:** The inspector should verify that moisture control and venting measures have been incorporated into the building per the construction documents.

## 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 2016 *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. The 2016 *California Energy Code*, CCR, Title 24, Part 6, Sections 120.1(a) through 120.1(e) with ventilation flow rates as required by Table120.1-A. There is a possibility of a more stringent local ordinance, so verify local ordinances.

### 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 plan reviewer should verify that the construction documents show compliance with the building ventilation requirements as specified in Title 24, Part 6, and if applicable, Part 8.

**On-site enforcement:** The inspector should verify the natural ventilation features and mechanical ventilation systems that are installed on the project, requesting results of any testing of ventilation rates. Adequate building ventilation before occupancy 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 2016 *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 established and recognized as safe for human occupancy. 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 to established levels.

### Compliance method:

**Design team:** Specify and show $CO_2$ sensor locations in the construction documents. Those familiar with demand control ventilation should be familiar with these requirements.

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:

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

### Enforcement:

**Plan intake:** The plan reviewer should confirm that the construction documents show the $CO_2$ sensors and that they meet the requirements of Part 6.

**On-site enforcement:** The inspector should verify that the complying sensors displaying readings are installed per the construction documents. Confirm 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 the *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 that has not been developed shall be determined by the local general plan noise element.
3. Within the 65 CNEL or Ldn noise contour of a freeway or expressway, railroad, industrial source or fixed-guideway notice 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 Leq-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 hours of operations

**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.

### 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.

### Compliance method:

**Design team:** Determine if this code applies; if so, then specify and detail wall and ceiling assemblies and show in the construction documents.

The contractor should install the wall and ceiling assemblies per the construction documents.

### Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents that STC ratings are included that meet these requirements.

**On-site enforcement:** The inspector should verify that complying wall and ceiling assemblies are installed correctly per the construction documents.

## 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 requirement 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. 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 by 2020. 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:

Add a note in the construction documents and in the equipment specifications that CFC's and Halons are prohibited.

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:** The plan reviewer should confirm HVAC, fire suppression or refrigeration systems specified meet the code.

**On-site enforcement:** The inspector should verify that the equipment installed meets the construction documents requirements. 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 ($CO_2$), 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 (¼) 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 discrupture 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:

The intent of these requirements is to reduce supermarket refrigerant leakage of refrigeration systems containing high-global-warming potential (high-GWP) refrigerants with a GWP of 150 or greater. This requirement will also assist in meeting statewide requirements for the reduction of greenhouse gas emissions to 1990 levels and to prevent ozone depletion. Currently the 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 by the year 2020. 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 the code section applies. If so, clearly note in the construction documents and specifications that the required leak reduction measures have been incorporated.

**Note:** The replacement of existing refrigeration systems in existing facilities need to comply with this code requirement.

### Enforcement:

### Plan intake:

The plan reviewer should confirm if this code section applies by verifying that the project is a new retail food store with 8,000 square feet or more of conditioned area and utilizes either refrigerated display cases or walk-in coolers or freezers connected to remote compressor units or condensing units.

> **Note:** If the existing system is going to be replaced with a new refrigeration system, then this code system applies.

**On-site enforcement:** The inspector should verify within the construction documents that equipment installed complies. Inspection of this equipment may be combined with verification of building commissioning or testing and adjusting.

# CHAPTER 6 REFERENCED ORGANIZATIONS AND STANDARDS

Chapter 6 includes references to standards that are used to regulate materials and methods of construction. This chapter provides a list of organizations and standards that are referenced in the *CALGreen* Code. These referenced standards shall be considered part of the requirements of the code to the prescribed extent of each such reference per Section 101.5 of the 2016 *CALGreen* Code. In the event that the referenced standard is simply stated without a complete compliance method discribed, it may be necessary to access the original standard for specificity and compliance requiremements.

This chapter has been amended to reflect the most current reference standards used in other parts of *CALGreen*.

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# CHAPTER 7
# INSTALLER AND SPECIAL INSPECTOR QUALIFICATIONS

## SECTION 702
## QUALIFICATIONS

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

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

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**[BSC-CG]** When required by the enforcing agency, the owner or the responsible entity acting as the owner's agent shall employ one or more special inspectors to provide inspection or other duties necessary to substantiate compliance with this code. Special inspectors shall demonstrate competence to the satisfaction of the enforcing agency for the particular type of inspection or task to be performed. In addition, the special inspector shall have a certification from a recognized state, national or international association, as determined by the local agency. The area of certification shall be closely related to the primary job function, as determined by the local agency.

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

## Intent:

The intent of this code section is to advise the code user and local jurisdictions that there is a requirement in the *CALGreen* Code that HVAC system installers shall be trained and certified in the installation of HVAC systems including ducts and equipment. Nationally or regionally recognized training or certification programs can be used to show compliance. Note that there are certain exceptions where certification is not required, e.g., uncertified persons may perform HVAC installations when under the direct supervision and responsibility of a person trained and certified to install HVAC systems or contractor licensed to install HVAC systems. *CALGreen* provides a list of acceptable training and certification programs.

### SECTION 703
### VERIFICATIONS

**703.1 Documentation.** Documentation used to show compliance with this code shall include but is not limited to, construction documents, plans, specifications, builder or installer certification, inspection reports, or other methods acceptable to the enforcing agency which demonstrate substantial conformance. When specific documentation or special inspection is necessary to verify compliance, that method of compliance will be specified in the appropriate section or identified in the application checklist.

## Intent:

The intent of this code section is to advise the code user and local jurisdictions that there is a requirement in the *CALGreen* Code for verification of compliance. Compliance can be shown on the construction documents, plans, specifications, builder or installer certification, inspection reports or other methods acceptable to the enforcing agency that demonstrate substantial conformance.

# CHAPTER 8
# COMPLIANCE FORMS AND WORKSHEETS


## Nonresidential Forms and Templates

Chapter 8 in *CALGreen* contains worksheets WS-1, WS-2, Construction Waste Management (CWM) Plan, CWM Worksheet and CMM Acknowledgment.

This guide provides additional *CALGreen* forms, worksheets and reference materials for implementing BSC *CALGreen* measures. Copies of these forms, worksheets and templates are also available on the CBSC website: www.bsc.ca.gov

Use of these forms is not mandatory for compliance with *CALGreen*. These forms serve as templates or guides for code users and may be modified for your convenience. These forms can be used to assist in implementing the *CALGreen* regulations. It is CBSC's intent to maintain these non-regulatory forms on the CBSC website.

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## Verification Guidelines (Guide Only)

Chapter 8 also provides verification guidelines that include three checklists to be used for implementing CBSC *CALGreen* voluntary measures. These checklists are also available on the CBSC website: www.bsc.ca.gov

CBSC has created three checklists: one for all mandatory nonresidential measures (found in Chapter 5), one for voluntary Tier 1 measures and one for Tier 2 voluntary measures. These checklists can be used for verifying compliance with the tier options. Use of these checklists is not mandated for compliance with *CALGreen;* however, they can assist the local building departments in selecting and adopting local green building standards amendments (i.e., local ordinances) to *CALGreen*. Additionally, these checklists may be used by code users to assist in implementing the locally adopted *CALGreen* amendments. It is CBSC's intent to maintain these non-regulatory forms on the CBSC website: www.bsc.ca.gov.

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – SOIL LOSS PREVENTION PLAN CHECKLIST (Less than 1 Acre) – Div. 5.1**
BSC CG-100 (Rev. 12/16)

## SOIL LOSS PREVENTION PLAN CHECKLIST (Less than 1 Acre)

Project location:_____Project area:_____

Contact name & title:_____

Telephone:_____Cell phone:_____

Date plan submitted:_____On plans ☐ Separately ☐

| BEST MANAGEMENT PRACTICES | 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: |

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – BASELINE WATER USE WORKSHEET – Div. A5.3**
BSC CG-101 (Rev. 12/16)

# BASELINE WATER USE WORKSHEET (WS-1)

| BASELINE WATER USE CALCULATION TABLE | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **FIXTURE TYPE** | **FLOW-RATE** | | **DURATION** | | **DAILY USES** | | **OCCUPANTS[1]** | | **GALLONS PER DAY** |
| Showerheads | 2.0 gpm@80 psi | × | 5 min. | × | 1 | × | Note 1a | = | |
| Lavatory faucets nonresidential | 0.5 gpm@60 psi | × | .25 min. | × | 3 | | | = | |
| Kitchen faucets | 1.8 gpm@60 psi | × | 4 min. | × | 1 | × | Note 1b | | |
| Replacement aerators | 2.0 gpm | × | | × | | × | | = | |
| Wash fountains | 1.8 gpm/20[rim space(in.)@ 60 psi] | × | | × | | × | | = | |
| Metering faucets | 0.20 gal/cycle | × | .25 min. | × | 3 | × | | = | |
| Metering faucets for wash fountains | 0.20 gal/cycle /20 [rim space(in.)@ 60 psi] | × | .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 or 0.125[3] gal/ flush | × | 1 flush | × | 2 male | × | | = | |
| Total daily baseline water use (BWU) | | | | | | | | = | |

1. For nonresidential occupancies, refer to Table A, Chapter 4, 2016 *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. Kitchen faucet use is determined by the occupant load of the area served by the fixture.
2. The daily use number shall be increased to three if urinals are not installed in the room.
3. Floor-mounted urinals @0.5 GPF or wall-mounted urinals @0.125 GPF

**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, Part 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: |

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – WATER USE REDUCTION CALCULATION WORKSHEET – Div. A5.303**
BSC CG-102 (Rev. 12/16)

## WATER USE REDUCTION WORKSHEET (WS-2)

**12, 20, 25-PERCENT REDUCTION WATER USE CALCULATION TABLE**

| Fixture Type | FLOW RATE[2] | | DURATION | | DAILY USES | | OCCUPANTS[1] | | GALLONS PER DAY |
|---|---|---|---|---|---|---|---|---|---|
| Showerheads | | × | 5 min. | × | 1 | × | Note 1a | = | |
| Lavatory faucets nonresidential[4] | | × | .25 min. | × | 3 | × | | = | |
| Kitchen faucets | | × | 4 min. | × | 1 | × | Note 1b | = | |
| Replacement aerators | | × | | × | | × | | = | |
| Wash fountains | | × | | × | | × | | = | |
| Metering faucets | | × | .25 min. | × | 3 | × | | = | |
| Metering faucets forwash fountains | | × | .25 min. | × | | × | | = | |
| Gravity tank type water closets[2] | | × | 1 flush | × | 1 male[3]<br>3 female | × | | = | |
| Flushometer tank water closets[2] | | × | 1 flush | × | 1 male[3]<br>3 female | × | | = | |
| Flushometer valve water closets[2] | | × | 1 flush | × | 1 male[3]<br>3 female | × | | = | |
| Electromechanical hydraulic water closets[2] | | × | 1 flush | × | 1 male[3]<br>3 female | × | | = | |
| Urinals | | × | 1 flush | × | 2 male | × | | = | |
| Urinals nonwater supplied | 0.0 gal/flush | × | 1 flush | × | 2 male | × | | = | |
| | | | | | | | Proposed water use | = | |

12% Reduction (BWU from WS-1) × .88 = _____ Allowable water use

20% Reduction (BWU from WS-1) × .80 = _____ Allowable water use

25% Reduction (BWU from WS-1) × .75 = _____ Allowable water use

1. For occupancies, refer to Table A, Chapter 4, 2016 *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. Kitchen faucet use is determined by the occupant load of the area served by the fixture.
2. Includes single and dual flush water closets with an effective flush of 1.28 gallons or less.
   Single flush toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is the average flush volume when tested in accordance with ASME A112.19.2.
   Dual flush toilets - The effective flush volume shall not exceed 1.28 gallons (4.8 liters). The effective flush volume is defined as the composite, average flush volume of two reduced flushes and one full flush. Flush volumes will be tested in accordance with ASME A112.19.2 and ASME A112.19.14.
3. The daily use number shall be increased to three if urinals are not installed in the room.
4. Where complying faucets are unavailable, aerators rated at .35 gpm or other means may be used to achieve reduction.

| **Contractor (Documentation Author's /Responsible Designer's Declaration Statement)** | |
|---|---|
| • I certify that this Certificate of Compliance documentation is accurate and complete.<br>• I certify that the features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 11 of the *California Code of Regulations*.<br>• 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: |

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – CONSTRUCTION WASTE MANAGEMENT (CWM) PLAN – Div. 5.4**
BSC CG-104 (Rev. 12/16)

# CONSTRUCTION WASTE MANAGEMENT (CWM) PLAN

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

Project Name: _____

Job #: _____

Project Manager: _____

Waste Hauling Company: _____

Contact Name: _____

**All Subcontractors shall comply with the project's Construction Waste Management Plan.**

**All Subcontractor foremen shall sign the CWM Plan Acknowledgement Sheet.**

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

1. The project's overall rate of waste diversion will be ____ %.
2. This project shall generate the least amount of waste possible by planning and ordering carefully, following all proper storage and handling procedures to reduce broken and damaged materials and reusing materials whenever possible. The majority of the waste that is generated on this jobsite will be diverted from the landfill and recycled for other use.
3. Spreadsheet 1, enclosed, identifies the waste materials that will be generated on this project, the diversion strategy for each waste type and the anticipated diversion rate.
4. Waste prevention and recycling activities will be discussed at the beginning of weekly subcontractor meetings. As each new subcontractor comes on-site, the WMP Coordinator will present him/her with a copy of the CWM Plan and provide a tour of the jobsite to identify materials to be salvaged and the procedures for handling jobsite debris. 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.

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – CONSTRUCTION WASTE MANAGEMENT (CWM) WORKSHEET – Div. 5.4**
BSC CG-105 (Rev. 12/16)

# CONSTRUCTION WASTE MANAGEMENT (CWM) WORKSHEET

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

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

| 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 recharge-able batteries, toner cartridges, and elec-tronic devices | | | |
| Other: | | | |
| Other: | | | |
| Other: | | | |
| | | | |

| **Contractor (Documentation Author's /Responsible Designer's Declaration Statement)**<br>• I certify that this Certificate of Compliance documentation is accurate and complete.<br>• I certify that the features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 11 of the *California Code of Regulations*.<br>• 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: |

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – CONSTRUCTION WASTE MANAGEMENT (CWM) ACKNOWLEDGMENT – Div. 5.4**
BSC CG-106 (Rev. 12/16)

# CONSTRUCTION WASTE MANAGEMENT (CWM) ACKNOWLEDGMENT

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

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

**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 |
|---|---|---|---|
| | | | |
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| **Contractor (Documentation Author's /Responsible Designer's Declaration Statement)** | |
|---|---|
| • I certify that this Certificate of Compliance documentation is accurate and complete.<br>• I certify that the features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 11 of the *California Code of Regulations*.<br>• 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: |

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – COMPLIANCE TEMPLATE – OWNER'S PROJECT REQUIREMENTS (OPR) – Div. 5.4**
BSC CG-107 (Rev. 12/16)

# OWNER'S PROJECT REQUIREMENTS (OPR) COMPLIANCE TEMPLATE

*The Owner's Project Requirements (OPR) is a step of commissioning required for compliance with the 2016 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

*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:**

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – COMPLIANCE FORM – OWNER'S PROJECT REQUIREMENTS (OPR) – Div. 5.4**
BSC CG-108 (Rev. 12/16)

## OWNER'S PROJECT REQUIREMENTS (OPR) COMPLIANCE FORM

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 2016 *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's Representative Signature

Date

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – COMPLIANCE TEMPLATE – BASIS OF DESIGN (BOD) – Div. 5.4**
BSC CG-109 (Rev. 12/16)

# BASIS OF DESIGN (BOD) COMPLIANCE TEMPLATE

*Documentation of the Basis of Design (BOD) is a step required for compliance with 2016 CALGreen Code, Section 5.410.2.1, for newly constructed buildings greater than 10,000 sq ft. This template is a guide for use by the design team.*

## 1. HVAC system]

### 1.1. Narrative Description of System

A. [*System type(s), location, control type, efficiency features, outdoor air ventilation strategy, indoor air quality features, noise reduction features, environmental benefits, other special features.*]

B. [*Describe how system meets any special requirements listed in the Owner's Project Requirements document.*]

### 1.2. Reasons for System Selection

[*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 2016 *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 2016 *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*]

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – COMPLIANCE FORM – Cx MEASURES IN CONSTRUCTION DOCUMENTS – Div. 5.4**
BSC CG-110 (Rev. 12/16)

## Cx MEASURES IN THE CONSTRUCTION DOCUMENTS COMPLIANCE FORM

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's Representative or Designer of Record Signature** **Date**

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – COMPLIANCE FORM – COMMISSIONING PLAN – Div. 5.4**
BSC CG-111 (Rev. 12/16)

## COMMISSIONING PLAN COMPLIANCE FORM

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's Representative Signature** **Date**

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – COMPLIANCE FORM – FUNCTIONAL PERFORMANCE TESTING – Div. 5.4**
BSC CG-112 (Rev. 12/16)

## FUNCTIONAL PERFORMANCE TESTING COMPLIANCE FORM

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**

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – COMPLIANCE FORM – SYSTEMS MANUAL – Div. 5.4**
BSC CG-113 (Rev. 12/16)

# SYSTEMS MANUAL COMPLIANCE FORM

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's Representative Signature** **Date**

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – COMPLIANCE FORM – SYSTEM OPERATIONS TRAINING – Div. 5.4**
BSC CG-114 (Rev. 12/16)

# SYSTEM OPERATIONS TRAINING COMPLIANCE FORM

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's Representative Signature** **Date**

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – COMPLIANCE FORM – COMMISSIONING REPORT – Div. 5.4**
BSC CG-115 (Rev. 12/16)

## COMMISSIONING REPORT COMPLIANCE FORM

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's Representative Signature** **Date**

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – FINISH MATERIAL CERTIFICATE – ADHESIVES – Div. 5.5**
BSC CG-116 (Rev. 12/16)

## ADHESIVE VOC LIMIT[1,2] (Table 5.504.4.1)

| FINISH | WHERE USED (TYPE) | MANUFACTURER | VOC LIMIT (GPL) | SUB-CONTR. INITIAL |
|---|---|---|---|---|
| **ADHESIVES (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 | |
| **SUBSTRATE SPECIFIC APPLICATIONS** | | | | |
| Metal to metal | | | 30 | |
| Plastic foams / porous material | | | 50 | |
| Wood | | | 30 | |
| Fiberglass | | | 80 | |

1. If an adhesive is used to bond dissimilar substrates together the adhesive with the higher VOC content shall be allowed.
2. For additional information regarding methods to measure the VOC content specified in this table, see South Coast Air Quality Management District Rule 1168, http://www.arb.ca.gov/DRDB/SC/CURHTML/R1168.PDF.

| **Contractor (Documentation Author's /Responsible Designer's Declaration Statement)**<br>• I certify that this Certificate of Compliance documentation is accurate and complete.<br>• I certify that the features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 11 of the *California Code of Regulations*.<br>• 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: |

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – FINISH MATERIAL CERTIFICATE – ARCHITECTURAL COATINGS– Div. 5.5**

BSC CG-117 (Rev. 12/16)

## VOC CONTENT LIMITS FOR ARCHITECTURAL COATINGS[2,3] (Table 5.504.4.3)

| FINISH | WHERE USED (TYPE) | MANUFACTURER | VOC LIMIT (GPL) | 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[1] | | | 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 | |

| FINISH | WHERE USED (TYPE) | MANUFACTURER | VOC LIMIT (GPL) | SUB-CONTR. INITIAL |
|---|---|---|---|---|
| Reactive penetrating sealers | | | 350 | |
| Recycled coatings | | | 250 | |
| Roof coatings | | | 50 | |
| Rust preventative coatings | | | 250[3] | |
| Shellacs<br>Clear:<br>Opaque | | | <br>730<br>550 | |
| Specialty primers, sealers and undercoaters | | | 100 | |
| Stains | | | 250 | |
| Stone consolidants | | | 450 | |
| Swimming pool coatings | | | 340 | |
| Traffic marking coatings | | | 100 | |
| Tub and tile refinish coatings | | | 420 | |
| Waterproofing membranes | | | 250 | |
| Wood coatings | | | 275 | |
| Wood preservatives | | | 350 | |
| Zinc-rich primers | | | 340 | |

1. Grams of VOC per liter of coating, including water and including exempt compounds
2. The specified limits remain in effect unless revised limits are listed in subsequent columns in the table.
3. Values in this table are derived from those specified by the California Air Resources Board, Architectural Coatings Suggested Control Measures, February 1, 2008. More information is available from the Air Resources Board.

**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, Part 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: |

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – FINISH MATERIAL CERTIFICATE – COMPOSITE WOOD PRODUCTS – Div. 5.5**
BSC CG-118 (Rev. 12/16)

## FORMALDEHYDE LIMITS (Table 5.504.4.5)

| 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 fiberboard[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, Part 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: |

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – FINISH MATERIAL CERTIFICATE – FLOORING – Div. 5.5**
BSC CG-119 (Rev. 12/16)

## CARPET SYSTEMS AND RESILIENT FLOORING SYSTEMS (See Sections 5.504.4.4 & 5.504.4.6)

| FINISH | MANUFACTURER | CERTIFICATION ORGANIZATION | SUB-CONTR. INITIAL |
|---|---|---|---|
| **FLOORING** | **All carpet installed in the building interior shall meet at least one of the following testing and product requirements** | | |
| Carpet 1 | | Carpet and Rug Institute – Green Label Plus Program | |
| | | 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); | |
| | | NSF/ANSI 140 at the Gold level or higher | |
| | | Scientific Certifications Systems Sustainable Choice | |
| | | Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria Interpretation for EQ 7.0 and EQ 7.1 (formerly EQ 2.2) dated July 2012 and listed in the CHPS High Performance Product Database | |
| Carpet 2 | | Duplicate requirement above | |
| | | Duplicate requirement above | |
| | | Duplicate requirement above | |
| | | Duplicate requirement above | |
| | | Duplicate requirement above | |
| Carpet cushion 1 | | Carpet and Rug Institute – Green Label Plus Program | |
| Carpet cushion 2 | | Duplicate requirement above | |
| Resilient flooring 1 | **For 80 percent of floor area receiving resilient flooring, installed resilient flooring shall meet at least one of the following:** | | |
| | | Certified under the Resilient Floor Covering Institute (RFCI) FloorScore program | |
| | | 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 | |
| | | Compliant with the Collaborative for High Performance Schools California (CA-CHPS) Criteria Interpretation for EQ 7.0 and EQ 7.1 (formerly EQ 2.2) dated July 2012 and listed in the CHPS High Performance Product Database | |
| | | Products certified under UL GREENGUARD Gold (formerly the Greenguard Children's & Schools Program) | |
| Resilient flooring 2 | | Duplicate requirement above | |
| | | Duplicate requirement above | |
| | | Duplicate requirement above | |
| | | Duplicate requirement above | |

| **Contractor (Documentation Author's /Responsible Designer's Declaration Statement)**<br>• I certify that this Certificate of Compliance documentation is accurate and complete.<br>• I certify that the features and performance specifications for the design identified on this Certificate of Compliance conform to the requirements of Title 24, Part 11 of the *California Code of Regulations*.<br>• 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: |

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen – FINISH MATERIAL CERTIFICATE – SEALANTS – Div. 5.5**
BSC CG-120 (Rev. 12/16)

## SEALANT VOC LIMIT (Table 5.504.4.2)

| FINISH | WHERE USED (TYPE) | MANUFACTURER | VOC LIMIT (GPL) | SUB-CONTR. INITIAL |
|---|---|---|---|---|
| **SEALANTS & CAULKS** | | | | |
| Architectural | | | 250 | |
| Marine deck | | | 760 | |
| Non-membrane roof | | | 300 | |
| Roadway | | | 250 | |
| Single-ply roof membrane | | | 450 | |
| Other | | | 420 | |
| **SEALANT PRIMERS** | | | | |
| Architectural nonporous<br>Porous | | | 250<br>775 | |
| Modified bituminous | | | 500 | |
| Marine deck | | | 760 | |
| Other | | | 750 | |

Note: For additional information regarding methods to measure the VOC content specified in this table, see South Coast Air Quality Management District Rule 1168.

**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, Part 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: |

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen Verification Guidelines – Mandatory Measures Checklist**
BSC CG-200 (Rev. 12/16)

## *CALGreen* VERIFICATION GUIDELINES MANDATORY MEASURES CHECKLIST

**Application:** This checklist shall be used for nonresidential projects that meet one of the following: new construction, building additions of 1,000 sq. ft. or greater or building alterations with a permit valuation of $200,000 or more pursuant to *CALGreeen* Section 301.1 AND do not trigger a Tier 1 or Tier 2 requirement:

**Y** = Yes (section has been selected and/or included)
**N/A** = Not Applicable (Code section does not apply to the project, mainly used for additions and alterations)
**O** = Other (provide explanation)
**[N]** = New construction pursuant to Section 301.1
**[A]** = Additions and/or alterations pursuant to Section 301.1

| CHAPTER 5 DIVISIONS | | SECTION TITLE | CODE SECTION | Y | N/A | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|
| **DIVISION 5.1 Planning and Design** | Mandatory | Storm Water Pollution Prevention w/ subsections | 5.106.1 through 5.106.1.2 | | | | |
| | Mandatory | Short Term Bicycle Parking | 5.106.4.1.1 | | | | |
| | Mandatory | Long Term Bicycle Parking | 5.106.4.1.2 | | | | |
| | Mandatory | Designated Parking For Clean Air Vehicles | 5.106.5.2 | | | | |
| | Mandatory | Parking stall marking | 5.106.5.2.1 | | | | |
| | Mandatory | Single (EV) Charging space requirements [N] | 5.106.5.3.1 | | | | |
| | Mandatory | Multiple (EV) Charging space requirements [N] | 5.106.5.3.2 | | | | |
| | Mandatory | EV charging space calculation [N] w/exceptions | 5.106.5.3.3 | | | | |
| | Mandatory | [N] Identification | 5.106.5.3.4 | | | | |
| | Mandatory | [N] Future charging spaces w/ notes 1-3 | 5.106.5.3.5 | | | | |
| | Mandatory | Light Pollution Reduction [N] w/ exceptions and note | 5.106.8 | | | | |
| | Mandatory | Grading and Paving w/exception for Additions and Alterations not altering the drainage path | 5.106.10 | | | | |
| **DIVISION 5.2 Energy Efficiency** | Mandatory | Meet the minimum Energy Efficiency Standard | 5.201.1 | | | | |
| **DIVISION 5.3 Water Efficiency and Conservation** | Mandatory | Separate Meters (new buildings or additions > 50,000 SF that consume more than 100 gal/day) | 5.303.1.1 | | | | |
| | Mandatory | Separate Meters (for tenants in new buildings or additions that consume more than 1,000 gal/day) | 5.303.1.2 | | | | |
| | Mandatory | Water closets shall not exceed 1.28 gallons per flush | 5.303.3.1 | | | | |
| | Mandatory | Wall-mounted urinals shall not exceed 0.125 gpf | 5.303.3.2.1 | | | | |
| | Mandatory | Floor-mounted urinals shall not exceed 0.5 gpf | 5.303.3.2.2 | | | | |
| | Mandatory | Single showerhead shall have maximum flow rate of 2.0 gpm (gallons per minute) at 80 psi | 5.303.3.3.1 | | | | |
| | Mandatory | Multiple showerheads serving one shower shall have a combined flow rate of 2.0 gpm at 80 psi | 5.303.3.3.2 | | | | |
| | Mandatory | Nonresidential lavatory faucets | 5.303.3.4.1 | | | | |
| | Mandatory | Kitchen faucets | 5.303.3.4.2 | | | | |
| | Mandatory | Wash basins | 5.303.3.4.3 | | | | |
| | Mandatory | Metering faucets | 5.303.3.4.4 | | | | |

| CHAPTER 5 DIVISIONS | | SECTION TITLE | CODE SECTION | Y | N/A | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|
| | Mandatory | Metering faucets for wash fountains | 5.303.3.4.5 | | | | |
| | Mandatory | Food waste disposers w/note | 5.303.4.1 | | | | |
| | Mandatory | Areas of additions and alterations | 5.303.5 | | | | |
| | Mandatory | Standards for plumbing fixtures and fittings | 5.303.6 | | | | |
| | Mandatory | Outdoor water use in landscape areas equal to or greater than 500 square feet | 5.304.2 | | | | |
| | Mandatory | Outdoor water use in rehabilitated landscape projects with areas equal to or greater than 2,500 square feet | 5.304.3 | | | | |
| | Mandatory | Outdoor water use in landscape areas of 2,500 square feet or less | 5.304.4 | | | | |
| | Mandatory | Graywater or rainwater use in landscaped areas | 5.304.5 | | | | |
| **DIVISION 5.4 Material Conservation and Resource Efficiency** | Mandatory | Weather Protection | 5.407.1 | | | | |
| | Mandatory | Moisture Control: sprinklers | 5.407.2.1 | | | | |
| | Mandatory | Moisture Control: Exterior door protection | 5.407.2.2.1 | | | | |
| | Mandatory | Moisture Control: Flashing | 5.407.2.2.2 | | | | |
| | Mandatory | Construction waste management-comply with either: sections 5.408.1.1, 5.408.1.2, 5.408.1.3 or more stringent local ordinance | 5.408.1.1, 5.408.1.2, 5.408.1.3 | | | | |
| | Mandatory | Construction waste management: Documentation w/notes | 5.408.1.4 | | | | |
| | Mandatory | Universal Waste [A] | 5.408.2 | | | | |
| | Mandatory | Excavated soil and land clearing debris w/ exception and notes | 5.408.3 | | | | |
| | Mandatory | Recycling by Occupants w/ exception | 5.410.1 | | | | |
| | Mandatory | Recycling by Occupants: Additions w/ exception | 5.410.1.1 | | | | |
| | Mandatory | Recycling by Occupants: Sample ordinance | 5.410.1.2 | | | | |
| | Mandatory | Commissioning new buildings (≥ 10,000 SF) [N] w/exceptions and notes | 5.410.2 | | | | |
| | Mandatory | Owner's or Owner representative's Project Requirements (OPR) [N] | 5.410.2.1 | | | | |
| | Mandatory | Basis of Design (BOD) [N] | 5.410.2.2 | | | | |
| | Mandatory | Commissioning Plan [N] | 5.410.2.3 | | | | |
| | Mandatory | Functional Performance Testing [N] | 5.410.2.4 | | | | |
| | Mandatory | Documentation and Training [N] | 5.410.2.5 | | | | |
| | Mandatory | Systems Manual [N] | 5.410.2.5.1 | | | | |
| | Mandatory | Systems Operation Training) [N] | 5.410.2.5.2 | | | | |
| | Mandatory | Commissioning Report [N] | 5.410.2.6 | | | | |
| | Mandatory | Testing and adjusting for new buildings < 10,000 SF or new systems that serve additions or alterations. | 5.410.4 | | | | |
| | Mandatory | System Testing Plan for HVAC, Lighting, water heating, renewable energy, landscape irrigation and water reuse. | 5.410.4.2 | | | | |
| | Mandatory | Procedures for testing and adjusting | 5.410.4.3 | | | | |
| | Mandatory | HVAC balancing | 5.410.4.3.1 | | | | |
| | Mandatory | Reporting for testing and adjusting | 5.410.4.4 | | | | |
| | Mandatory | Operation and Maintenance (O&M) Manual | 5.410.4.5 | | | | |
| | Mandatory | Inspection and reports | 5.410.4.5.1 | | | | |

| CHAPTER 5 DIVISIONS | | SECTION TITLE | CODE SECTION | Y | N/A | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|
| **DIVISION 5.5 Environ-mental Quality** | Mandatory | Fireplaces | 5.503.1 | | | | |
| | Mandatory | Woodstoves | 5.503.1.1 | | | | |
| | Mandatory | Temporary ventilation | 5.504.1 | | | | |
| | Mandatory | Covering of ducts openings and protection of mechanical equipment during construction | 5.504.3 | | | | |
| | Mandatory | Adhesives, sealants and caulks | 5.504.4.1 | | | | |
| | Mandatory | Paints and coatings | 5.504.4.3 | | | | |
| | Mandatory | Aerosol paints and coatings | 5.504.4.3.1 | | | | |
| | Mandatory | Aerosol paints and coatings: Verification | 5.504.4.3.2 | | | | |
| | Mandatory | Carpet systems | 5.504.4.4 | | | | |
| | Mandatory | Carpet cushion | 5.504.4.4.1 | | | | |
| | Mandatory | Carpet adhesive | 5.504.4.4.2 | | | | |
| | Mandatory | Composite wood products | 5.504.4.5 | | | | |
| | Mandatory | Composite wood products: Documentation | 5.504.4.5.3 | | | | |
| | Mandatory | Resilient flooring systems | 5.504.4.6 | | | | |
| | Mandatory | Resilient flooring: Verification of compliance | 5.504.4.6.1 | | | | |
| | Mandatory | Filters w/ exceptions | 5.504.5.3 | | | | |
| | Mandatory | Filters: Labeling | 5.504.5.3.1 | | | | |
| | Mandatory | Environmental tobacco smoke (ETS) control | 5.504.7 | | | | |
| | Mandatory | Indoor moisture control | 5.505.1 | | | | |
| | Mandatory | Outside air delivery | 5.506.1 | | | | |
| | Mandatory | Carbon dioxide ($CO_2$) monitoring | 5.506.2 | | | | |
| | Mandatory | Acoustical control w/ exception | 5.507.4 | | | | |
| | Mandatory | Exterior noise transmission, prescriptive method w/ exceptions | 5.507.4.1 | | | | |
| | Mandatory | Noise exposure where noise contours are not readily available | 5.507.4.1.1 | | | | |
| | Mandatory | Performance method | 5.507.4.2 | | | | |
| | Mandatory | Site features | 5.507.4.2.1 | | | | |
| | Mandatory | Documentation of compliance | 5.507.4.2.2 | | | | |
| | Mandatory | Interior sound transmission w/ note | 5.507.4.3 | | | | |
| | Mandatory | Ozone depletion and greenhouse gas reductions | 5.508.1 | | | | |
| | Mandatory | Chlorofluorocarbons (CFCs) | 5.508.1.1 | | | | |
| | Mandatory | Halons | 5.508.1.2 | | | | |
| | Mandatory | Supermarket refrigerant leak reduction for retail food stores 8,000 square feet or more sections 5.508.2 through 5.508.2.6.3 | 5.508.2 through 5.508.2.6.3 | | | | |
| | | END OF MANDATORY PROVISIONS | | | | | |

| | |
|---|---|
| **Documentation Author's /Responsible Designer's Declaration Statement Mandatory:** I attest that this mandatory provisions checklist is accurate and complete. | |
| Signature: | |
| Company: | Date: |
| Address: | License: |
| City/State/Zip | License: |

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen Verification Guidelines – Tier 1 Checklist**
BSC CG-201 (Rev. 12/16)

## *CALGreen* VERIFICATION GUIDELINES TIER 1 CHECKLIST

**Application:** This checklist shall be used for nonresidential projects that meet the following: new construction, or building additions of 1,000 sq. ft. or greater, or building alterations with a permit valuation of $200,000 or more pursuant to *CALGreen* Section 5.301.1, AND are adopting Tier 1 voluntary measures.

*Note: All applicable mandatory requirements in chapter 5 shall be met prior to applying Tier 1 voluntary measures.*

**Instructions:**

Comply with all Tier 1 (prerequisite) measures from the various categories shown on the table below.

Add a "Y" to all Mandatory and Tier 1 mandatory provisions in the appropriate columns.

Select the required number of additional electives from those categories shown on the table below and add a "Y" on the selected elective and add an "N" on the rest.

Count the total number of Tier 1 (prerequisite) measures plus the additional electives and write down the total number at the end of the checklist. Determine if the required number of Tier 1 measures have been selected to achieve Tier 1 compliance.

**Y** = Yes (section has been selected and/or included)
**N** = No (section has not been selected and/or included)
**O** = Other (provide explanation)
**[N]** = New construction pursuant to Section 301.1
**[A]** = Additions and/or alterations pursuant to Section 301.1

| CHAPTER 5 DIVISIONS | | SECTION TITLE | CODE SECTION | Y | N | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|
| **DIVISION 5.1 Planning and Design** | Mandatory | Storm Water Pollution Prevention w/subsections | 5.106.1 througth 5.106.1.2 | | | | |
| | Mandatory | Short Term Bicycle Parking | 5.106.4.1.1 | | | | |
| | Mandatory | Long Term Bicycle Parking | 5.106.4.1.2 | | | | |
| | Mandatory | Designated Parking for clean air vehicles | 5.106.5.2 | | | | |
| | *Tier 1 Prerequisite* | *Designated Parking - 10% of Parking Capacity* | *A5.106.5.1.1* | | | | |
| | Mandatory | Parking stall marking | 5.106.5.2.1 | | | | |
| | Mandatory | Single (EV) Charging space requirements | 5.106.5.3.1 | | | | |
| | Mandatory | Multiple (EV) Charging space requirements | 5.106.5.3.2 | | | | |
| | *Tier 1 Prerequisite* | *Electric Vehicle (EV) Charging [N]* | *A5.106.5.3.1* | | | | |
| | Mandatory | EV charging space calculation [N] w/ exceptions | 5.106.5.3.3 | | | | |
| | Mandatory | [N] Identification | 5.106.5.3.4 | | | | |
| | Mandatory | [N] Future charging spaces w/ notes 1-3 | 5.106.5.3.5 | | | | |
| | Mandatory | Light Pollution Reduction [N] w/ exceptions and note | 5.106.8 | | | | |
| | Mandatory | Grading and Paving, w/exception for Additions and Alterations not altering the drainage path | 5.106.10 | | | | |
| | *Tier 1 Prerequisite* | *Cool Roof (T.A5.106.11.2.2): SRI 75 when < 2:12, SRI 16 when >2:12* | *A5.106.11.2* | | | | |

| CHAPTER 5 DIVISIONS | | | SECTION TITLE | CODE SECTION | Y | N | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|---|
| | SELECT ONE ELECTIVE | *Electives* | *Community Connectivity* | *A5.103.1* | | | | |
| | | *Electives* | *Brownfield or Greyfield site redevelopment or infill area development.* | *A5.103.2* | | | | |
| | | *Electives* | *Reduce development footprint and optimize open space.* | *A5.104.1* | | | | |
| | | *Electives* | *Disassemble and Reuse Existing Building Structure (70%)* | *A5.105.1.1* | | | | |
| | | *Electives* | *Disassemble and Reuse Existing Non-Structure elements (50%)* | *A5.105.1.2* | | | | |
| | | *Electives* | *Salvage* | *A5.105.1.3* | | | | |
| | | *Electives* | *Storm Water Design* | *A5.106.2* | | | | |
| | | *Electives* | *Low Impact Development (LID)* | *A5.106.3* | | | | |
| | | *Electives* | *Changing rooms* | *A5.106.4.3* | | | | |
| | | *Electives* | *Parking Capacity* | *A5.106.6* | | | | |
| | | *Electives* | *Exterior Wall Shading* | *A5.106.7* | | | | |
| | | *Electives* | *Heat island Effect* | *A5.106.11* | | | | |
| **DIVISION 5.2 Energy Efficiency** | | Mandatory | Meet the minimum Energy Efficiency Standard | 5.201.1 | | | | |
| | | Tier 1 Prerequisite | Energy Performance Outdoor lighting power 90% of Part 6 | A5.203.1.1.1 | | | | |
| | | Tier 1 Prerequisite | If applicable, Service for water heating in restaurants 8,000 sf or greater | A5.203.1.1.2 | | | | |
| | | Tier 1 Prerequisite | Energy Budget 95% or 90% of Part 6 calculated value of allowance | A5.203.1.2.1 | | | | |
| | SELECT ONE ELECTIVE | Elective | On-site renewable energy w/ documentation | A5.211.1 A5.211.1.1 | | | | |
| | | Elective | Green power | A5.211.3 | | | | |
| | | Elective | Elevators w/ car lights and fan | A5.212.1.1 A5.212.1.1.1 | | | | |
| | | Elective | Escalators w/ controls | A5.212.1.2 A5.212.1.4 | | | | |
| | | Elective | Steel framing | A5.213.1 | | | | |
| **DIVISION 5.3 Water Efficiency and Conservation** | | Mandatory | Separate Meters (new Buildings or additions > 50,000 SF that consume more than 100 gal/day) | 5.303.1.1 | | | | |
| | | Mandatory | Separate Meters (for tenants in new buildings or additions that consume more than 1,000 gal/day) | 5.303.1.2 | | | | |
| | | Tier 1 Prerequisite | Water Reduction Tier 1. 12% savings over the "water use baseline" Table A5.303.2.2 or Meet table A5.303.2.3.1 | A5.303.2.3.1 | | | | |
| | | Mandatory | Water closets shall not exceed 1.28 gallons per flush | 5.303.3.1 | | | | |
| | | Mandatory | Wall-mounted urinals shall not exceed 0.125 gpf | 5.303.3.2.1 | | | | |
| | | Mandatory | Floor-mounted urinals shall not exceed 0.5 gpf | 5.303.3.2.2 | | | | |
| | | Mandatory | Single showerhead shall have maximum flow rate of 2.0 gpm (gallons per minute) at 80 psi | 5.303.3.3.1 | | | | |
| | | Mandatory | Multiple showerheads serving one shower shall have a combined flow rate of 2.0 gpm at 80 psi | 5.303.3.3.2 | | | | |
| | | Mandatory | Nonresidential lavatory faucets | 5.303.3.4.1 | | | | |
| | | Mandatory | Kitchen faucets | 5.303.3.4.2 | | | | |
| | | Mandatory | Wash basins | 5.303.3.4.3 | | | | |
| | | Mandatory | Metering faucets | 5.303.3.4.4 | | | | |

| CHAPTER 5 DIVISIONS | | | SECTION TITLE | CODE SECTION | Y | N | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|---|
| | | Mandatory | Metering faucets for wash fountains | 5.303.3.4.5 | | | | |
| | | Mandatory | Food waste disposers w/note | 5.303.4.1 | | | | |
| | | Mandatory | Areas of additions and alterations | 5.303.5 | | | | |
| | | Mandatory | Standards for plumbing fixtures and fittings | 5.303.6 | | | | |
| | | Mandatory | Outdoor water use in landscape areas equal to or greater than 500 square feet | 5.304.2 | | | | |
| | | Mandatory | Outdoor water use in rehabilitated landscape projects with areas equal to or greater than 2,500 square feet | 5.304.3 | | | | |
| | | Mandatory | Outdoor water use in landscape areas of 2,500 square feet or less | 5.304.4 | | | | |
| | | Mandatory | Graywater or rainwater use in landscaped areas | 5.304.5 | | | | |
| | SELECT ONE ELECTIVE | *Elective* | *Nonpotable water systems for indoor use* | *A5.303.2.3.4* | | | | |
| | | *Elective* | *Appliances and fixtures for commercial application* | *A5.303.3* | | | | |
| | | *Elective* | *Dual plumbing* | *A5.303.5* | | | | |
| | | *Elective* | *Outdoor potable water use* | *A5.304.2.1* | | | | |
| | | *Elective* | *Potable water reduction 60 percent ETo* | *A5.304.4 A5.304.4.1 A5.304.4.3* | | | | |
| | | *Elective* | *Potable water elimination* | *A5.304.5* | | | | |
| | | *Elective* | *Restoration of areas disturbed by construction* | *A5.304.6* | | | | |
| | | *Elective* | *Previously developed sites w/ exception* | *A5.304.7* | | | | |
| | | *Elective* | *Graywater irrigation system* | *A5.304.8* | | | | |
| | | *Elective* | *Nonpotable water systems* | *A5.305.1* | | | | |
| | | *Elective* | *Irrigation systems* | *A5.305.2* | | | | |
| | | *Elective* | *Wood framing or OVE w/ note* | *A5.404.1 A5.404.1.1 A5.404.1.2* | | | | |
| | | *Elective* | *Regional materials* | *A5.405.1* | | | | |
| | | *Elective* | *Bio-based materials* | *A5.405.2* | | | | |
| | | *Elective* | *Rapidly renewable materials* | *A5.405.2.2* | | | | |
| | | *Elective* | *Reused materials w/ note* | *A5.405.3* | | | | |
| **DIVISION 5.4 Material Conservation and Resource Efficiency** | | *Tier 1 Prerequisite* | *Recycled content for10% of total material cost* | *A5.405.4 A5.405.4.1 Through A5.405.4.5* | | | | |
| | | Mandatory | Weather Protection | 5.407.1 | | | | |
| | | Mandatory | Moisture Control: sprinklers | 5.407.2.1 | | | | |
| | | Mandatory | Moisture Control: Exterior door protection | 5.407.2.2.1 | | | | |
| | | Mandatory | Moisture Control: Flashing | 5.407.2.2.2 | | | | |
| | | Mandatory | Construction waste management-comply with either: sections 5.408.1.1, 5.408.1.2, 5.408.1.3 or more stringent local ordinance | 5.408.1.1, 5.408.1.2, 5.408.1.3 | | | | |
| | | Mandatory | Construction waste management: Documentation w/notes | 5.408.1.4 | | | | |

| CHAPTER 5 DIVISIONS | | SECTION TITLE | CODE SECTION | Y | N | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|
| | Mandatory | Universal waste [A] | 5.408.2 | | | | |
| | Mandatory | Excavated soil and land clearing debris w/ exceptions and notes | 5.408.3 | | | | |
| | *Tier 1 Prerequisite* | *Enhanced construction waste reduction 65% – Tier 1 w/ verification w/ verification* | *A5.408.3.1 A5.408.3.1.2* | | | | |
| | Mandatory | Recycling by Occupants w/ exception | 5.410.1 | | | | |
| | Mandatory | Recycling by Occupants: Additions w/ exception | 5.410.1.1 | | | | |
| | Mandatory | Recycling by Occupants: Sample ordinance | 5.410.1.2 | | | | |
| | Mandatory | Commissioning new buildings (≥ 10,000 SF) [N] w/exceptions and notes | 5.410.2 | | | | |
| | Mandatory | Owner's or Owner representative's Project Requirements (OPR) [N] | 5.410.2.1 | | | | |
| | Mandatory | Basis of Design (BOD) [N] | 5.410.2.2 | | | | |
| | Mandatory | Commissioning Plan [N] | 5.410.2.3 | | | | |
| | Mandatory | Functional Performance Testing [N] | 5.410.2.4 | | | | |
| | Mandatory | Documentation and Training [N] | 5.410.2.5 | | | | |
| | Mandatory | Systems Manual [N] | 5.410.2.5.1 | | | | |
| | Mandatory | Systems Operation Training) [N] | 5.410.2.5.2 | | | | |
| | Mandatory | Commissioning Report [N] | 5.410.2.6 | | | | |
| | Mandatory | Testing and adjusting for new buildings < 10,000 SF or new systems that serve additions or alterations. | 5.410.4 | | | | |
| | Mandatory | System Testing Plan for HVAC, Lighting, water heating, renewable energy, landscape irrigation and water reuse. | 5.410.4.2 | | | | |
| | Mandatory | Procedures for testing and adjusting | 5.410.4.3 | | | | |
| | Mandatory | HVAC balancing | 5.410.4.3.1 | | | | |
| | Mandatory | Reporting for testing and adjusting | 5.410.4.4 | | | | |
| | Mandatory | Operation and Maintenance (O&M) Manual | 5.410.4.5 | | | | |
| | Mandatory | Inspection and reports | 5.410.4.5.1 | | | | |
| | Mandatory | Fireplaces | 5.503.1 | | | | |
| | Mandatory | Woodstoves | 5.503.1.1 | | | | |
| | Mandatory | Temporary ventilation | 5.504.1 | | | | |
| **SELECT ONE ELECTIVE** ***(see next page for more options)*** | *Elective* | *Cement and concrete: Cement* | *A5.405.5.1* | | | | |
| | *Elective* | *Cement and concrete: Concrete /w SCM & Mix design equation* | *A5.405.5.2 A5.405.5.2.1 A5.405.5.2.1.1* | | | | |
| | *Elective* | *Cement and concrete: Additional means of compliance* | *A5.405.5.3 A5.405.5.3.1 A5.405.5.3.1.1 A5.405.5.3.1.2 A5.405.5.3.2 A5.405.5.3.2.1 A5.405.5.3.2.2 A5.405.5.3.2.3 A5.405.5.3.2.4* | | | | |

| CHAPTER 5 DIVISIONS | | | SECTION TITLE | CODE SECTION | Y | N | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|---|
| | SELECT ONE ELECTIVE | *Elective* | *Choice of materials* | *A5.406.1 A5.406.1.1 A5.406.1.2 A5.406.1.3* | | | | |
| | | *Elective* | *Life cycle assessment: General* | *A5.409.1* | | | | |
| | | *Elective* | *Whole building life cycle assessment* | *A5.409.2 A5.409.2.1 A5.409.2.2* | | | | |
| | | *Elective* | *Materials and system assemblies* | *A5.409.3* | | | | |
| | | *Elective* | *Substitution for prescriptive standards* | *A5.409.4* | | | | |
| | | *Elective* | *Verification of compliance* | *A5.409.5* | | | | |
| | | | *Indoor air quality (IAQ) during construction* | *A5.504.1 A5.504.1.1 A5.504.1.2* | | | | |
| | | *Elective* | *IAQ postconstruction* | *A5.504.2* | | | | |
| **DIVISION 5.5 Environmental Quality** | | Mandatory | Covering of ducts openings and protection of mechanical equipment during construction | 5.504.3 | | | | |
| | | Mandatory | Adhesives, sealants and caulks | 5.504.4.1 | | | | |
| | | Mandatory | Paints and coatings | 5.504.4.3 | | | | |
| | | Mandatory | Aerosol paints and coatings | 5.504.4.3.1 | | | | |
| | | Mandatory | Aerosol paints and coatings: Verification | 5.504.4.3.2 | | | | |
| | | Mandatory | Carpet systems | 5.504.4.4 | | | | |
| | | Mandatory | Carpet cushion | 5.504.4.4.1 | | | | |
| | | Mandatory | Carpet adhesives | 5.504.4.4.2 | | | | |
| | | Mandatory | Composite wood products | 5.504.4.5 | | | | |
| | | Mandatory | Composite wood products: Documentation | 5.504.4.5.3 | | | | |
| | | Mandatory | Resilient flooring systems | 5.504.4.6 | | | | |
| | | Mandatory | Resilient flooring: Verification of compliance | 5.504.4.6.1 | | | | |
| | | *Tier 1 Prerequisite* | *Resilient flooring systems, Tier 1w/ verification* | *A5.504.4.7 A5.504.4.7.2* | | | | |
| | | *Tier 1 Prerequisite* | *Thermal insulation, Tier 1 w/ verification of compliance* | *A5.504.4.8 A5.504.4.8.2* | | | | |
| | | Mandatory | Filters w/ exceptions | 5.504.5.3 | | | | |
| | | Mandatory | Filters: Labeling | 5.504.5.3.1 | | | | |
| | | Mandatory | Environmental tobacco smoke (ETS) control | 5.504.7 | | | | |
| | | Mandatory | Indoor moisture control | 5.505.1 | | | | |
| | | Mandatory | Outside air delivery | 5.506.1 | | | | |
| | | Mandatory | Carbon dioxide ($CO_2$) monitoring | 5.506.2 | | | | |
| | | Mandatory | Acoustical control w/ exception | 5.507.4 | | | | |
| | | Mandatory | Exterior noise transmission, prescriptive method w/ exceptions | 5.507.4.1 | | | | |
| | | Mandatory | Noise exposure where noise contours are not readily available | 5.507.4.1.1 | | | | |
| | | Mandatory | Performance method | 5.507.4.2 | | | | |
| | | Mandatory | Site features | 5.507.4.2.1 | | | | |

| CHAPTER 5 DIVISIONS | | | SECTION TITLE | CODE SECTION | Y | N | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|---|
| | | Mandatory | Documentation of compliance | 5.507.4.2.2 | | | | |
| | | Mandatory | Interior sound transmission w/ note | 5.507.4.3 | | | | |
| | | Mandatory | Ozone depletion and greenhouse gas reductions | 5.508.1 | | | | |
| | | Mandatory | Chlorofluorocarbons (CFCs) | 5.508.1.1 | | | | |
| | | Mandatory | Halons | 5.508.1.2 | | | | |
| | | Mandatory | Supermarket refrigerant leak reduction for retail food stores 8,000 square feet or more sections 5.508.2 through 5.508.2.6.3 | 5.508.2 through 5.508.2.6.3 | | | | |
| | SELECT ONE ELECTIVE | *Elective* | *IAQ testing* | *A5.504.2.1 A5.504.2.1.1 A5.504.2.1.2 A5.504.2.1.3* | | | | |
| | | *Elective* | *No added formaldehyde Tier 1 w/ notes* | *A5.504.4.5.1* | | | | |
| | | *Elective* | *Acoustical ceilings and wall panels w/ verification of compliance* | *A5.504.4.9 A5.504.4.9.1* | | | | |
| | | *Elective* | *Hazardous particulates and chemical pollutants* | *A5.504.5* | | | | |
| | | *Elective* | *Entryway systems* | *A5.504.5.1* | | | | |
| | | *Elective* | *Isolation of pollutant sources* | *A5.504.5.2* | | | | |
| | | *Elective* | *Filters, Tier 1* | *A5.504.5.3.1* | | | | |
| | | *Elective* | *Lighting and thermal comfort controls* | *A5.507.1 A5.507.1.1 through A5.507.1.2* | | | | |
| | | *Elective* | *Daylight w/ exception* | *A5.507.2* | | | | |
| | | *Elective* | *Views w/ exception* | *A5.507.3* | | | | |
| | | *Elective* | *Interior office spaces* | *A5.507.3.1* | | | | |
| | | *Elective* | *Multi-occupant spaces* | *A5.507.3.2* | | | | |
| | | *Elective* | *Hydrochlorofluorocarbons (HCFCs)* | *A5.508.1.3* | | | | |
| | | *Elective* | *Hydrofluorocarbons (HFCs)* | *A5.508.1.4* | | | | |
| Additional Measures | | *Select 1 additional measure (from any division)* | | Add section # | | | | |
| Total number of Measures required for Tier 1 | | | | 15 | | | | |
| Total number of Measures selected | | | | | | | | |

| **Documentation Author's /Responsible Designer's Declaration Statement**<br><br>**Check the appropriate box(s) for the list below**<br>• **Mandatory:** I attest that the mandatory provisions checklist is accurate and complete.<br>• **Tier 1compliant:** I attest that the total number of voluntary measures selected meet or exceed the total number required to achieve Tier 1compliance.<br>• **Partial Tier 1 compliant:** I attest that the total number of voluntary measures selected do not meet the total number required to achieve Tier 1compliance however partial Tier 1 compliance has been achieved. | |
|---|---|
| Signature: | |
| Company: | Date: |
| Address: | License: |
| City/State/Zip: | Phone: |

STATE OF CALIFORNIA – DEPARTMENT OF GENERAL SERVICES – BUILDING STANDARDS COMMISSION
**CALGreen Verification Guidelines – Tier 2 Checklist**
BSC CG-202 (Rev. 12/16)

# *CALGreen* VERIFICATION GUIDELINES TIER 2 CHECKLIST

**Application:** This checklist shall be used for nonresidential projects that meet the following: new construction, or building additions of 1,000 sq. ft. or greater, or building alterations with a permit valuation of $200,000 or more pursuant to *CALGreen* Section 5.301.1, AND are adopting Tier 1 voluntary measures.

*Note: All applicable mandatory requirements in chapter 5 shall be met prior to applying Tier 1 voluntary measures.*

**Instructions:**

Comply with all Tier 1 (prerequisite) measures from the various categories shown on the table below.

Add a "Y" to all Mandatory and Tier 1 mandatory provisions in the appropriate columns.

Select the required number of additional electives from those categories shown on the table below and add a "Y" on the selected elective and add an "N" on the rest.

Count the total number of Tier 1 (prerequisite) measures plus the additional electives and write down the total number at the end of the checklist. Determine if the required number of Tier 1 measures have been selected to achieve Tier 1 compliance.

**Y** = Yes (section has been selected and/or included)
**N** = No (section has not been selected and/or included)
**O** = Other (provide explanation)
**[N]** = New construction pursuant to Section 301.1
**[A]** = Additions and/or alterations pursuant to Section 301.1

| CHAPTER 5 DIVISIONS | | SECTION TITLE | CODE SECTION | Y | N | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|
| **DIVISION 5.1 Planning and Design** | Mandatory | Storm Water Pollution Prevention w/subsections | 5.106.1 through 5.106.1.2 | | | | |
| | Mandatory | Short Term Bicycle Parking | 5.106.4.1.1 | | | | |
| | Mandatory | Long Term Bicycle Parking | 5.106.4.1.2 | | | | |
| | Mandatory | Designated Parking for clean air vehicles | 5.106.5.2 | | | | |
| | *Tier 2 Prerequisite* | *Designated Parking - 12% of Parking Capacity* | *A5.106.5.1.2* | | | | |
| | Mandatory | Parking stall marking | 5.106.5.2.1 | | | | |
| | Mandatory | Single (EV) Charging space requirements [N] | 5.106.5.3.1 | | | | |
| | Mandatory | Multiple (EV) Charging space requirements [N] | 5.106.5.3.2 | | | | |
| | *Tier 2 Prerequisite* | *Electric Vehicle (EV) Charging [N]* | *A5.106.5.3.2* | | | | |
| | Mandatory | EV charging space calculation [N] w/ exceptions | 5.106.5.3.3 | | | | |
| | Mandatory | [N] Identification | 5.106.5.3.4 | | | | |
| | Mandatory | [N] Future charging spaces w/ notes 1-3 | 5.106.5.3.5 | | | | |
| | Mandatory | Light Pollution Reduction [N] w/ exceptions and note | 5.106.8 | | | | |
| | Mandatory | Grading and Paving, w/exception for Additions and Alterations not altering the drainage path | 5.106.10 | | | | |
| | *Tier 2 Prerequisite* | *Cool Roof (T.A5.106.11.2.3): SRI 75 when < 2:12, SRI 16 when >2:12* | *A5.106.11.2* | | | | |

| CHAPTER 5 DIVISIONS | | | SECTION TITLE | CODE SECTION | Y | N | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|---|
| | SELECT THREE ELECTIVES | *Electives* | *Community Connectivity* | *A5.103.1* | | | | |
| | | *Electives* | *Brownfield or Greyfield site redevelopment or infill area development.* | *A5.103.2* | | | | |
| | | *Electives* | *Reduce development footprint and optimize open space.* | *A5.104.1* | | | | |
| | | *Electives* | *Disassemble and Reuse Existing Building Structure (70%)* | *A5.105.1.1* | | | | |
| | | *Electives* | *Disassemble and Reuse Existing Non-Structure elements (50%)* | *A5.105.1.2* | | | | |
| | | *Electives* | *Salvage* | *A5.105.1.3* | | | | |
| | | *Electives* | *Storm Water Design* | *A5.106.2* | | | | |
| | | *Electives* | *Low Impact Development (LID)* | *A5.106.3* | | | | |
| | | *Electives* | *Changing rooms* | *A5.106.4.3* | | | | |
| | | *Electives* | *Parking Capacity* | *A5.106.6* | | | | |
| | | *Electives* | *Exterior Wall Shading* | *A5.106.7* | | | | |
| | | *Electives* | *Heat island Effect* | *A5.106.11* | | | | |
| **DIVISION 5.2 Energy Efficiency** | | Mandatory | Meet the minimum Energy Efficiency Standard | 5.201.1 | | | | |
| | | *Tier 2 Prerequisite* | *Energy Performance Outdoor lighting power 90% of Part 6* | *A5.203.1.1.1* | | | | |
| | | *Tier 2 Prerequisite* | *If applicable, Service for water heating in restaurants 8,000 sf or greater* | *A5.203.1.1.2* | | | | |
| | | *Tier 2 Prerequisite* | *Energy Budget 90% or 85% of Part 6 calculated value of allowance* | *A5.203.1.2.2* | | | | |
| | SELECT THREE ELECTIVES | *Elective* | *On-site renewable energy w/ documentation* | *A5.211.1 A5.211.1.1* | | | | |
| | | *Elective* | *Green power* | *A5.211.3* | | | | |
| | | *Elective* | *Elevators w/ car lights and fan* | *A5.212.1.1 A5.212.1.1.1* | | | | |
| | | *Elective* | *Escalators w/ controls* | *A5.212.1.2 A5.212.1.4* | | | | |
| | | *Elective* | *Steel framing* | *A5.213.1* | | | | |
| **DIVISION 5.3 Water Efficiency and Conservation** | | Mandatory | Separate Meters (new buildings or additions > 50,000 SF that consume more than 100 gal/day) | 5.303.1.1 | | | | |
| | | Mandatory | Separate Meters (for tenants in new buildings or additions that consume more than 1,000 gal/day) | 5.303.1.2 | | | | |
| | | *Tier 2 Prerequisite* | *Water Reduction Tier 2. 20% or 25% savings over the "water use baseline" Table A5.303.2.2* | *A5.303.2.3.2 or A5.303.2.3.3* | | | | |
| | | Mandatory | Water closets shall not exceed 1.28 gallons per flush | 5.303.3.1 | | | | |
| | | Mandatory | Wall-mounted urinals shall not exceed 0.125 gpf | 5.303.3.2.1 | | | | |
| | | Mandatory | Floor-mounted urinals shall not exceed 0.5 gpf | 5.303.3.2.2 | | | | |
| | | Mandatory | Single showerhead shall have maximum flow rate of 2.0 gpm (gallons per minute) at 80 psi | 5.303.3.3.1 | | | | |
| | | Mandatory | Multiple showerheads serving one shower shall have a combined flow rate of 2.0 gpm at 80 psi | 5.303.3.3.2 | | | | |

| CHAPTER 5 DIVISIONS | | | SECTION TITLE | CODE SECTION | Y | N | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|---|
| | | Mandatory | Nonresidential lavatory faucets | 5.303.3.4.1 | | | | |
| | | Mandatory | Kitchen faucets | 5.303.3.4.2 | | | | |
| | | Mandatory | Wash basins | 5.303.3.4.3 | | | | |
| | | Mandatory | Metering faucets | 5.303.3.4.4 | | | | |
| | | Mandatory | Metering faucets for wash fountains | 5.303.3.4.5 | | | | |
| | | Mandatory | Food waste disposers w/note | 5.303.4.1 | | | | |
| | | Mandatory | Areas of additions and alterations | 5.303.5 | | | | |
| | | Mandatory | Standards for plumbing fixtures and fittings | 5.303.6 | | | | |
| | | Mandatory | Outdoor water use in landscape areas equal to or greater than 500 square feet | 5.304.2 | | | | |
| | | Mandatory | Outdoor water use in rehabilitated landscape projects with areas equal to or greater than 2,500 square feet | 5.304.3 | | | | |
| | | Mandatory | Outdoor water use in landscape areas of 2,500 square feet or less | 5.304.4 | | | | |
| | | Mandatory | Graywater or rainwater use in landscaped areas | 5.304.5 | | | | |
| | SELECT THREE ELECTIVES | *Elective* | *Nonpotable water systems for indoor use* | *A5.303.2.3.4* | | | | |
| | | *Elective* | *Appliances and fixtures for commercial application* | *A5.303.3* | | | | |
| | | *Elective* | *Dual plumbing* | *A5.303.5* | | | | |
| | | *Elective* | *Outdoor potable water use* | *A5.304.2.1* | | | | |
| | | *Elective* | *Potable water reduction 60 percent ETo* | *A5.304.4 A5.304.4.1 A5.304.4.3* | | | | |
| | | *Elective* | *Potable water elimination* | *A5.304.5* | | | | |
| | | *Elective* | *Restoration of areas disturbed by construction* | *A5.304.6* | | | | |
| | | *Elective* | *Previously developed sites w/ exception* | *A5.304.7* | | | | |
| | | *Elective* | *Graywater irrigation system* | *A5.304.8* | | | | |
| | | *Elective* | *Nonpotable water systems* | *A5.305.1* | | | | |
| | | *Elective* | *Irrigation systems* | *A5.305.2* | | | | |
| **DIVISION 5.4 Material Conservation and Resource Efficiency** | | *Tier 2 Prerequisite* | *Recycled content for15% of total material cost* | *A5.405.4 A5.405.4.1 through A5.405.4.5* | | | | |
| | | Mandatory | Weather Protection | 5.407.1 | | | | |
| | | Mandatory | Moisture Control: sprinklers | 5.407.2.1 | | | | |
| | | Mandatory | Moisture Control: Exterior door protection | 5.407.2.2.1 | | | | |
| | | Mandatory | Moisture Control: Flashing | 5.407.2.2.2 | | | | |
| | | Mandatory | Construction waste management-comply with either: sections 5.408.1.1, 5.408.1.2, 5.408.1.3 or more stringent local ordinance | 5.408.1.1, 5.408.1.2, 5.408.1.3 | | | | |
| | | Mandatory | Construction waste management: Documentation w/notes | 5.408.1.4 | | | | |
| | | Mandatory | Universal waste [A] | 5.408.2 | | | | |
| | | Mandatory | Excavated soil and land clearing debris w/ exception and notes | 5.408.3 | | | | |
| | | *Tier 2 Prerequisite* | *Enhanced construction waste reduction 80%–Tier 2 w/ verification w/ verification* | *A5.408.3.1.1 A5.408.3.1.2* | | | | |
| | | Mandatory | Recycling by Occupants w/ exception | 5.410.1 | | | | |

| CHAPTER 5 DIVISIONS | | SECTION TITLE | CODE SECTION | Y | N | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|
| | Mandatory | Recycling by Occupants: Additions w/ exception | 5.410.1.1 | | | | |
| | Mandatory | Recycling by Occupants: Sample ordinance | 5.410.1.2 | | | | |
| | Mandatory | Commissioning new buildings (≥ 10,000 SF) [N] | 5.410.2 | | | | |
| | Mandatory | Owner's or Owner representative's Project Requirements (OPR) [N] | 5.410.2.1 | | | | |
| | Mandatory | Basis of Design (BOD) [N] | 5.410.2.2 | | | | |
| | Mandatory | Commissioning Plan [N] | 5.410.2.3 | | | | |
| | Mandatory | Functional Performance Testing [N] | 5.410.2.4 | | | | |
| | Mandatory | Documentation and Training [N] | 5.410.2.5 | | | | |
| | Mandatory | Systems Manual [N] | 5.410.2.5.1 | | | | |
| | Mandatory | Systems Operation Training) [N] | 5.410.2.5.2 | | | | |
| | Mandatory | Commissioning Report [N] | 5.410.2.6 | | | | |
| | Mandatory | Testing and adjusting for new buildings < 10,000 SF or new systems that serve additions or alterations. | 5.410.4 | | | | |
| | Mandatory | System Testing Plan for HVAC, Lighting, water heating, renewable energy, landscape irrigation and water reuse. | 5.410.4.2 | | | | |
| | Mandatory | Procedures for testing and adjusting | 5.410.4.3 | | | | |
| | Mandatory | HVAC balancing | 5.410.4.3.1 | | | | |
| | Mandatory | Reporting for testing and adjusting | 5.410.4.4 | | | | |
| | Mandatory | Operation and Maintenance (O&M) Manual | 5.410.4.5 | | | | |
| | Mandatory | Inspection and reports | 5.410.4.5.1 | | | | |
| | Mandatory | Fireplaces | 5.503.1 | | | | |
| **DIVISION 5.5 Environ-mental Quality** | Mandatory | Woodstoves | 5.503.1.1 | | | | |
| | Mandatory | Temporary ventilation | 5.504.1 | | | | |
| | Mandatory | Covering of ducts openings and protection of mechanical equipment during construction | 5.504.3 | | | | |
| | Mandatory | Adhesives, sealants and caulks | 5.504.4.1 | | | | |
| | Mandatory | Paints and coatings | 5.504.4.3 | | | | |
| | Mandatory | Aerosol paints and coatings | 5.504.4.3.1 | | | | |
| | Mandatory | Aerosol paints and coatings: Verification | 5.504.4.3.2 | | | | |
| | Mandatory | Carpet systems | 5.504.4.4 | | | | |
| | Mandatory | Carpet cushion | 5.504.4.4.1 | | | | |
| | Mandatory | Carpet adhesives | 5.504.4.4.2 | | | | |
| | Mandatory | Composite wood products | 5.504.4.5 | | | | |
| | Mandatory | Composite wood products: Documentation | 5.504.4.5.3 | | | | |
| | Mandatory | Resilient flooring systems | 5.504.4.6 | | | | |
| | Mandatory | Resilient flooring: Verification of compliance | 5.504.4.6.1 | | | | |
| | *Tier 2 Prerequisite* | *Resilient flooring systems, Tier 2 w/ verification* | *A5.504.4.7.1 A5.504.4.7.2* | | | | |
| | *Tier 2 Prerequisite* | *Thermal insulation, Tier 2 w/ verification of compliance* | *A5.504.4.8.1 A5.504.4.8.2* | | | | |
| | Mandatory | Filters w/ exceptions | 5.504.5.3 | | | | |

| CHAPTER 5 DIVISIONS | | | SECTION TITLE | CODE SECTION | Y | N | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|---|
| | | Mandatory | Filters: Labeling | 5.504.5.3.1 | | | | |
| | | Mandatory | Environmental tobacco smoke (ETS) control | 5.504.7 | | | | |
| | | Mandatory | Indoor moisture control | 5.505.1 | | | | |
| | | Mandatory | Outside air delivery | 5.506.1 | | | | |
| | | Mandatory | Carbon dioxide ($CO_2$) monitoring | 5.506.2 | | | | |
| | | Mandatory | Acoustical control w/ exception | 5.507.4 | | | | |
| | | Mandatory | Exterior noise transmission, prescriptive method w/ exceptions | 5.507.4.1 | | | | |
| | | Mandatory | Noise exposure where noise contours are not readily available | 5.507.4.1.1 | | | | |
| | | Mandatory | Performance method | 5.507.4.2 | | | | |
| | | Mandatory | Site features | 5.507.4.2.1 | | | | |
| | | Mandatory | Documentation of compliance | 5.507.4.2.2 | | | | |
| | | Mandatory | Interior sound transmission w/ note | 5.507.4.3 | | | | |
| | | Mandatory | Ozone depletion and greenhouse gas reductions | 5.508.1 | | | | |
| | | Mandatory | Chlorofluorocarbons (CFCs) | 5.508.1.1 | | | | |
| | | Mandatory | Halons | 5.508.1.2 | | | | |
| | | Mandatory | Supermarket refrigerant leak reduction for retail food stores 8,000 square feet or more sections 5.508.2 through 5.508.2.6.3 | 5.508.2 through 5.508.2.6.3 | | | | |
| | ***SELECT THREE ELECTIVES (see next page for more options)*** | *Elective* | *Wood framing or OVE w/ note* | *A5.404.1 A5.404.1.1 A5.404.1.2* | | | | |
| | | *Elective* | *Regional materials* | *A5.405.1* | | | | |
| | | *Elective* | *Bio-based materials* | *A5.405.2* | | | | |
| | | *Elective* | *Rapidly renewable materials* | *A5.405.2.2* | | | | |
| | | *Elective* | *Reused materials w/ note* | *A5.405.3* | | | | |
| | | *Elective* | *Cement and concrete: Cement* | *A5.405.5.1* | | | | |
| | | *Elective* | *Cement and concrete: Concrete /w SCM & Mix* | *A5.405.5.2* | | | | |
| | | *Elective* | *Cement and concrete: Additional means of* | *A5.405.5.3* | | | | |
| | | *Elective* | *Choice of materials* | *A5.406.1* | | | | |
| | | *Elective* | *Life cycle assessment: General* | *A5.409.1* | | | | |
| | | *Elective* | *Whole building life cycle assessment* | *A5.409.2* | | | | |
| | | *Elective* | *Materials and system assemblies* | *A5.409.3* | | | | |
| | | *Elective* | *Substitution for prescriptive standards* | *A5.409.4* | | | | |
| | | *Elective* | *Verification of compliance* | *A5.409.5* | | | | |
| | | *Elective* | *Indoor air quality (IAQ) during construction* | *A5.504.1* | | | | |
| | | *Elective* | *IAQ postconstruction* | *A5.504.2* | | | | |
| | | *Elective* | *IAQ testing* | *A5.504.2.1 A5.504.2.1.1 A5.504.2.1.2 A5.504.2.1.3* | | | | |
| | | *Elective* | *No added formaldehyde Tier 1 w/ notes* | *A5.504.4.5.1* | | | | |
| | | *Elective* | *Acoustical ceilings and wall panels w/ verification of compliance* | *A5.504.4.9 A5.504.4.9.1* | | | | |

| CHAPTER 5 DIVISIONS | | | SECTION TITLE | CODE SECTION | Y | N | O | Plan sheet, Spec or Attach Reference |
|---|---|---|---|---|---|---|---|---|
| | SELECT THREE ELECTIVES | *Elective* | *Hazardous particulates and chemical pollutants* | *A5.504.5* | | | | |
| | | *Elective* | *Entryway systems* | *A5.504.5.1* | | | | |
| | | *Elective* | *Isolation of pollutant sources* | *A5.504.5.2* | | | | |
| | | *Elective* | *Filters, Tier 2* | *A5.504.5.3.1.1* | | | | |
| | | *Elective* | *Lighting and thermal comfort controls* | *A5.507.1 A5.507.1.1 through A5.507.1.2* | | | | |
| | | *Elective* | *Daylight w/ exception* | *A5.507.2* | | | | |
| | | *Elective* | *Views w/ exception* | *A5.507.3* | | | | |
| | | *Elective* | *Interior office spaces* | *A5.507.3.1* | | | | |
| | | *Elective* | *Multi-occupant spaces* | *A5.507.3.2* | | | | |
| | | *Elective* | *Hydrochlorofluorocarbons (HCFCs)* | *A5.508.1.3* | | | | |
| | | *Elective* | *Hydrofluorocarbons (HFCs)* | *A5.508.1.4* | | | | |
| Additional Measures | | Added measures should be achieved across at least three categories | *Select 3 additional measures (from any division)* | *Additional measures: 1. 2. 3.* | | | | |
| **Total number of Measures required for Tier 2** | | | | *25* | | | | |
| **Total number of Measures selected** | | | | | | | | |

**Documentation Author's /Responsible Designer's Declaration Statement**
*Check the appropriate box(s) for the list below*

- **Mandatory:** I attest that the mandatory provisions checklist is accurate and complete.
- **Tier 2 compliant:** I attest that the total number of voluntary measures selected meet or exceed the total number required to achieve Tier 2 compliance.
- **Partial Tier 2 compliant:** I attest that the total number of voluntary measures selected do not meet the total number required to achieve Tier 2 compliance however partial Tier 2 compliance has been achieved.

| | |
|---|---|
| Signature: | |
| Company: | Date: |
| Address: | License: |
| City/State/Zip: | License: |

# APPENDIX A4 RESIDENTIAL VOLUNTARY MEASURES

The 2016 *CALGreen* Appendix A4 "Residential Voluntary Measures" is divided into six separate divisions and contain measures adopted by the Department of Housing and Community Development (HCD). *CALGreen* Appendix A4 addresses voluntary green building standards for residential structures and generally is not discussed in this guide. For information on non-energy efficiency portions of *CALGreen* Appendix A4, see the *Guide to the California Green Building Standards Code (Residential)* prepared by HCD at www.hcd.ca.gov.

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# APPENDIX A5 NONRESIDENTIAL VOLUNTARY MEASURES

This appendix chapter discusses voluntary measures in the 2016 *CALGreen* Code. Sections and items that include general information (Matrix Adoption Tables, general titles, definition lists, and reserved sections) have been omitted. Certain reference tables have also been omitted.

**Suggestion:** Refer to Chapter 8 for Verification Guidelines Checklists for Tier 1 and Tier 2 voluntary measures.

It is important that code users reference the appropriate version of *CALGreen*, including any errata or supplements from emergency or intervening code adoption cycles. Additionally, code users should be aware of lawfully enacted local amendments (ordinances) that require more restrictive green building standards.

**Items to consider when reviewing the voluntary mandatory provisions in Chapter A5**

1. Divisions A5.1 through A5.5 list the voluntary measures while Division A5.6 describes the voluntary tier compliance requirements for Tier 1 and Tier 2.

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2. The tiers and other voluntary measures are intended for a local jurisdiction to adopt as mandatory for its city, county or city and county. If voluntary measures are adopted locally they become enforceable just like the mandatory requirements of the code.

3. If the owner or developer elects to employ measures voluntarily, they should incorporate those measures in their design and should advise the local jurisdictions that they have been included. The voluntary measures should be enforced by the local building department to ensure that they are applied correctly.

# Division A5.1, Planning and Design

## SECTION A5.101
## GENERAL

**A5.101.1 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 A5.102
## DEFINITIONS

Note: All definitions are located in 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 measure is to ensure the reuse of existing locations in developed areas for nonresidential districts to help minimize the impact on undeveloped lands, and local air and water quality, as well as to minimize the greenhouse gas emissions generated from the development of a new site.

Some jurisdictions may have “Special Districts” or zoning that could benefit from these measures. Verify with the local enforcing authority if any special zoning conditions exist 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 a half-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 plan reviewer should confirm that the construction documents show the site selection meet the code as listed above.

**A5.103.2 Brownfield or greyfield site redevelopment or in fill 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 infill, and the use of existing infrastructures, in an effort to both revitalize an existing site with economic growth while minimizing urban blight and sprawl. By reclaiming brownfield (previously unusable locations due to contamination) or greyfield (50 percent covered with impervious materials such as existing parking lots) sites, undeveloped land may be preserved and greenhouse gas emissions limited.

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

### Compliance method:

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

### Enforcement:

Verify that remediation has occurred in accordance with appropriate local, state and/or federal requirements for brownfield or greyfield sites.

## 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 in a development and to encourage the utilization of vegetation within available areas. Incorporation of these provisions can result in improving ground-water recharge, open space and wildlife habitat preservation, as well as increasing the carbon sink effect, thus reducing greenhouse gas emissions.

**Reference:** Local zoning ordinances may have an impact on these provisions.

### Compliance method:

Provide open space for vegetation by initiating local ordinance(s) and document location and calculations on site or landscape plans.

### Enforcement:

**Plan intake:** The plan reviewer should confirm the construction documents for the open space area indication and calculations.

**On-site enforcement:** The inspector should verify that the open space represented in the construction documents has been preserved and landscaped 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.

Storm Water Design

## Intent:

The intent of these provisions is to salvage and recycle as much existing material as possible during construction processes and to minimize potential landfill deposits. The use of recovered versus new building materials cuts down on the continual consumption of natural resources, energy and water-intensive industrial processes, and greenhouse gas emissions due to the requirements of transporting manufactured materials.

There is also an economic factor to be considered. There is an established value to reusing existing structures and materials.

Always check with local jurisdiction regarding existing ordinances for these provisions.

### Compliance method:

**Existing building structure (A5.105.1.1).** Document using calculations to establish that the 75 percent minimum requirement for existing building structural components remains after improvement; show on a demolition, site or building plan.

**Existing nonstructural elements (A5.105.1.2).** Document using calculations to establish that at least 50 percent of the area of the completed building employs reuse of existing interior nonstructural elements; indicate on the plans.

**Salvage (A5.105.1.3).** Document using calculations to establish the salvage weight or number of items salvaged.

### Enforcement:

**Plan intake:** The plan reviewer 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 of elements have been integrated, reused and salvaged as shown.

**Suggestion:** Promote the concept of recovering and reusing existing building elements to design professionals. If the approach is incorporated from project conception, the disassembling process, corresponding cost savings and other potential innovative discoveries can result.

## 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 post construction treatment control best management practices (BMPs) to mitigate (infiltrate, filter or treat) storm water runoff from the 85th percen-

tile 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 measures is to limit the amount and rate of water runoff, in an attempt to maintain water quality. Ensuring that no measurable increase occurs will help prevent the discharge of surface water pollutants, from the project site into receiving waters. These provisions make exception for impervious areas that cannot retain all of the storm water on site.

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

### Compliance method:

The design plan should ensure that storm water runoff quality is not compromised and that the 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 plan reviewer should examine the construction documents for BMPs to control the storm water runoff rate, quantity and quality.

**On-site enforcement:** The inspector should verify the approved plans that on-site treatment controls meet with design criteria. Check the operations and maintenance manual for recommendations concerning 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 the U.S. EPA, or the California State Water Resources Control Board (SWRCB) websites, 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:

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

Greyfield or infill site. (A5.106.3.2) The intent is to manage rainfall at a lower rate for areas of impervious surfaces than that for undeveloped sites.

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

## Compliance method:

1. Design specific control measures in accordance with the Environmental Protection Agency (EPA) requirements and/or local Regional Water Control Board requirements for implementation of LID.

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

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

## Enforcement:

**Plan intake:** The plan reviewer should examine the construction documents to confirm compliance measures have been incorporated into the site design.

**On-site enforcement:** The inspector should verify that on-site control measures conform with the construction documents.

**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-UNIT (12" X 15" X 72" tot. ht.) 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-unit 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:

The intent for including changing rooms and showers is to encourage people to use bicycles as an alternative means of transportation. The mandatory long-term bicycle parking requirements further enhance the benefits of utilizing bicycles for daily transportation.

Aside from the advantages of producing fewer greenhouse gas emissions, cyclists may also enjoy the many health advantages that come with riding a bike. Additionally, bicycles do not use fuel, motor oil or toxic batteries, and they are easier on the environment from a manufacturing point of view. 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:

Construction documents should indicate the changing rooms and amenities required in Table A5.106.4.3 and provide occupant calculation.

## Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents that compliance measures in the correct quantities for changing rooms/shower facilities are included.

**On-site enforcement:** The inspector should verify that on-site changing rooms/shower facilities meet with design requirements on the approved plans.

> **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.** Ten percent of total spaces. 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 the *CALGreen* 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 the *CALGreen* 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 are set at 10 percent and 12 percent to provide "reach" standards, to help California meet its energy and greenhouse gas reduction goals.

## Compliance Method:

The site plan should identify the fuel-efficient parking stall locations and quantity based on the total number of parking spaces in the lot. Show stall markings. The size of the characters included in the stall markings should be at least 8 inches high per the mandatory Section 5.106.5.2.

### Enforcement:

**Plan intake:** The plan reviewer should confirm that the construction documents show the required number of fuel-efficient parking stalls.

**On-site enforcement:** The inspector should review and verify that parking stalls and designations meet with the design criteria in the construction documents.

**A5.106.5.3 Electric vehicle (EV) charging.** Construction shall comply with Section A5.106.5.3.1 and A5.106.5.3.2 to facilitate future installation of electric vehicle supply equipment (EVSE). When EVSE(s) is/are installed, it shall be in accordance with the *California Building Code* and the *California Electrical Code* and as follows:

**A5.106.5.3.1 Tier 1.** Table A5.106.5.3.1 shall be used to determine the number of multiple charging spaces required for future installation of EVSE. Refer to Section 5.106.5.3.2 for design space requirements.

**A5.106.5.3.2 Tier 2.** Table A5.106.5.3.2 shall be used to determine if single or multiple charging space requirements apply for future installation of EVSE. When a single charging space is required, refer to Section 5.106.5.3.1 for design requirements. When multiple charging spaces are required, refer to Section 5.106.5.3.2 for design requirements.

**TABLE A5.106.5.3.1**

| TOTAL NUMBER OF ACTUAL-PARKING SPACES | TIER 1 NUMBER OF REQUIRED EV CHARGING SPACES |
|---|---|
| 0–9 | 0 |
| 11–25 | 2 |
| 26–50 | 3 |
| 51–75 | 5 |
| 76–100 | 7 |
| 101–150 | 10 |
| 151–200 | 14 |
| 201 and over | 8 percent of total[1] |

1. Calculation for spaces shall be rounded up to the nearest whole number.

TABLE A5.106.5.3.2

| TOTAL NUMBER OF ACTUAL-PARKING SPACES | TIER 2 NUMBER OF REQUIRED EV CHARGING SPACES |
|---|---|
| 0–9 | 1 |
| 11–25 | 2 |
| 26–50 | 4 |
| 51–75 | 6 |
| 76–100 | 9 |
| 101–150 | 12 |
| 151–200 | 17 |
| 201 and over | 10 percent of total[1] |

1. Calculation for spaces shall be rounded up to the nearest whole number.

**A5.106.5.3.3 Identification.** The service panel or subpanel circuit directory shall identify the reserved overcurrent protective device space(s) for future EV charging as "EV CAPABLE." The raceway termination location shall be permanently and visibly marked as "EV CAPABLE."

## Intent:

The intent of these requirements is to facilitate EV charging capability by installing raceways for future electric vehicle supply equipment (EVSE) at the time of new building construction. Construction plans and specifications must reflect that the infrastructure will be capable of supporting future electrical demands. Having the infrastructure pre-installed will allow the charging stations to be more cost-effectively added at a later date. This will aid in achieving an interim goal for infrastructure that will support 1.5 million zero-emissions vehicles (ZEV's) on California roadways by 2025.

**Suggestions:** Anticipate accessibility requirements when EV charging stations are installed per the *California Building Code*, Part 2, Chapter 11B.

**Change for 2016:** These voluntary code sections have been amended. The percentages used to determine the number of charging spaces required for future EVSE infrastructure has increased.

## Compliance Method:

Include on the site plan the proposed location of the listed suitable cabinet(s), box(es), enclosure(s) or equivalent required for future EV equipment connections.

Indicate on the plans the 40-amp minimum service panel capacity with raceways to the approximate location of the future EV charging connections as required in code Section A5.106.5.3. Use Table A5.106.5.3.1 or A5.106.3.2 to determine if single or multiple charging space requirements apply for the future EVSE infrastructure installation. Lastly, ensure that the service panel or subpanel(s) circuit directory is properly identified as being "EV

CAPABLE" and that the raceway termination location is permanently and visibly marked as "EV CAPABLE."

### Enforcement:

**Plan intake:** The plan reviewer should confirm that the construction documents are compliant with Section A5.106.5.3.1 or A5.106.5.3.2, and A5.106.5.3.3 as applicable and that the appropriate EV capacity for future EV connection to the required number of future EV charging spaces per Table A5.106.5.3.1 or A5.106.5.3.2 has been provided. Confirm proper identification at the service panel or subpanel(s) and that the raceway termination location is permanently and visibly marked as "EV CAPABLE."

**On-site enforcement:** The inspector should verify on-site that the service panel and raceway with proper termination have been installed per the approved set of construction documents.

**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 Transportation Management Authorities (TMAs).

### Intent:

The intent of these provisions is to provide vehicle parking that meets local zoning requirements but reduces the on-site area needed to accommodate the required number of parking spaces. Further, it discourages the design of parking beyond required quantities.

### Compliance Method:

Indicate location and configuration of parking spaces, which include on-street parking and compact spaces or other approved strategies aimed at reducing site paving to a minimum. 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 plan reviewer should confirm that the construction documents show that the required strategies have been incorporated in the site design for parking capacity requirements and local zoning ordinances.

**On-site enforcement:** The inspector should 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 manmade 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.

**Exterior Shading**

### Intent:

The intent of these measures 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. *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 plan reviewer should confirm that construction documents show shading measures have been incorporated into the building and site design.

**On-site enforcement** The inspector should 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 P aged = [0.2 + ß [P initial– 0.2], where p 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 www.energy.ca.gov or by email at Title24@ energy.state.ca.us.

**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.


**Reduction in Heat Island Effect**

[Tables A5.106.11.2.1 and A5.106.11.2.2 are not shown for clarity. See the *CALGreen* Code.]

## 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. *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 plan reviewer should confirm that the construction documents show hardscape design calculations, energy compliance forms and specifications for compliance with the cool roof provisions.

**On-site enforcement:** The inspector should verify that hardscape alternatives are constructed as calculated. Check product data sheets for the roofing materials for compliance with cool roof values. If no documentation is available, inspect the project to ensure materials selected meet the SRI values.

# Division A5.2, Energy Efficiency

## SECTION A5.201
## GENERAL

**A5.201.1 Scope.** For the purpose of mandatory energy efficiency standards in this code, the California Energy Commission will continue to adopt mandatory standards. It is the intent of these voluntary provisions to encourage local jurisdictions through codification to achieve exemplary performance in the area of building energy efficiency.

## SECTION A5.202.1
## DEFINITIONS

Note: All definitions are located in Chapter 2.

## 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 and additions 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 Allowed Outdoor Lighting Power. The Allowed Outdoor Lighting Power calculation is specified in Title 24, Part 6, Section 140.7 “Requirements For Outdoor Lighting.”

**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.

**A5.203.1.2 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 or addition 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 Standard 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 Standard 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 or addition 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 Standard 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 Standard 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 measures is to encourage greater building performance beyond the requirements in the 2016 *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 strive toward achievement of that goal.

**Change for 2016:** The California Energy Commission amended the 2013 *CALGreen* Code for energy-related voluntary Tier 1 and Tier 2 measures. The CEC also revised the energy efficiency requirements to exclude alterations. Additionally, the Performance Standard for Tier 1 and Tier 2 levels were amended for outdoor lighting. The 2016 *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 documenting improvements via these voluntary measures. Compliance documents should be submitted with the construction documents in whatever format the enforcing agency requires for Part 6 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 plan reviewer should confirm that the construction documents show compliance with energy or other documentation for Part 6 energy code compliance, as well as confirmation of associated voluntary measures (see note above).

**On-site enforcement:** The inspector should verify energy compliance documents against the installed features 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 verifiers do for Part 6 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 2016 *California Electrical Code*. Natural gas or propane use is calculated in accordance with the 2016 *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 measure is to encourage the installation and use of on-site renewable energy generation that offsets a portion of a building's energy use.

Solar Modules

### 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.

### Enforcement:

**Plan intake:** The plan reviewer should confirm 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 confirm 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. 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 the certificate of occupancy.

### Suggestion:

If the permitee is 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 plan reviewer should review the construction documents for documentation.

**On-site enforcement:** The inspector should check utility electricity billings documenting enrollment in a renewable energy program and verify the operation and maintenance manual for recommendations to continue with the program.

## SECTION A5.21
## 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 measure 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, the installation and features of elevators and escalators that conserve energy. Regenerative drive systems for both elevators and escalators are currently available; 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.

Title 8 contains regulations for elevator and escalator safety, including a reference to ASME A17.1-2004. ASME A17.1, 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, unless the permittee has obtained a variance from Title 8.

## Compliance Method:

Where appropriate for the use intended, specify traction elevators and/or escalator show 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 plan reviewer should confirm that the construction documents for elevator and/or escalator show specifications that include features for energy savings as well as meet Title 8 and Title 24. The reviewer should request product data and specifications for elevators and/or escalator information submitted separately as a deferred approval.

**On-site enforcement:** The inspector should verify that the elevators and/or escalators and controls specified are installed as called for in the construction documents. Typically, elevators and escalators are also 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. Structural standards for building framing, and for steel in particular, are found in CCR, Title 24, Part 2, the *California Building Code*. Building energy efficiency standards are found in Part 6, the *California Energy Code*.

### Compliance Method:

Within structural parameters of the *California Building Code* and energy efficiency standards of the *California Energy Code*, specify material-efficient steel framing for those projects framed in steel. Provide framing, assembly and intersections details, and material specifications in the construction documents. Where feasible, install exterior rigid insulation to reduce the transmission of heat through assemblies. It is possible that rigid insulation and/or exterior wall cladding cannot span widely spaced framing members, so a choice of alternative techniques may need to be made.

## Enforcement:

**Plan intake:** The plan reviewer should review the construction documents 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 verify that the energy efficiency measures shown in the construction 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 necessary.

# Division A5.3 Water Efficiency and Conservation

## SECTION A5.302.1 DEFINITIONS

Note: All definitions are located in Chapter 2.

## SECTION A5.303 INDOOR WATER USE

**A5.303.2.3.1 Tier 1 – 12-percent savings.** A schedule of plumbing fixtures and fixture fittings that will reduce the overall use of potable water within the building by 12- percent shall be provided. The reduction shall be based on the maximum allowable water use per plumbing fixture and fitting as permitted by the California Building Standards Code. The 12-percent reduction in potable water use shall be demonstrated by one of the following methods:

1. Prescriptive method. Every plumbing fixture and fitting shall not exceed the maximum flow rate at greater than or equal to 12-percent reduction, as specified in Table A5.303.2.3.1; or
2. Performance method. A calculation demonstrating a 12-percent reduction in the building "water use baseline", as established in Table A5.303.2.2 shall be provided.

**A5.303.2.3.2 Tier 2 – 20-percent savings.** A schedule of plumbing fixtures and fixture fittings that will reduce the overall use of potable water within the building by 20-percent shall be provided. A calculation demonstrating a 20-percent reduction in the building "water use baseline" as established in Table A5.303.2.2 shall be provided.

**A5.303.2.3.3 Enhanced Tier 2 – 25-percent savings.** A schedule of plumbing fixtures and fixture fittings that will reduce the overall use of potable water within the building by 25-percent shall be provided. A calculation demonstrating a 25-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 the *CALGreen* Code.]

## Intent:

Faucet

The intent of these measures is to enhance indoor potable water use reduction beyond the mandatory reduced flow rates and compliance with the exception for 12 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 20 percent reduction is required for the achievement of Tier 2 compliance, and a 25 percent reduction for Enhanced Tier 2.

**Note:** See Chapter 8 of this guide for forms and templates.

**Change for 2016:** Code sections were amended to the Tier 1 and Tier 2 percentages for indoor water use. The percentages were decreased because the corresponding mandatory provisions found in Chapter 5 were increased so the adjustment was needed.

## Compliance Method:

1. Specify each fixture or fitting to meet the 12 percent reduction shown on Table A5.303.2.3.1

OR

2. Performance method: A calculation is performed to demonstrate overall 12, 20 or 25 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 12 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 recycled water are available.

## Enforcement:

**Plan intake:** The plan reviewer should confirm that the construction documents indicated either the prescriptive or performance method has been submitted for the 12 percent water reduction compliance. If the performance method is used, review the water calculations showing the 12, 20 or 25 percent reduction.

**On-site enforcement:** The inspector should verify that the specified water 12 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 12, 20 or 25 percent have been installed. The inspector may review the fixture specifications to verify compliance or accept a self-certification form.

**A5.303.2.3.4 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 12-, 20- or 25-percent reduction. The nonpotable water systems shall comply with the current edition of the *California Plumbing Code*.

### Intent:

The intent of this code measure 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. Section 5.303.2 of this code mandates reduced flow rates or gives an exception for a 12 percent reduction in indoor potable water use through a performance approach. If a tier is adopted by your city or county, a 20 or 25 percent reduction will likely be required, and there may be a local ordinance in place otherwise for a reduction in water usage. CBSC and HCD promulgated this code change in reference to provisions of the plumbing code, being proposed simultaneously for nonpotable water systems, to provide clarity to the code user.

**Change for 2016:** This is a new code section. CBSC adopted and amended the 2015 Uniform Plumbing Code to add gray water and rainwater catchment provisions for nonresidential occupancies in the 2016 *California Plumbing Code*. The 2016 *California Plumbing Code* may be used to assist in complying with this section.

### Compliance Method:

Comply with the 2016 *California Plumbing Code* requirements for the use of dual-plumbed water systems.

### Enforcement:

**Plan intake:** The plan reviewer should review the construction documents to confirm that dual-plumbing standards in the 2016 *California Plumbing Code*, Chapter 16, are used in the design.

**On-site enforcement:** The inspector should 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 found 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— Shall be in accordance with ENERGY STAR requirements. Refer to Table A5.303.3

3. Ice makers shall be air cooled.

4. Food steamers shall be connectionless or boilerless and shall consume no more than 2 gallons of water per pan per hour, including condensate water, for batch type steamers, and no more than 5 gallons of water per pan per hour, including condensate water, for cook-to-order steamers.

5. 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 present.

6. Combination ovens shall use a maximum of 1.5 gallons of water per hour per pan, including condensate water.

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.

8. Food waste pulping systems shall use no more than 2 gpm of potable water.

   8.1 Note: potable water excludes on-site graywater use, such as dishwasher discharge water.

**TABLE A5.303.3**
**COMMERCIAL DISHWASHER WATER USE**

| TYPE | HIGH-TEMPERATURE–MAXIMUM GALLONS PER RACK | LOW-TEMPERATURE–MAXIMUM GALLONS PER RACK |
|---|---|---|
| Single Tank Conveyer | 0.70 (2.6 L) | ≤ 0.79 (3 L) |
| Multiple Tank Conveyor | ≤ 0.54 (2 L) | ≤ 0.54 (2 L) |
| Stationary Single Tank Door | ≤ 0.89 (3.4 l) | ≤ 1.18 (4.5 L) |
| Under Counter | ≤ 0.86 (3.3 L) | ≤ 1.19 (4.5 L) |
| Pot, Pan and Utensil | ≤ 0.58 GPSF | ≤ 0.58 GPSF |
| Single Tank Flight Type | GPH ≤ 2.975x + 55.00 | GPH ≤ 2.975x + 55.00 |
| Multiple Tank Flight Type | GPH ≤ 4.96x+ 17.00 | GPH ≤ 4.96x + 17.00 |

Note: GPSF = gallons per square foot of rack; GPH = gallons per hour;

X = square feet of conveyor belt/minute (max conveyor speed sf/min as tested and certified to NSF/ANSI Standard 3)

### Intent:

The intent of this measure 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 12 percent reduction in Section 5.303.2, Tiers 1 and 2, or the 25 percent reduction. Section 5.303.2 of this code mandates reduced flow rates. If a tier is adopted by your city or county, a 12 or 20 percent reduction will likely be required, and there may be a local ordinance in place otherwise for a reduction in water usage.

**Change for 2016:** Amendments were made to the commercial kitchen appliances and a new code section was added for food waste pulping systems. Additionally, Table A5.303.3 “Commercial Dishwasher Water Use” was updated to meet *EnergyStar* standards.

### 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 plan reviewer should confirm that the construction documents’ appliance specifications meet the criteria. Any deferred approvals should be checked for compliance.

**On-site enforcement:** The inspector should 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.

### A5.303.4 Water conserving plumbing fixtures and fittings

**A5.303.4.1 Nonwater supplied urinals.** Nonwater supplied urinals are installed in accordance with the *California Plumbing Code*.

Where approved, Hybrid urinals, as defined in Chapter 2, shall be considered waterless urinals.

## Intent:

The intent of this measure is to enhance indoor potable water use reduction by providing nonwater supplied urinals as an allowed fixture. A wide range of technologies and measures can be employed to save water and associated energy consumption. These include water-efficient plumbing fixtures such as ultra low-flow toilets and urinals, waterless urinals, low-flow and sensored sinks, low-flow showerheads, and water-efficient dishwashers and washing machines. This measure will align with the residential code section that allows nonwater supplied urinals as an option, which adds consistency between the residential and nonresidential codes.

**Change for 2016:** amendments were made to this section to define that hybrid unrinals should be considered waterless urinals where approved.

## Compliance method:

Show on the construction documents nonwater supplied urinals that meet the requirements as shown in the 2016 *California Plumbing Code*. Note that the *California Plumbing Code* requires a water distribution line to be roughed-in to each nonwater supplied urinal along with other requirements.

## Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents that nonwater supplied urinals shown on the construction documents meet the requirements of the *California Plumbing Code*.

**On-site enforcement:** The inspector should verify that the specified nonwater supplied urinals are installed in accordance the manufacturer recommendations and with the applicable provisions in *California Plumbing Code*.

**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 measure is to reduce indoor potable water use when recycled water is available in the community. Section 5.303.2 of this code mandates reduced flow rates for indoor potable water use through a prescriptive approach. If a tier is adopted by your city or county, a 12 or 20 percent

reduction will likely be required, and there may be a local ordinance in place otherwise for a reduction in water usage. Chapter 15 of the 2016 *California Plumbing Code* regulates the installation of dual plumbing systems for potable and recycled water.

**Change for 2016:** CBSC adopted and amended the 2015 *Uniform Plumbing Code* to add graywater and rainwater catchment provisions for nonresidential occupancies for inclusion into the 2016 *California Plumbing Code*. The 2016 *California Plumbing Code* may be used to assist in complying with this section.

### Compliance method:

Comply with the 2016 *California Plumbing Code* requirements for the use of dual plumbed water systems.

### Enforcement:

**Plan intake:** The plan reviewer should confirm on the construction documents that the dual plumbing standards in the 2016 *California Plumbing Code*, Chapter 15, are used in the design.

**On-site enforcement:** The inspector should verify that dual piping is installed and labeled as specified and in accordance with the *California 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 Outdoor 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 water use for landscaped areas of at least 500 square feet but not more than 1,000 square feet.

### Intent:

The intent of this measure is to enhance outdoor water use reduction beyond the mandatory requirement in *Water Code* Section 535. 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. There might be local jurisdictions that have adopted ordinances that may be more restrictive.

**Change for 2016:** Editorial amendments were made to remove the reference to Section 5.304.2 “Outdoor Potable Water Use,” which was repealed in the 2016 *CALGreen* Code.

### 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: install a submeter after the main meter for outdoor water use

### Suggestion:

Show separate meters and submeters on the construction documents.

### Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents that a separate submeter was provided for landscape irrigation.

**On-site enforcement:** The inspector should verify that separate meters are installed as specified on the approved construction documents.

**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.

Note: Area of the building footprint is excluded from the calculation.

### Intent:

The intent of these measures 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 has a tendency to overrun their ecosystems, reducing diversity of flora and fauna. *California Code of Regulations*, 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 be installed. The 50 percent area calculations for previously developed sites can be shown on the site plan and, if applicable, on the building 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 in compliance with this provision. Restoring these areas with the recommended vegetation should be shown on site or landscaping plans.

### Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents the landscape materials listing. In the case of previously developed sites, they should check the calculations for 50 percent coverage with recommended plantings.

**On-site enforcement:** The inspector should verify that plants are installed in the locations as shown, checking to make sure that disturbed or previously developed or graded areas are planted.

**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 2016 *California Plumbing Code*.

### Intent:

The intent of these measures is to eliminate the use of potable water for landscape irrigation. They emphasize preserving the potable resource for human and wildlife consumption and for growing food exclusively. Furthermore, these provisions implement, interpret and make specific the provisions of *Health and Safety Code* Section 18941.8, which authorizes the California Building Standards Commission to promulgate building standards for graywater use in specified nonresidential applications. The *California Plumbing Code* includes provisions for the installation of graywater systems. There may be local prohibitions or requirements for the use of graywater.

### Compliance method:

Provide a graywater irrigation system complying with the the 2016 *California Plumbing Code*, as acceptable to the local jurisdiction. Detail in

construction documents on a graywater system piping plan and specifications for system components.

### Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents a graywater system piping plan and component specifications. The reviewer should make sure that the graywater system for irrigation meets applicable local, regional and state standards.

**On-site enforcement:** The inspector should verify 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:

The intent of this measure is to promote the use of nonpotable water systems to conserve potable water, and to reference the *California Plumbing Code* for requirements. The 2016 *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 the 2016 *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 plan reviewer should confirm in the construction documents the nonpotable system piping plan and component specifications. The reviewer should make sure that the nonpotable system for irrigation meets applicable local, regional and state standards.

**On-site enforcement:** The inspector should verify that the system is installed as shown in the drawings, using 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:

The intent of this measure is to reduce the overall outdoor water used for irrigation by requiring specified irrigation systems use recycled water. In April 2015 the Governor signed Executive Order B-29-15, which required the Department of Water Resources (DWR) to update the Model Water Efficient Landscape Ordinance (MWELO) within Chapter 2.7, Division 2, Title 23, *California Code of Regulations*, which establishes the regulations for outdoor water use for irrigation systems. Also in response to this executive order, the Building Standards Commission (BSC) and other state agencies promulgated emergency *CALGreen* standards to align with appropriate sections of MWELO. Requiring irrigation systems subject to the MWELO requirements in Title 23 to use recycled water will help promote water conservation statewide.

## Compliance Method:

Provide recycled water for irrigation systems, complying with California Department of Water Resources Model Water Efficient Landscape Ordinance (MWELO) and as acceptable to the local jurisdiction. Provide detail in construction documents for a recycled water system piping plan and specifications for system components.

## Enforcement:

Plan intake: The plan reviewer should confirm in the construction documents recycled system piping plan and component specifications. The reviewer should make sure that the required system for irrigation meets applicable local, regional or state standards.

On-site enforcement: The inspector should verify installation of a recycle water system and make sure that the system is installed as shown in the drawings, and using 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 Optimum Value Engineering (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 layout studs, openings, floor and roof joists, etc. There are opportunities to design the floor system to reduce joist count, yet ensure all plumbing and HVAC is coordinated with the floor framing. Following the "stack framing" concept yields efficient use of materials. Most importantly, many framing issues are resolved on paper, prior to the foundation being cast.

### Compliance method:

Incorporate as many OVE innovations and techniques as possible to increase the overall efficiency of material use and the energy required to achieve superior 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 alternative material specifications such as drywall thickness, insulation thickness, sheathing thickness and nail 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 plan reviewer will confirm on the construction documents that any OVE measures designed are in accordance with the innovative developing practices employed, as well as requirements of Title 24.

**On-site enforcement:** The inspector should verify advanced framing techniques, comparing them to measures indicated on 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 detail 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 measure is to conserve energy associated with the transportation of building materials over long distances to the job site.

### Compliance method:

Identify available sources of material products and choose the most sustainable and cost-effective source within 500 miles of the project site or within California. Identify in the construction documents those materials intended to be obtained locally. Keep receipts and records of material supply sources to present to the enforcing agency for verification; Ensure that at least 10 percent of the project total of building materials, based on cost, are to be from a source within 500 miles of the project site, or from within California.

### Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents building products that are locally available, and the estimation of those materials' cost to the project.

**On-site enforcement:** Using receipts and records supplied by the building contractor, the inspector should verify that at least 10 percent of the project's total materials cost value has been acquired from source within 500 miles of project site or from within California.

**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 a project's total materials cost.

### Intent:

The intent of this measure is to promote sustainable building practices by using self-regenerating materials wherever possible, as opposed to finite and limited resource materials.

### Compliance method:

Identify in the construction documents bio-based materials intended to be used in the project amounting to at least 2.5 percent of the project's materials estimated cost at design and actual cost at construction. Retain all certification accompanying the bio-based, certified and rapidly renewable component resources for verification by the enforcing agency for these conservation measures.

### Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents that bio-based materials are specified and include the estimation of those materials' cost to the project.

**On-site enforcement:** The inspector should verify, using receipts and certifications provided by the contractor, that at least 2.5 percent of the project's total materials cost 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 value of 5 percent of the project's total materials cost, based on estimates in design and on actual in construction. 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 measure is to further conserve materials through the reuse of at least 5 percent of total building materials, based on a project's cost.

### Compliance method:

Identify in the construction documents reused materials intended to be used in the project, the value amounting to at least 5 percent of the project's materials estimated cost at design and actual cost at construction. Retain all documentation accompanying the reused materials for verification by the enforcing agency.

## Enforcement:

**Plan intake:** The plan reviewer should confirm the reused materials specified in the construction documents and include an estimation of those materials' value to the project.

**On-site enforcement:** The inspector should verify through receipts and other product purchase documentation that the percentage of project cost in reused materials, replacing the need for new materials, is 5 percent or greater value of the overall material cost for the project.

**A5.405.4 Recycled content.** Use materials, equivalent in performance to virgin materials with a total (combined) recycled content value (RCV) of:

**Tier 1.** The RCV shall not be less than 10 percent of the total material cost of the project, or use 2 products which meet the minimum recycled content levels in Table A5.405.4 for at least 75%, by cost, of all products in that category in the project.

Required Total RCV (dollars) = Total Material Cost (dollars) x 10 percent **(Equation A5.4-1)**

**Tier 2.** The RCV shall not be less than 15 percent of the total material cost of the project, or use 3 products which meet the minimum recycled content levels in Table A5.405.4 for at least 75%, by cost, of all products in that category in 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 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 assembled products.

2. Sources and recycled content of some recycled materials can be obtained from CalRecycle if not provided by the manufacturer.

**TABLE A5.405.4**
**MINIMUM RECYCLED CONTENT LEVELS**

| MATERIAL/ PRODUCT TYPE | MINIMUM TOTAL RECYCLED CONTENT | MINIMUM POST-CONSUMER RECYCLED CONTENT |
|---|---|---|
| Insulation, fiberglassr | 30% | 30% |
| Insulation, cellulose | 75% | 75% |
| Exterior Paint, latex | 50% | 50% |
| Carpet, nylon | 10% | 10% |
| Compost | 80% | 80% |
| Mulch | 80% | 80% |
| Acoustical ceiling panels | 60% | — |
| Drywall, gypsum | 4% | 4% |
| Aggregate base | 80% | 80% |

**A5.405.4.1 Total material cost.** Total material cost is the total estimated or actual cost of materials and assembled 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, depending on tier.

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 (for design) or actual (for construction) cost 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. T**otal 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 ($RCV_M$) 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 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, the total amount shall be considered preconsumer 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 (RCA) and shall be determined by Equation A5.4-8.

RCVA (dollars) = Assembly cost (dollars) x Total RCA (percent) **(Equation A5.4-8)**

If not provided by the manufacturer, Total $RC_A$ (percent) is the sum ($\sum$) 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. **(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, the total amount shall be considered preconsumer 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 these measures is to reduce the use of virgin materials,

in favor of pre- or post- consumer recycled content values (RCV). 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.

**Change for 2016:** Amendments were made to Section A5.405.4 Recycled content by adding a hybrid prescriptive approach to the Tier 1 and Tier 2 language for the use of recycled content materials. Additionally, the language was amended to repeal the [BSC] banner and the title for Tier 1 section for editorial reasons. Additionally, Table A5.303.3 "Commercial Dishwasher Water Use" was updated. Also, the notes in Sections A5.405.4.3 and A5.405.4.4 were amended to change the way non-designated recycled content materials count toward compliance. Lastly, Table A5.405.4 Minimum Recycled Content Levels was added to the code to list the minimum requirements of products that qualify under the hybrid perscriptive approach calculation method.

### Compliance method:

The target values are in terms of estimated material cost. Actual cost is determined by the weight of the recycled content. By comparing cost as determined by weight, the total RCV (defined in Section A5.402) is calculated and tier levels are achieved accordingly. Indicate 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 plan reviewer should confirm in the construction documents that recycled content materials are specified, and confirm 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 ASTM C1157, *Standard*

*Performance Specification for Hydraulic Cement*.

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 A5.4-14)**

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.

## Intent:

The intent of these measures is to encourage the use of alternative 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 the 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.

Placing Concrete

## Compliance method:

**Design team:** Show in the engineering specification that 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 above) 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 percent SCMs

**Using Equation A5.4-1** - $F/25 + SL/50 + UF/12 \geq 1$;

adding 80 pounds of F or 20 percent and 120 pounds of SL or 30 percent, then

$20/25 + 30/50 + 0/12 = 8 + .6 = 1.4$, which is $\geq 1$; so mix is OK

**Contractor:** Place concrete for the specified uses that complies with the approved mix design and minimum amount of SCMs.

## Enforcement:

**Plan intake:** The plan reviewer should review the 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*.) Check that mix design requirements are stipulated.

**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 designer 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 to achieve resource efficiency.

### Compliance method:

Use any combination of the alternative materials and manufacturing methods listed above. Indicate materials and methods in the construction documents. The 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 plan reviewer should confirm in the construction documents any cement or concrete alternatives employed in addition to the provisions in Sections A5.405.2.1.1 through A5.405.5.

**On-site enforcement:** The inspector should verify documentation of cement or concrete alternatives used 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 measure is to reduce the consumption of resources by specifying the use of those materials shown to have a longer service life, which are reduced-maintenance materials that require a minimum of other material maintenance. 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.

## Compliance method:

Compliance with this 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 for the designer to promote 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, without a commensurate increase in the service life of the roof and window systems would not meet the intent of this voluntary regulation. If the designer chooses 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, and the analysis will 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, as an example.

**Plan intake:** The plan reviewer should confirm in the construction documents that any materials from this section, if used, can be verified to meet the requirements listed above.

**On-site enforcement:** The inspector should verify installation of all enhanced materials that have been documented.

## 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. Any mixed recyclables that are sent to mixed-waste recycling facilities shall include a qualified third party verified facility average diversion rate. Verification of diversion rates shall meet minimum certification eligibility guidelines, acceptable to the local enforcing agency.

**A5.408.3.1.1 Enhanced construction waste reduction – Tier 2.** 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 measure is to go beyond the mandatory 50 percent salvage of all nonhazardous, new construction or demolition waste; for Tier 1, 65 percent and for Tier 2, 80 percent, or as required by local ordinance, whichever is more restrictive. The objective is to reduce the amount of construction waste from new construction and demolition that would be sent to landfills. An additional purpose is to encourage material resource efficiency through reuse and recycling of construction waste products.

**Change for 2016:** Amendments were made to Section A5.408.3.1 by adding a requirement that any mixed recyclables that are sent to mixed-waste recycling facilities shall include a qualified third-party verified facility average diversion rate and shall meet minimum certification eligibility guidelines that are acceptable to the local enforcing agency.

### 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.

**Plan intake:** The plan reviewer should confirm in the construction documents the level of enhanced construction waste reduction called for by the designer and make sure a report is called for, stating the level intended.

**On-site enforcement:** The inspector should verify a report or equivalent documentation indicating that at least 65 percent (to meet Tier 1) or 80 percent (to meet Tier 2) of construction waste has been reused/recycled, if option A5.408.3.1 is chosen as a conservation measure. For Tier 1 compliance, verify that a qualified third-party verified facility average diversion rate has been provided.

## SECTION A5.409
## LIFE CYCLE ASSESSMENT

**A5.409.1 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, meeting the 2016 *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 website 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 measure 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. Data are being created and collected on various 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 plan reviewer should confirm in the construction documents support data for materials and products intended to create a longer life cycle; a data base instituted to keep information on the projected life cycle vs. actual life cycle will provide the means of knowing which 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 inspector should verify that 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 120.1 (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.

**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 in filtration.

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 measure is to promote practices that maintain healthy air quality during the construction process, to protect workers' health and to 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 when 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 power generators is promoted for those urban areas where noxious fumes may affect adjacent neighbors.

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:

Designers should include these measures 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 these practices are being followed.

### Enforcement:

**Plan intake:** The plan reviewer should confirm in construction documents directions on ventilation and IAQ practices to be followed by the contractor.

**On-site enforcement:** The inspector should verify which air quality practices the contractor is to use on the project and ask for a demonstration of their employment.

**A5.504.2 IAQ post construction.** 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 temperatures 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 equivalent of 14 days of maximum outdoor air (the target air volume) shall be calculated by multiplying the maximum feasible air flow rate (in ft3/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 measure is to promote practices that ensure 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, providing flush-out recommendations for that situation. CCR, Title 8, contains additional regulations for the protection of worker safety.

## Compliance method:

Designers should include the requirements for flush-out (including whether by mechanical or natural means), contingency plans, early occupancy, etc., in the project specifications for ventilation, and others as applicable. The contractor should be responsible for employing the provisions 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 plan reviewer should confirm in the construction documents directions for flush-out practices to be followed by the contractor.

**On-site enforcement:** The inspector should verify which flush-out practices the contractor is to use on the project, per the permit set, and ask for documentation of their employment.

**A5.504.2.1 IAQ testing.** If a designer 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 measure is to provide a testing alternative to building flush-out, and promote practices to ensure healthy air quality at the close of construction. It spells out test protocols, allowable levels of pollutants and retesting requirements. Testing can be a greater cost 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; thus testing could target only those areas of potential problems, if building flush-out is determined by the designer to be infeasible. The *California Energy Code*, CCR, Part 6, also contains ventilation standards for conditioned spaces. CCR, Title 8, contains additional regulations for worker safety.

### Compliance method:

Designers should include the requirements for testing of pollutant levels of air and materials in the project specifications for ventilation, 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 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 plan reviewer should review the plans and specifications for the designer's testing alternative to building flush-out.

**On-site enforcement:** The inspector should verify if testing is to be employed on the project and ask for documentation of test methods and results at the conclusion of the 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: www.arb.ca.gov/toxics/compwood/naf_ulef/listofnaf_ulef.htm.

### Intent:

The intent of this measure is to encourage the use of no-added formaldehyde (NAF) based resins or ultra-low emitting formaldehyde (ULEF) resins, for products installed in a project. 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 NAF-based resins or ULEF-resin products can be found on the website listed above.

### Compliance Method:

Specify no-formaldehyde-emitting composite wood products on the construction documents. Builders should show documentation verifying that materials are certified to meet pollutant emission limits, expressed on the CARB website, as noted in the code.

### Suggestion:

Retain product data sheets at the job site for verification by the enforcing agency and for the operation and maintenance manual.

### Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents that any composite wood products and/or resins are specified to meet the requirements on the CARB approved list.

**On-site enforcement:** The inspector should verify that any composite wood products specified on the approved construction documents are installed, or stored on site with the ability to be verified.

**A5.504.4.7 Resilient flooring systems, Tier 1.** 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.** 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, for the percentage of area installed of all such materials.

**A5.504.4.8 Thermal insulation, Tier 1.** 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.** 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 measures exceed the mandatory regulations in Chapter 5, Division 5.5, and are available as a tier option. 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.

**Note:** See Chapter 8 of this guide for forms and templates.

**Change for 2016:** References to the standards for carpet and resilient floor systems were updated in the approved list of products to align with the mandatory code. The requirement for resilient floor systems was increased to 90 percent for Tier 1 and 100 percent for Tier 2.

## 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 they show 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 FloorScore program may be found at: http://www.rfci.com/int_FS-ProdCert.htm
3. 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:

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

### Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents that these finishes are specified to meet VOC emission limits.

**On-site enforcement:** The inspector should verify that finishes specified on the approved construction documents are installed, or stored on site with the ability to be verified. The inspector may review product data provided with products or accept self-certification signed form from the contractor.

**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 higher level air quality for building occupants.

### Compliance method:

Specify entrance mats that are permanently fixed and cleanable from debris. The specifications should include a maintenance schedule to be followed during occupancy.

Roll-out mats are not recommended; usually not considered contract furnishings and their maintenance is an uncertain prospect. If roll-out mats are specified, however, provide a maintenance schedule to be followed after occupancy.

### Suggestion:

**Contractor:** Retain product data sheets and recommended maintenance schedule for on-site verification by the enforcing agency, and for inclusion in the operation and maintenance manual.

### Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents that entrance mats are included. A maintenance schedule is recommended to be included in the specifications.

**On-site enforcement:** The inspector should verify that mat systems specified on the approved construction documents are installed, or stored on site with the ability to be verified. The inspector may review specifications and maintenance recommendations provided with products or accept self-certification signed form 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 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 doors to the room closed.
2. For each space, provide self-closing doors and deck to deck partitions or a continuous 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. It also limits spread of hazardous effects to adjacent spaces.

### Compliance Method:

Identify spaces where activity may produce hazardous fumes or chemicals. Show compliance with the applicable listed requirements in the code.

### Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents that applicable listed requirements are shown.

**On-site enforcement:** The inspector should review the project for compliance with the approved construction documents.

**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 measure is to ensure that particulate matter is filtered from the air by the use of higher rated MERV filters for improved air quality during occupancy.

## Compliance Method:

Specify and install prior to occupancy at least MERV 11 filters for Tier 1 and MERV 13 for Tier 2 return air intakes.

## Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents that filters are specified to meet Tier 1 or Tier 2 MERV ratings.

**On-site enforcement:** The inspector should verify that HVAC filtration specified on the approved construction documents is installed, prior to occupancy 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 check records confirming installation date.

## 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 windows must meet the requirements of Section 120.1 (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 multi-occupant 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 to increase workplace satisfaction and reap whatever benefits there may be for individuals and organizations. The *California Energy Code,* CCR, Title 24, Part 6, regulates energy use associated with lighting, thermal comfort and ventilation of conditioned spaces. ASHRAE 55 contains standards for thermal comfort.

## Compliance method:

Indicate in the construction documents lighting locations, controls, 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 achieved.

## Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents that the lighting control means for at least 90 percent of occupants and thermal control means for at least 50 percent of occupants are shown. Verify energy code compliance is shown.

**On-site enforcement:** The inspector should 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 measures 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 operations 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. 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 the construction documents 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 achieved.

### Enforcement:

**Plan intake:** The plan reviewer should confirm in the construction documents that daylighting strategies and line-of-sight calculations or methods are employed on the project. Verify that energy code compliance is shown.

**On-site enforcement:** The inspector should 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 complying with either of the following:

1. Install HVAC, refrigeration and fire suppression equipment that do not contain HFCs or that do not contain HFCs with a global warming potential greater than 150.
2. Install HVAC and refrigeration equipment that limit the use of HFC refrigerant through the use of a secondary heat transfer fluid with a global warming potential no greater than 1.

### Intent:

The purpose of these measures is to reduce the use of refrigerants that deplete ozone and contribute to the greenhouse effect. These refrigerants are gradually being phased out of use by the EPA, but voluntary implementation of these standards can accelerate the process and protect our atmosphere. 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 use complying refrigerants. 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:

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 plan reviewer should confirm in the construction documents that the equipment and refrigerant types for the project comply.

**On-site enforcement:** The inspector should 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 A5.203.1.1.1 and Section A5.203.1.2.1.

**A5.601.2.4 Voluntary measures for 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 12 percent reduction for indoor potable water use in Section A5.303.2.3.1.

b) 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, or use two products from table A5.405.4 for at least 75% by 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, or use three products from table A5.405.4 for at least 75% by cost in Section A5.405.4.

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 jurisdictions that wish to adopt more stringent standards than the mandatory measures. Because of the increased energy savings and additional sustainability provisions that are required for each tier, these standards assist the state in achieving its greenhouse gas emission and net zero energy goals. Energy efficiency savings, cool roofs, enhanced water-use reduction and construction waste diversion are examples of this combined approach when coupled with other provisions.

A city, county, or city and county that wish 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 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 guide includes guidelines for all the voluntary measures, including those required to fulfill each tier. A table that simplifies the narrative language from the tier provisions as follows:

**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<br>Roof Slope > 2:12 SRI 16 | Roof Slope < 2:12 SRI 78<br>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 Efficiency[3]** | 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** | | 15 | 25 |

1. Exception: Allowance may be permitted in Tier 2 for up to 5-percent specialty purpose flooring.

2. Solar water-heating systems requirement for newly constructed restaurants as per A5.203.1.1.2.

   Exceptions:

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

   b. 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.

3. Life cycle assessment compliant with Section A5.409.4 in this code may be substituted for prescriptive measures from Division A5.4

# APPENDIX A6.1 VOLUNTARY STANDARDS FOR HEALTH FACILITIES

Appendix Chapter A6.1 "Voluntary Standards for Health Facilities [OSHPD1, 2 & 4]" has four divisions and contains measures adopted by the Office of Statewide Health Planning and Development (OSHPD) with application to health facilities as explained in Section 106 of the *CALGreen* Code. *CALGreen* Chapter A6.1 addresses green building standards for health facility occupancies and is not discussed in this guide.

CALGreen®

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**DATE: May 15, 2012**

**REVISION NO.:**

**APPROVED:**

**DEPARTMENT:** Administration

**City of Signal Hill Policy & Procedure**

**Municipal Green Building Policy**

I. Purpose

The purpose of this policy is to provide guidance and leadership in the development of sustainable green building practices by:

A. Promoting conscientious environmental practices.
B. Encouraging development that improves energy and resource efficiency.
C. Conservation of natural resources.
D. Developing cost-effective strategies.
E. Minimizing environmental impacts.
F. Ensuring the public welfare, health and safety.

II. Definitions

A. Building: As defined under SHMC 20.04.090.

B. CALGreen Code: California Green Building Standards Code, in short known as the CALGreen Code.

C. Green Building: Sustainable building and design practices which are environmentally conscious through cost efficient and energy saving measures.

D. LEED: Leadership in Energy and Environmental Design; a nationally recognized program developed by the US Green Building Council

E. LEED Rating System: A rating system developed by the USGBC based on 100 points that review the five categories: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, Indoor Environmental Quality, plus an additional 6 points for Innovation in Design and an additional 4 points for Regional Priority. The buildings can qualify under four certification categories:

1. Certified: 40–49 points
2. Silver: 50–59 points
3. Gold: 60–79 points
4. Platinum: 80 points and above

F. USGBC: United States Green Building Council; formed in 1993 as a national non-profit to accelerate the adoption of green building practices, technologies, policies, and standards.



Attachment B

III. Policy

A. The City shall incorporate USGBC green building standards in the construction of municipal buildings as follows:

   i. All new buildings greater than 2,000 square feet.

   ii. All new additions exceeding 50% or more of a building's total square footage.

   iii. New construction will strive for a USGBC LEED Certification Silver level rating.

   iv. The City Council may allow exceptions to this policy on a case by case basis.

B. The City shall encourage and provide guidance to encourage the utilization of green building practices in the private sector.

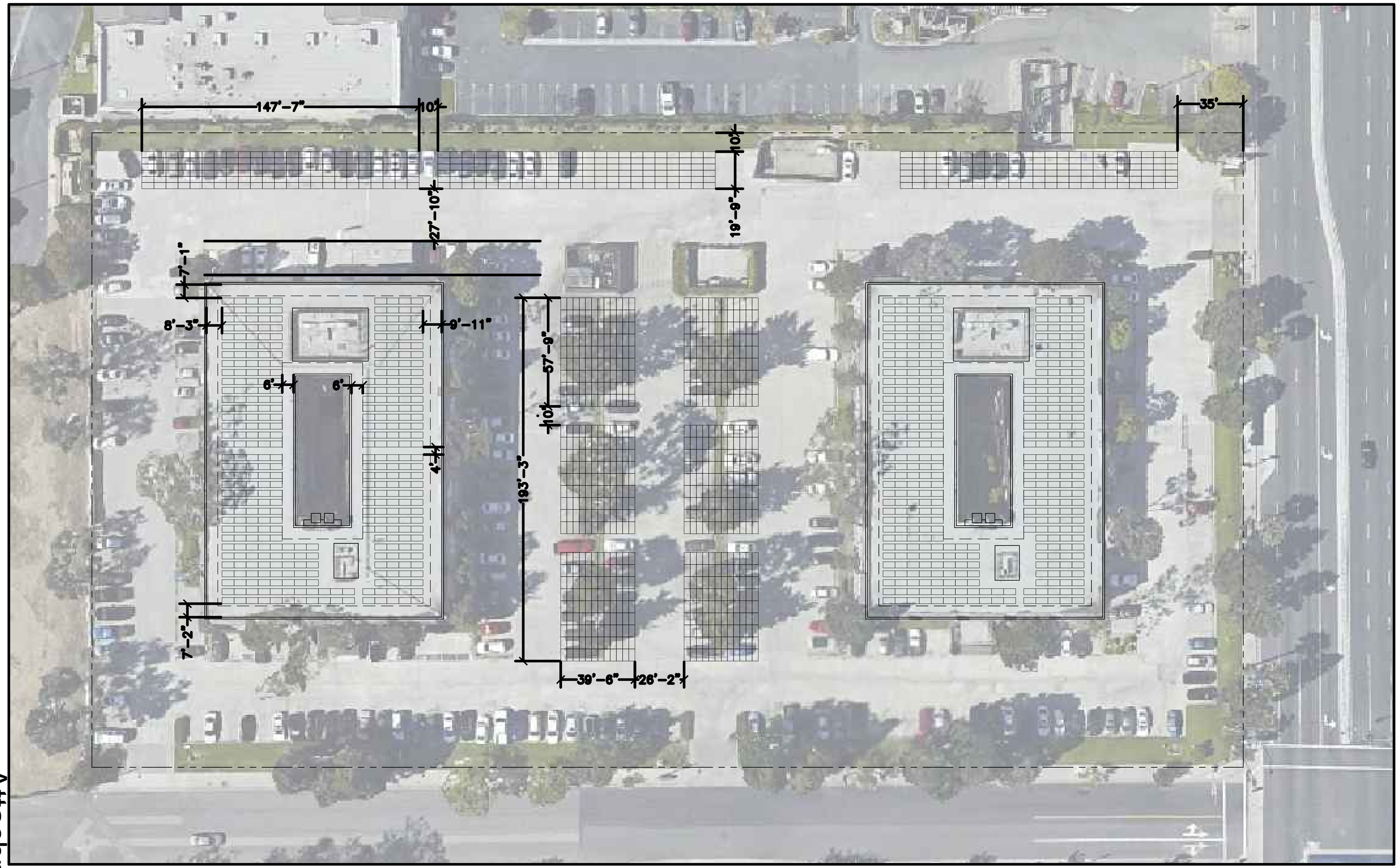
   i. The City will promote the application of USGBC LEED standards and rating system.

C. All projects shall comply with the CALGreen Code.

IV. Implementation

A. The City will ensure the management and implementation of the guidelines set forth in this policy.

B. Application of the policy shall become effective on the date it is adopted by the City Council.




NORTH

## SYSTEM SUMMARY:

GRID INTERACTIVE, UNGROUNDED PV SYSTEM.

**ROOF PV**

BUILDING 1 = 352 MODULES
BUILDING 2 = 352 MODULES

TOTAL STC SYSTEM SIZE: 228.800kW (DC)
TOTAL CEC SYSTEM SIZE: 210.167kW (AC)

PV MODULE: (704) PHONO SOLAR PS325M-24/T MODULES
PV INVERTER: (4) SOLECTRIA PVI-60TL (480V)

**PARKING CANOPY**

NORTH PARKING = 414 MODULES
CENTRAL PARKING = 648 MODULES

TOTAL STC SYSTEM SIZE: 345.150kW (DC)
TOTAL CE SYSTEM SIZE: 317.796kW (AC)

PV MODULES: (1,062) PHONO SOLAR PS325M-24T MODULES
PV INVERTER: (4) SOLECTRIA PVI-60TL (480V)
(2) SOLECTRIA PVI-36TL (480V)
OR
(9) SOLECTRIA PVI-36TL (480V)

## REVISION / RELEASE

| NO. | DESCRIPTION | DATE |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

SOLAR COMPANY:
PV GURU
18922 S. Broadway
Gardenia, CA 90248
Tel: 714-866-7979

SOLAR CONTRACTOR:
SOLAR OPTIMUM
614 WEST SOLORADO ST.
GLENDALE, CA 91204
800-552-9970
info@solaroptimum.com

PROJECT:

# 1501 CHERRY AVENUE SOLAR PV

1501 CHERRY AVENUE, SIGNAL HILL, CA 90755

SHEET TITLE:

SHEET NUMBER:

Attachment C

Attachment D

# 701 E. 28th St, Long Beach, CA


ORION CARPORT
SYSTEMS & CONSTRUCTION INC.

| Module Information | |
|---|---|
| Type: TSM-PD14 325 Watt | |
| Dimension: 77"x39.1"x1.57" | |
| **System Information** | |
| Size: 641.55 kW | Module Count: 1974 |
| Clearance Height: 9' | Revision: C |
| Additional Notes: | Date: 05/03/2017 |
| Titan Carport | |

| Array | Module Config. | Tilt | Total Panels |
|---|---|---|---|
| T1 | (20X77)-70 | 5 | 1470 |
| T4 | 12X14 | 5 | 168 |
| T5 | 12X14 | 5 | 168 |
| T6 | 12X14 | 5 | 168 |
| TOTAL | | | 1974 |



Attachment E

July

7c.

# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

July 18, 2017

**AGENDA ITEM**

**TO:** **HONORABLE CHAIR**
**AND MEMBERS OF THE PLANNING COMMISSION**

**FROM:** **RYAN AGBAYANI**
**ASSISTANT PLANNER**

**SUBJECT:** **DIRECTOR'S REPORT – VACANT PARCEL ORDINANCE (VPO)**

## Summary:

The City is obligated to adopt an ordinance requiring property owners of vacant parcels over 1.0 acre in size to install sediment control devices. The intent of the mandate is to reduce the amount of pollution that is carried by sediment from these sites by wind and rain into the stormwater system. Key provisions of the draft Vacant Parcel Ordinance (VPO) include:

- Property owners are responsible for preparing compliance plans consistent with provisions of a Guidance Manual.
- The deadline to install soil erosion and sediment control devices is currently set as April 24, 2018.
- Devices will be inspected on an annual basis prior to each rainy season to ensure that they are effective and properly maintained.

## Recommendations:

1) Provide comments and feedback; and

2) Schedule item for a public hearing at the Planning Commission meeting on August 15, 2017

## Background:

The Federal Clean Water Act (33 United States Code [USC] sections 1251 et seq.) authorizes the U.S. Environmental Protection Agency (USEPA) and/or approved states to administer the National Pollution Discharge Elimination System (NPDES) program in order to regulate the discharge of materials that affect water quality of surface waters of the United States.

In California, the State Water Resources Control Board and the nine Regional Water Quality Control Boards implement many of the Clean Water Act's provisions. The City is a Permittee under Regional Water Board Order No. R4-2012-0175, adopted on November 08, 2012, which establishes Waste Discharge Requirements for MS4 discharges within the Coastal Watersheds of Los Angeles County. The MS4 Permit established strict numerical limits regarding the amount of pollutants that can be discharged by stormwater and urban runoff. These pollutants are often carried by sediment.

The stormwater system serving the City connects to two watersheds – the Lower Los Angeles River and the Los Cerritos Channel (Attachment A). In order to comply with the MS4 Permit, the City has submitted Watershed Management Programs for each of the two watersheds. Both Watershed Management Programs include a commitment to make a good faith effort to reduce the amount of pollutants carried by soil and sediment.

On June 6, 2017, the Sustainable City Committee reviewed a draft of the proposed ordinance prepared by the City's stormwater consultant, John L. Hunter and Associates (JHLA). Committee members provided comments regarding:

- The definition of vacant parcel;
- Potential costs to property owners; and
- The inventory of affected properties.

## Analysis:

As a hilltop city, Signal Hill is susceptible to soil erosion. Within the City, vacant parcels are at high risk. During a rain event, sediment acts as a vehicle for pollutants (such as metals, nutrients, pesticides, and bacteria) to adhere to soil particles. The impacts resulting from erosion of vacant lands include degradation of ecosystems and pollution of receiving waters. However, effective sediment control can be achieved by minimizing the amount of sediment exposed to stormwater which, in turn, reduces the transport of pollutants to receiving waters.

Once adopted, the VPO would require owners of vacant lots to employ sediment controls to limit exposed soil. In an attempt to limit the number of property owners potentially affected and demonstrate the effectiveness of the effort, the VPO would initially apply only to vacant parcels greater than 1.0 acre in size.

To assist affected property owners, JHA has prepared a draft Vacant Parcel Erosion and Sediment Control Manual (Attachment B). The Manual provides control practice design guidelines based on site characteristics and various Best Management Practices (BMPs) to be included on compliance plans submitted for City review and approval.

The VPO calls for installation of required improvements within 180 days of the effective date of the Ordinance (Attachment C). It also calls for a proactive enforcement policy in which the City's stormwater inspector will inspect each site on an annual basis prior to the rainy season to observe site conditions and BMPs for effectiveness.

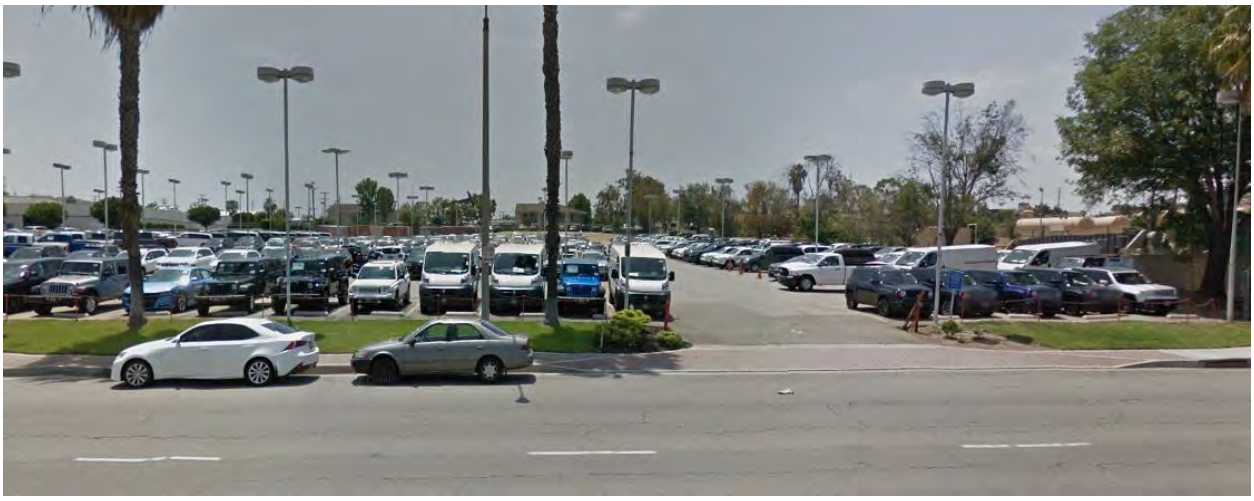
Definitions

Based on feedback from the June meeting, the SCC members requested clarification on which parcels would be subject to the VPO. In Signal Hill, there are many vacant properties due to our oil field legacy. In addition, there are a number of properties developed with what are considered "interim" uses such as trucking yards, storage yards, and Auto Center related storage lots. These uses are not considered the "highest and best" uses. However, these uses are regulated by the City and the properties include limited improvements. Examples of parcels that are vacant or have interim uses include:

Vacant Lot with Oil Well


Trucking Yard with Compliance Plan

Storage Yard with Compliance Plan



Approved Auto Center Related Storage Lot

In order to distinguish "typical" vacant lots from those with interim uses, staff is proposing the following definition:

> "Vacant parcel" shall mean a parcel without a structure as defined by the Zoning Ordinance and without a lawful land use regulated by the City through a conditional use permit, compliance plan, or similar permit. Oil and gas wells are not considered a land use for purposes of this section.

The SCC members noted that there may be situations where the same entity owns contiguous vacant parcels that individually are under the 1.0 acre threshold, but collectively exceed the threshold. To address this concern, staff is proposing the following definition:

> "Contiguous unimproved vacant parcel" shall mean any unimproved vacant parcels with the same owner, are side by side, and are not interrupted by any physical barrier, such as a public right-a-way, shall be considered a single unimproved vacant parcel.

Cost

During the presentation, staff will present several types of compliance plans with estimates of costs to the property owner to install required improvements.

Inventory of Affected Parcels

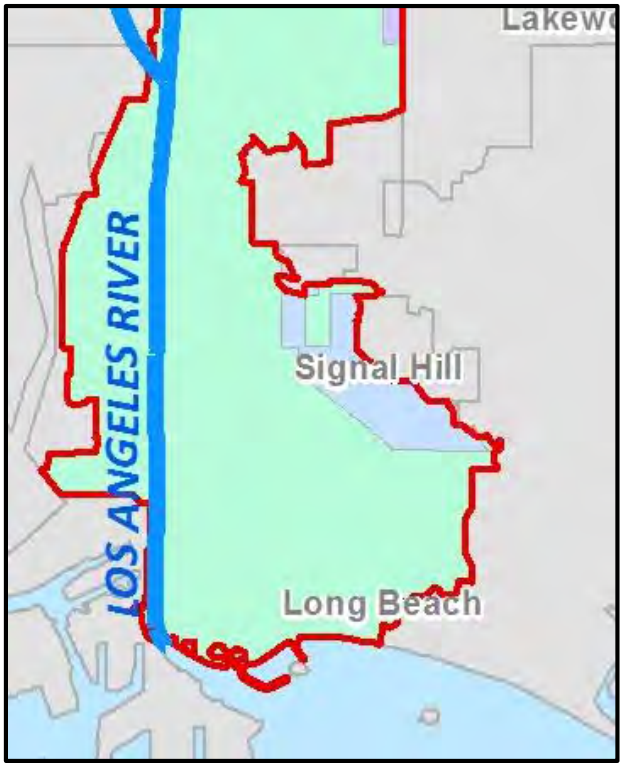
The initial data received from Los Angeles County quantified a total 958 vacant parcels within Signal Hill. JHLA has determined that it would be prudent to focus initial efforts on large parcels and has suggested that the qualifying threshold be parcels over 1.0 acre using the definitions above. Accordingly, 45 vacant parcels qualify for VPO (Attachment D). The 45 vacant parcels cover roughly 143 acres of land. It is important to note that of the 45 qualifying parcels, eight are owned by either the City of Signal Hill or Long Beach and 17 are owned by Signal Hill Petroleum. The remaining 20 parcels are owned by independent parties.

Approved by:

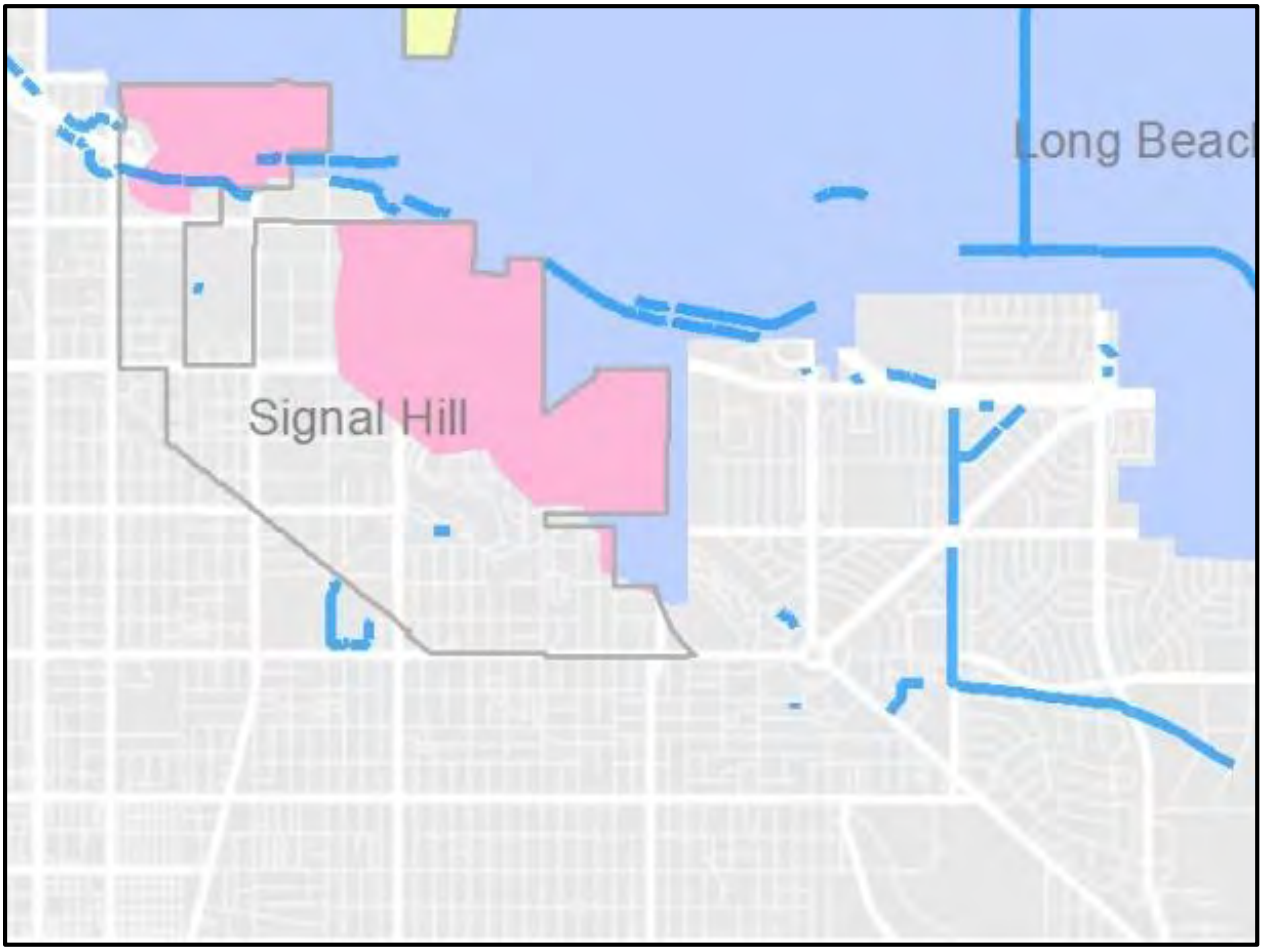
_____

Scott Charney
Director of Community Development

Lower Los Angeles River Watershed




Los Cerritos Channel Watershed




Attachment A

# VACANT PARCEL EROSION AND SEDIMENT CONTROL (VPESC) MANUAL

June 2017

City of Signal Hill

Attachment B

# Table of Contents

# Section 1: INTRODUCTION

## *WHY VACANT LOTS?*

Vacant lots are one of the primary areas of exposed soil not associated with construction sites. This manual identifies control measures to address sediment loading in stormwater resulting from vacant, unstable sites. The objectives of this Vacant Parcel Erosion & Sediment Control (VPESC) Manual are to decrease sediment discharges to the local waterbodies and implement controls necessary to achieve water quality goals.

## *WHAT IS EROSION?*

Soil erosion is the removal of soil particles by wind, water, or gravity. In most cases, natural erosion occurs at slow rates; however, the rate of erosion increases when land is cleared or altered and left unprotected. Vacant, barren sites are susceptible to up to one hundred times more erosion than a naturally vegetated site.[1] There are three main categories of erosion associated with vacant sites:

- *Rainfall Impact Erosion:* The impact of raindrops on bare soil can cause erosion. On undisturbed soil protected by vegetation or other cover, the erosion is minimal; however, on barren sites, the erosion potential from rainfall is highly increased due to the amount of soil exposed.
- *Sheet Erosion*: During a rain event, water flows in a thin layer called sheet flow. The distance of sheet flow depends on slope, soil roughness, type of vegetative cover, and rainfall intensity. This sheet flow is capable of transporting soil particles dislodged by the impact of raindrops onto bare soil.
- *Rill and Gully Erosion:* As it rains, runoff concentrates in very small streams called rivulets. These rivulets cut through the soil creating rills which generally run parallel to one another and to the slope of the soil surface. During a large rain event, these rills can join together to form a gully. The rate of rill erosion can be estimated as more than hundred times greater than that of sheet flow, and the rate of gully erosion can estimated as more than one hundred times greater than rill erosion. Therefore, sites with a potential for rill and gully erosion (i.e. barren hillsides) should take great consideration to prevent such sediment loss.

[1] California Stormwater Quality Association. Stormwater Best Management Practice Handbook; Construction. 2003.

## *WHY PREVENT EROSION?*

Sediment is a common component of stormwater, and is the most underestimated pollutant. Sedimentation is defined as the settling out of particles transported by water. Sedimentation occurs when the velocity of water is slowed sufficiently to allow suspended soil particles to settle. Larger particles, such as gravel and sand, settle more rapidly than fine particles such as silt and clay. The impacts due to erosion and sedimentation include degradation of aquatic and riparian ecosystems, pollutant transport, and erosion of land and sedimentation within water bodies and stormwater conveyance systems (i.e. storm drains and channels).

Sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Additionally, sediment can act as a vehicle for other pollutants that attach themselves to the particles. These pollutants include nutrients, trace metals, and hydrocarbons. Sediment is also the primary component of total suspended solids (TSS), an analytical parameter commonly used to determine water quality.

In addition to impacts directly associated with sedimentation, various pollutants can also be transported along with sediment particles leaving sites with exposed soil. Such pollutants include metals, nutrients, organics, conventional pollutants, pesticides, and coliform. These pollutants are often released into the atmosphere, resulting in widespread aerial deposition. They can also originate from organic components, plant residues, and nutrient elements within soils. Once the pollutants are available on a site they have the potential to be mobilized by erosion and later deposited downstream during sedimentation. Table 1 highlights the stormwater pollutants that are typically identified in sedimentation and soil transportation.

## *WHAT CAN I DO?*

Effective sediment control begins with minimizing the availability of particles for settling downstream. If sediment is not generated or released, it will not be available for transport to local waterbodies. In addition, if soils can be stabilized and sediment controlled, the major transportation mechanisms will be eliminated or greatly reduced, and fewer pollutants will reach the local waterbodies.

All vacant, unprotected parcels are subject to the provisions of the City of Signal Hill's Vacant Parcel Ordinance. This VPESC Manual provides guidance for control practice selection based on site configurations and constraints. The initial step in selecting appropriate control practice(s) is to determine the site layout. site considerations for control practice selection can be found in Section 2. The next step would be to follow the Control Practice Design Guidelines in Section 3 to ensure proper control practice selection and installation.

In cases where a site is vacant with protection, a waiver may be issued by the Director of Public Works.

**Table 1 - Stormwater Pollutants Typical to Sediment Transport.**

| Pollutant | Source | Effects |
|---|---|---|
| Sediment/solids | ➢ Vacant, unprotected lots | ➢ Increased turbidity<br>➢ Increased transport of soil bound pollutants<br>➢ Negative effects on the reproduction and function of aquatic organisms<br>Suppress aquatic vegetation growth |
| Metals (cadmium, chromium, copper, lead, mercury, and zinc) | ➢ Lead and chromium have been used as corrosion inhibitors in primer coatings and are also raw material components in non-metal products such as fuels, adhesives, paints, and other coatings.<br>➢ Copper and zinc are typically associated with building materials, including galvanized metal and ornamental copper, and automotive products, including tires and brake pads. | ➢ Toxic to aquatic organisms and can accumulate in sediments and fish tissues |
| Nutrients | ➢ Vehicle emissions<br>➢ Atmospheric deposition | ➢ Promotes eutrophication<br>➢ Depleted dissolved oxygen concentrations<br>➢ Release of toxins in sediment<br>➢ Significant swings in hydrogen ion concentration (pH) |
| Organics associated with petroleum (e.g., PAHs) | ➢ Vehicle emissions<br>➢ Automotive fluids<br>➢ Petroleum hydrocarbon products<br>➢ Motor products from leaking vehicles<br>➢ Esters<br>➢ Oils<br>➢ Fats<br>➢ Waxes<br>➢ High molecular-weight fatty acids | ➢ Toxic to aquatic organisms |
| Toxic Organic Compounds: (pesticides, solvents, hydrocarbons) | ➢ Dirt, grease, and grime retained in cleaning fluid or rinse water<br>➢ Hydrocarbon products<br>➢ Landscape maintenance<br>➢ Vehicle maintenance areas<br>➢ Waste handling | ➢ Toxic to humans and aquatic organisms |
| Microbial Pathogens (bacteria and viruses) | ➢ Animal or human fecal wastes | ➢ Harmful for humans and aquatic organisms |

# Section 2: SITE CONSIDERATIONS

Specific elements which should be given special consideration in the site assessment process include:

- *Slope:* The appropriate control practices for steeper sites are more limited.
- *Access to Water:* All vegetated control practices will require irrigation or access to water at the frequency necessary to achieve vegetative health.
- *Parkways:* All barren, unprotected parkways must be addressed.
- *Neighboring Sites:* If a control practice results in an increased discharge of runoff to an adjacent site, an encroachment permit will be necessary.

Below is a list of site configurations and the associated acceptable and unacceptable control practices to be considered for that type of site. The site categories include the following:

- Flat sites
- Unpaved Streets
- Parkways
- Sloped Sites
  - Slope 10:1 (H:V) to 3:1 (H:V)
  - Slope 3:1 (H:V) to 2:1 (H:V)
  - Slope 2:1 (H:V) to 1:1 (H:V)
  - Slope greater than 1:1 (H:V)

A site may fall into multiple categories (i.e., a flat site which conveys water to a sloped area). In these cases control practices will need to be identified for all applicable categories.

## FLAT SITES

### Acceptable Control Practices

- Landscape
- Vegetated Filter Strip
- Decomposed Granite (DG)
- Gravel Mulch
- Hydroseeding
- Silt Dike
- Hydraulic Mulch
- Compost Blanket

### Unacceptable Control Practices

- Rock Slope Protection
- Geotextiles and Mats
- Slope Drain
- Sediment Basin

**Figure 1 - Flat Site Example.**

## UNPAVED STREETS

### Acceptable Control Practices

- Decomposed Granite (DG)
- Gravel Mulch

### Unacceptable Control Practices

- Landscape
- Vegetated Filter Strip
- Rock Slope Protection
- Hydroseeding
- Silt Dike
- Hydraulic Mulch
- Geotextiles and Mats
- Slope Drain
- Compost Blanket
- Sediment Basin

**Figure 2 - Unpaved Street Example.**

## PARKWAYS

### Acceptable Control Practices

- Landscape
- Vegetated Filter Strip
- Decomposed Granite (DG)
- Gravel Mulch
- Hydroseeding
- Hydraulic Mulch
- Compost Blanket

### Unacceptable Control Practices

- Rock Slope Protection
- Silt Dike
- Geotextiles and Mats
- Slope Drain
- Sediment Basin


**Figure 3 - Parkway Example.**

## SLOPE 10:1 (H:V) TO 3:1 (H:V)

### Acceptable Control Practices

- Landscape
- Decomposed Granite (DG) with stabilizer or tackifier
- Gravel Mulch with stabilizer or tackifier
- Hydroseeding
- Silt Dike
- Hydraulic Mulch
- Geotextiles and Mats
- Slope Drain
- Compost Blanket
- Sediment Basin

### Unacceptable Control Practices

- Vegetated Filter Strip
- Decomposed Granite (DG) without stabilizer or tackifier
- Gravel Mulch without stabilizer or tackifier


**Figure 4 - 10:1 Slope Example.**


**Figure 5 - 3:1 Slope Example.**

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## SLOPE 3:1 (H:V) TO 2:1 (H:V)

### Acceptable Control Practices

- Landscape
- Rock Slope Protection
- Hydroseeding
- Silt Dike (along toe)
- Hydraulic Mulch
- Geotextiles and Mats
- Slope Drain
- Compost Blanket
- Sediment Basin

### Unacceptable Control Practices

- Vegetated Filter Strip
- Decomposed Granite (DG)
- Gravel Mulch


**Figure 6 - 3:1 Slope Example.**


**Figure 7 - 2:1 Slope Example.**

## SLOPE 2:1 (H:V) TO 1:1 (H:V)

Acceptable Control Practices

- Landscape
- Rock Slope Protection
- Silt Dike (along toe)
- Hydraulic Mulch
- Geotextiles and Mats
- Slope Drain
- Sediment Basin

Unacceptable Control Practices

- Vegetated Filter Strip
- Decomposed Granite (DG)
- Gravel Mulch
- Hydroseeding


**Figure 8 - 2:1 Slope Example.**

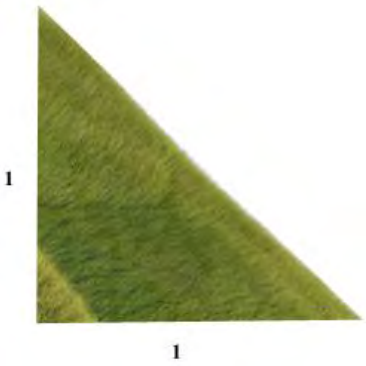


**Figure 9 - 1:1 Slope Example.**

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## SLOPE GREATER THAN 1:1 (H:V)

Acceptable Control Practices

- Landscape
- Silt Dike (along toe)
- Hydraulic Mulch
- Geotextiles and Mats
- Slope Drain
- Sediment Basin

Unacceptable Control Practices

- Vegetated Filter Strip
- Decomposed Granite (DG)
- Gravel Mulch
- Rock Slope Protection
- Hydroseeding

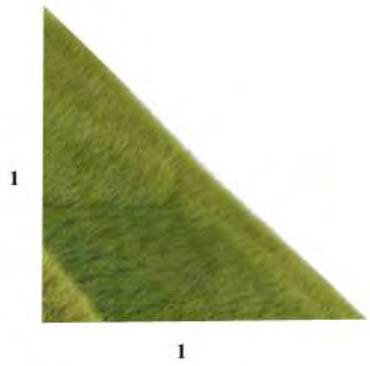



**Figure 10 - 1:1 Slope Example.**

# Section 3: CONTROL PRACTICE DESIGN GUIDELINES

Each control practice is expected to have conditions for which the practice works well and conditions for which the practice will not achieve the desired results. Below is a table containing the most suitable application and restricted applications for each control practice. The sections below include the descriptions, application, design criteria, and approximate cost for each accepted control measure.

**Table 2 - Control Practice Considerations.**

| Control Practice | Suitable Applications | Restricted Application | Maximum Life Span[2] |
|---|---|---|---|
| **Landscape** | ✓ All sites where landscape is anticipated to thrive | – Highly trafficked areas | Permanent |
| **Vegetated Filter Strip** | ✓ All sites where landscape is anticipated to thrive | – Highly trafficked areas<br>– Slopes greater than 10:1 [H:V] | Permanent |
| **Decomposed Granite (DG)** | ✓ Areas where vegetation establishment is difficult<br>✓ Flat surfaces<br>✓ Trails and pathways<br>✓ Slight slopes (i.e., 10:1 [H:V]), when used with a stabilizer or tackifier | – Slight slopes without a stabilizer or tackifier<br>– Slopes greater than 10:1 (H:V) | Permanent |
| **Gravel Mulch** | ✓ Areas where vegetation establishment is difficult<br>✓ Flat surfaces<br>✓ Trails and pathways<br>✓ Slight slopes (i.e., 10:1 [H:V]), when used with a stabilizer or tackifier | – Slight slopes without a stabilizer or tackifier<br>– Slopes greater than 10:1 (H:V) | Permanent |
| **Rock Slope Protection** | ✓ Slopes subject to scour or with high erosion potential<br>✓ Slopes adjacent to flowing waterways<br>✓ Slopes subject to overflow from detention facilities | – Rounded stones may not be used on slopes greater than 2:1 (H:V) | Permanent |
| **Hydroseeding** | ✓ Apply permanent stabilization measures<br>✓ Areas with permanent or temporary irrigation<br>✓ Areas not subject to heavy wear by equipment or high traffic | – Temporary seeding on slopes steeper than 3:1 (H:V)<br>– Temporary seeding without irrigation | Permanent |
| **Silt Dike** | ✓ Along the perimeter of unprotected sites<br>✓ Along the toe of exposed and erodible slopes | – Drainage areas greater than 5 acres | Unknown |
| **Hydraulic Mulch** | ✓ Slopes with exposed soil between existing vegetation such as trees or shrubs<br>✓ Slopes planted with live, container-grown vegetation or plugs<br>✓ Slopes burned by wildfire | – Highly trafficked areas | 6-12 Months |
| **Geotextiles and Mats** | ✓ Highly erodible slopes where vegetation is slow to establish<br>✓ Areas where seeding cannot occur<br>✓ Areas with fine grained and potentially erosive soils<br>✓ Steep slopes<br>✓ Slopes and disturbed soils where mulch must be anchored<br>✓ Barren areas where plants are slow to develop<br>✓ Slopes adjacent to water bodies | – Excessively rocky sites<br>– Areas where the final vegetation will be mowed<br>– Hard or rocky soil<br>– Areas with high foot traffic (tripping hazard) | 2 Years |
| **Slope Drains** | ✓ Areas with concentrated flow of surface runoff over a slope<br>✓ Drainage for top of slope diversion dikes or swales.<br>✓ Drainage for top of cut and fill slopes where water can accumulate | – Sites greater than 10 acres | Permanent |
| **Compost Blanket** | ✓ In combination with temporary and/or permanent seeding<br>✓ Slopes with exposed soil between existing vegetation<br>✓ Slopes planted with live, container-grown vegetation<br>✓ Areas where plants are slow to develop<br>✓ Slopes of 2:1 (H:V) or gentler | – Areas of concentrated flows<br>– Slopes greater than 2:1 (H:V) | Unknown |
| **Sediment Basin** | ✓ Drainage areas equal to or greater than 5 acres | – Drainage areas greater than 75 acres | Unknown |

[2] The maximum life span is assuming the most stable application for each control measure. The life span of some control measures may vary significantly depending on the materials and application used.

## *LANDSCAPE*

Description

Incorporating appropriate landscape on a vacant, unprotected site is the most effective control method that can be implemented. It is important to consider the site's existing hydrologic, and vegetative features to determine if partial or full landscape is suitable. Landscape designs should maximize natural water storage and infiltration opportunities, protect slopes and channels, and utilize drought tolerant vegetation, to the maximum extent possible.

**Figure 11 - Landscape Application.**

Suitable Applications

Appropriate applications include all areas not anticipated to contain high traffic.

Limitations

- Highly trafficked areas

Implementation

Design requirements for landscapes should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies. During the development of a landscape plan, map and assess land suitability for urban uses. Include the following landscape features in the assessment:

- Steep slopes
- Erosion-prone soils
- Foundation suitability
- Soil suitability for waste disposal
- Aquifers
- Aquifer recharge areas
- Various categories of urban land use

The following criteria must be considered for landscape planning:

- Convey runoff safely from the tops of slopes.
- Stabilize exposed slopes as quickly as possible.
- Control and filter flows in landscaping prior to reaching existing drainage systems.
- Install energy dissipaters, such as riprap, at the outlets of systems that convey runoff to landscaped areas.
- Consider other design principles that are comparable and equally effective.
- Vegetate slopes with native or drought tolerant vegetation.

Costs

The cost of landscape varies significantly depending on the vegetation used and the site configuration.

Inspection and Maintenance

- Inspect at least twice annually for erosion or damage to vegetation, preferably once at the beginning and once at the end of the wet season. Additional inspections after periods of heavy runoff is preferred.
- Vegetation should be checked for debris, litter, and sediment accumulation.

## *VEGETATED FILTER STRIP*

Description

Vegetated filter strips are vegetated surfaces that are designed to treat sheet flow from adjacent surfaces. Filter strips function by slowing runoff velocities and allowing sediment and other pollutants to settle and by providing some infiltration into underlying soils. If properly designed, vegetated, and operated, buffer strips can provide reliable water quality benefits in conjunction with high aesthetic appeal.

The use of vegetated filter strips is limited to gently sloping areas where the vegetative cover is robust and diffuse, and where shallow flow characteristics are possible. The practical water quality benefits can be effectively eliminated with the occurrence of significant erosion or when flow concentration occurs across the vegetated surface.

**Figure 12 – Vegetated Filter Strip Application.**
**Source: California Department of Transportation <http://www.dot.ca.gov>**

Slopes should not exceed 1:10 (H:V). The vegetative surface should extend across the full width of the area being drained. The upstream boundary of the filter should be located adjacent to the site.

Limitations

- A thick vegetative cover is needed for these practices to function properly.
- Buffer or vegetative filter length must be adequate and flow characteristics acceptable or water quality performance can be severely limited.
- May not be used on slopes greater than 10:1 (H:V)
- Not appropriate without supplemental irrigation

Implementation

- The tributary area may have a length (in the direction of flow towards the buffer) no greater than 60 feet.
- Slopes should not exceed 10:1 (H:V).
- Filter strip must have a slope no less than 1%.
- Filter strip must be a minimum of 15 feet in the direction of flow.
- Width should be the same as the tributary area.
- Either grass or a diverse selection of other low growing, drought tolerant, native vegetation should be specified. Vegetation whose growing season corresponds to the wet season is preferred.
- Use appropriate fertilizer and soil amendments based on the needs of the vegetation requirements.
- If sod tiles must be used, they should be placed so that there are no gaps between the tiles; stagger the ends of the tiles to prevent the formation of channels along the strip.
- Use a roller on the sod to ensure that no air pockets form between the sod and the soil.
- Where seeds are used, erosion controls will be necessary to protect seeds for at least 75 days after the first rainfall of the season.

Costs

The cost of landscape varies significantly depending on the vegetation used and the site configuration.

Maintenance

- Inspect strips at least twice annually for erosion or damage to vegetation, preferably once at the beginning and once at the end of the wet season. Additional inspections after periods of heavy runoff is preferred.
- The strip should be checked for debris, litter, and sediment accumulation.
- Regularly inspect vegetated buffer strips for pools of standing water. Vegetated buffer strips can become a nuisance due to mosquito breeding if proper drainage slopes are not implemented and maintained.

## *DECOMPOSED GRANITE*

Description

Decomposed granite is a form of non-vegetative stabilization. This method is typically used for long term or permanent stabilization of areas prone to erosion and should be used only where vegetative options cannot be established in the required timeframe, due to soil or climactic conditions, or where vegetation may be a potential fire hazard. This erosion protection method consists of a layer of stabilized decomposed granite placed over an erodible surface.

**Figure 13 - Decomposed Granite Application.**

Suitable Applications

Decomposed Granite (DG) is suitable for use in areas where vegetation establishment is difficult, on flat surfaces, trails and pathways, and when used in conjunction with a stabilizer or tackifier, on shallow slopes (i.e., 10:1 [H:V]). Decomposed Granite can also be used on shallow rocky slopes where vegetation cannot be established for permanent erosion control. Suitable applications for decomposed granite include:

- Areas of vehicular or pedestrian traffic such as roads or paths
- Arid environments where vegetation would not provide ground coverage or would require excessive irrigation
- Soils where vegetation would be difficult to establish

Limitations

- If not tackified, material may be susceptible to erosion even on slight slopes (e.g., 30:1 [H:V])
- Installed costs may be more expensive than vegetative stabilization methods

Implementation

- If used for a road or path, should be installed on a prepared base.
- Should be mixed with a stabilizer if used for roads or pathways, or on slope applications.
- Recommended to prevent standing water on or next to a decomposed granite road or pathway.

Costs

Costs are highly variable depending not only on technique chosen, but also on materials chosen within specific techniques.

Inspection and Maintenance

- Inspect monthly, prior to forecasted rain events, and after the conclusion of rain events
- For permanent installation, require inspection periodically and after major storm events to look for signs of erosion or damage to the stabilization
- All damage should be repaired immediately
- Rake out and add decomposed granite or gravel as needed to areas subject to rill erosion
- Inspect upgradient drainage controls and repair/modify as necessary
  Any significant problem areas should be repaired to restore uniformity to the installation

## *GRAVEL MULCH*

Description

Gravel mulch is a form of non-vegetative stabilization. This method is typically used for long term or permanent stabilization of areas prone to erosion and should be used only where vegetative options cannot be established in the required timeframe, due to soil or climactic conditions, or where vegetation may be a potential fire hazard. Gravel mulch is a non-degradable erosion control product that is composed of washed and screened coarse to very coarse gravel, 16 mm to 64 mm (0.6" - 2.5"), similar to an AASHTO No. 3 coarse aggregate placed over an erodible surface.

**Figure 14 - Gravel Mulch Application.**
**Source: California Department of Transportation <http://www.dot.ca.gov>**

Suitable Applications

Gravel mulch is suitable for use in areas where vegetation establishment is difficult, on flat surfaces, trails and pathways, and when used in conjunction with a stabilizer or tackifier, on shallow slopes (i.e., 10:1 [H:V]). Gravel mulch can also be used on shallow rocky slopes where vegetation cannot be established for permanent erosion control. Suitable applications for gravel mulch include:

- Areas of vehicular or pedestrian traffic such as roads or paths
- Arid environments where vegetation would not provide timely ground coverage, or would require excessive irrigation
- Soils where vegetation would be difficult to establish

Limitations

- If not properly screened and washed, can contain fine material that can erode and/or create dust problems
- If inadequately sized, material may be susceptible to erosion on sloped areas
- Pore spaces fill with dirt and debris over time; may provide a growing medium for weeds

Implementation

- Should be sized based on slope, rainfall, and upgradient run-on conditions. Stone size should be increased as potential for erosion increases (steeper slopes, high intensity rainfall).
- If permanent, a weed control fabric should be placed prior to installation.
- Should be installed at a minimum 2" depth.
- Should completely cover all exposed surfaces.

Costs

Costs are highly variable depending not only on technique chosen, but also on materials chosen within specific techniques. Caltrans has provided an estimate for gravel mulch of $10 - $16/yd$^2$ in flat areas and $11 - $25/ yd$^2$ on side slopes.[3]

Inspection and Maintenance

- Inspect monthly, prior to forecasted rain events, and after the conclusion of rain events.
- For permanent installation, require inspection periodically and after major storm events to look for signs of erosion or damage to the stabilization.
- All damage should be repaired immediately.
- Rake out and add decomposed granite or gravel as needed to areas subject to rill erosion. Inspect upgradient drainage controls and repair/modify as necessary.
- Should remain stable under loose surface material. Any significant problem areas should be repaired to restore uniformity to the installation.

[3] Costs obtained from CASQA Factsheets, 2011 and reflect a 5% escalation to reflect 2015 costs. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

## *ROCK SLOPE PROTECTION*

**Figure 15 - Rock Slope Protection Application.**
**Source: California Department of Transportation <http://www.dot.ca.gov>**

Description

Rock slope protection is a form of non-vegetative stabilization. This method is typically used for long term or permanent stabilization of areas prone to erosion and should be used only where vegetative options cannot be established in the required timeframe, due to soil or climactic conditions, or where vegetation may be a potential fire hazard. This erosion protection method consists of utilizing large rock or rip-rap (4"-24") to stabilize slopes with a high erosion potential and those subject to scour along waterways.

Suitable Applications

Rock slope protection is suitable for use in areas where vegetation establishment is difficult and the slopes are subject to scour or have a high erosion potential, such as slopes adjacent to flowing waterways or slopes subject to overflow from detention facilities (spillways). Suitable applications for rock slope protection include:

- Arid environments where vegetation would not provide timely ground coverage, or would require excessive irrigation
- Soils where vegetation would be difficult to establish
- Slopes subject to scour or with a high erosion potential

Limitations

- Installation is labor intensive
- Installed costs can be significantly higher than vegetative stabilization methods
- Rounded stones may not be used on slopes greater than 2:1 [H:V]

Implementation

- Rock slope protection installation should follow Caltrans Standard Specification 72-2: Rock Slope Protection. Refer to the specification for rock conformity requirements and installation methods.
- When using rock slope protection, rock size and installation method should be specified by an Engineer.
- A geotextile fabric should be placed prior to installation.

Costs

Costs are highly variable depending not only on technique chosen, but also on materials chosen within specific techniques.

Inspection and Maintenance

- Inspect monthly, prior to forecasted rain events, and after the conclusion of rain events.
- For permanent installation, require inspection periodically and after major storm events to look for signs of erosion or damage to the stabilization.
- All damage should be repaired immediately.

## *HYDROSEEDING*

Description

Hydroseeding is when a mixture of a hydraulic mulch, seed, fertilizer, and stabilizing emulsion is applied with a hydraulic mulcher to a bare soil surface. This practice is used to temporarily protect exposed soils from erosion by water and wind.

Suitable Applications

Hydroseeding is suitable for vacant areas requiring temporary or permanent protection. Hydroseeding without additional cover (i.e. hydraulic mulch, erosion control blanket, etc.) is not a stand-alone erosion control BMP and should be combined with additional measures until vegetation establishment.

**Figure 16 - Hydroseed Application.**
**Source: California Department of Transportation <http://www.dot.ca.gov>**

Typical applications for hydroseeding include:

- Areas where permanent stabilization or earthwork is not anticipated prior to seed germination
- Areas with permanent or temporary irrigation
- Areas not subject to heavy wear by construction equipment or high traffic

Limitations

- Hydraulic seed should be applied with hydraulic mulch or should be followed by rolled erosion control products or application of a compost blanket
- Hydraulic seed may be used alone only on small flat surfaces when there is sufficient time in the season to ensure adequate vegetation establishment and coverage to provide adequate erosion control.
- Hydraulic seed without mulch does not provide immediate erosion control
- Temporary seeding is not appropriate for slopes steeper than 3:1 (H:V)
- Temporary seeding is not appropriate without supplemental irrigation
- Temporary vegetation may have to be removed before permanent vegetation is applied
- Temporary vegetation may not be appropriate for short term inactivity (i.e. less than 6 months)

Implementation

In order to select appropriate hydraulic seed mixtures, an evaluation of site conditions should be performed with respect to:

- Soil conditions - Maintenance requirements
- Site topography and exposure (sun/wind) - Sensitive adjacent areas
- Vegetation types - Plans for permanent vegetation

Refer to the local office of the U.S.D.A. Natural Resources Conservation Service (NRCS) is for information on appropriate seed mixes. The following steps should be followed for implementation:

- Where appropriate or feasible, soil should be prepared to receive the seed by disking or otherwise scarifying the surface to eliminate crust, improve air and water infiltration, and create a more favorable environment for germination and growth.
- Avoid use of hydraulic seed in areas where it will affect future earthwork activities.
- Hydraulic seed can be applied using a multiple step or one step process.
  - In a multiple step process, hydraulic seed is applied first, followed by mulch or a Rolled Erosion Control Product (RECP).
  - In the one step process, hydraulic seed is applied with hydraulic mulch in a hydraulic matrix. When the one step process is used to apply the mixture of fiber, seed, etc., the seed rate should be increased to compensate for all seeds not having direct contact with the soil.
- All hydraulically seeded areas must have mulch or alternate erosion control cover to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.
- All seeds should be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag should be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. The container should be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. All legume seed should be pellet inoculated. Inoculant sources should be species specific and should be applied at a rate of 2 lb of inoculant per 100 lb seed.
- Commercial fertilizer should conform to the requirements of the California Food and Agricultural Code, which can be found at http://www.leginfo.ca.gov/.html/fac_table_of_contents.html. Fertilizer should be pelleted or granular form.
- Follow up applications should be made as needed to cover areas of poor coverage or germination/vegetation establishment and to maintain adequate soil protection.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

Costs

Average costs for installation vary depending on the site layout. Cost of seed mixtures vary based on types of required vegetation. The estimated costs for hydroseeding range from $2,166 per acre for flat slopes and stable soils to $4,560 per acre for moderate to steep slopes and/or erosive soils.[4]

Inspection and Maintenance

- Inspect monthly, prior to forecasted rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and hydroseed must be re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application.
- Where seeds fail to germinate, or they germinate and die, the area must be re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates.
- Irrigation systems should be inspected daily while in use to identify system malfunctions and line breaks. When line breaks are detected, the system must be shut down immediately and breaks repaired before the system is put back into operation.
- Irrigation systems should be inspected for complete coverage and adjusted as needed to maintain complete coverage.

[4] Source: Caltrans Soil Stabilization BMP Research for Erosion and Sediment Controls, July 2007. Costs reflect a 14% escalation from 2007 to 2015. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

## *SILT DIKE*

Description

Silt dikes are pre-manufactured devices that are typically specified and installed for semi-permanent drainage and sediment control on the perimeter of unprotected sites.

**Figure 17 - Silt Dike Application.**
**Source: http://www.tri-siltdike.com**

Suitable Applications

Silt dikes are generally used to slow down runoff water, divert drainage, or contain fines and sediment. A silt dike typically consists of a triangular foam core covered in geotextile fabric. Silt dikes have a variety of profiles (triangular, round, and square). Suitable applications of silt dikes include:

- Along the perimeter of unprotected sites
- Along the toe of exposed and erodible slopes

Limitations

- Silt dikes require additional measures to adhere to asphalt in cold and windy climates, as glue may not adhere adequately to the pavement
- Silt dikes are not appropriate for drainage areas greater than 5 acres
- Runoff will pond upstream of the barrier, possibly causing flooding or bypass if sufficient space does not exist to accommodate ponding
- Silt dikes may require frequent maintenance especially when used near vehicle traffic or to detain concentrated flows
- When used to detain concentrated flows, maintenance requirements increase

Implementation

When appropriately placed, silt dikes intercept and slow sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. The core is porous, which allows the ponded runoff to flow slowly through the silt dike, releasing the runoff as sheet flows. Generally, silt dikes should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

The following should be taken into consideration for the design and layout of silt dikes:

- Silt dikes containing a rubber core are prohibited.
- Silt dikes used on soil should be attached to the ground per manufacturer specifications.
- Silt dikes used on asphalt or concrete may be attached using a variety of methods, including nailing the dikes to the pavement, or using a high strength adhesive.
- Follow manufacturer specifications when installing silt dikes.
- Allow sufficient space up slope from the silt dikes to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, silt dikes should be set back three feet from the slope toe to facilitate cleaning. Where site conditions do not allow set back, the silt dike may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- Butt ends of silt dikes tightly. Overlaps should be sealed in accordance with the manufacturer's detail.

Costs

Silt dikes average around $36.75 - $47.25 per 7 ft. section.[5]

Inspection and Maintenance

- Inspect monthly, prior to forecasted rain events, and after the conclusion of rain events.
- Silt dikes exposed to sunlight will need to be replaced more frequently due to photo-degradation.
- Reshape or replace sections of damaged temporary silt dike as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Remove sediment when accumulation reaches one-third of the barrier height.
- Removed sediment should be incorporated onsite or disposed of properly.

[5] Costs obtained from CASQA Factsheets, 2011 and reflect a 5% escalation to reflect 2015 costs. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

## *HYDRAULIC MULCH*

Description

Hydraulic mulch consists of various types of fibrous materials mixed with water and sprayed onto the soil surface in slurry form to provide a layer of temporary protection from wind and water erosion. Hydraulic mulch is a stabilization method which can be used for temporary non-vegetative stabilization.

**Figure 18 – Hydraulic Mulch Application.**
**Source: California Department of Transportation <http://www.dot.ca.gov>**

Suitable Applications

Hydraulic mulch is a temporary, stand alone, erosion control practice suitable for unprotected areas that require temporary protection from wind and water erosion until permanent soil stabilization is achieved. Suitable applications include:

- Arid environments where vegetation would not provide timely ground coverage, or would require excessive irrigation
- Soils where vegetation would be difficult to establish
- Unprotected areas that will remain barren
- Slopes with exposed soil between existing vegetation such as trees or shrubs
- Slopes planted with live, container-grown vegetation or plugs
- Slopes burned by wildfire

Hydraulic mulch can also be applied to augment other supplemental application of soil amendments, such as fertilizer, lime, gypsum, soil biostimulants or compost.

Limitations

In general, hydraulic mulch is not limited by slope length, gradient or soil type. However, the following limitations typically apply:

- Most hydraulic mulch applications, particularly bonded fiber matrices (BFMs), require at least 24 hours to dry before rainfall occurs.
- Temporary applications (i.e., without a vegetative component) may require a second application in order to remain effective for an entire rainy season.
- Treatment areas must be accessible to hydraulic mulching equipment.
- Availability of water sources in remote areas for mixing and application is necessary.
- As a stand-alone temporary BMP, hydraulic mulches may need to be re-applied to maintain their erosion control effectiveness, typically after 6-12 months depending on the type of mulch used.
- Cellulose fiber mulches alone may not perform well on steep slopes or in course soils.

Implementation

- Where feasible, it is preferable to prepare soil surfaces prior to application by roughening embankments and fill areas with a crimping or punching type roller or by track walking.
- The majority of hydraulic mulch applications do not necessarily require surface/soil preparation although in almost every case where re-vegetation is included as part of the practice, soil preparation can be beneficial. One of the advantages of hydraulic mulch over other erosion control methods is that it can be applied in areas where soil preparation is precluded by site conditions, such as steep slopes, rocky soils, or inaccessibility.
- Avoid mulch over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

- Hydraulic mulching is generally performed utilizing specialized machines that have a large water-holding/mixing tank and some form of mechanical agitation or other recirculation method to keep water, mulch and soil amendments in suspension. The mixed hydraulic slurry can be applied from a tower sprayer on top of the machine or by extending a hose to areas remote from the machine.
- Where possible, apply hydraulic mulch from multiple directions to adequately cover the soil. Application from a single direction can result in shadowing, uneven coverage and failure.
- Hydraulic mulch can also include a vegetative component, such as seed, rhizomes, or stolons.
- Typical hydraulic mulch application rates range from 2,000 pounds per acre for standard mulches (SMs) to 3,500 pounds per acre for BFMs. However, the required amount of hydraulic mulch to provide adequate coverage of exposed topsoil may appear to exceed the standard rates when the roughness of the soil surface is changed due to soil preparation methods or by slope gradient.
- Other factors such as existing soil moisture and soil texture can have a profound effect on the amount of hydraulic mulch required (i.e. application rate) applied to achieve an erosion-resistant covering.
- Avoid use of mulch without a tackifier component, especially on slopes.
- Mulches used in the hydraulic mulch slurry can include:
  - Cellulose fiber
  - Thermally-processed wood fibers
  - Cotton
  - Synthetics
  - Compost

The following categories of hydraulic mulches are accepted:

**Standard Hydraulic Mulch (SM)**

Standard hydraulic mulches are generally applied at a rate of 2,000 pounds per acre and are manufactured containing around 5% tackifier (i.e. soil binder), usually a plant-derived guar or psyllium type. Most standard mulches are green in color derived from food-color based dyes.

**Hydraulic Matrices (HM) and Stabilized Fiber Matrices (SFM)**

Hydraulic matrices and stabilized fiber matrices are slurries which contain increased levels of tackifiers/soil binders; usually 10% or more by weight. HMs and SFMs have improved performance compared to a standard hydraulic mulch (SM) because of the additional percentage of tackifier and because of their higher application rates, typically 2,500 – 4,000 pounds per acre. Hydraulic matrices can include a mixture of fibers, for example, a 50/50 blend of paper and wood fiber. In the case of an SFM, the tackifier/soil binder is specified as a polyacrylamide (PAM).

**Bonded Fiber Matrix (BFM)**

Bonded fiber matrices (BFMs) are hydraulically-applied systems of fibers, adhesives (typically guar based) and chemical cross-links. Upon drying, the slurry forms an erosion-resistant blanket that prevents soil erosion and promotes vegetation establishment. The cross-linked adhesive in the BFM should be biodegradable and should not dissolve or disperse upon rewetting.

BFMs are typically applied at rates from 3,000 to 4,000 lbs/acre based on the manufacturer's recommendation. BFMs should not be applied immediately before, during or immediately after rainfall or if the soil is saturated. Depending on the product, BFMs typically require 12 to 24 hours to dry and become effective.

**Mechanically-Bonded Fiber Matrices (MBFM)**

Mechanically-bonded fiber matrices (MBFMs) are hydraulically applied systems similar to BFM that use crimped synthetic fibers and PAM and are typically applied to a slope at a higher application rate than a standard BFM.

## Hydraulic Compost Matrix (HCM)

Hydraulic compost matrix (HCM) is a field-derived practice whereby finely graded or sifted compost is introduced into the hydraulic mulch slurry. A guar-type tackifier can be added for steeper slope applications as well as any specified seed mixtures. A HCM can help to accelerate seed germination and growth. HCMs are particularly useful as an in-fill for three-dimensional re-vegetation geocomposites, such as turf reinforcement mats (TRM).

Costs

Average installed costs for hydraulic mulch categories are provided below.

**Table 3 - Hydraulic Mulch Cost Table.**

| BMP | Installed Cost per Acre[6] |
|---|---|
| Standard Hydraulic Mulching (SM) | $1,938 - $4,104 |
| Hydraulic Matrices (HM) and Stabilized Fiber Matrices<br>Guar-based<br>PAM-based | <br>$2,280 - $4,560<br>$2,850 - $6,395 |
| Bonded Fiber Matrix (BFM) | $4,446 - $7,866 |
| Mechanically Bonded Fiber Matrix (MBFM) | $5,130 - $6,840 |
| Hydraulic Compost Matrix (HCM) | $3,420 - $3,990 |

Inspection and Maintenance

- Maintain an unbroken, temporary mulched ground cover throughout the period of exposure.
- Inspect monthly, prior to forecasted rain events, and after the conclusion of rain events.
- Areas where erosion is evident should be repaired and mulch re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of mulch.
- Compare the number of bags or weight of applied mulch to the area treated to determine actual application rates and compliance with specifications.
- For permanent installation, require inspection periodically and after major storm events to look for signs of erosion or damage to the stabilization.
- All damage should be repaired immediately.

[6] Source: Caltrans Soil Stabilization BMP Research for Erosion and Sediment Controls, July 2007. Costs reflect a 14% escalation from 2007 to 2015 costs. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

## *GEOTEXTILES AND MATS*

**Figure 19 - RECP Application.**
**Source: http://www.integratedgroup.com.au/services/erosion-control/geotextile-matting/**

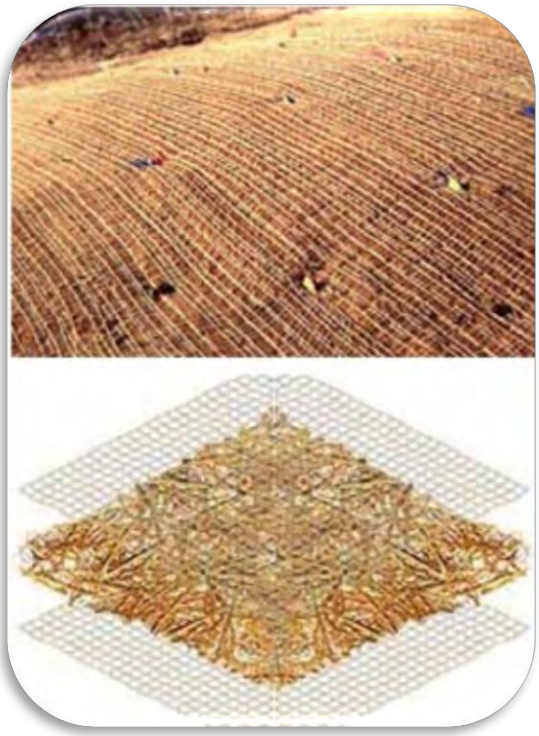


**Figure 20 - RECP Application.**
**Source: California Department of Transportation <http://www.dot.ca.gov>**

Description

Geotextiles and mats are categorized as Rolled Erosion Control Products (RECPs). Accepted geotextiles and mats are made of natural material and are designed and specified based on their functional longevity. RECPs are used to cover the soil surface to reduce erosion from rainfall impact, hold soil in place, and absorb and hold moisture near the soil surface. Additionally, RECPs may be used to stabilize soils until vegetation is established or to reinforce non-woody surface vegetation. Geotextiles and Mats can be used for temporary non-vegetative stabilization. All geotextiles and mats should be replaced when they exceed their functional longevity or when permanent stabilization will commence. Depending on material selection, geotextiles and mats can be used as a short-term (3 months – 1 year) or long-term (1-2 years) stabilization method.

Suitable Applications

RECPs are typically applied on slopes where erosion hazard is high and vegetation will be slow to establish. RECPs may also be used when seeding cannot occur and should be considered when the soils are fine grained and potentially erosive. Non-vegetated stabilization, such as RECPs, should only be utilized when vegetation cannot be established in the required timeframe, due to soil or climactic conditions, or where vegetation may be a potential fire hazard. Suitable applications include:

- Arid environments where vegetation would not provide ground coverage or would require excessive irrigation
- Soils where vegetation would be difficult to establish
- Steep slopes, generally steeper than 3:1 (H:V)
- Slopes where the erosion potential is high
- Slopes and unprotected soils where mulch must be anchored
- Barren areas where plants are slow to develop
- Slopes adjacent to water bodies

Limitations

- RECPs may delay seed germination, due to reduction in soil temperature.
- RECPs are generally not suitable for excessively rocky sites or areas where the final vegetation will be mowed due to the potential for staples and netting to be caught in mowers. If a staple or pin cannot be driven into the soil because the underlying soil is too hard or rocky, then an alternative BMP should be selected.
- If used for temporary erosion control, RECPs should be removed and disposed of prior to application of permanent soil stabilization measures.
- Plastic mats or sheeting cannot be used.
- RECPs may have limitations based on soil type, slope gradient, or channel flow rate; consult the manufacturer for proper selection.
- Not suitable for areas that have foot traffic (tripping hazard).
- RECPs that incorporate a plastic netting (e.g. straw blanket typically uses a plastic netting to hold the straw in place) may not be suitable near known wildlife habitat. Wildlife can become trapped in the plastic netting.

Implementation

Natural RECPs have been found to be effective where re-vegetation will be provided by reseeding. The choice of material should be based on the size of area, side slopes, surface conditions such as hardness, moisture, weed growth, and availability of materials. The following natural RECPs are commonly used:

**Geotextiles**

- Material can be a woven or a non-woven fabric with minimum thickness of 0.06 in., minimum width of 12 ft and should have minimum tensile strength of 150 lbs (warp), 80 lbs (fill) in conformance with the requirements in ASTM Designation: D 4632. The permittivity of the fabric should be approximately 0.07 $sec^{-1}$ in conformance with the requirements in ASTM Designation: D4491. The fabric should have an ultraviolet (UV) stability of 70 percent in conformance with the requirements in ASTM designation: D4355. Geotextile blankets must be secured in place with wire staples or sandbags and by keying into tops of slopes to prevent infiltration of surface waters under geotextile. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Geotextiles may be reused if they are suitable for the use intended.

**Erosion Control Blankets/Mats**

- Biodegradable RECPs are typically composed of jute fibers, curled wood fibers, straw, coconut fiber, or a combination of these materials. In order for an RECP to be considered 100% biodegradable, the netting, sewing or adhesive system that holds the biodegradable mulch fibers together must also be biodegradable.
  - **Jute** is a natural fiber that is made into a yarn that is loosely woven into a biodegradable mesh. The performance of jute as a stand-alone RECP is low. Most other RECPs outperform jute as a temporary erosion control product and therefore jute is not commonly used. It is designed to be used in conjunction with vegetation. The material is supplied in rolled strips, which should be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
  - **Excelsior** (curled wood fiber) blanket material should consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 6 in. or longer. The excelsior blanket should be of consistent thickness. The wood fiber must be evenly distributed over the entire area of the blanket. The top surface of the blanket should be covered with a photodegradable extruded plastic mesh. The blanket should be smolder resistant without the use of chemical additives and should be non-toxic and non-injurious to plant and animal life. Excelsior blankets should be furnished in rolled strips, a minimum of 48 in. wide, and should have an average weight of 0.8 $lb/yd^2$, ±10 percent, at the time of manufacture. Excelsior blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.

- **Straw blanket** should be machine produced mats of straw with a lightweight biodegradable netting top layer. The straw should be attached to the netting with biodegradable thread or glue strips. The straw blanket should be of consistent thickness. The straw should be evenly distributed over the entire area of the blanket. Straw blanket should be furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd$^2$. Straw blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- **Wood fiber blanket** is composed of biodegradable fiber mulch with extruded plastic netting held together with adhesives. The material is designed to enhance re-vegetation. The material is furnished in rolled strips, which must be secured to the ground with Ushaped staples or stakes in accordance with manufacturers' recommendations.
- **Coconut fiber blanket** should be a machine produced mat of 100 percent coconut fiber with biodegradable netting on the top and bottom. The coconut fiber should be attached to the netting with biodegradable thread or glue strips. The coconut fiber blanket should be of consistent thickness. The coconut fiber should be evenly distributed over the entire area of the blanket. Coconut fiber blanket should be furnished in rolled strips with a minimum of 6.5 ft wide, a minimum of 80 ft. long and a minimum of 0.5 lb/yd$^2$. Coconut fiber blankets must be secured in place with wire staples. Staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- **Coconut fiber mesh** is a thin permeable membrane made from coconut or corn fiber that is spun into a yarn and woven into a biodegradable mat. It is designed to be used in conjunction with vegetation and typically has longevity of several years. The material is supplied in rolled strips, which must be secured to the soil with U-shaped staples or stakes in accordance with manufacturers' recommendations.
- **Straw coconut fiber blankets** are commonly machine produced mats of 70 percent straw and 30 percent coconut fiber with a biodegradable netting top layer and a biodegradable bottom net. The straw and coconut fiber must be attached to the netting with biodegradable thread, glue strips, or equivalent. The straw coconut fiber blanket should be of consistent thickness. The straw and coconut fiber should be evenly distributed over the entire area of the blanket. Straw coconut fiber blanket is furnished in rolled strips a minimum of 6.5 ft wide, a minimum of 80 ft long and a minimum of 0.5 lb/yd$^2$. Straw coconut fiber blankets must be secured in place with wire staples made of minimum 11 gauge steel wire and U-shaped with 8 in. legs and 2 in. crown.

### Site Preparation

- Proper soil preparation is essential to ensure complete contact of the RECP with the soil. Soil Roughening is not recommended in areas where RECPs will be installed.
- Grade and shape the area of installation.
- Remove all rocks, clods, vegetation or other obstructions so that the installed blankets or mats will have complete, direct contact with the soil.
- Prepare seedbed by loosening 2 to 3 in. of topsoil.

### Seeding/Planting

Seed the area before blanket installation for erosion control and re-vegetation. Seeding after mat installation is often specified for turf reinforcement application. When seeding prior to blanket installation, all areas disturbed during blanket installation must be re-seeded. Where soil filling is specified for turf reinforcement mats (TRMs), seed the matting and the entire disturbed area after installation and prior to filling the mat with soil. Fertilize and seed in accordance with seeding specifications or other types of landscaping plans. The protective matting can be laid over areas where grass has been planted and the seedlings have emerged. Where vines or other ground covers are to be planted, lay the protective matting first and then plant through matting according to design of planting.

### Check Slots

Check slots shall be installed as required by the manufacturer.

### Laying and Securing Matting

Before laying the matting, all check slots should be installed and the seedbed should be friable, made free from clods, rocks, and roots. The surface should be compacted and finished according to the requirements of the manufacturer's recommendations. Mechanical or manual lay down equipment should be capable of handling full rolls of fabric and laying the fabric smoothly without wrinkles or folds. The equipment should meet the fabric manufacturer's recommendations or equivalent standards.

### Anchoring

- U-shaped wire staples, metal geotextile stake pins, or triangular wooden stakes can be used to anchor mats and blankets to the ground surface.
- Wire staples should be made of minimum 11 gauge steel wire and should be U-shaped with 8 in. legs and 2 in. crown.
- Metal stake pins should be 0.188 in. diameter steel with a 1.5 in. steel washer at the head of the pin, and 8 in. in length.
- Wire staples and metal stakes should be driven flush to the soil surface.

### Installation on Slopes

Installation should be in accordance with the manufacturer's recommendations. In general, these will be as follows:

- Begin at the top of the slope and anchor the blanket in a 6 in. deep by 6 in. wide trench. Backfill trench and tamp earth firmly.
- Unroll blanket down slope in the direction of water flow.
- Overlap the edges of adjacent parallel rolls 2 to 3 in. and staple every 3 ft (or greater, per manufacturer's specifications).
- When blankets must be spliced, place blankets end over end (shingle style) with 6 in. overlap. Staple through overlapped area, approximately 12 in. apart.
- Lay blankets loosely and maintain direct contact with the soil. Do not stretch.
- Staple blankets sufficiently to anchor blanket and maintain contact with the soil. Staples should be placed down the center and staggered with the staples placed along the edges. Steep slopes, 1:1 (H:V) to 2:1 (H:V), require a minimum of 2 staples/yd$^2$. Moderate slopes, 2:1 (H:V) to 3:1 (H:V), require a minimum of 1 ½ staples/yd$^2$. Check manufacturer's specifications to determine if a higher density staple pattern is required.

### Soil Filling – if specified for turf reinforcement mat (TRM)

Installation should be in accordance with the manufacturer's recommendations. Typical installation guidelines are as follows:

- After seeding, spread and lightly rake ½ - ¾ inches of fine topsoil into the TRM apertures to completely fill TRM thickness. Use backside of rake or other flat implement.
- Alternatively, if allowed by product specifications, spread topsoil using lightweight loader, backhoe, or other power equipment. Avoid sharp turns with equipment.
- Always consult the manufacturer's recommendations for installation.
- Do not drive tracked or heavy equipment over mat.
- Avoid any traffic over matting if loose or wet soil conditions exist.
- Use shovels, rakes, or brooms for fine grading and touch up.
- Smooth out soil filling just exposing top netting of mat.

### Temporary Soil Stabilization Removal

- Temporary soil stabilization removed from the site of the work must be disposed of if necessary.

Costs

Approximate costs for installed materials are shown below:

**Table 4 - Geotextiles and Mats Cost Table.**

| Rolled Erosion Control Products | Estimated Cost per Acre[7] | |
|---|---|---|
| **Jute Mesh** | $8,100 | $9,450 |
| **Curled Wood Fiber** | $10,800 | $14,175 |
| **Straw** | $10,800 | $14,175 |
| **Wood Fiber** | $10,800 | $14,175 |
| **Coconut Fiber** | $17,550 | $18,900 |
| **Coconut Fiber Mesh** | $40,500 | $44,550 |
| **Straw Coconut Fiber** | $13,500 | $16,200 |

Inspection and Maintenance

- Inspect monthly, prior to forecasted rain events, and after the conclusion of rain events.
- Areas where erosion is evident shall be repaired and BMPs reapplied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- If washout or breakage occurs, re-install the material after repairing the damage to the slope or channel.
- Make sure matting is uniformly in contact with the soil.
- Check that all the lap joints are secure.
- Check that staples are flush with the ground.
- For permanent installation, require inspection periodically and after major storm events to look for signs of erosion or damage to the stabilization.
- All damage should be repaired immediately.

[7] Source: Erosion Control Pilot Study Report, Caltrans, June 2000. Costs reflect a 35% escalation over year 2000 to 2015 costs. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

## *SLOPE DRAINS*

Description

A slope drain is a pipe used to intercept and direct surface runoff or groundwater into a stabilized watercourse, trapping device, or stabilized area. Slope drains are used with earth dikes and drainage ditches to intercept and direct surface flow away from slope areas to protect cut or fill slopes. The slope drain is applicable for any site where concentrated surface runoff can accumulate and must be conveyed down the slope in order to prevent erosion. The slope drain is effective because it prevents the stormwater from flowing directly down the slope by confining all the runoff into an enclosed pipe or channel. Particularly in steep terrain, slope drains can protect unprotected areas from erosion.

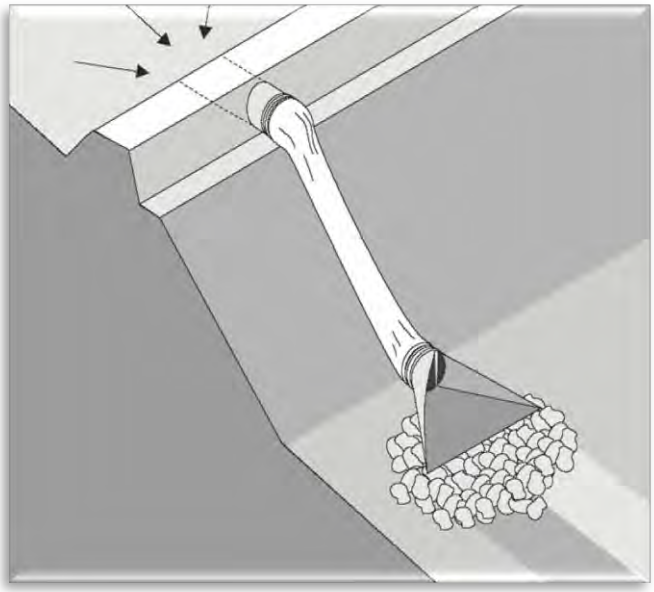


**Figure 21 - Slope Drain Application.**
**Source: CASQA Factsheets, 2011.**

Suitable Applications

- Where concentrated flow of surface runoff must be conveyed down a slope in order to prevent erosion
- Drainage for top of slope diversion dikes or swales
- Drainage for top of cut and fill slopes where water can accumulate

Limitations

Installation is critical for effective use of the pipe slope drain to minimize potential gully erosion.

- Maximum drainage area per slope drain is 10 acres.
- Large areas should consider a paved chute, rock lined channel, or additional pipes.
- Severe erosion may result when slope drains fail by overtopping, piping, or pipe separation.
  - During large storms, pipe slope drains may become clogged or over charged, forcing water around the pipe and causing extreme slope erosion.
  - If the sectional downdrain is not sized correctly, the runoff can spill over the drain sides causing gully erosion and potential failure of the structure.
- Dissipation of high flow velocities at the pipe outlet is required to avoid downstream erosion.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in energy dissipaters associated with slope drain outlets.

Installation

The slope drain may be a rigid pipe, such as corrugated metal, a flexible conduit, or a lined terrace drain with the inlet placed on the top of a slope and the outlet at the bottom of the slope. Slope drains are typically used in combination with a diversion control, such as an earth dike or drainage swale at the top of the slope.

The following criteria must be considered when siting slope drains:

- Inlet structures must be securely entrenched and compacted to avoid severe gully erosion.
- Slope drains must be securely anchored to the slope and must be adequately sized to carry the capacity of the design storm and associated forces.

- Outlets must be stabilized with riprap, concrete or other type of energy dissipator, or directed into a stable sediment trap or basin.
- Debris racks are recommended at the inlet. Debris racks located several feet upstream of the inlet can usually be larger than racks at the inlet, and thus provide enhanced debris protection and less plugging.
- Safety racks are also recommended at the inlet and outlet of pipes where children or animals could become entrapped.
- Secure inlet and surround with dikes to prevent gully erosion and anchor pipe to slope.
- When using slope drains, limit drainage area to 10 acres per pipe. For larger areas, use a rock lined channel or a series of pipes.
- Size to convey at least the peak flow of a 10-year storm. The design storm is conservative due to the potential impact of system failures.
- Maximum slope generally limited to 2:1 (H:V) as energy dissipation below steeper slopes is difficult.
- Direct surface runoff to slope drains with interceptor dikes. Top of interceptor dikes should be 12 in. higher than the top of the slope drain.
- Slope drains can be placed on or buried underneath the slope surface.
- Recommended materials include both metal and plastic pipe, either corrugated or smooth wall. Concrete pipe can also be used.
- When installing slope drains:
  - Install slope drains perpendicular to slope contours.
  - Compact soil around and under entrance, outlet, and along length of pipe.
  - Securely anchor and stabilize pipe and appurtenances into soil.
  - Check to ensure that pipe connections are watertight.
  - Protect area around inlet with filter cloth. Protect outlet with riprap or other energy dissipation device. For high energy discharges, reinforce riprap with concrete or use reinforced concrete device.
  - Protect outlet of slope drains using a flared end section when outlet discharges to a flexible energy dissipation device.
  - A flared end section installed at the inlet will improve flow into the slope drain and prevent erosion at the pipe entrance. Use a flared end section with a 6 in. minimum toe plate to help prevent undercutting. The flared section should slope towards the pipe inlet.

Design and Layout

The capacity for temporary drains should be sufficient to convey at least the peak runoff from a 10-year rainfall event. The pipe size may be computed using the Rational Method or a method established by the local municipality. Higher flows must be safely stored or routed to prevent any offsite concentration of flow and any erosion of the slope. The design storm is purposely conservative due to the potential impacts associated with system failures.

As a guide, temporary pipe slope drains should not be sized smaller than shown in the following table:

**Table 5 - Slope Drain Sizing Chart.**

| Minimum Pipe Diameter (Inches) | Maximum Drainage Area (Acres) |
|---|---|
| 12 | 1.0 |
| 18 | 3.0 |
| 21 | 5.0 |
| 24 | 7.0 |
| 30 | 10.0 |

Larger drainage areas can be mitigated if the area can be subdivided into areas of 10 acres or less and each area is conveyed through a separate slope drain. Drainage areas exceeding 10 acres must be designed by a Registered Civil Engineer and approved by the City of Signal Hill.

**Materials:**

Soil type, rainfall patterns, construction schedule, local requirements, and available supply are some of the factors to be considered when selecting materials. The following types of slope drains are commonly used:

- **Rigid Pipe:** This type of slope drain is also known as a pipe drop. The pipe usually consists of corrugated metal pipe or rigid plastic pipe. The pipe is placed on undisturbed or compacted soil and secured onto the slope surface or buried in a trench. Concrete thrust blocks must be used when warranted by the calculated thrust forces. Collars should be properly installed and secured with metal strappings or watertight collars.
- **Flexible Pipe**: The flexible pipe slope drain consists of a flexible tube of heavy duty plastic, rubber, or composite material. The tube material is securely anchored onto the slope surface. The tube should be securely fastened to the metal inlet and outlet conduit sections with metal strappings or watertight collars.
- **Section Downdrains**: The section downdrain consists of pre-fabricated, section conduit of half round or third round material. The sectional downdrain performs similar to a flume or chute. The pipe must be placed on undisturbed or compacted soil and secured into the slope.
- **Concrete-lined Terrace Drain**: This is a concrete channel for draining water from a terrace on a slope to the next level. These drains are typically specified as permanent structures and should be designed according to local drainage design criteria.

Costs

Cost varies based on pipe selection and selected outlet protection. Average installed costs for slope drains are provided below.

**Table 6 - Slope Drain Cost Table.**

| Size | Supplied and Installed Cost (No Trenching Included)[8] |
|---|---|
| Corrugated Steel Pipes, Per Foot | |
| **12”** | $22.34 |
| **15”** | $25.08 |
| **18”** | $29.64 |
| **24”** | $36.48 |
| **30”** | $57.00 |
| PVC Pipes, Per Foot | |
| **12”** | $27.93 |
| **14”** | $55.86 |
| **16”** | $58.14 |
| **18”** | $61.56 |
| **20”** | $75.24 |
| **24”** | $106.02 |
| **30”** | $148.20 |

[8] Source: Caltrans Soil Stabilization BMP Research for Erosion and Sediment Controls, July 2007. Costs reflect a 14% escalation from 2007 to 2015. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

Inspection and Maintenance

- Inspect monthly, prior to forecasted rain events, and after the conclusion of rain events.
- Inspect control measures subjected to non-stormwater discharges daily while non-stormwater discharges occur. Minimize areas of standing water by removing sediment blockages and filling scour depressions.
- Inspect outlet for erosion and downstream scour. If eroded, repair damage and install additional energy dissipation measures. If downstream scour is occurring, it may be necessary to reduce flows being discharged into the channel unless other preventative measures are implemented.
- Insert inlet for clogging or undercutting. Remove debris from inlet to maintain flows. Repair undercutting at inlet and if needed, install flared section or rip rap around the inlet to prevent further undercutting.
- Inspect pipes for leakage. Repair leaks and restore damaged slopes.
- Inspect slope drainage for accumulations of debris and sediment.
- Remove built up sediment from entrances and outlets as required. Flush drains if necessary; capture and settle out sediment from discharge.
- Make sure water is not ponding onto inappropriate areas (e.g., active traffic lanes, material storage areas, etc.).
- Pipe anchors must be checked to ensure that the pipe remains anchored to the slope. Install additional anchors if pipe movement is detected.

## *COMPOST BLANKET*

Description

A compost blanket is applied to slopes and unprotected areas to prevent erosion, and in some cases, increase infiltration and/or establish vegetation. The compost blanket can be applied by hand, conveyor system, compost spreader, or pneumatic delivery (blower) system. The blanket thickness is determined from the slope steepness and anticipated precipitation. A compost blanket protects the soil surface from raindrop erosion, particularly rills and gullies that may form under other methods of erosion control. A compost blanket, if properly installed, can be very successful at vegetation establishment, weed suppression and erosion control.

**Figure 22 - Compost Blanket Application.**
**Source: CASQA Factsheets, 2011.**

The compost blanket comes into direct contact with the underlying soil, reducing rill formation. Furthermore, compost provides organic matter and nutrients important for vegetation growth. The compost blanket provides soil structure that allows water to infiltrate the soil surface and retain moisture, which also promotes seed germination and vegetation growth, in addition to reducing runoff.

Compost is typically derived from combinations of feedstocks, biosolids, leaf and yard trimmings, manure, wood, or mixed solid waste. Many types of compost are products of municipal recycle or "Greenwaste" programs. Compost is organic and biodegradable and can be left onsite. There are many types of compost with a variety of properties with specific functions, and accordingly, compost selection is an important design consideration in the application of this type of erosion control.

Suitable Applications

A compost blanket is appropriate for slopes and exposed areas requiring protection until permanent stabilization is established. A compost blanket can also used in combination with temporary and/or permanent seeding strategies to enhance plant establishment. Examples include:

- Slopes with exposed soil between existing vegetation such as trees or shrubs
- Slopes planted with live, container-grown vegetation
- Areas where plants are slow to develop

A compost blanket should be used on slopes not steeper than 2:1 (H:V). Compost can be pre-seeded prior to application to the soil (recommended by the EPA for stormwater runoff control) or seeded after the blanket has been installed. The compost medium can also remove pollutants in stormwater including heavy metals; oil and grease; and hydrocarbons (USEPA, 1998).

Limitations

- Compost can potentially leach nutrients (dissolved phosphorus and nitrogen) into runoff and potentially impact water quality. Compost should not be used directly upstream from nutrient impaired waterbodies.
- Compost may also contain other undesirable constituents that are detrimental to water quality. Carefully consider the qualifications and experience of any compost producer/supplier.
- A compost blanket applied by hand is more time intensive and potentially costly. Using a pneumatic blower truck is the recommended cost effective method of application.
- When blowers are used, the treatment areas should be within 300 ft of a road or surface capable of supporting trucks.
- Wind may limit application of compost and result in application to undesired locations.
- Compost blankets should not be applied in areas of concentrated flows.
- Steeper slopes may require additional blanket thickness and other stability measures such as using tackifiers or slope interruption devices (compost socks and berms).

Implementation

**Compost Materials**

- California Compost Regulations (Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7, Section 17868.3) define and require a quality of compost for application. Compost should comply with all physical and chemical requirements. Specific requirements are provided in the Caltrans Standard Special Provision 10-1 (SSP 10-1).
- The compost producer should be fully permitted as specified under the California Integrated Waste Management Board, Local Enforcement Agencies and any other State and Local Agencies that regulate Solid Waste Facilities. If exempt from State permitting requirements, the composting facility should certify that it follows guidelines and procedures for production of compost meeting the environmental health standards of Title 14, California Code of Regulations, Division 7, Chapter 3.1, Article 7.
- The compost producer should be a participant in United States Composting Council's Seal of Testing Assurance program.
- Compost moisture should be considered for composition quality and application purposes. A range of 30-50% is typical. Compost that is too dry is hard to apply and compost that is too wet is more difficult (and more expensive) to transport. For arid or semi-arid areas, or for application during the dry season, use compost with greater moisture content than areas with wetter climates. For wetter or more humid climates or for application during the wet season, drier composts can be used as the compost will absorb moisture from the ambient air.
- Organic content of the compost is also important and should range from 30 to 65% depending on site conditions.
- Compost should be high-quality mature compost. Immature compost can potentially leach nutrients.
- Compost should not be derived from mixed municipal solid waste and should be free of visible contaminants.
- Compost should not contain paint, petroleum products, pesticides or any other chemical residues harmful to animal life or plant growth. Metal concentrations in compost should not exceed the maximum metal concentrations listed under Title 14, California Code of Regulations, Division 7, Chapter 3.1, Section 17868.2.
- Compost should not possess objectionable odors.
- Compost should be weed free.

## Installation

- Prior to compost application, prepare the slope by removing loose rocks, roots, stumps, and other debris greater than 2" in diameter. Prepare the slope area surface by scarifying or track walking/roughening if necessary.
- Select method to apply the compost blanket. A pneumatic blower is most cost effective and most adaptive in applying compost to steep, rough terrain, and hard to reach locations.
- A compost blanket thickness of 1" to 4" should be applied to slopes of 2:1 (H:V) or gentler, based on site-specific conditions. Increase blanket thickness with increased slope steepness and/or during installation during the rainy season (for example, 2" to 3" should be used for a 3:1 [H:V] slope, while 1" to 2" can be used for a 4:1 [H:V] slope).
- Compost blankets should not be used for slopes greater than 2:1 (H:V).
- For steeper slopes, tackifiers should be utilized and/or other stabilization techniques employed. For example, compost socks or berms can be installed at intervals over the compost blanket.
- Compost socks or berms (or equivalent linear sediment control BMP) should be placed at the top and/or bottom of the slope for additional erosion control performance.
- For optimum vegetation establishment, a blanket thickness of 1" to 2" is recommended. If vegetation establishment is not the primary function of the compost blanket, a thicker blanket may be recommended based on slope or rainfall conditions.
- Evenly distribute compost on the soil surface to the desired blanket thickness (1/2" to 4" as calculated prior based on site conditions and objectives). Even distribution is an important factor in preventing future rill and gully erosion.
- The compost blanket should extend 3 to 6 feet over the top of the shoulder of the slope. A compost sock or compost berm can be used at the top of the slope as an auxiliary technique to prevent runoff from flowing underneath the compost blanket.
- Use additional anchoring and erosion control BMPs in conjunction of the compost blanket as needed.

### Costs

Average installed costs for a compost blanket are provided below. Application by hand is more time intensive and likely more costly.

**Table 7 - Compost Blanket Cost Table.**

| **Application Cost per Acre** | |
|---|---|
| Application of an unseeded 1 inch compost blanket [9] | $5,500 - $8,800 |
| Proprietary blends of seeded compost with nutrient rich "tackifier" 2 inch blanket[10] | $15,750 |

### Inspection and Maintenance

- Inspect monthly, prior to forecasted rain events, and after the conclusion of rain events.
- Areas where erosion is evident, another layer of compost should be reapplied as soon as possible. It may be necessary to install an additional type of stormwater BMP at the top of slope or as a slope interrupter to control flow, such as a fiber roll or compost sock.
- Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require reapplication of BMPs.
- Limit or prohibit foot traffic to minimize damage to BMP or impede vegetation establishment.

[9] Source: Caltrans Compost Specifications, 2009. Costs reflect a 10% escalation from 2009 to 2015 costs. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

[10] Source: CASQA Factsheets, 2011. Costs reflect a 5% escalation from 2011 to 2015 costs. Escalation based on informal survey of industry trends. Note: Expected cost increase is offset by competitive economic conditions.

## *SEDIMENT BASIN*

Description

A sediment basin is a temporary basin formed by excavation or by constructing an embankment so that sediment-laden runoff is temporarily detained, allowing sediment to settle out before the runoff is released. Sediment basins must be designed by a California registered civil engineer and must follow an accepted design standard (i.e., CASQA SE-2 Factsheet).

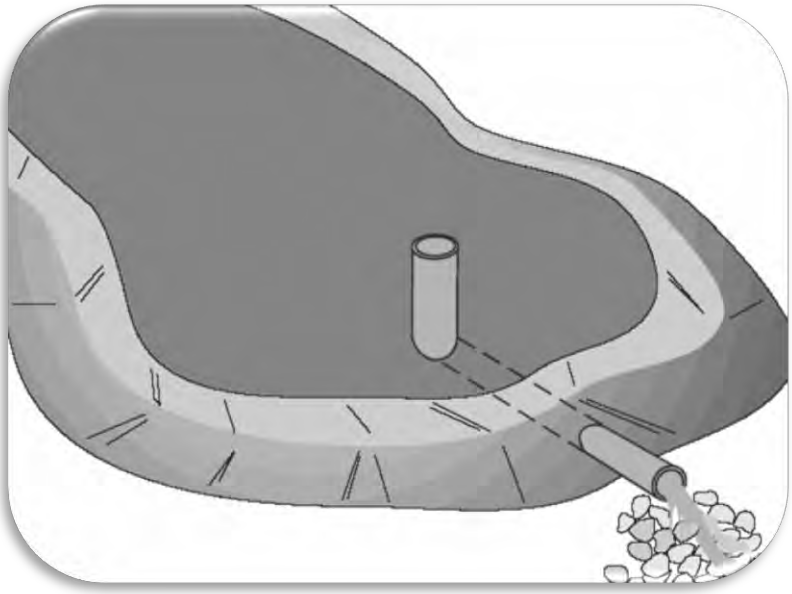


**Figure 23 - Sediment Basin Application.**
**Source: CASQA Factsheets, 2011.**

Suitable Applications

Sediment basins may be suitable for use on larger projects with sufficient space for constructing the basin. Sediment basins should be considered for use on sites over 5 acres.

Limitations

Sediment basins must be installed only within the property limits and where failure of the structure will not result in loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities. Local ordinances regarding health and safety must be adhered to.

- As a general guideline, sediment basins are suitable for drainage areas of 5 acres or more, but not appropriate for drainage areas greater than 75 acres.
- Sediment basins may become an “attractive nuisance” and care must be taken to adhere to all safety practices. If safety is a concern, basin may require protective fencing.
- Basins with a height of 25 ft or more or an impounding capacity of 50 ac-ft or more must obtain approval from California Department of Water Resources Division of Safety of Dams (http://www.water.ca.gov/damsafety/).
- Water that stands in sediment basins longer than 96 hours may become a source of mosquitoes (and midges), particularly along perimeter edges, in shallow zones, in scour or below-grade pools, around inlet pipes, along low-flow channels, and among protected habitats created by emergent or floating vegetation (e.g. cattails, water hyacinth, algal mats, riprap, etc.).
- Basins require large surface areas to permit settling of sediment. Size may be limited by the available area.

Implementation

To improve the effectiveness of the basin, it should be located to intercept runoff from the largest possible amount of exposed area. Locations best suited for a sediment basin are generally in lower elevation areas of the site (or basin tributary area) where site drainage would not require significant diversion or other means to direct water to the basin. The use of earth dikes and drainage swales may be used to convey runoff to the basin. The basin should not be located where its failure would result in the loss of life or interruption of the use or service of public utilities or roads.

Sediment basins must be designed by a California registered civil engineer and must follow an accepted design standard (i.e., CASQA SE-2 Factsheet).

During installation the following guidelines must be followed:

- Securely anchor and install an anti-seep collar on the outlet pipe/riser and provide an emergency spillway for passing major floods (see local flood control agency).
- Areas under embankments must be cleared and stripped of vegetation.
- Chain link fencing should be provided around each sediment basin to prevent unauthorized entry to the basin or if safety is a concern.

Costs

The cost of a sediment basin is highly variable and is dependent of the site configuration.

Inspection and Maintenance

- Inspect monthly, prior to forecasted rain events, and after the conclusion of rain events.
- Examine basin banks for seepage and structural soundness.
- Check inlet and outlet structures and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Check inlet and outlet area for erosion and stabilize if required.
- Check fencing for damage and repair as needed.
- Sediment that accumulates in the basin must be periodically removed in order to maintain effectiveness. Sediment should be removed when sediment accumulation reaches one half the designated sediment storage volume. Sediment removed during maintenance must be appropriately evaluated and used or disposed of accordingly. Options include: incorporating sediment on the site (only if there is no risk that sediment is contaminated); or off-site export/disposal at an appropriate location (e.g., sediment characterization and disposal to an appropriate landfill).
- Remove standing water from basin within 96 hours after accumulation.
- If the basin does not drain adequately, dewatering should be conducted in accordance with CASQA dewatering techniques and in accordance with local permits.
- To minimize vector production:
  - Remove accumulation of live and dead floating vegetation in basins during every inspection.
  - Remove excessive emergent and perimeter vegetation as needed or as advised by local or state vector control agencies.

# REFERENCES

Please note that the City of Signal Hill's Vacant Parcel Ordinance takes precedent in the event of any inconsistencies with any outside references.

1. Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.
2. Stormwater Best Management Practice Handbook; New Development and Redevelopment, California Stormwater Quality Association (CASQA), January 2003
3. Stormwater Best Management Practice Handbook; Construction, California Stormwater Quality Association (CASQA), January 2011

**ORDINANCE NO._____**

**AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF SIGNAL HILL, CALIFORNIA, AMENDING SIGNAL HILL MUNICIPAL CODE CHAPTER 12.16, TO EXPAND THE APPLICABILITY OF THE EXISTING STORM WATER AND URBAN RUNOFF POLLUTION CONTROL BY IMPOSING PERMANENT SOIL EROSION AND SEDIMENT CONTROL MEASURES ON UNIMPROVED VACANT PARCELS OF LAND.**

**WHEREAS,** the Federal Clean Water Act (33 United States Code [USC] sections 1251 et seq.) authorizes the U.S. Environmental Protection Agency (USEPA) and/or approved states to administer the National Pollution Discharge Elimination System (NPDES) program in order to regulate the discharge of materials that affect water quality of surface waters of the United States; and

**WHEREAS,** in California, the State Water Resources Control Board and the nine Regional Water Quality Control Boards implement many of the Clean Water Act's provisions. The USEPA and the California Regional Water Quality Control Board, Los Angeles Region (Regional Water Board) have classified the Greater Los Angeles County MS4 as a large municipal separate storm sewer system (MS4) pursuant to 40 CFR section 122.26(b)(4) and a major facility pursuant to 40 CFR section 122.2. The City is a Permittee under Regional Water Board Order No. R4-2012-0175, adopted on November 08, 2012 which establishes Waste Discharge Requirements for MS4 discharges within the Coastal Watersheds of Los Angeles County, and

**WHEREAS**, the Regional Water Board has adopted Total Maximum Daily Loads (TMDLs) for pollutants which are numerical limits that must be achieved effectively through Best Management Practices defined within the Watershed Management Programs approved on April 28, 2015; and the Regional Water Board mandated implementation of the efforts to improve stormwater pollution conditions by achieving the numerical limits for pollutants that are on the Clean Water Act 303(d) list and of which a TMDL has been developed; and

**WHEREAS,** the City, in order to comply with Regional Water Board Order No. R4-2012-0175, submitted two Watershed Management Programs (Lower Los Angeles River and Los Cerritos Channel); and

**WHEREAS,** the approved Watershed Management Programs include a commitment to develop an ordinance that attempts to reduce the amount of pollutants carried by soil and sediment; and

**WHEREAS**, the City is committed to a stormwater management program that protects water quality and water supply by employing watershed-based approaches that balance environmental and economic considerations; and

**WHEREAS**, the City has the authority under the Regional Water Board Order No. R4-2012-0175 to adopt and enforce ordinances imposing conditions,

restrictions and limitations with respect to any activity that might degrade surface waters of the State; and

**WHEREAS,** the highest priority pollutants identified in the Watershed Management Programs include metals, and a significant source of metals is soil and sediment; and

**WHEREAS,** unimproved vacant parcels are a source of soil and sediment loss due to wind and rain erosion, and human activity.

**NOW, THEREFORE, THE CITY COUNCIL OF THE CITY OF SIGNAL HILL, CALIFORNIA, DOES HEREBY ORDAIN AS FOLLOWS:**

**Definitions 12.16.010**

Contiguous Unimproved Vacant Parcel.
"Contiguous unimproved vacant parcel" shall mean any unimproved vacant parcels with the same owner, are side by side, and are not interrupted by any physical barrier, such as a public right-a-way, shall be considered a single unimproved vacant parcel.

Erosion.
"Erosion" shall mean the wearing a way of land by action of wind, water, ice, gravity, or a combination thereof.

Grading.
"Grading" shall mean any stripping, excavating, stockpiling, or combination thereof, including the land in its excavated or filled condition.

Parcel.
"Parcel" shall mean a contiguous quantity of land, in the possession of, owned by, or recorded as the property of the same claimant of person.

Permanent Soil Erosion and Sediment Control Measures.
"Permanent soil erosion and sediment control measures" shall mean control measures which are installed or constructed to control soil erosion and sedimentation and which are maintained indefinitely.

Regional Stormwater Treatment System.
"Regional Stormwater Treatment System" shall mean a treatment system designed to remove sediment and pollutant from stormwater from two or more parcels.

Sediment.
"Sediment" shall mean material which may be soil or organic that is displaced from the point of origin by wind, water, gravity, or human activities and deposited elsewhere.

Soil Erosion.
“Soil erosion” shall mean the wearing a way of soil particles by wind, water and gravity, or a combination thereof.

Stabilization.
“Stabilization” shall mean the establishment of vegetation, or the proper placement, grading, or covering of soil to ensure its resistance to soil erosion, sliding, or other earth movement.

Surface water.
“Surface water” shall mean water that may or may not be generated by a storm event which is not infiltrated or absorbed into the group, and eventually is captured by storm drains.

Unimproved Vacant Parcel.
“Unimproved vacant parcel” shall mean parcels that are unimproved due to never having been developed or having become vacant subsequent to the removal of any pre-existing buildings, structures or impervious surfaces.

Vacant Parcel.
“Vacant parcel” shall mean a parcel without a structure as defined by the Zoning Ordinance and without a lawful land use regulated by the City through a conditional use permit, compliance plan, or similar permit. Oil and gas wells are not considered a land use for purposes of this section.

**20.16.122 Sediment discharge reduction for unimproved vacant parcels**

A. Guidance Manual. The director shall prepare a guidance manual to advise the property owner how to bring the unimproved vacant parcel into compliance. The guidance manual shall be available to the property owner and tenants at City Hall and posted on the City’s website. The property owner shall submit a compliance plan following the guidance manual to the director for approval.

B. Compliance Plans Required.

1. For unimproved vacant parcels that are less than 43,560 square feet (one acre) in size the property owner shall be exempt from this section.
2. For unimproved vacant parcels that are equal to 43,560 square-feet (one acre) or greater, the property owner shall submit a compliance plan following the guidance manual for approval.
    a. All contiguous unimproved vacant parcels totaling 43,560 square-feet (one acre) or greater will be considered one unimproved vacant parcel.
3. Compliance Plans. The property owner must submit compliance plans for review and approval by the director. Compliance plans must meet the intent of the guidance manual. Compliance plans must also include a maintenance section detailing procedures to ensure permanent soil erosion and sediment control measures are in

proper working condition indefinitely. The guidance manual contains procedures for proper maintenance of various types of permanent soil erosion and sediment control measures. The director may waive some or all requirements of this section upon adequate documentation of technical, topographical, soil or economic factors that could limit the ability of the property owner to install permanent soil erosion and sediment control measures.

C. Time Frame for Compliance. Regardless of whether the compliance plan is approved or disapproved by the director, the property owner shall bring the parcel into compliance by taking the action provided for in the compliance plan, no later than one hundred eighty (180) days from the date of the original mailing or posting, unless additional time is granted by the director. Any request for additional time shall be made in writing, shall include agreement to comply with the requirements of this section, shall provide justification for the request, shall state an estimated completion date and shall be signed by the property owner(s).

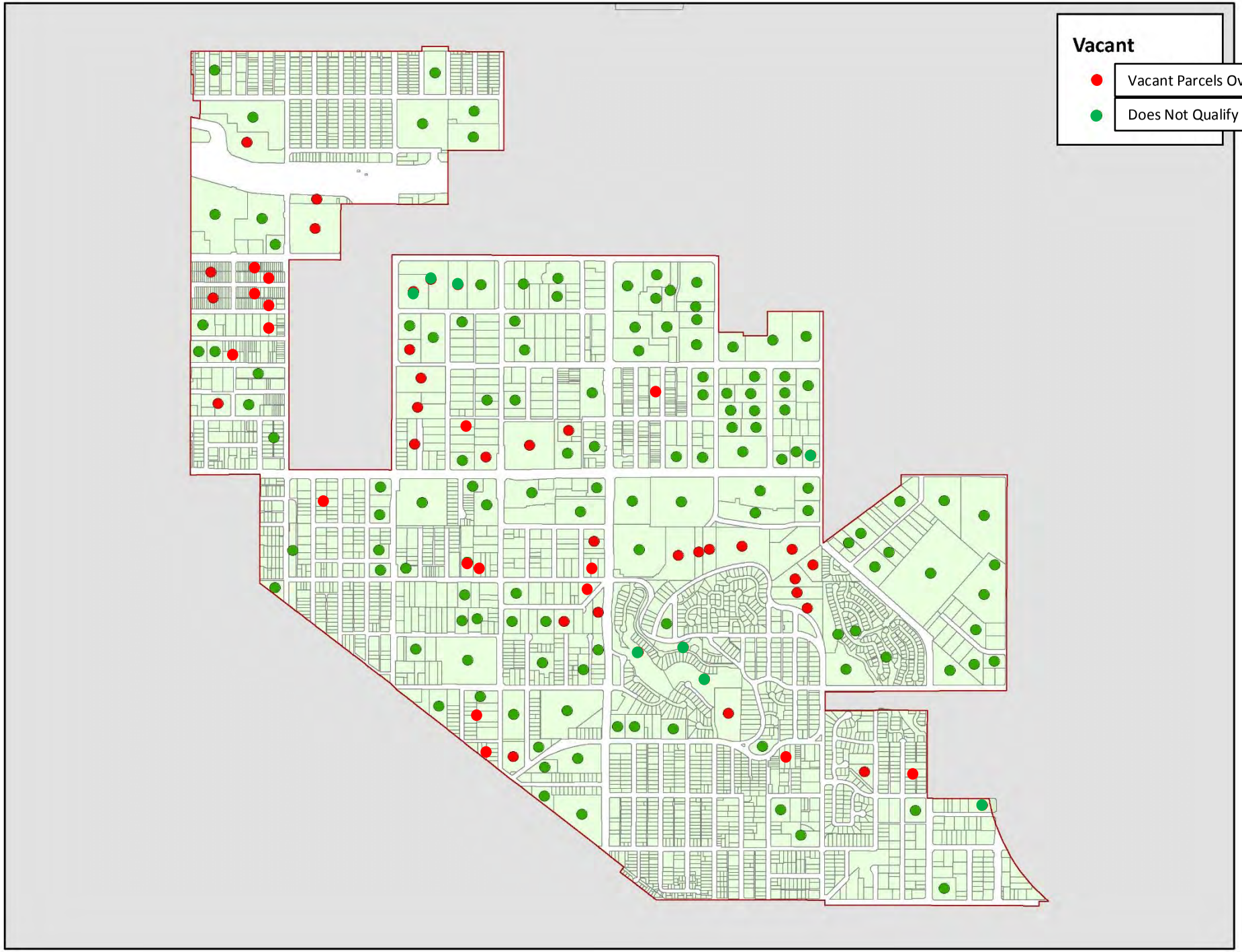
D. Maintenance, Inspections, and Corrections.

1. The property owner shall conduct proper maintenance of permanent soil erosion and sediment control measures as defined in the compliance plan and guidance manual. Additionally the property owner shall not create a nuisance as defined in Section 8.12.
2. The director shall conduct annual or as necessary inspections of the parcels subject to this section to ensure proper installation and maintenance of the permanent soil erosion and sediment control measures in the approved plans.
3. Adequate maintenance of permanent soil erosion and sediment control measures identified in the compliance plan shall be determined by the director following inspections. Unimproved vacant parcels will be determined to be in compliance with this section by inspection of permanent soil erosion and sediment control measures which must be maintained to the standards described in the compliance plan and guidance manual.
4. If the unimproved vacant parcel is not in compliance, property owners will be notified in writing that corrective actions are required. The property owner shall be responsible for addressing corrective actions and maintaining permanent soils erosion and sediment control measures and ensure compliance with the provisions of this section.
5. If, subsequent to such notification of corrective actions, the director determines that any unimproved vacant parcel has become non-compliant with this section, improperly operated and maintained, or that the use of the parcel has changed significantly, the director may require a new compliance plan, which shall require the property owner to complete repairs and/or maintenance of damaged or deteriorated permanent soil erosion and sediment control measures.

E. Exemption.

1. The director, at his or her sole discretion, may exempt an unimproved vacant parcel from the requirements of this section upon demonstration of:

a. Adequately sized and maintained regional stormwater treatment system located downstream and which receives runoff from the parcel being exempted. Contiguous unimproved vacant parcels totaling one acre or more shall not be subject to this exemption.
b. The parcel is subject to a Conditional use Permit (CuP), Compliance Plan (CP), and/or a Construction General Permit (CGP).
c. The parcel has been improved in a manner which permanent soil erosion and sediment control measures are no longer required by this section.




Attachment D

July

**7d.**

# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

July 18, 2017

**AGENDA ITEM**

**TO:** **HONORABLE CHAIR**
**AND MEMBERS OF THE PLANNING COMMISSION**

**FROM:** **COLLEEN DOAN – SENIOR PLANNER**
**RYAN AGBAYANI – ASSISTANT PLANNER**

**SUBJECT:** **DIRECTOR'S REPORT – STUDY SESSION ON SITE PLAN AND DESIGN REVIEW**

## Summary:

Staff will be presenting the second in a series of Director's Reports regarding tools and procedures to assist the Planning Commission with their duties. This month's study session is on the Site Plan and Design Review (SPDR) process with an emphasis on design review. During the session, staff will engage the Planning Commission in an interactive design exercise.

## Recommendation:

Receive and file.

## Background and Analysis:

Nearly all development projects in the City, including substantial modification, alteration, repair or rehabilitation of existing improvements, require Site Plan and Design Review. Projects have different reviewing authorities based on their scope. The reviewing bodies are:

Director of Community Development

- Construction of new buildings, additions or extensions which are 10,000 square feet or less in any commercial or industrial zone,
- Construction of first story additions of 500 square feet or less to an existing dwelling (excluding garages, patios, balconies, uncovered pools/spas, etc.); and

- All exterior structural and physical improvements, relocations, and/or exterior alterations to existing buildings and structures, including physical site improvements such as landscaping, parking and loading areas, driveways, walls, signs, fences and trash enclosures.

Planning Commission

- New custom single family dwellings (SFD's),
- New second units,
- Construction of new buildings, additions or extensions which exceed 10,000 square feet in any commercial or industrial zone,
- Construction of first story additions greater than 500 square feet (excluding garages, patios, balconies, uncovered pools/spas, etc.) to an existing dwelling unit; and
- Second story additions.

Findings and Standard of Review

There are two types of determinations under Planning Commission SPDR:

- Compliance with Development Standards: These standards include such items as compliance with zoning and the general plan, parking, setbacks, building height etc. Each staff report will note whether the project "meets or does not meet" each standard.

- Criteria for Design Review: Design elements include such items as architectural form, bulk, mass, scale, compatibility, treatments, materials, color etc. Each staff report will note whether staff has concerns about any design elements. However, design approval rests with the Planning Commission.

The Signal Hill Municipal Code (SHMC) provides the guidance and authority to the Planning Commission when making SPDFR decisions (Attachment A). This guidance is in SHMC Section 20.52.050, "Findings and Standards of Review".

*Findings:* The Code requires that the Commission shall make five findings in order to approve a project under SPDR. Four of the five findings refer to the "meets or does not meet" development standards. Only one of the five findings addresses design. This single finding incorporates multiple design considerations:

> **5. The proposed development provides for appropriate exterior building design and appearance consistent and complementary to present and proposed buildings and structures in the vicinity of the subject project while still providing for a variety of designs, forms and treatments.**

*Design Criteria:* Design determinations are more subjective and can require personal interpretation and opinion. For this reason the SHMC provides further guidance in the form of "Design Review Criteria". It states that the Commission shall utilize the criteria to assist them with their determination (Attachment B). Only four of the twenty-one criteria address design. Similar to the findings these four criteria incorporate multiple design considerations:

> **1. The overall development plan integrates land with building forms and achieves architectural unity and environmental harmony within the development, consistent with the objective of emphasizing and enhancing the positive aesthetic characteristics existing, developing or to be developed in the surrounding area;**
>
> **5. Exterior building treatments are restrained, not harsh or garish, and selected for durability, wear characteristics, ease of maintenance, and initial beauty. All exterior treatments are coordinated with regard to color, materials, architectural form and detailing to achieve design harmony and continuity. Exposed metal flashing or trim should be anodized or painted to blend with the exterior colors of the building;**
>
> **6. Rooflines on a building are compatible through-out the development and with surrounding development;**
>
> **7. Buildings and related outdoor spaces are designed to avoid abrupt changes in building scale. The height and bulk of buildings are in scale with surrounding sites and do not visually dominate the site or call undue attention to buildings. Structures higher than two stories emphasize horizontal, as well as vertical appearance, e.g., by the use of projection or recession of stories, balconies, horizontal fenestration, changes in roof levels or planes, landscaping or outdoor structures or detailing, to convey a more personal scale;**
>
> **10. The designs of accessory structures, fences and walls are harmonious with main buildings, insofar as possible, the same building materials are used on all structures on the site;**

SPDR is a subjective and dynamic process. The Planning Commission is authorized and required include design decisions under each SPDR. By making use of the design criteria as a tool to make the required design finding, the Commission is better able to reach a consensus and to make consistent, although subjective design decisions. During the session, staff will engage the Planning Commission in an interactive design exercise.

Approved by:

_____

Scott Charney
Director of Community Development

# Section 20.52.050 Findings and Standard of Review

**A**. **Findings.** In approving or conditionally approving a site plan and design review application, the director of planning and community development, the planning commission or city council, as the case may be, shall find that:

1. The proposed project is in conformance with the general plan, zoning ordinance, and other ordinances and regulations of the city;
2. The proposed project is in conformance with any redevelopment plan and regulations of the redevelopment agency and any executed owner's participation agreement or disposition and development agreement;
3. The following are so arranged as to avoid traffic congestion, to ensure the public health, safety, and general welfare, and to prevent adverse effect on surrounding properties:
   a. Facilities and improvements;
   b. Pedestrian and vehicular ingress, egress, and internal circulation;
   c. Setbacks;
   d. Height of buildings;
   e. Signs;
   f. Mechanical and utility service equipment;
   g. Landscaping;
   h. Grading;
   i. Lighting;
   j. Parking;
   k. Drainage;
   l. Intensity of land use;
4. The topography is suitable for the proposed site plan and the site plan, as proposed, is suitable for the use intended;
5. **The proposed development provides for appropriate exterior building design and appearance consistent and complementary to present and proposed buildings and structures in the vicinity of the subject project while still providing for a variety of designs, forms and treatments.**

# Section 20.52.050 Findings and Standard of Review

**B. Site Plan and Design Review Criteria.** In reviewing any site plan or design review application pursuant to the requirements of this chapter, the director of the department of planning and community development, the planning commission, or the city council, as the case may be, shall utilize the following criteria:

**1. The overall development plan integrates land with building forms and achieves architectural unity and environmental harmony within the development, consistent with the objective of emphasizing and enhancing the positive aesthetic characteristics existing, developing or to be developed in the surrounding area;**

2. Structures shall be situated so as to respect and respond to the existing topography, to minimize alteration of natural land forms, to minimize disruption of desirable trees and vegetation, and to minimize interference with the privacy of and views from surrounding properties;

3. Building pads should be established and graded as near to existing topographic elevations as possible and in such manner as to blend with contours of adjoining properties and avoid abrupt transitions;

4. The size and location of proposed structures enhance, protect or minimize interference with the views of or vistas to the hill which is that area generally bounded by Willow Street on the north, 21st Street on the south, Cherry Avenue on the west and Temple Avenue on the east, from major, modified, and secondary modified streets and from any other public areas;

**5. Exterior building treatments are restrained, not harsh or garish, and selected for durability, wear characteristics, ease of maintenance, and initial beauty. All exterior treatments are coordinated with regard to color, materials, architectural form and detailing to achieve design harmony and continuity. Exposed metal flashing or trim should be anodized or painted to blend with the exterior colors of the building;**

**6. Rooflines on a building are compatible through-out the development and with surrounding development;**

**7. Buildings and related outdoor spaces are designed to avoid abrupt changes in building scale. The height and bulk of buildings are in scale with surrounding sites and do not visually dominate the site or call undue attention to buildings. Structures higher than two stories emphasize horizontal, as well as vertical appearance, e.g., by the use of projection or recession of stories, balconies, horizontal fenestration, changes in roof levels or planes, landscaping or outdoor structures or detailing, to convey a more personal scale;**

8. The development protects the site and surrounding properties from noise, vibration, odor, and other factors which may have an adverse effect on the environment;

9. The designs of buildings, driveways, loading facilities, parking areas, signs, landscaping, lighting and other project features are responsive both to functional requirements, such as automobile, pedestrian and bicycle circulation, and to aesthetic concerns including the visual impact on other properties and from the view of the public street;

**10. The designs of accessory structures, fences and walls are harmonious with main buildings, insofar as possible, the same building materials are used on all structures on the site;**

11. Proposed signs, and the materials, size, color, lettering, location and arrangement thereof, are an integrated part of and complementary to the overall design of the entire development;

12. Landscaping is incorporated in such a way as to complement the overall development, enhance visual interest and appeal, and visually integrate buildings within the natural setting. Landscaping shall include combinations of trees, shrubs, turf, and groundcover with major emphasis on utilization and retention of native species and drought tolerant plant materials suited to local climatic conditions. Landscaping in parking areas shall be located so as to provide visual relief from expanses of paved surfaces. Landscaping buffers shall be used to screen exterior trash and recycling areas, loading docks and ramps, electrical utility boxes and transformers, and fire flow valves and backflow preventers;

13. Landscape buffers should also be used, in conjunction with earthen berms, to minimize the visual impact and presence of vehicles by screening them from view to the extent feasible from both on-site and off-site vantage points;

14. Mechanical and utility service equipment is designed as part of the structure or is screened consistent with building design. Electrical transformers shall not be located in required front yard setbacks. Large vent stacks and similar features should be avoided, but if essential, are screened from view or painted to be nonreflective and compatible with building colors. Rooftop mechanical equipment shall be screened from view of public rights-of-way or integrated into the design of the structure. Particular attention should be paid to minimizing the visual impact of rooftop equipment which may be visible from properties or rights-of-way at higher elevations;

15. Natural space-heating, cooling, ventilation and day lighting are provided, to the extent possible, through siting, building design and landscaping. Deep eaves, overhangs, canopies and other architectural features that provide shelter and shade should be encouraged;

16. Trash enclosures and truck loading areas, to the extent feasible, shall be located out of view from public rights-of-way, and shall be of appropriate size and shape to accommodate additional receptacles for recycling materials;

17. Proposed building, walkway, and parking lighting enhances building design and landscaping, as well as security and safety, and does not create glare for occupant on adjoining properties;

18. Drainage is provided so as to avoid flow onto adjacent property;

19. On new development, all utility facilities are underground;

20. Adequate provisions are made for fire safety;

21. All Oil and Gas Code development standards contained in Chapter 16.24 are met., and a condition of approval has been added that prior to issuance of any certificate of occupancy for developments constructed over or in close proximity to abandoned wells, the property owner shall record a declaration of CC&Rs, in a form subject to the review and approval of the City Attorney, putting future owners and occupants on notice of the following: the existence of abandoned wells on the site; that the wells within the area of development have been leak tested and found not to leak; description of any methane mitigation measures employed; disclosure that access to these wells has been provided to address the fact that they may leak in the future causing potential harm; acknowledgment that the state may order the reabandonment of any well should it leak in the future; acknowledgment that the state does not recommend building over wells; and releasing and indemnifying the city for issuing project permits.

22. All zoning ordinance development standards are met.

(Ord. 2015-05-1475 § 9 (part); Ord. 2013-07-1459 §§ 9, 10; Ord. 2013-07-1460 §§ 9, 10; Ord. 91-09-1112 (part): Ord. 90-05-1067 § 1 (part))

July

7e.

# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

July 18, 2017

**AGENDA ITEM**

**TO:** **HONORABLE CHAIR**
**AND MEMBERS OF THE PLANNING COMMISSION**

**FROM:** **SCOTT CHARNEY**
**COMMUNITY DEVELOPMENT DIRECTOR**

**SUBJECT:** **DIRECTOR'S REPORT – PLANNING COMMISSION BUSINESS CARDS**

## Summary:

Staff will be ordering business cards for use by Commissioners in relation to their duties and responsibilities as appointed officials.

## Recommendation:

Receive and file.

## Background and Analysis:

Use of business cards is covered by the City Business Card Policy (Attachment). Please use the cards judiciously. The contact information provided will be the Community Development Department's general email and phone line. Any inquiries received will be forwarded to the Commissioner by the Department's Administrative Assistant.

**DATE:** April 17, 2017

***City of Signal Hill Policy***

**City Business Card Policy**

**REVISION NO.:**

**APPROVED:**

**DEPARTMENT: Administration**

## I. PURPOSE

To establish procedures for the issuance and use of City business cards for City Council Members, Commissioners, Appointed Officials, Board Members, and City employees.

## II. DISCUSSION

It is the policy of the City of Signal Hill to issue business cards as necessary for City Council Members, Commissioners, Appointed Officials, Board Members, and City employees to use in relation to their duties and functions in an official capacity.

## III. POLICY

A. City business cards shall only be used when the City Council Member, Commissioner, Appointed Official, Board Member or City employee is acting in an official capacity on official city business, at a city-sponsored event, or at a city-endorsed event.

B. The following template business card is approved for use by City Council Members, Commissioners, Appointed Officials, Board Members, and City employees. (scan and include sample) Information on the business cards must contain at a minimum the name and title of the City Council Member, Commissioner, Appointed Official, Board Member or City employee.




Attachment A

C. The City Manager, City Clerk, Commissioner/Board Secretary, or a department head will determine the additional information to be pre-printed on business cards.

D. Private and personal email addresses and phone numbers shall not be used on City business cards.

E. Business cards must be purchased with City funds, under appropriations approved by the City Council and City Manager, in the budget for the commission, board, or department.

F. Requests for issuance of business cards shall be made and approved by the City Manager for a Council Member, Commissioner/Board Secretary of a Commissioner/Board Member, and department head of an employee.

G. Reissuance of additional business cards shall be at the discretion of the City Manager, Commissioner/Board Secretary, or department head in consideration of reasonable use of business cards in relation to each person's duties and functions in an official capacity.

H. Printed business cards must be in compliance with the City of Signal Hill Municipal Code 1.02.130 - Use of City Seal and/or City Logo.

I. Unauthorized or inappropriate use of City business cards is prohibited and may result in confiscation or disciplinary action.

J. All business cards remain the property of the City and shall be returned to the City Clerk's Office or the department head upon termination of service term, appointment, employment, or by special request of the City Manager, Commissioner/Board Secretary, employee's department head, or the Personnel Office.

# July

**8a.**

# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

July 18, 2017

**AGENDA ITEM**

**TO:** **HONORABLE CHAIR**
**AND MEMBERS OF THE PLANNING COMMISSION**

**FROM:** **SCOTT CHARNEY**
**COMMUNITY DEVELOPMENT DIRECTOR**

**SUBJECT:** **MINUTES**

**Summary:**

Attached for your review and approval are the minutes of last month's regular meeting.

**Recommendation:**

Approve.

**A REGULAR MEETING OF THE CITY OF SIGNAL HILL**
**PLANNING COMMISSION**
**June 20, 2017**
**7:00 P.M.**

## CALL TO ORDER

Commissioner Richárd called the meeting to order at 7:00 p.m.

## ROLL CALL

The Commission Secretary conducted roll call.

Present: Commissioner Carmen Brooks
Commissioner Jane Fallon
Commissioner Victor Parker
Commissioner Rose Richárd
Commissioner Chris Wilson

Staff present:

1) Community Development Director Scott Charney
2) Senior Planner Colleen Doan
3) Assistant Planner Ryan Agbayani
4) Assistant City Attorney Gina Chung

In addition, there were 6 people in attendance.

## PLEDGE OF ALLEGIANCE

Commissioner Richárd led the audience in reciting the Pledge of Allegiance.

## PUBLIC BUSINESS FROM THE FLOOR

There was no public business from the floor.

## OATHS OF OFFICE

a. Commission Secretary Scott Charney administered the Oath of Office for newly appointed Planning Commissioners. The newly appointed commissioners (Brooks, Parker, and Wilson) publically recited their Oaths of Office.

## REORGANIZATION

a. Commission Secretary Scott Charney stated that annually at this time, the Commission selects members to serve one-year terms as Chair and Vice Chair. Secretary Charney called for nominations for Chair.

   Commissioner Fallon nominated Commissioner Richárd for Chair. There were no further nominations. The vote carried 5/0 to select Commissioner Richárd as Chair for the 2017/18 term of office.

   Chair Richárd nominated Commissioner Parker for Vice Chair. There were no further nominations. The vote carried 5/0 to select Commissioner Parker as Vice Chair for the 2017/18 term of office.

## COMMUNITY DEVELOPMENT DIRECTOR'S REPORTS

a. Selection of the Sustainable City Committee (SCC) Planning Commission Representative and Alternate

   Assistant Planner, Ryan Agbayani, presented the Director's Report.

   Chair Richárd opened the floor to nominations for the SCC Representative. Commissioner Fallon nominated herself. Commissioner Brooks also nominated herself. A roll-call vote was conducted for Commissioner Fallon and a majority was reached to select Commissioner Fallon as the SCC Representative.

   Chair Richárd then opened the floor to nominations for the SCC Alternate. Commissioner Brooks nominated herself. Chair Richárd nominated Vice Chair Parker. A roll-call vote was conducted for Commissioner Brooks and a majority (Brooks, Fallon, and Wilson) was reached to select Commissioner Brooks as the SCC Alternate.

b. Solicitation of Nominations for Future Beautification Awards

   Senior Planner, Colleen Doan, presented the Director's Report.

   Commissioner Brooks asked to receive a list of past award recipients. She also asked for clarification regarding the distinction between Beautification Awards and Sustainability Awards.

   Commissioners Wilson asked about public outreach, and Commissioner Parker asked about the split between commercial and residential recipients.

   Staff noted that informational flyers and nomination forms will be available at the upcoming Summer Concert Series, and that the City web site and City Views newsletters also feature winners and a link to the nomination form.

The project located at 1880 Dawson Ave. was selected as the third quarter Beautification Award winner by a 5/0 vote.

c. Study Session on the Development Status Report

Staff presented the Director's Report.

Vice Chair Parker asked for clarification about the WELO checkbox under the project description column.

Commissioner Brooks inquired about the procedure if the scope of a project changes after the CTL clock has been initiated. She also asked for clarification about the terms and sunset procedures.

Staff provided details.

The Commission voted 5/0 to receive and file the report.

## CONSENT CALENDAR

It was moved by Commissioner Fallon and seconded by Commissioner Wilson to receive and file the Consent Calendar.

The motion carried 5/0.

## COMMISSION NEW BUSINESS

Chair Richárd personally welcomed the three new commissioners.

## ADJOURNMENT

It was moved by Vice Chair Parker and seconded by Commissioner Fallon to adjourn to the next regular meeting of the Planning Commission to be held on Tuesday, July 18, 2017, at 7:00 p.m., in the Council Chamber of City Hall, 2175 Cherry Avenue, Signal Hill, CA, 90755.

The motion carried 5/0.

Chair Richárd adjourned the meeting at 7:55 p.m.

_____

Chair

Attest:

Scott Charney
Commission Secretary

July

**8b.**

# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

July 18, 2017

**AGENDA ITEM**

**TO:** **HONORABLE CHAIR**
**AND MEMBERS OF THE PLANNING COMMISSION**

**FROM:** **SCOTT CHARNEY**
**COMMUNITY DEVELOPMENT DIRECTOR**

**SUBJECT:** **CITY COUNCIL FOLLOW-UP**

## Summary:

Below for your review is a brief summary of the City Council's actions from the last two Council meetings.

## Recommendation:

Receive and file.

## Background and Analysis:

1) At the June 27, 2017 City Council Meeting:
   - The City Council conducted the second reading of Ordinance Amendment 17-01, amending Title 15 of the Signal Hill Municipal Code entitled "Buildings and Construction".
   - The City Council adopted the following resolutions: 1. Adopting the Operating and Capital Budget for Fiscal Year 2017-18; and 2. Approving and adopting the annual appropriations limit for the Fiscal Year 2017-18.
   - Community Development Director Scott Charney presented the Green City Annual Progress Report.

2) At the July 11, 2017 City Council Meeting:
   - The City Council was introduced to Kelli Tunnicliff, the new Public Works Director.
   - Public Works Deputy Director Grissel Chavez made a presentation regarding the public comments received after the activation of Well #9.

July

8c.

# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

July 18, 2017

**AGENDA ITEM**

**TO:** **HONORABLE CHAIR**
**AND MEMBERS OF THE PLANNING COMMISSION**

**FROM:** **SCOTT CHARNEY**
**COMMUNITY DEVELOPMENT DIRECTOR**

**SUBJECT:** **DEVELOPMENT STATUS REPORT**

## Summary:

Attached for your review is the monthly Development Status Report which highlights current projects.

## Recommendation:

Receive and file.

# City of Signal Hill
# Community Development Department
# Development Status Report
# July 18, 2017

**Commercial-Industrial**

| | | | REVIEW | | | SPDR/CUP | | | CTL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | **Director approval** | **PC approval** | **CC approval** | **Expires** | **1st Ext.** | **2nd Ext.** | **Expires** | **1st Ext.** | **2nd Ext.** | **Status** |
| 2351 Walnut Avenue<br><br>Applicant: Roger Vititow | Proposal for a new warehouse (7,974 sf) and office building (first floor: 1,374 sf) (second floor: 635 sf) with associated landscaping, trash enclosure, and parking lot | Administrative Review<br><br>☒ WELO req. | Required | N/A | N/A | Required | | | | | | • Revised preliminary plans were submitted for planning review. Well discovery was completed and survey document has been received.<br>• The agent for the applicant has submitted plans for a preliminary review (7/17).<br>• Reviewed plans and emailed comments to agent (7/11/17).<br><br>RA/JH |
| 2200 E. Willow St.<br><br>Applicant: Costco Wholesale | Amendment to CUP 13-01 to extend the gas station hours of operation from 5 am to 10 pm seven days a week. | Amendment to CUP<br><br>☐ WELO req. | N/A | 7/15/15 | Required | | | | | | | • Community meeting held (2/15).<br>• Planning Commission public hearing on 7/14/15.<br>• A permanent plan to address on-site circulation issues is pending (3/17).<br><br>CTD |
| 3201 California Ave.<br><br>SHP Inc. | Abandoned well leak testing and WAR review.<br><br>Applicant: SHP Inc. | Administrative Review<br><br>☐ WELO req. | N/A | | | | | | N/A | | | • Methane leak tests approved. Three Well Abandonment Reports (WARs) approved. Development plans are on hold (6/16).<br><br>CTD/JH |

**City of Signal Hill**
**Community Development Department**
**Development Status Report**
**July 18, 2017**

**Commercial-Industrial**

| | | | REVIEW | | | SPDR/CUP | | | CTL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | Director approval | PC approval | CC approval | Expires | 1st Ext. | 2nd Ext. | Expires | 1st Ext. | 2nd Ext. | **Status** |
| 2370 Walnut Avenue | Remodel for office and auto body repair facility.<br><br>Applicant: Beetley Auto Center | Admin. SPDR and Lot Merger | | | | | | | | | | • Planning review is approved. Lot merger and plan check are pending (7/17)<br><br>CTD |
| 2499 PCH | Remodel of commercial laundry.<br><br>Applicant: Bill Mylonas | Admin. SPDR<br><br>☐ WELO req. | | | | | | | | | | • Planning and public works review 1st comments have been provided to the applicant.<br>• Public improvements bond and lot merger are pending.<br>• Applicant has indicated they would like to pursue a CUP amendment to extend hours of operation (7/17).<br><br>CTD/AC |
| 1501 E. 28th Street | Site paving and LID BMPs for a mobile fueling facility.<br><br>Applicant: Chuck Bleumel | Admin. SPDR<br><br>☐ WELO req. | | | | | | | | | | • Planning, LID and preliminary grading review is pending (7/17).<br><br>CTD |
| 2020 Walnut Avenue | Preliminary review of a 110,300 SF industrial park.<br><br>Applicant: Xebec | ZOA, Parcel Map and SPDR pending<br><br>☐ WELO req. | | | | | | | | | | • Preliminary review 1st comments have been provided to applicant and submittal is pending (7/17)<br><br>CTD |

**City of Signal Hill**
**Community Development Department**
**Development Status Report**
**July 18, 2017**

**Commercial-Industrial**

| | | | REVIEW | | | SPDR/CUP | | | CTL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | Director approval | PC approval | CC approval | Expires | 1st Ext. | 2nd Ext. | Expires | 1st Ext. | 2nd Ext. | **Status** |
| 2953 Obispo Ave.<br><br>Futsal Indoor Soccer | A request to allow indoor soccer as a conditionally permitted use in the City.<br><br>Applicant: Mike Biddle | ZOA<br>CUP<br><br>☐ WELO req. | N/A | Required | Required | | | | | | | • Deposit submitted to begin coordination of workshops w/HOAs (7/14).<br>• Applicant requested to temporarily postpone request (12/14).<br>• Applicant submitted ZOA application to allow the indoor soccer use and a CUP to operate at the subject location.<br>• A workshop was conducted at the May PC mtg.<br>• Staff will schedule visits, research parking standards, and prepare for a second neighborhood meeting in preparation of a zoning ordinance amendment and CUP for the use (7/17).<br><br>CTD |

# City of Signal Hill
## Community Development Department
## Development Status Report
## July 18, 2017

**Commercial-Industrial**

| Address | Project Description | Application | REVIEW | | | SPDR/CUP | | | CTL | | | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Director approval | PC approval | CC approval | Expires | 1st Ext. | 2nd Ext. | Expires | 1st Ext. | 2nd Ext. | |
| 1136 Willow St.<br><br>Micro-brewery ZOA/CUP | Application for a ZOA to allow brewing and tasting rooms w/allowance for food trucks in industrial zones.<br><br>Applicant: Daniel Sundstrom | ZOA 16-04<br>CUP 16-02<br><br>☐ WELO req. | N/A | 6/21/16 | 7/12/16 | Building Permit Issued: 11/28/16 | | | 5/22/18   | | | • Planning Commission workshop held 5/17/16 to discuss the ZOA and CUP.<br>• City Council approved on 7/12/16, and the ordinance became effective on 8/25/16.<br>• Building permit issued on 11/28/16. Underground plumbing complete, awaiting delivery of equipment for installation (4/17).<br>• Equipment arrived. Plumbing installation completed and inspected. (6/17)<br>• Anticipated opening to the public on July 29, 2017 (7/17).<br><br>CTD/JH |
| 2750 Rose Avenue<br><br>Collision and auto body repair CUP | Application for a CUP to allow vehicle body repair and painting as an Auto Center accessory use.<br><br>Accessory Dealership: Mercedes Benz<br>Applicant: Class Auto Center Inc. | CUP 16-03<br><br>☐ WELO req. | N/A | 11/15/16 | 12/13/16 | | | | | | | • Planning Commission recommended approval on 11/15/16.<br>• City Council approved on 12/13/16.<br>• Outdoor storage was removed. The draft parking covenant was submitted for review by legal counsel (6/17).<br>CTD |

**City of Signal Hill**
**Community Development Department**
**Development Status Report**
**July 18, 2017**

**Commercial-Industrial**

| | | | REVIEW | | | SPDR/CUP | | | CTL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | **Director approval** | **PC approval** | **CC approval** | **Expires** | **1st Ext.** | **2nd Ext.** | **Expires** | **1st Ext.** | **2nd Ext.** | **Status** |
| 999 Willow Avenue | Remodel of commercial bldg.<br><br>Applicant: 2H Construction LLC | Admin SPDR | | | | | | | | | | • Planning Review 1st comments have been circulated to applicant and corrections are pending (7/17).<br><br>CTD |
| 2501 Cherry Avenue<br>701 E. 28th Street | Request to install solar panels over parking areas and on roof tops of existing commercial buildings.<br><br>Applicant: Orion Systems Inc. | Admin SPDR<br><br>☐ WELO req. | 7/3/17 | N/A | N/A | | | | | | | • Admin. Planning approval. Plan check submittal pending (7/17).<br><br>CTD/JH |

Business Licenses and Permit Summary

- Planning Department staff reviewed and approved 11 business licenses.
- Building Department staff issued 17 permits including 2 residential solar permits. The valuation of the projects is approximately $1,680,000 with permit revenues at $8,800.

Training/Tours/Events

- The SCC summer concerts booth will feature recycling, water conservation and sustainability information and activities. The first concert is July 12, 2017.
- Crescent Square model homes are open and offered a tour of the homes to City Council and staff on July 5, 2017.

Ongoing / Upcoming Projects

- Vacant Parcel Ordinance (scheduled for July PC).
- Oil Well Inspections.
- Density Bonus Ordinance Amendment.
- The City Attorney, City Manager, and city staff continue to meet with SHP regarding a master development agreement for future projects citywide.

# City of Signal Hill
# Community Development Department
# Development Status Report
# July 18, 2017

**Auto Center Vehicle Storage/Auction**

| | | | Term I | | | | Term II | |
|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | **Term** | **Submit Permanent Improvement Plan** | **Review/ Approve Permanent Improvement Plan** | **Extension** | **Install Permanent Improvements** | **Status** |
| 1250 28th Street<br><br>Property Owner: SHP<br>Applicant: Honda | Auto Center Vehicle Storage Yard | Permanent Improvement Terms | Expires 8/12/19<br><br>  | Tentatively 4/2017 | PC Review of permanent improvements plan is on hold. | Optional 1 year | TBD | • Deposit payment was paid (8/16).<br>• Business license was issued (8/16).<br>• Compliance Plan approved w/final edits (9/16).<br>• Non-oil field related storage removal is still pending and staff have inquired about the removal time frame (4/17).<br>• Following the recent rainfall, a plan to improve stormwater BMP's was developed and installation of improvements is pending (5/17)<br>• Storage removal is pending per the Compliance Plan.<br>• SHP has indicated that they will likely not be extending the lease for the property beyond the current 3 year term. Therefore they will not be preparing a permanent improvement plan (7/17).<br><br>CTD |
| 1241 Burnett Street<br><br>Applicant: Lee Crecelius | Dealer's Choice Auto Auction. | Permanent improvements pending | | | | | | • Relocated Mercedes Benz auto auction site from auto center at Mercedes to subject location. Permanent improvement plans pending (7/17).<br><br>CTD |

**City of Signal Hill**
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**July 18, 2017**

**Auto Center Dealership Improvements**

| | | | REVIEW | | | SPDR/CUP | | | CTL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | **Director approval** | **PC approval** | **CC approval** | **Expires** | **1st Ext.** | **2nd Ext.** | **Expires** | **1st Ext.** | **2nd Ext.** | **Status** |
| 1500 E. Spring Street | Honda Expansion Revision:<br><br>A request to make improvements at the existing auto dealership, including:<br>• 802 sf showroom addition;<br>• 262 sf office area addition;<br>• 1,300 sf service dept. write-up area; and<br>• New facade treatment and signage.<br><br>Applicant: Goree Architects for Long Beach Honda | SPDR 17-02<br><br>☐ WELO req. | N/A | 3/22/17 | N/A | | | | | | | • Application and plans for a Site Plan & Design Review received on 2/7/17. Project is scheduled for a PC public hearing on 2/21/17.<br>• The previous 2/21/17 approval was rescinded. A new application with revised plans was approved by the PC on 3/22/17.<br>• Applicant submitted plans for building plan check on 4/4/17. Both Building and Planning plan checks were completed on 5/9/17.<br>• The applicant submitted for a modified exterior lighting plan (of rectangular fixtures) on 4/20/17 and went to public hearing on 5/16/17.<br>• Planning Commission upheld the existing standard of rounded light fixtures and denied the rectangular fixtures proposed by Honda. Temporary trailers<br><br>RA |

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**Auto Center Dealership Improvements**

| | | | REVIEW | | | SPDR/CUP | | | CTL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | Director approval | PC approval | CC approval | Expires | 1st Ext. | 2nd Ext. | Expires | 1st Ext. | 2nd Ext. | **Status** |
| 1400 Spring St.<br><br>City of SH Successor Agency | In preparation for a new Mazda dealership.<br><br>Applicant: City Successor Agency and Glenn E. Thomas | SPDR pending<br><br>☐ WELO req. | | | | | | | | | | • Methane leak tests completed and approved.<br>• Two WARs have been submitted and approved.<br>• DDA and Neg. Dec were approved, by Council on 6/13/17.<br><br>EM |

# City of Signal Hill
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**Wireless Communication Facilities**

| | | | REVIEW | | | SPDR | | | CTL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | **Director approval** | **PC approval** | **CC approval** | **Expires** | **1st Ext.** | **2nd Ext.** | **Expires** | **1st Ext.** | **2nd Ext.** | **Status** |
| 2411 Skyline Dr. | A request to add 2 new Tower Dishes and 3 Antennas, to the Cell Tower as allowed by CUP 99-05 (Cal. Internet).<br><br>A request to add structural modifications was reviewed by City consultants and approval is pending payment of the developer deposit and an estimate of the structural to equipment capacity for the CUP allowed equipment additions (Crown Castle).<br><br>A request to add 10 Micro Wave dishes is incomplete pending an updated equipment audit and compliance with the Master Operating Agreement (MOP) with Long Beach.<br><br>Applicant:<br>Crown Castle | Administrative to add equipment allowed under CUP 99-05 | ✓ | N/A | N/A | Building permit issued 2/5/16 | | | | | | • Updated equipment/tenant audit was received.<br>• Plans approved for Cal Internet additional equipment as allowed under the CUP.<br>• A request to add tower shoring was approved (1/16).<br>• Building permit issued for additional equipment on 2/5/16 and structural modification on 2/25/16.<br>• Structural work is complete, fence and gate have been painted and landscape repairs.<br>• Due to removal of Long Beach tower property fence, site is accessible to the public. A letter was sent to Crown Castle and a site visit with Crown Castle was conducted on 9/14/16.<br>• A gate has been installed to secure the area. (9/16).<br>• Revised plans for Telepacific equipment approved and bldg. permits issued (6/17).<br><br>CTD/JH |

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**Wireless Communication Facilities**

| | | | REVIEW | | | SPDR | | | CTL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | **Director approval** | **PC approval** | **CC approval** | **Expires** | **1st Ext.** | **2nd Ext.** | **Expires** | **1st Ext.** | **2nd Ext.** | **Status** |
| 1855 Coronado rooftop facility | Six 6' high panel, 9 RRUs antennas, new hybrid cables and larger screen boxes screen the equipment<br><br>Applicant: Core Dev. | Administrative to modify CUP 08-03 | ✓ | N/A | N/A | | | | | | | • Plans ready for permit issuance, applicant notified on 5/16 and 9/16.<br>• Third reminder sent (1/17).<br><br>CTD |
| 2525 Cherry Avenue | Removing and replacing the 3 existing antennas<br><br>Applicant: Core Dev. for Sprint | Administrative to modify CUP 02-01 | ✓ | N/A | N/A | | | | | | | • Building permit ready for issuance 1/26/16.<br>• Reminders sent to applicant for permit issuance on 3/16, 7/16, 9/16, and 12/16.<br>• Final reminder sent notifying the applicant that the plans will expire on 1/25/17.<br>• Building permit issued on 1/13/17. Work not completed (6/17).<br><br>CTD/JH |
| 2201 Orange Avenue | Remove 3 existing antennas and replace them with 3 antennas which are the same size and shape<br><br>Applicant: Crown Castle for T-Mobile | Administrative to modify 07-04 | ✓ | N/A | N/A | | | | | | | • Building permit issued on 12/7/16.<br><br>CTD/JH |

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**Residential**

| Address | Project Description | Application | REVIEW | | | SPDR | | | CTL | | | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Director approval | PC approval | CC approval | Expires | 1st Ext. | 2nd Ext. | Expires | 1st Ext. | 2nd Ext. | |
| 2518 Willow St. | New front entry electronic gate w/stone veneer pilasters, update guard shack<br><br>Applicant: Willow Ridge Homeowners Association | Administrative Review<br><br>☐ WELO req. | ✓ | N/A | N/A | Building Permit Issued 6/2/16 | | | | | | • Building permit issued 6/2/16.<br>• Retaining wall was not constructed per plans. Contractor was ordered to reconstruct 3 times (9/16).<br>• Guard shack framing completed (10/16).<br>• Work is progressing slowly for the new front entry gate (5/17).<br>• Front gate installed and inspected.<br>• Landscaping being installed (7/17).<br><br>CTD/JH |
| 2016 E. 19th St | 441 sf addition for a new bedroom, new bathroom and new detached 2-car garage to an existing single-family dwelling<br><br>Applicant: Miguel Munoz | Administrative Review<br><br>☐ WELO req. | ✓ | N/A | N/A | Building Permit Issued: 11/21/16 | | | 11/21/17   | | | • Building plans approved (12/16).<br>• Building permit issued 11/21/16.<br>• Foundation and framing complete (5/17).<br>• Stucco and drywall being installed (6/17).<br><br>CTD/JH |

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**Residential**

| | | | REVIEW | | | SPDR | | | CTL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | **Director approval** | **PC approval** | **CC approval** | **Expires** | **1st Ext.** | **2nd Ext.** | **Expires** | **1st Ext.** | **2nd Ext.** | **Status** |
| 3347 Brayton Ave. | Remodel of the front SFD to include a 271 sf addition and new 1-car garage on the first floor and a 731 sf second story addition<br><br>Applicant: Reginald McNulty | SPDR 15-02<br><br>☐ WELO req. | N/A | 4/14/15 | N/A | Building Permit Issued 4/15/16 | | | 5/31/17   | 6/04/17   | | • Grading and building permits issued 4/15/16.<br>• Footing inspection completed (8/16). Framing completed (9/16). Lath installed (10/16).<br>• Stucco completed, Interior work ongoing (2/17).<br>• Applicant requested and was granted a 50 day CTL extension by the Community Development Director due to rain delays (4/17).<br>• School fees paid. Work continuing (5/17).<br>• 1st CTL extension expired. Applicant has requested a 2nd extension which requires approval by the PC is scheduled for the July 2017 mtg. (7/17).<br><br>CTD/JH |

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**Residential**

| | | | REVIEW | | | SPDR | | | CTL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | **Director approval** | **PC approval** | **CC approval** | **Expires** | **1st Ext.** | **2nd Ext.** | **Expires** | **1st Ext.** | **2nd Ext.** | **Status** |
| 2085 Freeman Ave. | New two-story 4,050 sf SFD with attached 3-car garage on a vacant lot<br><br>Applicant: RPP Architects | SPDR 16-01<br><br>☒ WELO req. | N/A | Approved 1/19/16 | N/A | Building Permit Issued 9/8/16 | | | 3/2/18<br>  | | | • Grading and building permit issued on 9/8/16.<br>• Grading completed, foundation installation underway (12/16).<br>• Methane barrier is installed. Foundation poured. Framing started (3/17).<br>• Retaining walls have been completed (4/17).<br>• Framing completed (5/17).<br>• Stucco and drywall completed (7/17).<br><br>CTD/JH |
| 1900 Temple Ave. | A new two-story 3,013 sf SFD with attached 3-car garage<br><br>Applicant: Phala Chhean | SPDR 16-06<br><br>☒ WELO req. | N/A | Required | N/A | | | | | | | • Application submitted 10/7/16.<br>• A view analysis is required and story poles installed 3/2016.<br>• No view requests were received.<br>• Reviewed by PC at 5/16/17 workshop.PC direction was to add design elements to reduce the bulk and mass of the exterior walls.<br>• Staff is working with the applicant on design alternatives (7/17).<br><br>CTD |

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**Residential**

| | | | REVIEW | | | SPDR | | | CTL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | **Director approval** | **PC approval** | **CC approval** | **Expires** | **1st Ext.** | **2nd Ext.** | **Expires** | **1st Ext.** | **2nd Ext.** | **Status** |
| 1995 St. Louis Ave. | Demolish existing dwelling and garage and construct a two story 3,072 sf SFD with attached 3-car garage<br><br>Applicant: Seth Sor for Kimberly and Phat Ly | SPDR 15-04<br><br>☒ WELO req. | N/A | 8/11/15 | N/A | Demo Permit Issued 4/1/16<br><br>Grading Permit Issued 4/27/17 | | | 9/28/16 (Demo finaled)<br><br>10/19/18   | | | • Demolition permit finaled on 8/31/16.<br>• Building plans are approved. Issuance pending completing all COAs (1/16).<br>• Landscape plans are approved (3/16).<br>• Methane assessment approved, no barrier required (12/16).<br>• Grading permit issued on 4/27/17. CTL expires on 10/19/18. Notices mailed (5/17).<br>• On 5/15/17, applicant inquired about floor plan revision to relocate bedroom #3 to the second floor. Staff informed that change requires Planning Commission review.<br>• Staff has not heard further from applicant about the change (6/17).<br><br>RA |

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**Residential**

| Address | Project Description | Application | REVIEW | | | SPDR | | | CTL | | | Status |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Director approval | PC approval | CC approval | Expires | 1st Ext. | 2nd Ext. | Expires | 1st Ext. | 2nd Ext. | |
| 2260 Walnut Ave. | A proposal for a new two story 1,894 sf SFD with attached 2-car garage on a vacant lot<br><br>Applicant: Santana Investors | SPDR 16-05<br><br>☐ WELO req. | N/A | Required | N/A | | | | | | | • Leak test passed, vent cone was not installed (2/15). Well survey and access exhibit approved (9/15).<br>• Story poles were installed 1 month late and a letter extending the comment time frame was mailed.<br>• The extended comment time frame ended on 8/12/16.<br>• One request for a view analysis was made and the report has been prepared. Revisions to the design to improve views have not been submitted (4/17).<br><br>CTD |

## Large Subdivisions (5 or more lots) and Multi-family Developments

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Crescent Square<br><br>Walnut/ Crescent Heights St. | 25 three-story detached single-family dwellings at the N/E corner of Walnut and Crescent Heights Street on a 3.18-acre lot<br><br>Applicant: Far West Industries | SPDR 14-04<br>ZOA 14-03<br>VTTM 72594<br><br>☒ WELO req. | N/A | 8/12/14 | 9/2/14 | Grading Permit Issued 8/29/16 | | | 8/14/19<br>OK | | | • 2 Model home permits issued on 12/7/16.<br>• Model construction and landscaping complete.<br>• Foundations in progress for rest of homes. Revisions to the model home parking plan will be reviewed at the July PC mtg. (7/17)<br><br>CTD/JH |

# City of Signal Hill
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**Residential**

| | | | REVIEW | | | SPDR | | | CTL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | **Director approval** | **PC approval** | **CC approval** | **Expires** | **1st Ext.** | **2nd Ext.** | **Expires** | **1st Ext.** | **2nd Ext.** | **Status** |
| Zinnia (formerly Gundry Hill)<br><br>1500 E Hill St. | 72 multiple-family, affordable units, three and four stories in height and a community building, community garden, tot lot and courtyard with on-site management on a 1.61-acre lot<br><br>Applicant: Meta Housing | Administrative Review (SPDR 15-01)<br><br>☒ WELO req. | Approved 2/18/15 | N/A | N/A | Building Permit Issued 11/30/15 | | | 11/09/19<br>  | | | • Framing for all three buildings are completed, roofing started. Contractor has requested to exchange some exterior materials (1/17).<br>• Staff met with the contractor and made the determination that the new materials are comparable to the previously approved materials and approved the changes (2/17).<br>• Underground utilities installed (3/17).<br>• Exterior finishes being applied (5/17).<br>• Building one completion date is end of July (7/17).<br><br>JH/SC |

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**Residential**

| | | | REVIEW | | | SPDR | | | CTL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | **Director approval** | **PC approval** | **CC approval** | **Expires** | **1st Ext.** | **2nd Ext.** | **Expires** | **1st Ext.** | **2nd Ext.** | **Status** |
| 1939 Temple Avenue<br><br>The Courtyard | Residential development on a .6-acre lot for 10 condominium units (5 buildings with 2 attached units) two stories and three stories in height.<br><br>SP-21, Courtyard Residential Specific Plan to deviate from current RH zoning for 3-stories height and a reduced front and rear setback.<br><br>Applicant: High Rhodes Property Group | SPDR 16-02<br>TTM 74232<br>ZOA 16-03 (new Specific Plan)<br><br>☐ WELO req. | N/A | 5/17/16 | Required | | | | | | | • 2 wells discovered, leak tested and vent cones installed (8/15).<br>• View Notice mailed 10/26/15. Planning Commission (PC) workshop #1: 12/15/15.<br>• View Notice for revised plans mailed 2/17/16. PC workshop #2: 3/15/16. PC public hearing: 5/17/16.<br>• At the 6/28/16 City Council (CC) meeting, CC continued the ZOA to the 9/13/16 CC meeting.<br>• New story poles were installed (10/16). Neighborhood meeting held on 10/10/16.<br>• CC held a study session on 12/13/16 and recommended denial without prejudice of ZOA at the next CC meeting.<br>• City Council denied the project without prejudice on 1/10/17.<br>• New project can be submitted without a 1 year waiting period.<br>• As preparation for the new submittal, a neighborhood meeting was conducted to review revised plans.<br>• Following the meeting four new view analyses were requested.<br>• New plans and application were submitted on 3/16/17 and the view analysis was received 4/10/17.<br>• PC workshop was conducted |

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**Residential**

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| **Address** | **Project Description** | **Application** | Director approval | PC approval | CC approval | Expires | 1st Ext. | 2nd Ext. | Expires | 1st Ext. | 2nd Ext. | **Status** |
| 1939 Temple Avenue (cont.)<br><br>The Courtyard | Applicant: High Rhodes Property Group | | | | | | | | | | | on 5/16/17. PC directed the applicant to:<br>• Clean-up and maintain the site,<br>• Revise the story pole ribbons to match the roof pitch and<br>• Revise the view report photos to be more clear,<br>• Deliver and review the view reports with the residents,<br>• Respond to workshop questions from the public per bldg. heights; and<br>• Revise plans per staff direction (6/17).<br>• Revised plans and view reports are pending (7/17).<br><br>CTD/SC |

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**Residential**

| | | | REVIEW | | | SPDR | | | CTL | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Address** | **Project Description** | **Application** | **Director approval** | **PC approval** | **CC approval** | **Expires** | **1st Ext.** | **2nd Ext.** | **Expires** | **1st Ext.** | **2nd Ext.** | **Status** |
| 2599 Pacific Coast Highway | Residential SP-10 on a .4-acre lot<br><br>1st concept plan had 14 attached units<br><br>2nd concept plan had 12 attached units<br><br>3rd concept plan had 10 detached units<br><br>4th concept plan has 9 detached units<br><br>Applicant: Mike Afiuny | | N/A | Required | Required | | | | | | | • Staff met w/owner who reported an unsuccessful lot consolidation outreach effort (9/12).<br>• A revised design (10 units) more closely meets the intent of SP-10.<br>• Access & guest parking revised (6/14).<br>• PC requested additional design changes. Plan revised to 9 units & met most of the standards. Some buildings still exceed height limit.<br>• Condo map and story pole plan were submitted and view analysis request letter was sent 4/1/16.<br>• Due to delays of story pole installation, viewing period was extended 4/14/16. Story poles were installed and comments received. A view analysis report was prepared & reviewed with residents.<br>• Due to impacts on views, the applicant further reduced bldg. heights however, most still exceed the 30' height limit.<br>• City Engineer completed review of the on-site sewer conditions and will require repair and certification by the County for construction over |

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| | | | Director approval | PC approval | CC approval | Expires | 1st Ext. | 2nd Ext. | Expires | 1st Ext. | 2nd Ext. | |
| 2599 Pacific Coast Highway (cont) | Applicant: Mike Afiuny | | | | | | | | | | | the line.<br>• Review of the revised view report completed, story pole cert submitted.<br>• Due to a fire on-site a code enforcement case was opened to verify the bldg. is fire safe and not being occupied as a residence and site clean-up items are required. Final inspections (3/17).<br>• A neighborhood mtg. was held 2/23/17 and nearby residents and property owners noted that 6/9 of the bldgs. are over the height limit and blocking views.<br>• Concerns were voiced about traffic, the density of the project, and parking and traffic impacts on an already impacted neighborhood and alley.<br>• The applicant was instructed to meet with the neighbors and develop options to revise the project.<br>• The applicant has not revised the project and requested a meeting to discuss how to proceed.<br>• Staff prepared a detailed memo following the meeting regarding project deficiencies and past Council direction on a similar project. |

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**Residential**

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| **Address** | **Project Description** | **Application** | Director approval | PC approval | CC approval | Expires | 1st Ext. | 2nd Ext. | Expires | 1st Ext. | 2nd Ext. | **Status** |
| 2599 Pacific Coast Highway (cont) | Applicant: Mike Afiuny | | | | | | | | | | | • Applicant submitted a revised site plan with 1 less unit and reduced bldg. heights on several bldgs. However, 5/8 units still exceed max. bldg. height and may still block views.<br>• Applicant request mtg. and staff reiterated they should not expect recommendation of approval if bldg. hts. exceed regs. and block views.<br>• Applicant indicated they would revise plans.<br>• Staff noted revised plans would have to be reviewed by City Traffic Engineer to address parking and traffic impact concerns (7/17).<br><br>CTD |

July

**8d.**

# CITY OF SIGNAL HILL

2175 Cherry Avenue ◆ Signal Hill, CA 90755-3799

July 18, 2017

**AGENDA ITEM**

**TO:** **HONORABLE CHAIR**
**AND MEMBERS OF THE PLANNING COMMISSION**

**FROM:** **SCOTT CHARNEY**
**COMMUNITY DEVELOPMENT DIRECTOR**

**SUBJECT:** **IN THE NEWS**

## Summary:

Articles compiled by Staff that may be of interest to the Commission include:

- Affordable Housing Market Hurt By Tax Overhaul Uncertainty _ NPR
- Federal Tax Credit Uncertainty Puts Affordable Housing at Risk
- Here Comes the Sun
- Remaking Vacant Lots to Cut Crime
- The Autonomobile and the City
- Transit Accessability Data
- Uber Delivers Planning Data

## Recommendation:

Receive and file.

AROUND THE NATION

# < Affordable Housing Market Hurt By Tax Overhaul Uncertainty

July 5, 2017 · 5:05 AM ET



MARY LOUISE KELLY, HOST:

Uncertainty over tax reform has already hurt the affordable housing market. Here's why. A tax credit used for building affordable housing lost a chunk of its value with the November elections. From member station WBUR in Boston, Simon Rios reports.

SIMON RIOS, BYLINE: Bart Mitchell looks over a field along the train tracks in Boston's Jamaica Plain neighborhood. The site was supposed to be full of workers and heavy equipment right now for 78 affordable apartments. But then the elections happened.

BART MITCHELL: We hoped to be in construction of some beautiful, new, mixed-income housing, but we aren't starting construction because of what's changed to the low-income housing tax credit marketplace.

RIOS: That $8 billion federal tax credit, known as LIHTC, is used to finance 9 out of 10 affordable units built in the United States. Here's how it used to work. A developer, like Bart Mitchell, would be awarded a million dollars in tax credits. He'd sell them to a bank for roughly a million dollars in financing. And the bank would use the credits to save money on Tax Day. But when President Trump was elected, everything changed.

MITCHELL: On November 9, there were investors saying, we may not want to proceed with tax credit investments for the next many months. We may pull out projects that you thought we were committed to.

RIOS: Suddenly, millions - even hundreds of millions of dollars - evaporated for affordable housing. That's because if the tax rate goes down, so does the price of the tax credits. Banks are now pricing them at 10 or 15 cents less on the dollar. That's if they're willing to buy them at all.

ESTHER SCHLORHOLTZ: Until there's more certainty about that, it makes it very hard for us to make investment decisions.

RIOS: Esther Schlorholtz heads community investments at Boston Private bank. The bank is heavily invested in affordable housing tax credits, but it's not buying any right now.

SCHLORHOLTZ: Our analysis is that we will need to wait to make a more prudent decision on our equity investments.

RIOS: LIHTC now supports the building of about 100,000 affordable units a year. Michael Novogradac sits on the board of directors of the affordable housing tax-credit coalition.

MICHAEL NOVOGRADAC: And if the value of the tax credit were to decline the 10 to 15 percent range, then you would end up losing 10,000 to 15,000 affordable rental housing units a year.

RIOS: And that's already happening. But Novogradac says it could be even worse, depending on whether the corporate tax rate is cut more than investors are expecting. In the case of Bart Mitchell's development in Boston, he was able to patch the money together to fill the financing gaps for his project to go forward, albeit a half a year behind schedule. But it's sort of like robbing Peter to pay Paul.

MITCHELL: There will be less affordable housing built because the existing resources will have to fill gaps on existing projects, rather than be saved for funding the next projects.

RIOS: The price of low-income housing tax credits isn't the only problem builders are facing. President Trump wants to cut funding to the Department of Housing and Urban Development by 13 percent. Those cuts could threaten programs that provide gap funding to affordable housing developments. But many in the industry are optimistic about the future of low-income housing tax credits. A bipartisan bill in the Senate would expand the tax credit program by 50 percent. Supporters say that expansion would lead to 400,000 new homes over a decade. It may sound like a lot, but there's over 4 million Americans who now qualify for low-income housing and don't get it. For NPR News, I'm Simon Rios in Boston.

(SOUNDBITE OF EXPLOSIONS IN THE SKY'S "CATASTROPHE AND THE CURE")

# Federal Tax Credit Uncertainty Puts Affordable Housing at Risk

FOR 30 YEARS, federal affordable housing tax credits have been the nation's most potent tool to create housing for the homeless and low-income households. But the possibility of major corporate tax cuts in the Trump administration is causing uncertainty in tax credits markets, affecting affordable housing projects across the country.

The Low Income Housing Tax Credit program, created during the Reagan administration in 1986, allots a finite amount of tax credits to state housing authorities using a population-based formula. States then use competitive processes to distribute credits to developers. Developers who sell them to investors, like big banks, use the proceeds to cover typically 50 to 70 percent of the cost of low-income housing projects that otherwise don't generate enough rental income to be viable. Investors then use the credits to offset federal income tax liabilities. The credits, however, become less valuable if the corporate tax rate drops.

Just the prospect of a drop from the current 35 percent corporate tax rate has already jarred tax credit markets, dropping tax credit prices seven to 15 percent depending on location and type of development, and creating financing gaps of hundreds of thousands of dollars or more for projects that received credit allocations in the 2016 funding cycle, experts and government officials say. As a result, some of those projects could be delayed or even halted.

"There is concern," says Larry Jones, assistant executive director of the U.S. Conference of Mayors. "People are pulling back . . . because they don't know what is going to happen."

### Ripple effect

Since its inception, the tax credit program has had a major impact on the nation's housing stock, helping create 2.8 million affordable units nationwide between 1987 and 2014, according to a federal Department of Housing and Urban Development database. A 10 percent drop in tax credit price can cause a "very significant" problem for projects that often have tight financing packages, says Michael Novogradac, managing partner at Novogradac and Company and a board member of the Affordable Housing Tax Credit Coalition. Under that scenario, a $10 million project relying on $7 million in tax credits would have to reconcile a $700,000 funding gap, Novogradac says.

Low-income housing tax credits funded about 63 percent of Rethke Terrace, a $8.9 million, 60-unit building developed by Chicago-based Heartland Housing to provide permanent housing to the homeless in Madison, Wisconsin.

PHOTO BY ROMULOS MORISHITA, UEDA PHOTOGRAPHY

Uncertainty is also flowing into the 2017 funding cycle. Developers are recalculating how projects can get financed, Novogradac says. Some states, including Illinois, Minnesota, and Wisconsin, have already adjusted application deadlines to allow time for more clarity on tax reform. Cities are closely watching and anticipating impacts.

Potentially, "the national impact is devastating," says Paul Soglin, mayor of Madison, Wisconsin. The city's Affordable Housing Initiative, begun in 2015, relies heavily on city and county investments to leverage tax credits distributed through the Wisconsin Housing and Economic Development Authority.

One developer, Chicago-based Heartland Housing, a nonprofit that has done 19 projects in Illinois and Wisconsin since 1988, used $5.5 million in tax credits from 2015 to build an $8.9 million, 60-unit housing project for the homeless in Madison in 2016. It secured $7 million in credits in 2016 to build 45 more units in an $11 million project there this year, and is preparing to seek credits in coming months to finance additional housing in 2018.

Heartland had a letter of intent from an investor but still saw a modest tax credit price reduction on the project it intends to build in Madison this year, says Nadia Underhill, the nonprofit's director of real estate development. But Heartland hadn't secured similar commitments from other investors and saw

steeper price reductions for developments slated for Chicago and Milwaukee this year. The coming application cycle looks even more daunting, she says.

The uncertainly is being felt in other cities too. In late 2016, Dallas got applications from eight developers seeking $7.6 million in city financial support—more than the city has to give—to help leverage $96.7 million in state tax credits this year, says Bernadette Mitchell, director of Dallas's Housing and Community Services. Developers need more city support to close financing gaps caused by a drop in tax credit prices and rising construction costs, she adds.

The future of the tax credit program depends on many factors, including whether the credit itself survives tax reform, how much the corporate tax rate drops, and what the rest of any tax reform initiative looks like, experts say.

According to Novogradac, the federal affordable housing tax credit has enjoyed strong bipartisan support and is likely to survive. He notes that senators Maria Cantwell (D-Wash.) and Orrin Hatch (R-Utah) last year introduced legislation to expand the credit 50 percent over five years. However, there is uncertainty about tax-exempt bonds for housing, which are related to the tax credit program, he says, adding that it's going to take some time for clarity on the country's tax structure. ■

—Dean Mosiman

Mosiman is the Madison city government reporter for the *Wisconsin State Journal*.

# Miami Street Experiment Prioritizes People

FOR MANY YEARS, U.S. 1, a broad and busy boulevard, coursed through the heart of downtown Miami, separating the residential and business district from the city's expansive waterfront park, Bayfront Park. Crossing the eight lanes of Biscayne Boulevard, as it is locally known, was not for the faint of heart.

In January, in an effort to show Miamians what it would be like if the boulevard wasn't a barrier but instead a walkable public space, the Miami Downtown Development Authority conducted an experiment in urban design.

For three weeks, one lane of the boulevard was converted to on-street parking, while another lane was restricted to public transit and bikes. Meanwhile, the 101 existing parking spaces in the median were converted into 75,000 square feet of public green space. In addition to providing areas for residents and visitors to gather, the MDDA hosted movies al fresco, tango and yoga classes, concerts, and other events. A dog park and a playground were installed. Nontraditional crosswalks were painted to

PHOTO COURTESY MIAMI DOWNTOWN DEVELOPMENT AUTHORITY

Designed as a one-month "urban experiment," the Biscayne Green demonstration project in downtown Miami temporarily repurposed a segment of a major eight-lane boulevard as public space that included a dog park, playground, and interactive elements for both residents and visitors alike to enjoy.

**OIL PIPELINES** were a major focus of President Donald Trump's first week in office, when he ordered expedited review and approval of the controversial Keystone XL and Dakota Access pipelines. Former President Barack Obama rejected Keystone XL, Transcanada's proposed Alberta-to-Texas pipeline, in 2015 because of environmental concerns. Completion of the Dakota Access Pipeline was delayed last year pending a federal impact review; following Trump's order, the U.S. Army Corps of Engineers announced in February that it would grant approval of the necessary permit.

**CALIFORNIA'S DROUGHT** is over for 42 percent of the state, says a U.S. Drought Monitor study. Heavy precipitation in Northern California this winter led to flooding, full reservoirs, and an above-average Sierra snowpack (which provides one-third of the state's water supply). Twenty-four percent of the state, mainly in Southern California, remains in severe drought, but those numbers are nearly three times better than last year.

**CHICAGO'S U.S. STEEL** plant, vacant since 1992 despite previous redevelopment efforts, has found a buyer. With their Chicago 8080 Lakeshore Masterplan, Barcelona Housing Systems and WELink aim to transform the 430-acre South Works site into 30 blocks of up to 12,000 homes. The design takes inspiration from Barcelona, Spain's pedestrian-friendly superblocks. Build-out will likely take decades.

**BANNING TRAFFIC** from Public Square may cost Cleveland $12 million in federal funding. The city made the decision in November, citing safety concerns, following a $50 million renovation. The Federal Transit Administration says the ban violates a 2004 federal grant agreement that required buses to run through the square as part of a proposed downtown transit zone. At press time, the FTA had given the Greater Cleveland Transit Authority until February 21 to repay the funds.

# Here comes the Sun

PHOTO BY MARVIN P. TOUSSAINT, SOCIAL MEDIA MANAGER, NYSERD

**COMMUNITY SOLAR, OR SHARED SOLAR, IS GROWING NATIONWIDE AS A MEANS OF GIVING PEOPLE A LOCAL SOURCE OF SOLAR ENERGY, EVEN IF THEY DON'T OWN A HOME.**

**BY CHARLES W. THURSTON**

THE SOLAR ENERGY INDUSTRIES ASSOCIATION, based in Washington, D.C., notes that the U.S. generated over 300 megawatts of community solar power in 2016, following an initial boom in 2010. By 2020, that figure could shoot up to 1.8 gigawatts, six times the current generation capacity. One firm, GTM Research, reckons that New York State alone has a 1.8 GW community solar pipeline. Such growth could shift community solar's share of cumulative U.S. solar installations from less than one percent today to nearly five percent in just three years. ¶If that growth occurs, community solar could catch up to the installation rates of residential rooftop solar. The National Renewable Energy Laboratory estimates community solar could make up half of the distributed (locally consumed) solar market in 2020. NREL research also shows that about three-quarters of U.S. states can adopt community solar with favorable economics.

**PROJECT**
Renovus Community Solar, Trumansburg, New York

**HOW IT WORKS**
Residents buy solar panels in an off-site solar array and receive credits on their electric bills for power produced.

**FUNDING**
NY-Sun, a community solar initiative of the New York State Energy Research and Development Corporation.

### A new dawn in government support

The federal government is responding to the research. In November 2015, former President Obama held a community solar summit at the White House, setting a goal of fostering 1 GW of solar in low- and moderate-income communities by 2020—a bump up from the 100-MW goal in Obama's 2013 Climate Action Plan. That meeting spurred the formation of the National Community Solar Partnership, with participation from a variety of federal, state, and private agencies. The group is also tapping philanthropic donors to fund pilot community solar programs in low-income communities.

At the state level, progress is also being made. So far, five states—California, Colorado, Massachusetts, Minnesota, and New York—lead the way in enacting legislation that encourages local community solar projects, while nearly two dozen states have enabling legislation in place or in process.

But state support for community solar goes beyond merely enabling legislation. In California, the Public Utilities Commission recently approved a plan for utility companies PG&E, San Diego Gas & Electric, and Southern California Edison to add 600 megawatts of community solar farms. California is one of 29 U.S. states to have adopted renewable portfolio standards, mandating that utilities sell a certain amount of renewable electricity.

Still, in some places, communities are ahead of government efforts. "We have no direct legislative mandate to us for community solar," says Tim Dempsey, director of planning in East Lansing, Michigan. "As a university community, however, we have a large interest in and a high priority for renewables and green infrastructure, and community solar is a good fit."

### Local siting quandaries

Planners like Dempsey are helping foster community solar at all levels of government and through a variety of measures that dovetail with broader mandates and philosophies, including renewable energy plans and incentives, low-income housing goals, special zoning considerations, and tax incentives. Where they typically and specifically come into play is, of course, siting community solar projects.

"Solar gardens are the next generation solution for renewables development, but it gets tricky talking about land use," says Susie Strife, the Boulder County, Colorado, sustainability coordinator. "You are looking for areas not zoned for open space, outside flood plains, avoiding sensitive agriculture, and not otherwise used—if not blighted," she says. "You also have to consider grid interconnections and proximity to distribution lines, so there are a lot of things to consider."

In Fort Collins, Colorado, Grid Alternatives, a community solar developer, was going to site a project as a ground-mount structure (as opposed to one on the roof) next to the city's water treatment facility. "But there were barriers with the planning processes that made the project cost-prohibitive," says Tom Figel, the policy and regulatory manager for the Oakland-based group. "We ultimately sited the project on a warehouse rooftop that belonged to the local utility, which allowed us to move forward more

PHOTO COURTESY NRG COMMUNITY SOLAR

quickly but reduced the project's size and increased costs," he says.

Boulder County is an active participant in finding the right spot for community solar projects, offering up potential sites that the developers then vet by performing feasibility and utility interconnection studies. "It's a complicated dance, since we might provide 10 sites, but only develop one," says Strife. "However, we have exciting partnerships now in the initial stages with solar garden developers, schools, universities, and municipalities, to do community solar." Already there are well over 100 community solar installations in the county.

### Affordable energy for affordable housing

A big reason jurisdictions are pursuing these community solar projects is to improve access for low-income housing constituents. Their motivation is to reduce infrastructure costs, including customers' electricity costs, which are frequently subsidized.

"More and more community solar developers are going into planning offices offering to include low-income access, in order to make the project as beneficial to as many elements of the community as possible," says Tim Braun, director of public affairs for the Clean Energy Collective, a Louisville, Colorado-based community solar developer with more than 100 projects in a dozen states.

"Some regulatory bodies are addressing this [issue] with code: Colorado has a five percent carveout for low-income households in its Black Hills program, for example," says Jonathan Fitzpatrick, director of land management for CEC.

It was certainly important to local leaders in Spencer, Massachusetts. "Offering solar to renters is one of the goals of [our project]," says Drew Warshaw, the vice president of community solar at NRG, an energy company based in New York. In fact, NRG has "contracts with several public housing authorities in and around Spencer. It's a great opportunity for [the other cities] to take advantage of the project without having the land themselves; that's part of the magic of community solar."

At the time of the inauguration of the Spencer project, located on 200 acres of St. Joseph's Abbey, John Stevens, the chairman of the Spencer Board of Selectmen, said, "Generating electricity from renewable energy offers significant public benefits, energy price stability, and health dividends."

### Going (and earning) green

The Spencer project was lauded by Massachusetts state planners for its environmental contributions. "The Commonwealth is a national leader in solar energy, harnessing the full potential of clean energy innovations to reduce costs and carbon emissions," said Matthew Beaton, the state energy and environmental affairs secretary, at the commissioning of the project. "The Baker-Polito administration is committed to working with our municipal partners across Massachusetts to expand community solar projects, saving ratepayers and taxpayers thousands of dollars annually that can be reinvested into the community."

Municipalities often lead states in setting ambitious environmental goals to which community

**PROJECT**
The Spencer Community Farm at St. Joseph's Abbey, Spencer, Massachusetts

**HOW IT WORKS**
Subscribers entered into a 20-year agreement with NRG Community Solar. In return for a fixed monthly payment, they earn credits toward their electric bill based on their allocation of renewable energy net metering credits generated by the project.

**FUNDING**
Subscribers

solar can contribute. "Boulder has a goal of being 100 percent renewable by 2030, but we are limited in terms of available land, so customers can buy into community solar if the project is in the same county, or neighboring counties," says Matt Lehrman, Boulder's energy strategy coordinator.

Better use of blighted or idle land often is another contribution of community solar projects. East Lansing, Michigan, planners chose to site one community solar project at the Burcham Park landfill and another at the BWL Wise Road Water Treatment Plant. The locations were previously maintenance cost centers but now produce revenue for the community.

Similarly, the landmark 1922 Fort Madison Middle School in the Iowa city of the same name was nearly lost to the bulldozer, but thanks to developer Todd Schneider and state-administered funding from a federal Community Development Block Grant, the building was converted into new housing and is now a showcase of renewable energy.

"Designing green definitely helped finance [the Ford Madison] project, because the CDBG is a competitive loan that is scored on a point system, so more points for our green design, including renewable energy, pushed us to the top of the pile," says Schneider, who notes that project got $3 million of the $12 million in funds available statewide as part of a disaster relief grant. "We discount [residents'] utility bills by 20 percent," he notes.

Some municipalities or counties may choose to entice solar developers to site in their communities through substantial tax breaks, but others see solar as a fiscal necessity. "Our community solar project represents a revenue stream for the city, and it gen-

## Putting the 'Community' in Community Solar BY TORY HANNA, AICP

COMMUNITY SOLAR isn't always an easy sell, but there are some things planners can do to bring community members along—and even get them excited.

The biggest hurdle to adopting such projects continues to be their visual impacts. Large-scale, ground-mounted arrays can cover from five to 50 acres. Some have referred to their sometimes haphazard siting as "pastoral eminent domain," where a sea of ugly blue solar panels screwed into metal posts supplants a once-lovely rural or agrarian scene.

Planners can help by preselecting land and zones that are not located along scenic byways or near historic districts. Successful projects are typically sited on back wooded lots or underproductive farm fields far from high-traffic roads.

In several rural states, community solar is an exceptional accessory use, and provides ancillary income for farmers. That cash flow from leasing land to solar developers often allows multigenerational farmers to keep family-owned farms.

Cities can make room for them, too. Both Massachusetts and New Jersey have been successful in driving community solar to brownfields and capped landfills in urban contexts.

### Starting points

Model bylaws can help local planners determine how and where to regulate community solar. Massachusetts (tinyurl.com/hvhu8lr) and New York (tinyurl.com/jckstoj) do a particularly good job with this.

Butte County, California, (power.buttecounty.net/SolarZone.aspx) and Gila Bend, Arizona, (tinyurl.com/jl45ck6f) use solar overlay districts, which have proven to be successful from the community's perspective, but are also good for the solar industry.

For solar developers, both standalone ordinances and overlay districts offer a tremendous benefit. The existence of regulations illustrate not only that a community supports large-scale solar adoption, but that it has spent time planning for it.

The challenges for developers and investors are real. Solar projects need to jump through the many hoops of land-use approvals and environmental and natural heritage permitting, while also winning the community's support. And financing frequently involves a complex mix of bank lending, tax equity deals, and long-term solar power purchase agreements.

Like any large infrastructure project, financing can make or break it, so the more facilitative communities can be toward permits and approvals, the more likely the project's success will be.

So work with your planning board or redevelopment authority to prepare an RFP for soliciting solar proposals. Contemplate devising a solar overlay district to call out as-of-right zones and parcels where community solar projects can be clustered (and stay largely out of sight).

Most of all, engage the private sector to devise your regulations. To attract investment and projects, the rules must be created in partnership with the solar industry, so we all can benefit from the sun.

Tory Hanna is a planner and currently the director of business development, marketing, and permitting lead for Origin Solar Energy. He can be reached at tory.hanna@originsolarenergy.com.

erates a considerable amount of tax—we call it our hidden industrial park," says Jack Healy, the administrator for the town of Freetown, Massachusetts. "The Massachusetts Municipal Association also is working hard to make sure the state legislature doesn't cave in to giving the solar developers tax breaks they don't need," he says.

NRG's Warshaw says, "There is a tax revenue component in most community solar projects. Municipalities gain revenue but without the huge demand on them for services, as with most other types of development. The panels are passive, not sucking up limited municipal resources."

### Making the money work

Participants can directly fund a community solar project in a variety of ways, including purchase of solar panels, panel leases, and power purchase agreement—or, via a combination of all three, crowdfunding.

In the San Juan Islands of Washington State, "people in the local community bought shares through microloans to the local conservation district, which raised $200,000 from individuals and organizations," says Jay Kimball, who advised local cooperative utility Opalco on its project. The loans included an $11,000 loan from the nonprofit Odd Fellows Lodge, under a zero-interest, 10-year payback arrangement, says Kimball, the principal at 80/20 Vision, a local consultancy.

State funding is also vital. Opalco recently won a grant of $1 million from the Washington Clean Energy Fund to add a 2 MW/hour commercial battery to their community solar project as a grid stabilization measure.

Other projects tap federal funding. In July 2016, the U.S. Department of Energy announced plans to finance $287 million worth of solar projects in low- and moderate-income communities, and Housing and Urban Development's CDBG program may be the largest source of federal aid for community solar.

"We created a low-interest renewable energy loan program through a local credit union that was backed by a DOE loan loss reserve," says Strife of Boulder County. "And we just passed a sustainability tax for the county."

Another way to finance such projects is through nonprofits. PACE, short for property assessed clean energy, is a way for cities or counties to lend home owners and building owners the funds for a system, with repayment stretched out over 20 or 30 years. Some pioneering counties, like Sonoma County in California, started out with a loan for their PACE program from the general county fund and repaid it from loan revenue. Their PACE program is now self-financing.

Commercial businesses can also be targeted. NRG does that in many of its developments, which can solidify the bankability of a project quickly.

In Minnesota, NRG has already signed up Ecolab, Land O'Lakes, Macy's, and U.S. Bank as customers. However, no single customer can own more than 40 percent of any site's total solar production.

One commercial participant in a CEC community solar project, Alpine Bank, not only meets its own internal environmental goals, but might also count the investment under its requirement to meet Community Reinvestment Act requirements as mandated by the U.S. Department of Treasury's Office of Comptroller of the Currency.

In short, a plethora of financing mechanisms and providers can be tapped for a community solar project, and now that the market segment is better known, perceived risk is diminishing and more participants are coming on board.

Investors are building plants to gain federal tax credits, utilities are welcoming community solar as a boost to grid reliability, cities are siting it to improve land use and gain lease or tax revenues, and all layers of government are using it to further their alternative energy and other green goals—and that's just the beginning.

Based on these first efforts, the future of community solar is looking bright. ■

Charles W. Thurston is a freelance writer based in Cotati, California.

#### RESOURCES

**FROM APA**

SunShot Solar Outreach Partnership: planning.org/research/solar.

*Planning for Solar Energy* (PAS report 575): planning.org/publications/report/9117592.

**ONLINE**

National Community Solar Partnership: tinyurl.com/h2zdkuj.

12 Best Practices: A Roadmap to a Solar Friendly Community (Colorado Solar Energy Industries Association): solarcommunities.org/12-best-practices.

Solar Energy Industries Association: seia.org.

The National Renewable Energy Laboratory: nrel.gov.

HUD's Renewable Energy Toolkit: tinyurl.com/zocq3t7.

complement the overall design.

"The message was: This is what happens when we prioritize people over cars and getting cars in and out as fast as possible," says Fabian De La Espriella, AICP, a planner at the MDDA. "The response from the community was great. People asked us, 'why does this have to be removed?'"

Around 20,000 people visited the area for the events, or just to use the free wifi or enjoy a coffee in the shade, he says. The project was funded in part by a $145,000 grant from the Knight Foundation Cities Challenge program.

The experiment yielded other results too: For instance, the Development Authority found that the new lane configurations succeeded in slowing traffic, "but there was no big gridlock," De La Espriella said. "[The flow of traffic] didn't seem all that different from any other day," he said.

### Inspiring permanent change

The experiment is now over and the boulevard is back to normal. While the fancy crosswalks are still in place, as are the markings designating one lane for bicycles and buses, drivers seem to be ignoring them. De La Espriella doesn't expect many bikers to use the boulevard now that traffic has resumed its normal speed. But the impact of the event, and the knowledge of what the boulevard could be for Miamians, lingers.

The MDDA is now working to get the Florida Department of Transportation, which controls the boulevard, to permanently eliminate one lane of traffic, while also studying ways to permanently convert the median parking lots into public space. Eventually, they'd like to eliminate two lanes total, just like in the experiment.

If all goes as planned, De La Espriella expects it to take five years to fully reconstruct the thoroughfare, although some pieces of the overall plan—like conversion of one of the median parking lots to a dog park and playground—could be completed and opened to the community sooner. ■

—Susannah Nesmith

Nesmith is a freelance writer based in Miami.

Philadelphia's LandCare program installs split rail fences, rather than chain-link, around cleared vacant lots to provide neighborhood residents with usable green space.

PHOTO COURTESY THE PENNSYLVANIA HORTICULTURAL SOCIETY

# Remaking Vacant Lots to Cut Crime

MANY CITIES ARE FINDING that something as simple as installing a split rail fence around a cleared and mowed vacant lot not only fights urban blight, it can help fight crime.

Inspired by a program in Philadelphia, cities such as Cincinnati, Houston, and New Orleans are using heavy equipment to clear, grade, and seed thousands of vacant lots, believing that empty properties with head-high weeds, scrubby trees, trash, and debris are excellent hiding places for guns, drugs, and criminal activity.

Installing a fence around a vacant lot can make a huge difference by signaling that although a lot is vacant, it isn't abandoned. The theory, akin to the "broken windows" philosophy of policing, is that minor crimes, such as littering and vandalism, are signs of social disorder that often invite more serious crime.

The cleanup effort has been spurred by an explosion of vacant property, especially in Rust Belt cities like Youngstown, Baltimore, Chicago, Cleveland, and Detroit, where populations have declined or the 2008 foreclosure crisis swelled the number of vacancies.

A 2016 study by the University of Pennsylvania's Urban Health Lab showed that fixing up vacant lots reduced nearby gun violence by five percent. The study also found that every dollar Philadelphia spends on fixing up vacant lots saves taxpayers $26 in reduced costs from gun violence.

Philadelphia's LandCare program is considered a model. The city runs the $2.9 million program through the Pennsylvania Horticultural Society, which in turn hires contractors or neighborhood groups to maintain the lots.

Houston modeled its vacant lot maintenance program on Philadelphia's. Mow Down began as a pilot program in 2013 and now covers 261 lots with the goal of doubling that number annually, says Reggie Harris, deputy assistant director of Houston's Department of Neighborhoods.

Harris says he already sees the difference on streets where gangs used to congregate on untended property. "They're not there anymore, because there's a clear path to see them," he says. "They don't sit at the end of that street like they used to. Somebody can see them a whole block away." ■

—Martha T. Moore

Moore is a contributor for *Stateline*, an initiative of The Pew Charitable Trusts. The story was reprinted with permission from *Stateline* (pewtrusts.org/en/research-and-analysis/blogs/stateline).

*News and Legal Lessons are edited by Mary Hammon. Please send information to Mary Hammon, Planning's associate editor, at mhammon@planning.org.*

# The Autonomobile and the City

## Urban mobility in the future can liberate the street and transform it into a truly shared public place.

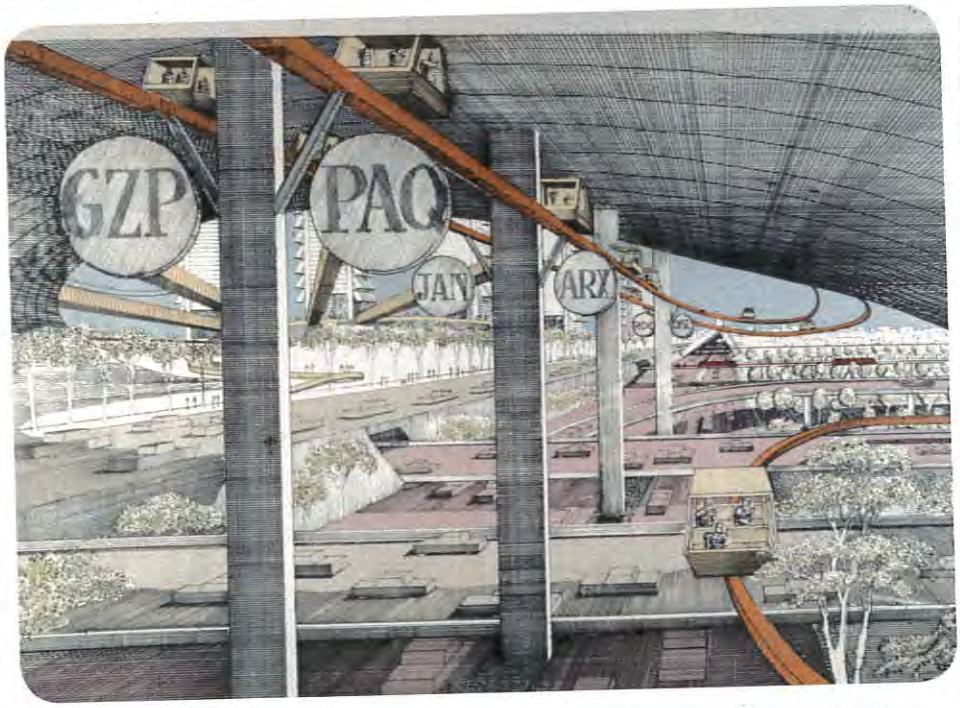
BY MICHAEL SORKIN

**LIKE MANY** New Yorkers, I often use Via, a ride-sharing app which—for five bucks—will transport you between any two points in Manhattan below 125th Street. They've got their algorithms in a row and, in general, the system works very smoothly. But it's clear, when the car pulls up, that something's slightly off. The trip is almost completely automated, and computers organize the pickup, drop-off, journey, and payment: the anomaly is the driver. Watching the route unfold—following the instructions of that anodyne, robotic, female voice from the GPS—I catch the sad whiff of impending obsolescence. The self-driving car is about to arrive.

The implications are profound, and not just for the employment prospects of the immigrants and "shared economy" operatives who drive the vehicles. Something radical looms, both for the fundamental nature of our mobility and for the form of the cities in which we circulate. Just as earlier technological innovations, like streetcar lines, railways, and horseless carriages, had transformative effects on urban morphology and life (exponential growth, suburbanization, corridorization, and other dramatic physical and social changes), so the advent of the autonomous vehicle—*autonomobiles*—will transform our cities decisively.

In the U.S., we've long relied on the radical inefficiency of private cars or on rail and bus trunk lines that are only economical in conditions of high density, and which often produce the classic "last mile" conundrum. Public transport is not one of America's glories: despite many decades of argument for transit-oriented development and other densification policies, close to 90 percent of daily trips are by car, and our sprawling cities are its natural habitat and spawn.

As the modal mix rapidly transformed in the early 20th century, much creativity—and loopiness—was devoted to imagining cities reshaped by this technological maelstrom of planes, trains, and automobiles. These visions ranged from the extreme lamination of the vertical metropolis with its multiple modes stacked in space: subways, cars, el trains, pedestrians, auto-gyros, and airplanes shish-kebobbed together by elevators; the fantasy of the linear city—an endless band of settlement along a rail line; the "people mover"—a desperately constrained system that attempted to hybridize the car and the railway but which could never rise above the tyranny of its fixed routes or crude technology; the car-enabled edge city that has so complicated the historically centrifugal relations between urban centers and peripheries. What all have in common is the idea of modal separation, systems of isolation in which the least powerful yields to the most: pedestrians give way to bikes, bikes to cars, cars to trolleys, trolleys to trains, etc.




Paul Rudolph's 1967 proposal for the Lower Manhattan Expressway showed layers of highways and "people movers" woven through stretches of buildings.

*Autonomobiles* could present a truly new model of on-demand, point-to-point mobility. Indeed, new shared, responsive systems have already had major impacts on urban patterns and habits. I've been working on planning projects for the South Side of Chicago for decades, and the transformations brought about by the arrival of Uber and Lyft in many of its relatively low-density, transit-poor neighborhoods is startling: sparsity becomes practical. My survey is not scientific, but I'm impressed, when using ride-share services there, by how many fellow passengers are on simple errands of moderate distance, otherwise impossible without a personal vehicle. This surely suggests capacious possibilities for urban transformation—new mixes of use, local centers, flexible access to available housing, and networks of sociability that are otherwise thwarted by distance, danger, and inclemency.

Autonomobility will have perhaps its greatest formal impact in altering the most critical matrix of public urbanity: the street. In New York, our streets are both troubled and changing. The widespread growth of cycling, an increase in tree cover, and various managerial efforts to ease traffic via modal mixing have resulted in an even more horizontally laminated streetscape that retains and reinforces modal isolation (sidewalk, bike lane, parking lane, bus lane, traffic lane, median, repeat . . .). We haven't had the courage of more radical mixing tactics like the *woonerf*, or shared street, in which all modes coexist in one minimally regulated space. And we haven't even begun to look at what the recapture of the street might look like if it were considered from scratch, with a radically reformed mix in mind—one in which individually owned cars headed for urban extinction.

One immediate effect could be the liberation of well over a third of street area from use as vehicular storage space. If small-scale, mobile passenger and logistics "particles" were deployed around the clock and on demand, a radical reduction of the number of actual vehicles in service would occur (an MIT

study of Singapore suggests the reduction could be at least two-thirds) and with it the liberation—and lubrication—of an enormous portion of urban streets. A variety of robotic and sensor technologies would also allow the efficient utilization of curb space for the transfer of both goods and people from the street to buildings or sidewalks. Indeed, the defeat of the hydra of storage parking and delivery double-parking would have a cascade of beneficial impacts, from eased mobility to reduced pollution and accident reduction to the most important prospect of all: the capture of this public space for more authentically public uses.

In New York City, the street could become a true public service conduit. Traffic would move at a rational pace and bikes could safely join the mix. Sidewalks would be augmented with new uses, including plantings and bioswales, recreational areas, small facilities, and—most crucially and transformatively in New York and other cities that don't have service alleys—could become the site of operations for managing our solid waste. Replacing our Alpine heaps of plastic sacks of rubbish, a fascinating new architecture of collection, recycling, redistribution, and remediation might arise, anticipating the day when the very idea of waste is relegated to history's own dustbin. Ultimately, this freeing and reappropriation of the street can be part of a truly localist metabolics in which our air, water, climate, energy, mobility, education, sociability, and nutrition become the central focus of the space we most urgently share.

The horizontal re-lamination of city streets is likely to be accompanied before long by a vertical one as well. Given the imminence of ubiquitous drone movements—as well as the soon-to-appear flying Ubers (the company has already branded its vertical-lift ride-sharing operation "Uber Elevate")—the space above the city is also sure to be reconfigured. Although the physics (and acoustics) of flying cars will seriously limit their point-to-point capacity at first, NASA and others are already deep into the study of the laminar systems and "rules of the road" to allow large numbers of unmanned aircraft systems (UAS) to operate above and in cities, bringing consumption's necessities from Amazon and GrubHub. A variety of concepts—including sky-lanes, sky-corridors, and sky-tubes—renew that early fantasy of the laminar city that includes flying vehicles, although most seem to be based on the conventional geometry and parameters of deference that rule roads.

Such revolutionary technology can have fundamental impacts on the form of both current and coming cities. To keep it friendly, however, will demand fighting the growing dominance of the "smart city" mind-set and its uncritical accumulations of "big data" to improve efficiency and control, without much deep thinking about noncorporate forms of desire. This must include the defense of many of our traditional gathering places—our squares, plazas, parks, and sidewalks. The reasons for mobility are not merely logistical. We move to live, to experience the other, to engage the pleasures of place, to collaborate, to enjoy happy accidents of encounter, and to enlarge the space of the political, which demands the verifying integrity of the face-to-face. New mobility systems, however, risk undermining urbanity in favor of a distributive entropy that arrives under the false flag of convenience. Mobility may become more flexible, but it might also become far less accessible (Uber Elevate won't be cheap), a privilege rather than a right.

This surge of technology could simply yield three-dimensional traffic jams, and it's urgent that the transition to these new means be finessed with art and determination. Simply adding a new class of vehicles will have the same effect as adding more miles of highway: more traffic. For an autonomobile system to truly fulfill its promise demands radical subtraction. Fewer vehicles and less pavement will mark the truly sustainable cities we might have if we're authentically dedicated to sharing them equitably and efficiently. ■

“Transit accessability data.” *Planning.* March 2017: Page 43.

**Transit accessability data**

Last March, the Obama administration granted open access to federal and local information on housing, transportation, jobs, and other neighborhood amenities through The Opportunity Project. It was a call to action to promote community engagement via digital, easy-to-use tools with digestible data.

This February, Trulia, the online residential real estate company, continues to answer the call by updating their Rent Near Transit feature to include seven more cities, for a grand total of 13.

To get a greater sense of context in neighborhoods where they'd potentially like to live, Trulia's house hunters no longer need to reference a separate maps platform. Now, with Rent Near Transit, users can filter their searches by commute time and proximity to transit stations, as well as compare median prices of listings near stations across their targeted city.

With February's update, Rent Near Transit now supports Atlanta, Boston, Chicago, Dallas, Los Angeles, Miami, Minneapolis, New York, Portland, Philadelphia, San Diego, San Francisco, and Washington, D.C.

Residents can calculate the commute from neighborhoods where they want (and can afford) to live here: trulia.com/rent-near-chicago-l. Users can select from a drop-down menu of available cities.

“Uber delivers planning data.” *Planning.* March 2017: Page 42.

MEDIA

**Uber delivers planning data**

For the first time ever, Uber is sharing its data with the public. In January, the ride-share company launched Movement (movement.uber.com/cities), an online tool specifically created to help planners improve infrastructure.

The tool allows users to map travel times and variables that affect them, including events, closures, traffic congestion, and transit emergencies, like the March 2016 subway fire in Washington, D.C. (movement.uber.com/use-case/dc). During each ride, Uber conducts multiple GPS check-ins, tracking how long it takes to get from pickup to drop-off, and every block in between. Considering Uber completed its billionth ride—for the second time—last July, the data pool they're offering is pretty deep.

Currently, Movement supports only a handful of locations but will eventually analyze routes in each of the 500-plus cities Uber serves. To see it in action, watch: youtube.com/watch?v=bszvEIMVsIc.