

**Summary of Stakeholder Comments**

- **Chamber of Commerce (August 11, 2010)**
  - A request for economic analysis of the effects of CALGreen, based upon a reasonable estimate of actual activity in the City.
  - A concern was noted about the continual elevation of the level of compliance that the Planning Commission requires for projects that come before them above the state mandated requirements.
  - A request for information on the costs of green building particularly compared with other cities.
  - A request for staff to craft a list of known and anticipated future development projects.
  - A concern was noted about offering rewards over regulations and asked if fees could be reduced for those choosing a higher level of compliance.
  - A suggestion was provided for some form of education be provided for the public.
  - A concern was noted about the ever-increasing energy requirements mandated by the State Energy Commission and the increased costs associated with them.
  - A request for a complete list of electives to be included in the presentation, so as to clarify that an applicant will still have many choices for their designs.
  
- **Economic Vitality Committee—Subcommittee (August 19, 2010)**
  - A concern was noted that projects that go to hearing are required to go above the current Green Building code.
  - A concern was noted about the time spent on merging the two regulations if what is required still will be pushed beyond at hearings.
  - A concern was noted that current standards that had been raised so often that they have become the standard [waste diversion percentages]. It was specifically note that projects that have already (voluntarily) stated that the project will go beyond the code standards should not be asked for additional increases.
  - A concern was noted that if other jurisdictions are just adopting the minimum, developers might go elsewhere rather than try to do business here.
  - A suggestion was made for staff to do a workshop with Planning Commission where they get a chance to hear the stakeholders' concerns.
  - A suggestion was made for staff to show the costs for Tier 1 vs. Pleasanton's current level.
  
- **Committee on Energy and the Environment (August 25, 2010)**
  - A suggestion was made for staff focus on the savings and payback of these measures.
  - A suggestion was made to offer incentives for going to Tier 2

- **James Paxson (Hacienda Business Park Owners Association) meeting (August 31, 2010)**

- A request was made for weather based moisture-detecting irrigation devices being required over the soil based devices.
- A request was made for the City to do outreach to property management companies in this regard.
- A request was made for that a "GREEN TEAM" with Daniel Smith, Director of Operation Services, to look at incentives.
- A request was made for the City to offer help to the construction community that may want to submit to BIG™ or LEED™; an incentive to make it feel less imposing.
- A suggestion was made for the presentation to be more focused on showing how Title 24 [State building code's energy requirements] gets a project through a lot of these points/measures.
- A request was made for a memo to be provided before the September 16 meeting and that the attachments should be posted on the City's web page.

- **Pleasanton Downtown Association—Downtown Vitality Committee (September 7, 2010)**

- A concern was noted about impacts on the costs for building affordable housing.
- A concern was noted about impacts of Proposition 23, if passed at the November general election, potentially repealing this code.
- A concern was noted about the green costs for demolishing existing structures to build new green buildings.
- A concern was noted about waste diversion requirements creating costs and feasibility challenges for small construction companies.
- A suggestion was noted to find a way to provide all requirements in a list that a contractor can just insert into plans.
- A concern was noted about discouraging development and revenue generation in the downtown.
- A request was made to have information/updates provided.

## Chamber of Commerce Meeting Notes

August 11, 2010: 18 chamber attendees and 4 City staff

Director David Stark started the meeting, and began with self introductions around the table.

President/CEO Scott Raty asked for an economic analysis of the effects of CalGreen, based upon a reasonable estimate of actual activity in the City.

Pam Hardy was concerned about the continual elevation of the level of compliance that the Planning Commission requires for projects that come before them above the state mandated requirements.

Janice Phalen asked about the costs of green building, particularly compared with other cities.

Planning Commission Chair Arne Olsen responded that the Planning Commission has asked for additional requirements, but usually only for the very large custom home type of projects.

Janice Phalen suggested that staff craft a list of known and anticipated future development projects.

Jan Batcheller also expressed concern about the economic effects of these requirements. She spoke of favoring the carrot versus the stick analogy, asking if fees could be reduced for those choosing a higher level of compliance.

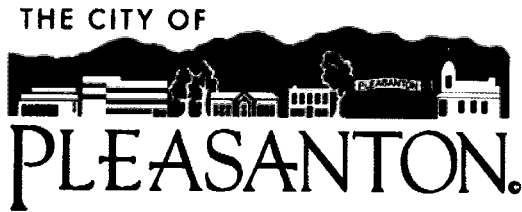
Gary Schwaegerle asked if the Pleasanton Downtown Association or the Pleasanton Heritage Association was involved in the outreach process.

Sharrell Michelotti asked how these requirements will affect historic properties and additions, and also had the same concern as Pam Hardy regarding the Planning Commission. She also suggested that some form of education be provided for the public.

Zone 7 Public Information Specialist Boni Brewer asked if these regulations were consistent with the State mandated water reduction requirements.

Pam Hardy also expressed her concerns about the ever-increasing Energy requirements mandated by the Energy Commission and the increased costs associated with them.

Commissioner Olsen asked that the complete list of electives be included in the presentation, so as to clarify that applicants will still have many choices for their designs.



**Economic Vitality Committee**  
Subcommittee Meeting  
**MINUTES**

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**Large Conference Room**  
200 Old Bernal Avenue, Pleasanton, CA 94566  
**Thursday, August 19, 2010**

The meeting was called to order at 3:45 p.m. by staff, Rosalind Rondash.

**1. INTRODUCTIONS**

Subcommittee Members Present:

Janice Sangster-Phalen; Mark Herberger; and Sharrell Michelotti.

City Staff Present:

Janice Stern, Planning Manager; Dennis Corbett, Senior Plan Checker; and Rosalind Rondash, Assistant Planner

Subcommittee Members Absent:

James Paxson, Pam Hardy, John Mahoney, and Jay Galvin

**2. PRESENTATION**

- a. Adoption of the California's Green Building Code (CALGreen) and related amendments to Chapter 17.50 (Green Building) of the Pleasanton Municipal Code (PRZ-55, City of Pleasanton).**

**Consider and make a recommendation regarding: (1) Proposed amendments; (2) Adoption of local Building Code amendments; and (3) Application of the codes to additions, etc.**

Rosalind Rondash opened the meeting by stating that there were familiar faces from the recent Chamber meeting, but that there was one new face. Rosalind introduced herself as staff assigned to lead this project and stated that the City has had an ordinance in effect for Green Building, but the State has introduced its own green building code, called CALGreen. City staff has been charged with the task harmonizing the current ordinance with the building codes that are coming down. Teaming up with Dennis Corbett, the Senior Plan Checker with the Building and Safety Division, they are looking at how to make the best out of the transition to the new code.

Janice Sangster-Phalen commented that they had volunteered for this subcommittee in advance of the Chamber of Commerce meeting presentation that staff did recently.

That is why there is duplicate attendance, not because they really liked the topic of Green Building.

Rosalind responded by offering to shorten this presentation and stated that the meeting would be recorded for future meeting minute preparation. Questions or comments can be interjected or they can be held until the end, whichever was the preference, but requested that the speakers state their name before proceeding with their comment or question.

A roundtable introduction was conducted.

Rosalind then started the PowerPoint presentation by stating that currently the City uses LEED and Build It Green (BIG) requirements. There is still discussion on where the Pleasanton Municipal Code should be amended to house the CALGreen directives. Originally, the City was proposing to amending 17.50, but have since started to consider repealing 17.50 and amending Title 20 to incorporate the CALGreen codes. This would provide all building code information in the same location. She noted that was probably a little technical, but it is a change from what was stated at the Chamber meeting.

Rosalind presented information on what is building green, historical dates starting from the inception of Pleasanton's green building code in 2002, to the current CALGreen adoption date, and stated that the building inspectors would be inspecting these measures as they do with all other elements for the building code. The City of Pleasanton currently deals with two outside agencies, the USGBC for LEED (commercial and civic buildings) and BIG (Build it Green) for the residential (single family and multi-family) projects. Examples of the scorecards and checklists were displayed and explained.

The comparison of the current scorecards and checklists to the requirements of CALGreen was done. The comparison was based on applying points to the CALGreen measures to see how a CALGreen project would rate against the current standards. This showed that applying just the basic CALGreen measures would not reach the current standard of green building in Pleasanton. If the measures for Tier 1 were used, the project would then meet the current green building standards in Pleasanton.

The benefits of going to the one system - CALGreen code (with Tier 1) rather than running both (17.50 and CALGreen) are:

Creates a harmonized code

Streamlines customer service

One checklist

Uniform standards for the whole State

Pre-established update timelines (on a 3 year cycle)

New building inspectors would likely already be trained

Mrs. Rondash stated that as the City goes forward there are opportunities for enhancement of the CALGreen code to incorporate: additions to structures, specific

language for exempting historic structures, and modifying the checklists, but retaining the flexibility of the code.

Mrs. Rondash noted that the Chamber of Commerce wants information on the cost impacts. Though there is not a lot of information in this regard, but staff was able to obtain some information from the CBIA. Based on a 2100 sq ft house in Pleasanton, they would see about a \$1.60 to \$2.14 per sq ft increase in total building costs. Mrs. Rondash went on to explain the areas of construction that would see those increases.

Janice Stern interjected to clarify that this is all green measures (basic plus Tier 1), this is not an increase from the current costs (under our current green code). Dennis Corbett confirmed that those were the numbers for Basic and Tier 1 level measures on a single family home not building to a green level in our climate zone. Mr. Corbett further states that the \$4,000.00 increase in construction costs is relatively minor, and notes that the end user will benefit from it in the long run with reduced energy bills and reduced water bills.

Sharrell Michelotti questioned if that standard is going to apply no matter what square foot size the home is?

Dennis responded stating that some of the measures are automatic, the energy compliance is the largest portion of the increase and this dependent on the size of the home and the standard is to design to be 15% better than the base line for that size building.

Mrs. Rondash interject to clarify that the increase in cost is no different then today's current cost for homes in Pleasanton, because we already require these measures in the current green code.

Janice Sangster-Phalen questioned if the City totally scrapped the current code and the City adopted that we were going to a minimum of Tier 1, but was concerned that as Pam Hardy stated [at the Chamber Meeting] that her last project was required to go over the current code [by the Planning Commission]. Why then, are we spending so much time talking about Tier 1 if developers are going to be forced to go beyond that?

Janice Stern responded by acknowledging the situation and clarified that this presentation is about what staff is recommending for the code as a basic requirement. But the comment is very apt in regards to Planning Commission and City Council needing to hear the concern of why are additional requirements being asked for. Janice further stated that there are certain reasons and certain cases because of additional density or something like a trade on amenities, etc. that would be a trade-off for support of the project.

Janice Sangster-Phalen questioned why we would go through the exercise of merging the two if what is stated here will be pushed beyond it anyways? Is there any benefit to merging the two?

Janice Stern replied that the benefits would be, as Rosalind has indicated, we would get regular updates as compared to the current situation when we don't know when the updates are happening, a training structure that is state wide for building inspectors and planning staff rather than keeping our own specific system which is not going to be familiar to people outside; by adopting it [the CALGreen Basic] and doing the minor tweaks needed to meet the current code standard.

Rosalind Rondash added that we need to keep in-mind outside areas as well. We have to show that we are meeting our current standard or we will need to provide additional reasoning for why we are stepping down, this could also mean doing environmental reports to show what it means to our greenhouse gases, what it means to our climate action plan if we go backwards in this area. There are many facets that we have to be aware of, and that is why our charge is to figure out what the comparable level is to where we are at today. Thus, utilizing minor local amendments to make sure that we are keeping the level comparable to what we have today. As well as getting feedback and input from our local stakeholders to make sure we go forward with a recommendation that is ultimately going to be supported.

Sharrell Michelotti stated that Pam said [at the Chamber Meeting] that there were current standards that had been raised so often that the higher level has now become the standard [waste diversion percentages]. She feels that it is important the Planning Commission and City Council be advised of how this has come up already, and they need to understand that people have already gone (voluntarily) way beyond the standards before they start the discussion and asking for more exactions. Janice Sangster-Phalen added to Sharrell's comment with the fact that they were now asking people to go from 80% [the imposed standard that is above code] to 100%- what are we getting as a point of benefit to the environment verses costs. The Commission and Council is just going to arbitrarily keep pushing because we have the "Pleasanton standard" that says we are always going to be 50% better or something.

Sharrell Michelotti further stated that Scott really summed it up well at the end [of the Chamber meeting] when he said what we are looking at and what Economic Vitality might be looking at too is what is the overall effect in comparison to other jurisdictions. If other jurisdictions are just adopting the minimum, will developers go else where rather than try to do business here?

Mark Herberger questioned what the frequency of development that goes above the current standard (voluntarily, not by condition of approval)?

Rosalind Rondash responded that it is hard to quantify that because the applicants are aware of our code and have worked out their plans before they meet with staff. As an estimate it is about 90% that come in with some area above what would get them a specific point, whether they have access to that material or they prefer that material or that is they way that they do business, as Pam was saying [at the Chamber meeting] they already doing 80-85% waste diversion as a business practice.

Mark then stated that it should then be stated that they are already going above and that there is no need to go and set standards that are even higher than the code.

Janice Stern questioned if it would be true to say that the CALGreen checklist provides for more flexibility than the current checklists?

Dennis responded that both programs have a lot of room for flexibility; in the CALGreen program there are a lot of options to pick from.

Rosalind stated that another part of the discussion is that the current system is point based, which allows someone that doesn't understand MERV filter or sun orientation to say that they want to increase the points or percentage. The current system lends itself to be extracted upon, were as, the new system you would really have to say this is the area where we want to see an improvement over.

Rosalind then continued with the presentation stating that staff did survey the surrounding jurisdictions. For surveying the City of Fremont that we still need to look into. Rosalind stated that staff recently talked to the County of Ventura and the City of Camarillo, neither one of them have an existing green building ordinance and they both have adopted the CALGreen basic already. As for the surrounding jurisdictions, Rosalind provided the summary of where Dublin, Livermore, San Ramon, Walnut Creek, and Palo Alto are in their review process. Rosalind clarified that though it may seem like our surrounding jurisdictions are only going with CALGreen basic, staff feels that they haven't really thought how their existing green ordinances and how everything will be harmonized. They are now starting discussions with us to see what information we have. From an environmental stand point they may also be faced with needing to go with a Tier 1. Dennis added that we are still vary early in the process. We have only been working with the Adopted version of the code a week ago, before that we were looking at draft versions trying to get a head start.

Janice Sangster-Phalen stated that she also could see Dublin and Livermore will be doing whatever we do.

Dennis stated that there was a lot of involvement from the primary organization of the construction industry in the creation of this code. They did look at our ordinance to try to allow a level what would allow us to transition into the code.

Rosalind then explained how the Climate Action Plan fits into the makeup of this topic. There may be some additional changes that will come about as a result of the Climate Action Plan study that is currently going on.

Janice Stern stated that the City will be striving to reach the State target for Green House Gas reductions. Using the Climate Action Plan to get us there in the next few months.



Staff is moving forward with our initial recommendation to the stakeholders so that we can get comments to craft our solid recommendation. We are moving forward with amending the PMC and adopting CALGreen basic for projects that are not currently subject to our current Green Building ordinance, and Basic plus Tier 1 for those projects that are currently covered and to incorporate CALGreen as our reference standard.

Sharrell Michelotti asked about defining historic structures.

Janice Stern described the structures that are on the City list of historic structures or by use of a DPR-523 form to determine if the structure is historic.

Rosalind described the timeline, having the item before PC September 29<sup>th</sup> and to the CC on the 19<sup>th</sup> of Oct. and a second reading by Nov. 16<sup>th</sup> with staff training Nov to Dec. and ready to service the public with the new codes January 1, 2011.

Suggestions from the group were:

- Staff should make sure that Pam gets her comments in (Sharrell Michelotti).
- Staff should do a workshop with Planning Commission where they get a chance to hear the stakeholders (Sharrell Michelotti).
  
- The costs need to be shown for Tier1 vs. Pleasanton's level (Janice Sangster-Phalen)
  
- Staff should allow a bigger menu (Sharrell Michelotti)

*Dennis stated that we will also be building in an option for projects to still be able to opt to use BIG or LEED as an alternative to the CALGreen measures. They will be paying those other agencies for that process.*

- Janice Sangster-Phalen wants staff to be clearer in how electives are factored in.
- Sharrell wants staff reports to state that the project staff report to specifically state that it meets and exceeds the state requirements, to reduce the tendency to have additional measures required. The officials need to be educated that we are already higher than others and that they should not ask for more.
- Janice Sangster-Phalen wants the new terms to be used- stop using the old terms and doesn't feel that these regulations are going to turn off a developer from coming here.
- The other attendees agreed with that comment.

The meeting was then concluded at 5:00 p.m.

Respectfully,

Rosalind Rondash  
Recording Secretary

**Meeting Notes**  
**CITY OF PLEASANTON**  
**COMMITTEE ON ENERGY AND ENVIRONMENT**  
**August 25, 2010**

The regular monthly meeting of the Committee on Energy and Environment was called to order at the hour of 6:00 p.m.

Present: Members: Mark Posson, Thomas Kato, William Carrick, Howard Royer, Meera Jaeel  
Mike McGinley

Others: Daniel Smith, Thomas Fullam, Laura Ryan and Donna D'Abate, Rosalind Rondash,

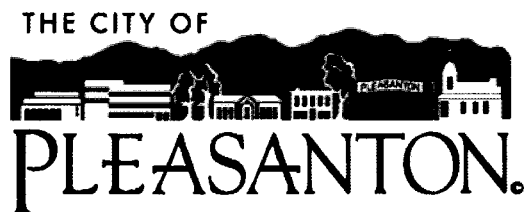
Absent: Craig Higgins

**INFORMATIONAL REPORT:**

1, Green Building Presentation from the Planning Department – Daniel introduced Rosalind Rondash, Assistant Planner, to review the City's proposed green building ordinance amendments. The Planning Department has already presented this overview to the EVC sub-committee and to the Chamber and will be making further presentations to the Downtown Association, Rotary Club, etc.. Rosalind stated that the City must adopt CALGreen standards by January 2011, so it is possible that we may need to update the ordinance again after the Climate Action Plan is developed. Attached to these minutes is the presentation from the Planning Department.

The Planning Department is proposing that the City adopt an ordinance that requires conformance with CALGreen basic and Build It Green Tier 1 standards. A question was raised regarding savings and payback. A member of the public said that currently, it appears that Pleasanton is adding additional costs to new construction without any explanation. It would be good idea to express to the public what the cost savings would be down the road. There was a brief discussion on considering Tier 2 and why we should or should not consider that and if we could find incentives for this. The Committee feels that if we were to impose extremely rigorous requirements and exorbitant fees that builders would go elsewhere.

Daniel said we are not looking for a resolution but rather for a motion from the committee or comments, since the new ordinance will be going to City Council in October. The Committee's recommendation is to Support the adoption of the CALGreen plus Tier 1 ordinance as presented by the Planning Department but for the City to consider incentives for developers and builders to go to Tier 2. Motion – all in favor.



## James Paxson Meeting NOTES

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**Council Chambers**  
200 Old Bernal Avenue, Pleasanton, CA 94566  
**Tuesday, August 31, 2010**

### **PRESENTATION**

- a. **Adoption of the California's Green Building Code (CALGreen) and related amendments to Chapter 17.50 (Green Building) of the Pleasanton Municipal Code (PRZ-55, City of Pleasanton).**  
**Consider and make a recommendation regarding: (1) Proposed amendments; (2) Adoption of local Building Code amendments; and (3) Application of the codes to additions, etc.**

Rosalind Rondash opened the meeting by providing a handout of the presentation that was used for the other stakeholder meetings. Given James' level of green building knowledge, many of the slides for only glanced at. stating that currently the City uses LEED and Build It Green (BIG) requirements.

The comparison of the currently scorecards and checklists to the requirements of CALGreen was done. The comparison was based on applying points to the CALGreen measures to see how a CALGreen project would rate against the current standards. This showed that applying just the basic CALGreen measures would not reach the current standard of green building in Pleasanton. If the measure for Tier 1 were used the project would then meet the current green building standards in Pleasanton.

The benefits of going to the one system- CALGreen code (with tier 1) rather than running both (17.50 and CALGreen) are:

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New building inspectors would likely already be trained

Mrs. Rondash stated that as the City goes forward there are opportunities for enhancement of the CALGreen code to incorporate additions to structures, specific language for exempting historic structures, and modifying the checklists, but retaining the flexibility of the code.

Mrs. Rondash noted that though there is not a lot of information in regard to costs, staff was able to obtain some information from the CBIA. Based on a 2100 sq ft house in

Pleasanton, they would see about a \$1.60 to \$2.14 per sq ft increase in total building costs. Mrs. Rondash went on to explain the areas of construction that would see those increases.

Dennis Corbett noted that those were the numbers for Basic and Tier 1 level measures on a single family home not building to a green level in our climate zone. Mr. Corbett further states that the \$4,000.00 increase in construction costs is relatively minor, and notes that the end user will benefit from it in the long run with reduced energy bills and reduced water bills.

Dennis responded stating that some of the measures are automatic, the energy compliance is the largest portion of the increase and this dependent on the size of the home and the standard is to design to be 15% better than the base line for that size building.

There was some discussion on how sub meters for water and separate meters for water were going to be required. James asked what legal right would the City have to review sub meter records? Staff responded that reading sub meters is not in our work plan.

There was some discussion about purple lines and the amount of water used for irrigation. James stated that weather detecting devices are better than soil ones for irrigation purposes, and would like to see the City require the weather devices over the soil ones. James also requested that the City do outreach to property management companies in this regard.

Mrs. Rondash interject to clarify that the increase in cost is no different then today's current cost for homes in Pleasanton, because we already require these measures in the current green code.

Rosalind Rondash added that we need to keep in-mind outside areas as well. We have to show that we are meeting our current standard or we will need to provide additional reasoning for why we are stepping down, this could also mean doing environmental reports to show what it means to our greenhouse gases, what it means to our climate action plan if we go backwards in this area. There are many facets that we have to be aware of, and that is why our charge is to figure out what the comparable level is to where we are at today. Thus, utilizing minor local amendments to make sure that we are keeping the level comparable to what we have today. As well as, getting feedback and input from our local stakeholders to make sure we go forward with a recommendation that is ultimately going to be supported.

Rosalind stated that staff has surveyed the surrounding jurisdictions and provided the summary of where Dublin, Livermore, San Ramon, Walnut Creek, and Palo Alto are in their review process. Rosalind clarified that though it may seem like our surrounding jurisdictions are only going with CALGreen basic, staff feels that they haven't really thought how their existing green ordinances and how everything will be harmonized.

They are now starting discussions with us to see what information we have. From an environmental stand point they may also be faced with needing to go with a Tier 1. Dennis added that we are still vary early in the process. We have only been working with the Adopted version of the code a week ago, before that we were looking at draft versions trying to get a head start.

James requested that a "GREEN TEAM" with Daniel Smith to look at incentives.

There was some discussion about commissioning and staff noted that this process still needs to be worked out.

James requested that the City offer help to the construction community that wanted to submit to BIG or LEED to make it feel less imposing.

Rosalind then explained how the Climate action Plan fits into the makeup of this topic. There may be some additional changes that will come about as a result of the Climate Action Plan study that is currently going on.

Staff is moving forward with our initial recommendation to the stakeholders so that we can get comments to craft our solid recommendation. We are moving forward with amending the PMC and adopting CALGreen basic for projects that are not currently subject to our current Green Building ordinance, and Basic plus Tier 1 for those projects that are currently covered and to incorporate CALGreen as our reference standard.

James suggested that the presentation be more focused on showing how T24 get you through a lot of these points/measures.

In closing, James requested that a memo be provided before the Sept 16 meeting and that the attachments should be posted on the web page.

Respectfully,

Rosalind Rondash  
Recording Secretary

**Meeting Notes  
CITY OF PLEASANTON  
Downtown Vitality Committee  
September 7, 2010**

**CALL TO ORDER**

The special of the Committee was started at the hour of 12:05 p.m.

**ATTENDEES**

Jeb Bing  
Mike Trifah  
Peter MacDonald  
Mike Cheney  
Janice Stern  
Howard Long  
Mike Hosterman  
Rosalind Rondash

**INFORMATIONAL PRESENTATION:**

Green Building Presentation from the Planning Department

Staff provided a presentation on the various aspects of the CALGreen code and a comparison to the City's current Green Building requirements.

The questions/comments/concerns that came from the group are as follows:

1. Impacts on the costs for building affordable housing should be considered.
2. Impacts of Proposition 23 repealing this code should be considered.
3. What are the green costs for demolishing existing structures to build new green buildings?
4. Concerns of waste diversion requirements having a cost and feasibility challenge for small construction companies.
5. Staff should find a way to provide all requirements in a list that a contractor and just insert into plans.
6. Concerns about discouraging development and revenue generation in the downtown.
7. Can staff provide information/updates via a website?

**ADJOURNMENT:** The meeting was closed at 1:15pm

Respectfully submitted,

Rosalind Rondash

## Cost Analysis

A 2004 study by Davis Langdon Adamson, a construction cost-planning and management company found that the first costs of constructing a sustainable building tend to match or only slightly exceed those of comparable non-green buildings. The study, *Costing Green: A Comprehensive Cost Database and Budgeting Methodology* measured the square-foot construction costs of 61 buildings seeking certification under the LEED™ green building rating system against those of buildings of similar type that did not aim for sustainability. Taking into account a range of construction factors including climate, location, market conditions and local standards, the study found that for many of the green projects, pursuing LEED™ certification had little impact.

The study's findings also underline that incorporating and integrating green features into a project early is critical to the success of any green building project. "It is the choices made during design which will ultimately determine whether a building can be sustainable, not the budget set," the report concluded.

The study noted that developers who gain expertise in high performance techniques rapidly reap rewards. The costs of adopting new methods and materials quickly fall away, giving rise to better buildings with lower maintenance, operations, and insurance costs, and even more consistent rent or mortgage payments.

Additionally the study indicated that the investment in green affordable housing benefits the regional economy by meeting the need for truly low-cost homes. Energy efficiency not only reduces utility bills for the tenant/owner, but keeps utility rates lower for all customers by reducing demand.

A study performed by ConSol for California Building Industry Association (CBIA) indicated that the costs for building to the CALGreen Basic plus Tier 1 requirements over standard construction for a 2,100 sf home in our climate zone will likely have an increase in total home construction costs of about \$1.67 to \$2.14 per square foot (which is considered minimal). The study further indicated that the areas incurring the increase costs are:

- Energy compliance = \$2,000 to \$2,500
- 1.28 gal/flush toilet = \$0 to \$400
- Weather-based irrigation controller = \$250
- Waste Diversion = \$0 to \$1,500
- Moisture Control = \$250 to \$2,000



Since Pleasanton already requires new construction to build to a green level over standard construction methods and since staff is proposing amendments that would equate to our current standards for projects that are already subject to green standards, staff believes that the costs to utilize the CALGreen code are the same as for project already covered under the City's Green Building Ordinance. However, staff does acknowledge that CALGreen (Basic measures only) will be applied to some projects that are currently exempt under our current code, i.e. buildings in Downtown, residential homes under 2,000 square feet, and commercial project under 20,000 square feet. Therefore, the potential increase in construction costs will be applicable to those projects. It is important to note that the City can not exempt these projects from CALGreen and that the increase in construction costs for these projects are equivalent to those faced state-wide come January 1, 2011.

It is also important to note the benefits for building to a green standard. Staff has reviewed an energy-effectiveness study that was prepared by Gabel Associates, LLC and published in April 2010. The study, *Climate Zone 12 Energy Cost-Effectiveness Study* projected the costs associated with the energy measures and the payback period for those measures. The following is a table to illustrate the information provided in the study:

<b>Building Type</b>	<b>15% above current code</b>	<b>Overall cost increase %</b>	<b>Payback Period</b>
Single-family home, 2,025 sf	\$0.62/sf to \$1.41/sf	0.5% to 1.14%	10.4 to 13.4 years
Single-family home, 4,500 sf	\$0.48/sf to \$1.13/sf	0.39% to 0.92%	12.4 to 15.9 years
2 story, 8 unit multi-family building, 8,442 sf	\$0.58/sf to \$1.82/sf	0.53% to 1.65%	11.0 to 18.7 years
5 story, 40 unit multi-family building, 36,800 sf	\$0.69/sf to \$2.31/sf	0.55% to 1.85%	8.3 to 17.2 years
1 story office building, 10,580 sf	\$1.83/sf to \$3.84/sf	1.47% to 3.08%	7.2 to 13.8 years
5 story office building, 52,900 sf	\$0.51/sf to \$1.30/sf	0.36% to 0.92%	2.5 to 3.8 years

The study states that regardless of the building design, occupancy profile or number of stories, the incremental improvement in overall annual energy performance of buildings which exceed the 2008 Title 24 Building Energy Efficiency Standards by 15% appears cost-effective. However, the study further notes that each building's overall design, occupancy type and specific design choices may allow for a large range of incremental first cost and payback projections.

# Residential Required Measures

## PLANNING AND DESIGN

- A plan must developed and implemented to manage storm water drainage during construction. **4.106.2, PMC 9.14**
- The site shall be planned and developed to keep surface water away from buildings. Construction plans shall indicate how site grading or a drainage system will manage all surface water flows. **4.106.3**
- Topsoil shall be protected or saved for reuse. Displaced topsoil shall be stockpiled for reuse in a designated area and covered or protected from erosion. **A4.106.2.3**
- The post-construction landscape design shall limit turf areas to not more than 50 percent of the total landscaping. **A4.106.3**
- Permeable paving must be utilized for not less than 20 percent of the total parking, walking or patio surfaces. **A4.106.4**
- Roofing materials shall have a minimum 3-year aged solar reflectance and thermal emittance or a minimum Reflectance Index (SRI) equal to or greater than the values specified in Tables A4.106.5(1). **A4.106.5**

## ENERGY EFFICIENCY

- New residential buildings shall exceed the California Energy Code requirements by 15 percent, based on the 2008 California Energy Efficiency Standards. **4.201.1**

## WATER EFFICIENCY AND CONSERVATION

- Indoor water use shall be reduced using one of the following methods (effective 07/01/2011). **4.303.1**
  - Water saving fixtures or flow restrictors shall be used.
  - A 20 percent reduction in baseline water use shall be demonstrated.
- Plumbing fixtures and fittings shall comply with the following maximum flow rates (effective 07/01/2011) **4.303.3, A4.303.1, 4.303.2:**
  - Toilets  $\leq 1.28$  gallons per flush
  - Urinals  $\leq 0.5$  gallons per flush
  - Bathroom faucets  $\leq 1.5$  gallons per minute @ 60 psi
  - Kitchen faucets and dishwashers  $\leq 1.5$  gallons per minute at 60 psi
  - Showerheads  $\leq 2.0$  gallons per minute @80 psi (The sum of multiple showerheads must be combined and shall not exceed maximum showerhead flow rate)
- Automatic irrigation systems controllers installed at the time of final inspection shall be weather- or soil-based. **4.304.1**
- Provide water efficient landscape irrigation design that does not exceed 65 percent of ETo times the landscape area. **A4.304.4**

## MATERIAL CONSERVATION AND RESOURCE EFFICIENCY

- The foundation mix design shall utilize not less than a 20 percent reduction in cement use. **A4.403.2**

# Residential Electives

## PLANNING & DESIGN (2 Required)

- A site which complies with at least one of the following characteristics is selected **A4.103.1**:
  1. An infill site is selected.
  2. A greyfield site is selected.
  3. An EPA-recognized Brownfield site is selected.
- An individual with oversight responsibility for the project has participated in an educational program promoting environmentally friendly design or development and has provided training or written instruction to all appropriate entities. **A4.104.1**
- Existing buildings are disassembled for reuse or recycling of building materials. The proposed structure utilizes either appliances, electrical devices, light fixtures, plumbing fixtures, doors, masonry, or portions of foundations which can be easily reused **A4.105.2**:
- Optimize solar energy use by oriented the long side of the house to the south. **A4.106.1**
- A soil analysis is performed by a licensed design professional and the findings utilized in the structural design of the building. **A4.106.2.1**
- Soil disturbance and erosion are minimized by at least one of the following **A4.106.2.2**:
  1. Natural drainage patterns are evaluated and erosion controls are implemented to minimize erosion during construction and after occupancy.
  2. Site access is accomplished by minimizing the amount of cut and fill needed to install access roads and driveways.
  3. Joint trenching is utilized, minimize the amount of time the disturbed soil is exposed and the soil is replaced using accepted compaction methods.
- The construction area shall be identified and delineated by fencing or flagging to limit construction activity to the construction area.
- Postconstruction landscape designs accomplish one or more of the following **A4.106.3**:
  1. Areas disrupted during construction are restored to be consistent with native vegetation species and patterns.
  2. Limit turf areas to not more than 25 percent of total landscaped area.
  3. Utilize at least 75 percent native California or drought tolerant plant and tree species appropriate for climate zone 12.
  4. Hydrozoning irrigation techniques are incorporated into the landscape design.
- Permeable paving is utilized for at least 30 percent of the parking, walking or patio surfaces. **A4.106.4**
- Roofing materials on low sloped roofs having a minimum 3-year aged solar reflectance of 0.65 and thermal emittance of 0.85, or a minimum Solar Reflectance Index (SRI) of 78. **A4.106.5**
- Roofing materials on high sloped roofs having a minimum 3-year aged solar reflectance of 0.23 and thermal emittance of 0.85, or a minimum Solar Reflectance Index (SRI) of 20. **A4.106.5**
- Additional items necessary to address innovative concepts or local environmental conditions. **A4.107.1**

## ENERGY EFFICIENCY (4 Required)

- Exceed the California Energy Code requirements, based on the 2008 Energy Efficiency Standards requirements by 30 percent. **A4.203.1**
- A radiant roof barrier is installed. **A4.205.1**
- Exterior shading of at least 18 inches in depth is provided on all south and west windows. **A4.205.2**
- Third party blower door test is conducted and passed to verify building envelope tightness. **A4.206.1**
- Radiant, hydronic, ground source and other innovative space heating and cooling systems are included in the proposed design. **A4.207.1**

## **MATERIAL CONSERVATION & RESOURCE EFFICIENCY (2 Required)**

- Cement use in the foundation mix design is reduced by at least 25 percent. **A4.403.2**
- Beams, headers and trimmers are the minimum size necessary to support the load. **A4.404.1**
- Building dimensions and layouts are designed to minimize waste. **A4.404.2**
- A pre-manufactured building system is used for the floor, wall and/or roof system. **A4.404.3**
- Material lists are included in the plans which specify material quantity and provide direction for on-site cuts. **A4.404.4**
- Exterior trim, windows, siding or exterior wall coverings which do not require paint or stain. **A4.405.1:**
- Floors that do not require additional coverings, including but not limited to stained, natural or stamped concrete floors. **A4.405.2**
- Not less than a 15 percent recycled content value (RCV) materials are used for at least 10 percent of the estimated total value on the project. **A4.405.3**
- Renewable source building products are used. **A4.405.4**
- Install a foundation and landscape drainage system. **A4.407.1**
- Install gutter and downspout systems to route water at least 5 feet away from the foundation or connect to a landscape drainage system. **A4.407.2**
- Provide flashing details on the building plans. **A4.407.3**
- Protect building materials delivered to the construction site from rain & other sources of moisture. **A4.407.4**
- Exterior doors to the dwelling are covered to prevent water intrusion. **A4.407.6**
- A permanent overhang or awning at least 2 feet in depth is provided. **A4.407.7**
- At least a 75 percent reduction in construction waste generated at the site is diverted to recycle or salvage. **A4.408.1**
- Additional items necessary to address innovative concepts or local environmental conditions. **A4.411.1**

## **ENVIRONMENTAL QUALITY (1 Required)**

- Meet the formaldehyde limits contained in Table 4.504.5 before the mandatory compliance dates in 2012, or use composite wood products made with either California Air Resources Board approved no-added formaldehyde (NAF) resins or ultra-low emitting formaldehyde (ULEF) resins. **A4.504.1**
- At least 90 percent of the floor area receiving resilient flooring shall comply with the VOC-emission limits defined in the Collaborative for High Performance Schools (CHPS) Low-emitting Materials List or be certified under the Resilient Floor Covering Institute (RFCI) FloorScore program. **A4.504.2**
- Install insulation which contains No-Added Formaldehyde (NAF) and is in compliance with the VOC-emission limits defined in Collaborative for High Performance Schools (CHPS) Low-emitting Materials List. **A4.504.3**
- Install higher than MERV 6 filters on central air or ventilation systems. **A4.506.1**
- Direct vent appliances are used or isolated from the conditioned space. **A4.506.2**
- Additional items necessary to address innovative concepts or local environmental conditions. **A4.509.1**

# CALGreen Non-Residential Required Measures

## PLANNING AND DESIGN

- For projects of one acre or less, develop a Storm Water Pollution Prevention Plan (SWPPP) that has been designed, specific to its site, conforming to the State Storm water NPDES Construction Permit as is required for projects over one acre. The plan should cover prevention of soil loss by storm water run-off and/or wind erosion, of sedimentation and/or of dust/particulate matter air pollution. **5.106.1**
- If the project is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5 percent of visitor motorized vehicle parking capacity, with a minimum of one two-bike capacity rack. **5.106.4.1**
- For buildings with over 10 tenant-occupants, provide secure bicycle parking for 5 percent of tenant-occupied motorized vehicle parking capacity, with a minimum of one space. **5.106.4.2**
- Provide designated parking spaces for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles. **5.106.5.2**
- Comply with lighting power requirements in the California Energy Code and design interior and exterior lighting such that zero direct-beam illumination leaves the building site. Meet or exceed exterior light levels and uniformity ratios using the following strategies: **5.106.8**
  1. Shield all exterior luminaires or use cutoff luminaires.
  2. Contain interior lighting within each source.
  3. Allow no more than .01 horizontal foot candle 15 ft beyond the site.
  4. Contain all exterior lighting within property boundaries.

**Exception:** See the California Building Code Section 1205.6 for campus lighting requirements for parking facilities and walkways.
- The site shall be planned and developed to keep surface water away from buildings. Construction plans shall indicate how site grading or a drainage system will manage all surface water flows. **5.106.10**

## ENERGY EFFICIENCY

- Meet the California Energy Code requirements, based on the 2008 Energy Efficiency Standards. **5.201**

## WATER EFFICIENCY & CONSERVATION

- For building 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 gallons per day (gpd). **5.303.1.1**
  2. For spaces used for laundry or cleaners, restaurant or food service, medical or dental office, laboratory or beauty salon or barber shop projected to consume more than 100 gpd. **5.303.1.1**
- Separate submeters are required for any building within a project, or any space within a building that is projected to consume more than 1,000 gpd. **5.303.1.2**
- 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. (Calculate savings by Water Use Worksheets) **5.303.2**

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- When single shower fixtures are served by more than one showerhead, the combined flow rate of all the showerheads shall not exceed the maximum flow rates specified in the 20 percent reduction column contained in Table 5.303.2.3 or the shower shall be designed to only allow one showerhead to be in operation at a time. **5.303.2.1, A5.303.2.1**
- Plumbing fixtures and fittings shall comply with the following maximum flow rates: **Table 5.303.6**
  1. Toilets ≤ 1.28 gallons per flush
  2. Urinals ≤ 0.5 gallons per flush
  3. Lavatory faucets ≤ 0.5 gallons per minute @ 60 psi
- Each building shall reduce the generation of wastewater by one of the following methods: **5.303.4**
  1. The installation of water-conserving fixtures or
  2. Utilizing nonpotable water systems.
- In new nonresidential projects with between 1,000 and 2,500 square feet of landscaped area (the level at which the MLO applies), install weather- or soil moisture-based irrigation controllers. **5.304.3**
- A water budget is required to demonstrate landscape irrigation compliance with the California Department of Water Resources Model Water Efficient Landscape Ordinance (WELO). **5.304.1**

## **MATERIAL CONSERVATION AND RESOURCE EFFICIENCY**

- Provide a weather-resistant exterior wall and foundation envelope as required by California Building Code Section 1403.2 and California Energy Code Section 150 or manufacturer's installation instructions, whichever is more stringent. **5.407.1**
- Prevent irrigation spray on structures. **5.407.2.1**
- Design exterior entries and openings to prevent water intrusion into buildings. **5.407.2.2**
- Submit a construction waste management plan demonstrating a minimum 50% diversion for all waste, and a minimum 90% diversion for asphalt and concrete. **PMC 9.21**
- 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. **5.408.4**
- Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of nonhazardous materials for recycling. **5.410.1**
- For new buildings 10,000 square feet and over, building commissioning for all building systems covered by the California Energy Code, process systems and renewable energy systems shall be included in the design and construction processes of the building project. Commissioning requirements shall include the Owner's Project Requirements (OPR), a written explanation of how the design of the building systems meets the OPR, a commissioning plan describing how the project will be commissioned and the functional performance testing necessary to demonstrate the correct installation and operation of each component, system and system-to-system interface in accordance with the approved plans and specifications. **5.410.2**
  1. A Systems manual and systems operations training are required. **5.410.2.5**
  2. 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. **5.410.2.6**
- For buildings less than 10,000 square feet, testing and adjusting of systems is required before a new space-conditioning system serving a building or space is operated for normal use. **5.410.4**
  1. After completion of testing, adjusting and balancing, provide a final report of testing signed by the individual responsible for performing these services. **5.410.4.4**
  2. Provide the building owner with detailed operating and maintenance instructions and copies of warranties/warranties for each system prior to final inspection. **5.410.4.5**

## **ENVIRONMENTAL QUALITY**

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- Install only a direct-vent sealed-combustion gas or sealed wood-burning fireplace or a sealed woodstove and refer to residential requirements in the California Energy Code. **5.503.1**
- Woodstoves shall comply with US EPA Phase II emission limits. **5.503.1.1**
- At the time of rough installation or during storage on the construction site and until final startup of the heating and cooling equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheetmetal or other methods acceptable to the enforcing agency to reduce the amount of dust or debris which may collect in the system. **5.504.3**
- Adhesives and sealants used on the project shall meet the requirements of the following standards.
  1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks shall comply with local or regional air pollution control or air quality management district rules, or SCAQMD Rule 1168 VOC limits. **5.504.4.1**
  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. **5.504.4.1**
- Architectural paints and coatings shall comply with Table 5.504.4. **5.504.4.3**
- Aerosol paints and coatings shall meet the Product-Weighted MIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances (CCR, Title 17, Section 94520 et seq). **5.504.4.3.1**
- All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute (CRI) Green Label program. **5.504.4.4.1**
- All carpet adhesive shall meet the requirements of Table 804.4.1. **5.504.4.4.2**
- Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in Table 5.504.4. **5.504.4.5**
- For at least 50 percent of floor area receiving resilient flooring, install resilient flooring complying with the VOC-emission limits defined in the 2009 CHPS criteria and listed on its Low-emitting Materials List (or Product Registry) or certified under the FloorScore program of the Resilient Floor Covering Institute. **5.504.4.6**
- In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air prior to occupancy that provides at least a MERV of 8. **5.504.5.3**
- Prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows where outdoor areas are provided for smoking and in buildings. **5.504.7**
- Wall and floor-ceiling assemblies making up the building envelope shall have an STC of at least 50 and exterior windows shall have a minimum STC of 30 whenever within 1,000 feet of a freeway right-of-way, within 5 miles of airports serving more than 10,000 commercial jets per year, or when the sound level at the property line regularly exceeds 65 decibels. **5.507.4.1**
- Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40. **5.507.4.2**
- Install HVAC, refrigeration and fire suppression equipment that does not contain CFCs. **5.508.1.1**
- Install HVAC, refrigeration and fire suppression equipment that does not contain Halons. **5.508.1.2**

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# Non-Residential Tier 1 Required Measures

## PLANNING AND DESIGN

- For projects of one acre or less, develop a Storm Water Pollution Prevention Plan (SWPPP) that has been designed, specific to its site, conforming to the State Storm water NPDES Construction Permit as is required for projects over one acre. The plan should cover prevention of soil loss by storm water run-off and/or wind erosion, of sedimentation and/or of dust/particulate matter air pollution. **5.106.1**
- If the project is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5 percent of visitor motorized vehicle parking capacity, with a minimum of one two-bike capacity rack. **5.106.4.1**
- For buildings with over 10 tenant-occupants, provide secure bicycle parking for 5 percent of tenant-occupied motorized vehicle parking capacity, with a minimum of one space. **5.106.4.2**
- Provide at 10 percent of total designated parking spaces for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles. **A5.106.5.1**
- Comply with lighting power requirements in the *California Energy Code* and design interior and exterior lighting such that zero direct-beam illumination leaves the building site. Meet or exceed exterior light levels and uniformity ratios using the following strategies: **5.106.8**
  1. Shield all exterior luminaires or use cutoff luminaires.
  2. Contain interior lighting within each source.
  3. Allow no more than .01 horizontal foot candle 15 ft beyond the site.
  4. Contain all exterior lighting within property boundaries.

**Exception:** See the California Building Code Section 1205.6 for campus lighting requirements for parking facilities and walkways.
- The site shall be planned and developed to keep surface water away from buildings. Construction plans shall indicate how site grading or a drainage system will manage all surface water flows. **5.106.10**
- Comply with at least one additional elective from Division A5.1.

## ENERGY EFFICIENCY

- Exceed *California Energy Code* requirements, based on the 2008 Energy Efficiency Standards, by 15 percent. **A5.203.1.1, A5.601.2.2**

## WATER EFFICIENCY & CONSERVATION

- For building 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 gallons per day (gpd). **5.303.1.1**
  2. For spaces used for laundry or cleaners, restaurant or food service, medical or dental office, laboratory or beauty salon or barber shop projected to consume more than 100 gpd. **5.303.1.1**
- Separate submeters are required for any building within a project, or any space within a building that is projected to consume more than 1,000 gpd. **5.303.1.2**
- A schedule of plumbing fixtures and fixture fittings that will reduce the overall use of potable water within the building by 30 percent shall be provided. (Calculate savings by Water Use Worksheets) **A5.303.2.3.1**

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- When single shower fixtures are served by more than one showerhead, the combined flow rate of all the showerheads shall not exceed the maximum flow rates specified in the 30 percent reduction column contained in Table A5.303.2.3.1 or the shower shall be designed to only allow one showerhead to be in operation at a time. **5.303.2.1, A5.303.2.1**
- Plumbing fixtures and fittings shall comply with the following maximum flow rates: **A5.303.2.3.1**
  1. Toilets ≤ 1.12 gallons per flush
  2. Urinals ≤ 0.5 gallons per flush
  3. Lavatory faucets ≤ 0.35 gallons per minute @ 60 psi
  4. Kitchen faucets and dishwashers ≤ 1.6 gallons per minute at 60 psi
  5. Showerheads ≤ 1.8 gallons per minute @80 psi
- Each building shall reduce the generation of wastewater by one of the following methods: **5.303.4**
  1. The installation of water-conserving fixtures or
  2. Utilizing nonpotable water systems.
- For new water service, separate meters or submeters shall be installed for indoor and outdoor potable water use for landscaped areas between 500 square feet and 1,000 square feet. **A5.304.2.1**
- In new nonresidential projects with between 1,000 and 2,500 square feet of landscaped area (the level at which theMLO applies), install weather- or soil moisture-based irrigation controllers. **5.304.3**
- Reduce the use of potable water to a quantity that does not exceed 60 percent of ETo times the landscape area. A calculation demonstrating the applicable potable water use reduction required by this section shall be provided. **A5.304.4.1**
- Comply with at least one additional elective from Division A5.3.

## **MATERIAL CONSERVATION AND RESOURCE EFFICIENCY**

- Use materials, equivalent in performance to virgin materials, with postconsumer or preconsumer recycled content value (RCV) equaling at least 10 percent of the total value, based on estimated cost of materials on the project. Provide documentation as to the respective values. **A5.405.4**
- Provide a weather-resistant exterior wall and foundation envelope as required by California Building Code Section 1403.2 and California Energy Code Section 150 or manufacturer's installation instructions, whichever is more stringent. **5.407.1**
- Prevent irrigation spray on structures. **5.407.2.1**
- Design exterior entries and openings to prevent water intrusion into buildings. **5.407.2.2**
- Submit a construction waste management plan demonstrating a minimum 50% diversion for all waste, and a minimum 90% diversion for asphalt and concrete. **PMC 9.21**
- 100 percent of trees, stumps, rocks and associated vegetation and soils resulting primarily from land clearing shall be reused or recycled. **5.408.4**
- Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of nonhazardous materials for recycling. **5.410.1**
- For new buildings 10,000 square feet and over, building commissioning for all building systems covered by the California Energy Code, process systems and renewable energy systems shall be included in the design and construction processes of the building project. Commissioning requirements shall include the Owner's Project Requirements (OPR), a written explanation of how the design of the building systems meets the OPR, a commissioning plan describing how the project will be commissioned and the functional performance testing necessary to demonstrate the correct installation and operation of each component, system and system-to-system interface in accordance with the approved plans and specifications. **5.410.2**
  1. A Systems manual and systems operations training are required. **5.410.2.5**
  2. 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. **5.410.2.6**

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- For buildings less than 10,000 square feet, testing and adjusting of systems is required before a new space-conditioning system serving a building or space is operated for normal use. 5.410.4
  1. After completion of testing, adjusting and balancing, provide a final report of testing signed by the individual responsible for performing these services. 5.410.4.4
  2. Provide the building owner with detailed operating and maintenance instructions and copies of warranties/warranties for each system prior to final inspection. **5.410.4.5**
  3. Include a copy of all inspection verifications and reports required by the enforcing agency. **5.410.4.5.1**
- Comply with at least one additional elective from Division A5.4.

## ENVIRONMENTAL QUALITY

- Install only a direct-vent sealed-combustion gas or sealed wood-burning fireplace or a sealed woodstove and refer to residential requirements in the California Energy Code. **5.503.1**
- Woodstoves shall comply with US EPA Phase II emission limits. **5.503.1.1**
- At the time of rough installation or during storage on the construction site and until final startup of the heating and cooling equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheetmetal or other methods acceptable to the enforcing agency to reduce the amount of dust or debris which may collect in the system. **5.504.3**
- Adhesives and sealants used on the project shall meet the requirements of the following standards.
  1. Adhesives, adhesive bonding primers, adhesive primers, sealants, sealant primers and caulks shall comply with local or regional air pollution control or air quality management district rules, or SCAQMD Rule 1168 VOC limits. **5.504.4.1**
  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. **5.504.4.1**
- Architectural paints and coatings shall comply with Table 5.504.4. **5.504.4.3**
- Aerosol paints and coatings shall meet the Product-Weighted MIR Limits for ROC in Section 94522(a)(3) and other requirements, including prohibitions on use of certain toxic compounds and ozone depleting substances (CCR, Title 17, Section 94520 et seq). **5.504.4.3.1**
- All carpet cushion installed in the building interior shall meet the requirements of the Carpet and Rug Institute (CRI) Green Label program. **5.504.4.4.1**
- All carpet adhesive shall meet the requirements of Table 804.4.1. **5.504.4.4.2**
- Hardwood plywood, particleboard and medium density fiberboard composite wood products used on the interior or exterior of the building shall meet the requirements for formaldehyde as specified in Table 5.504.4. **5.504.4.5**
- Composite wood products shall meet the Phase 2 requirements before the compliance dates indicated in Table 5.504.4.5. **A5.504.4.5.1**
- For at least 80 percent of floor area receiving resilient flooring, install resilient flooring complying with the VOC-emission limits defined in the 2009 CHPS criteria and listed on its Low-emitting Materials List (or Product Registry) or certified under the FloorScore program of the Resilient Floor Covering Institute. **A5.504.4.7**
- Thermal Insulation must comply with the VOC-emission limits defined in 2009 CHPS criteria and listed on its Low-emitting Materials List. **A5.504.4.8**
- In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air prior to occupancy that provides at least a MERV of 8. **5.504.5.3**
- Prohibit smoking within 25 feet of building entries, outdoor air intakes and operable windows where outdoor areas are provided for smoking and in buildings. **5.504.7**
- Wall and floor-ceiling assemblies making up the building envelope shall have an STC of at least 50 and exterior windows shall have a minimum STC of 30 whenever within 1,000 feet of a freeway right-

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of-way, within 5 miles of airports serving more than 10,000 commercial jets per year, or when the sound level at the property line regularly exceeds 65 decibels. **5.507.4.1**

- Wall and floor-ceiling assemblies separating tenant spaces and tenant spaces and public places shall have an STC of at least 40. **5.507.4.2**
  - Install HVAC and refrigeration equipment that does not contain CFCs. **5.508.1.1**
  - Install fire suppression equipment that does not contain Halons. **5.508.1.2**
  - Install HVAC and refrigeration equipment that does not contain HCFCs. **A5.508.1.3**
  - Install HVAC complying with either of the following: **A5.508.1.4**
    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.
  - Comply with at least one additional elective from Division A5.5.
- 
- Comply with at least one additional elective from any Division.

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# Non-Residential Electives

## PLANNING AND DESIGN (at least one required)

### Site Selection

**Community connectivity.** Locate project on a previously developed site within a ½ mile radius of at least ten basic services, listed in Section A5.103.1. **A5.103.1**

**Brownfield or greyfield site redevelopment or infill area development.** Select for development a brownfield in accordance with Section A5.103.2.1 or on a greyfield or infill site as defined in Section A5.102. **A5.103.2**

**A5.103.3.1 Brownfield redevelopment.** Develop a site documented as contaminated and fully remediated or on a site defined as a brownfield.

### Site Preservation

**A5.104.1.1 Local zoning requirement in place.** Exceed the zoning's open space requirement for vegetated open space on the site by 25 percent.

**A5.104.1.2 No local zoning requirement in place.** Provide vegetated open space area adjacent to the building equal to the building footprint area.

**A5.104.1.3 No open space required in zoning ordinance.** Provide vegetated open space equal to 20 percent of the total project site area.

### Deconstruction and Reuse of Existing Structures

**A5.105.1.1 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 for reuse on this project in an onsite storage area or for salvage in dedicated collection bins. Document the weight or number of the items salvaged.

### Site Development

**A5.106.3 Low impact development (LID).** Reduce peak runoff in compliance with Section 5.106.3.1. Employ at least two of the following methods or other best management practices to allow rainwater to soak into the ground, evaporate into the air or collect in storage receptacles for irrigation or other beneficial uses. LID strategies include, but are not limited to those listed in Section A5.106.4.

**A5.106.4.3 Changing rooms.** In conjunction with the required bicycle parking, for buildings with over 10 tenant-occupants, provide changing/shower facilities in accordance with Table A5.106.4.3 or document arrangements with nearby changing/shower facilities.

**A5.106.5.1 Designated parking for fuel-efficient vehicles.** Provide at least 12 percent of the total designated parking spaces for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles.

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**A5.106.5.3.1 Electric vehicle supply wiring.** For each space required in Table A406.1.6.2.1, provide one 120 VAC 20 amp and one 208/240 V 40 amp, grounded AC outlets or panel capacity and conduit installed for future outlets and as shown in Table A5.106.5.3.1.

**A5.106.6.1 Reduce parking capacity.** With approval, employ strategies to meet but not exceed on-site parking 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.

**A5.106.7 Exterior walls.** Meet requirements in the current edition of the *California Energy Code* and select one of the following for wall surfaces:

1. Provide vegetative or man-made shading devices for east-, south- and west-facing walls with windows.
2. Use wall surfacing with minimum SRI 25 (aged), for 75 percent of opaque wall areas.

**A5.106.9 Building orientation.** Locate and orient the building as follows:

1. Long sides facing north and south
2. Protect the building from thermal loss, drafts and degradation of the building envelope caused by wind and wind-driven materials.

**A5.106.11 Heat island effect.** Reduce nonroof heat islands and roof heat islands as follows:

**A5.106.11.1 Hardscape alternatives.** Use one or a combination of strategies 1 through 3 for 50 percent of site hardscape or put 50 percent of parking underground.

1. Provide shade (mature within 5 years of occupancy).
2. Use light colored/ high-albedo materials.
3. Use open-grid pavement system.

**A5.106.11.2 Cool roof.** Use roofing materials having solar reflectance, thermal emittance or Solar Reflectance Index (SRI) equal to or greater than the values shown in Table A5.106.11.2.2.

## **ENERGY EFFICIENCY (at least one required)**

### **Performance Requirements**

**A5.203.1.2 Tier 2.** Exceed *California Energy Code* requirements, based on the 2008 Energy Efficiency Standards, by 30 percent.

### **Prescriptive Measures**

**A5.204.1 ENERGY STAR equipment and appliances.** All equipment and appliances provided by the builder shall be ENERGY STAR labeled if ENERGY STAR is applicable to that equipment or appliance.

**A5.204.2 Energy monitoring.** Provide submetering or equivalent combinations of sensor measurements and thermodynamic calculations, if appropriate, to record energy use data for each major energy system in the building.

**A5.204.2.1 Data storage.** The data management system must be capable of electronically storing energy data and creating user reports showing hourly, daily, monthly and annual energy consumption for each major energy system.

**A5.204.2.2 Data access.** Hourly energy use data shall be accessible through a central data management system and must be available daily.

**A5.204.3 Demand response.** HVAC systems with Direct Digital Control Systems and centralized lighting systems shall include preprogrammed demand response strategies that are automated with either a Demand Response Automation Internet Software Client or dry contact relays.

**A5.204.3.1 HVAC.** The preprogrammed demand response strategies should be capable of reducing the peak HVAC demand by cooling temperature set point adjustment.

**A5.204.3.2 Lighting.** The preprogrammed demand response strategies should be capable of reducing the total lighting load by a minimum 30 percent through dimming control or bi-level switching.

**A5.204.3.3 Software clients.** The software clients will be capable of communicating with a DR Automation Server.

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## **Renewable Energy**

**A5.211.1 On-site renewable energy.** Use on-site renewable energy for at least 1 percent of the electrical service overcurrent protection device rating calculated in accordance with the 2007 *California Electrical Code* or 1KW, whichever is greater, in addition to the electrical demand required to meet 1 percent of natural gas and propane use calculated in accordance with the 2007 *California Plumbing Code*.

**A5.211.1.1 Documentation.** Calculate renewable on-site system to meet the requirements of Section A5.211.1. Factor in net-metering, if offered by local utility, on an annual basis.

**A5.211.3 Green power.** Participate in the local utility's renewable energy portfolio program that provides a minimum of 50 percent electrical power from renewable sources. Maintain documentation through utility billings.

**A5.211.4 Prewiring for future solar.** Install conduit from the building roof or eave to a location within the building identified as suitable for future installation of a charge controller (regulator) and inverter.

**A5.211.4.1 Off-grid prewiring for future solar.** If battery storage is anticipated, conduit should run to a location within the building that is stable, weather-proof, insulated against very hot and very cold weather and isolated from occupied spaces.

## **Elevators, Escalators and Other Equipment**

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

## **Energy Efficient Steel Framing**

**A5.213.1 Steel framing.** Design for and employ techniques to avoid thermal bridging.

# **WATER EFFICIENCY AND CONSERVATION (at least one required)**

## **Indoor Water Use**

**5.303.2 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. (Calculate savings by Water Use Worksheets)

**5.303.2.1 Multiple showerheads serving one shower.** When single shower fixtures are served by more than one showerhead, the combined flow rate of all the showerheads shall not exceed the maximum flow rates specified in the 20 percent reduction column contained in Table 5.303.2.3 or the shower shall be designed to only allow one showerhead to be in operation at a time.

**A5.303.2.3.2 35 percent savings.** A schedule of plumbing fixtures and fixture fittings that will reduce the overall use of potable water within the building by 35 percent shall be provided. (Calculate savings by Water Use Worksheets)

## **A5.303.3 Appliances.**

1. Clothes washers shall have a maximum Water Factor (WF) that will reduce the use of water.
2. Dishwashers shall meet the criteria in Section A5.303.3(2)(a) and (b).
3. Ice makers shall be air cooled.
4. Food steamers shall be connectionless or boilerless.
5. The use and installation of water softeners shall be limited or prohibited by local agencies.

**A5.303.5 Dual plumbing.** New buildings and facilities shall be dual plumbed for potable and recycled water systems.

## **Outdoor Water Use**

**A5.304.4 Potable water reduction.** Provide water efficient landscape irrigation design that reduces by the use of potable water.

**A5.304.4.1 Tier 1 –** Reduce the use of potable water to a quantity that does not exceed 60 percent of ETo times the landscape area.

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**A5.304.4.2** Reduce the use of potable water to a quantity that does not exceed 55 percent of ETo times the landscape area.

**A5.304.5 Potable water elimination.** Provide a water efficient landscape irrigation design that eliminates the use of potable water beyond the initial requirements for plant installation and establishment.

Methods used to accomplish the requirements of this section shall include, but not be limited to, the items listed in Section A5.304.4.

**A5.304.6 Restoration of areas disturbed by construction.** Restore all areas disturbed during construction by planting with local native and/or noninvasive vegetation.

**A5.104.7 Previously developed sites.** On previously developed or graded sites, restore or protect at least 50 percent of the site area with native and/or noninvasive vegetation.

**A5.304.8 Graywater irrigation system.** Install graywater collection system for onsite subsurface irrigation using graywater.

## **MATERIAL CONSERVATION & RESOURCE EFFICIENCY (at least one required)**

### **Efficient Framing Systems**

**A5.404.1 Wood framing.** Employ advanced wood framing techniques or OVE, as permitted by the enforcing agency.

### **Material Sources**

**A5.405.1 Regional materials.** Select building materials or products for permanent installation on the project that have been harvested or manufactured in California or within 500 miles of the project site, meeting the criteria listed in Section A5.405.1.

**A5.405.2 Bio-based materials.** Select bio-based building materials per Section A5.405.2.1 or A5.405.2.2.

**A5.405.2.1 Certified wood products.** Certified wood is an important component of green building strategies and the California Building Standards Commission will continue to develop a standard through the next code cycle.

**A5.405.2.2 Rapidly renewable materials.** Use materials made from plants harvested within a ten-year cycle for at least 2.5 percent of total materials value, based on estimated cost.

**A5.405.3 Reused materials.** Use salvaged, refurbished, refinished or reused materials for at least 5 percent of the total value, based on estimated cost of materials on the project.

**A5.405.4.1 Recycled content.** Use materials, equivalent in performance to virgin materials, with postconsumer or preconsumer recycled content value (RCV) for a minimum of 15 percent of the total value, based on estimated cost of materials on the project. Provide documentation as to the respective values.

**A5.405.5 Cement and concrete.** Use cement and concrete made with recycled products and complying with the following sections:

**A5.405.5.1 Cement.** Meet the following standards for cement:

1. Portland cement shall meet ASTM C 150.
2. Blended hydraulic cement shall meet ASTM C 595.

**A5.405.5.2 Concrete.** Unless otherwise directed by the engineer, use concrete manufactured with cementitious materials in accordance with Sections A5.405.5.2.1 and A5.405.5.2.2, as approved by the enforcing agency.

**A5.405.5.2.1 Supplementary cementitious materials (SCMs).** Use concrete made with one or more of the SCMs listed in Section A5.405.5.2.1.

**A5.405.5.2.1.1 Mix design equation.** Use any combination of one or more SCMs, satisfying Equation A4.5-1.

**Exception:** Minimums for concrete products requiring high early strength may be lower as directed by the engineer.

**A5.405.5.3 Additional means of compliance.** Any of the following measures may be employed for the production of cement or concrete, depending on their availability and suitability, in conjunction with Section A5.405.5.2.

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**A5.405.5.3.1 Cement.** The following measures may be used in the manufacture of cement.

**A5.405.5.3.1.1 Alternative fuels.** Where permitted by state or local air quality standards, use alternative fuels.

**A5.405.5.3.1.2 Alternative power.** Use alternate electric power generated at the cement plant and/or green power purchased from the utility meeting the requirements of Section A5.211.

**A5.405.5.3.1.3 Alternative ingredients.** Use inorganic processing additions and limestone meeting ASTM C 150.

**A5.405.5.3.2 Concrete.** The following measures may be used in the manufacture of concrete,

**A5.405.5.3.2.1 Alternative energy.** Use renewable or alternative energy meeting the requirements of Section A5.211.

**A5.405.5.3.2.2 Recycled aggregates.** Use concrete made with one or more of the materials listed in Section A5.405.5.3.2.2.

**A5.405.5.3.2.3 Mixing water.** Use water meeting ASTM C1602, either recycled water provided by the local water purveyor or water reclaimed from manufacturing processes.

### **Enhanced Durability and Reduced Maintenance**

**A5.406.1.1 Service life.** Select materials for longevity and minimal deterioration under conditions of use.

**A5.406.1.2 Reduced maintenance.** Select materials that require little, if any, finishing.

**A5.406.1.3 Recyclability.** Select materials that can be re-used or recycled at the end of their service life.

### **Life Cycle Assessment**

**A5.409.1 Materials and system assemblies.** Select materials assemblies based on life cycle assessment of their embodied energy and/or green house gas emission potentials. See Sections A5.409.1.1 and A5.409.1.2 for available tools.

## **ENVIRONMENTAL QUALITY (at least one required)**

### **Pollutant Control**

**A5.504.1 Indoor air quality (IAQ) during construction.** Maintain IAQ as provided in Sections A5.504.1.1 and A5.504.1.2.

**A5.504.1.1 Temporary ventilation.** Provide temporary ventilation during construction in accordance with Section 121 of the *California Energy Code*, CCR, Title 24, Part 6 and Chapter 4 of CCR, Title 8 and as listed in Items 1 through 4 in Section A5.504.1.2.

**A5.504.1.2 Additional IAQ measures.** Employ additional measures as listed in Items 1 through 5 in Section A5.504.1.3.

**A5.504.2 IAQ postconstruction.** Flush out the building per Section A5.504.2 prior to occupancy or if the building is occupied.

**A5.504.2.1 IAQ Testing.** A testing alternative may be employed after all interior finishes have been installed, using testing protocols recognized by the United State Environmental Protection Agency (U.S. EPA) and in accordance with Section A5.504.2.1.2. Retest as required in Section A5.504.2.1.3.

**A5.504.2.1.1 Maximum levels of contaminants.** Allowable levels of contaminant concentrations measured by testing shall not exceed the following:

1. Carbon Monoxide (CO): 9 parts per million, not to exceed outdoor levels by 2 parts per million;
2. Formaldehyde: 27 parts per billion;
3. Particulates (PM10): 50 micrograms per cubic meter;
4. 4-Phenylcyclohexene (4-PCH): 6.5 micrograms per cubic meter; and
5. Total Volatile Organic Compounds (TVOC): 300 micrograms per cubic meter.

**A5.504.2.1.2 Test protocols.** Testing of indoor air quality should include the elements listed in Items 1 through 4.

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**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.

**A5.504.4.6.1 Verification of compliance.** Documentation shall be provided verifying that resilient flooring materials meet the pollutant emission limits.

**A5.504.4.7.1 Resilient flooring systems.** For 100 percent of floor area scheduled to receive resilient flooring, install resilient flooring complying with the VOC-emission limits defined in the 2009 CHPS criteria and listed on its Low-emitting Materials List (or Product Registry) or certified under the FloorScore program of the Resilient Floor Covering Institute.

**A5.504.4.7.2 Verification of compliance.** Documentation shall be provided verifying that resilient flooring materials meet the pollutant emission limits.

**A5.504.4.8.1 Thermal insulation, Tier 2.** Install No-Added Formaldehyde thermal insulation in addition to meeting Section A5.504.4.8.

**A5.504.4.8.2 Verification of compliance.** Documentation shall be provided verifying that thermal insulation materials meet the pollutant emission limits.

**A5.504.4.9 Acoustical ceilings and wall panels.** Comply with Chapter 8 in Title 24, Part 2 and with the VOC-emission limits defined in the 2009 CHPS criteria and listed on its Low-emitting Materials List (or Product Registry).

**A5.504.4.9.1 Verification of compliance.** Documentation shall be provided verifying that acoustical finish materials meet the pollutant emission limits.

**A5.504.5 Hazardous particulates and chemical pollutants.** Minimize and control pollutant entry into buildings and cross-contamination of regularly occupied areas.

**A5.504.5.1 Entryway systems.** Install permanent entryway systems measuring at least six feet in the primary direction of travel to capture dirt and particulates at entryways directly connected to the outdoors as listed in Items 1 through 3 in Section A5.504.5.1.

**A5.504.5.2 Isolation of pollutant sources.** In rooms where activities produce hazardous fumes or chemicals, exhaust them and isolate them from their adjacent rooms as listed in Items 1 through 3 in Section A5.504.5.2.

**A5.504.5.3.1 Filters.** In mechanically ventilated buildings, provide regularly occupied areas of the building with air filtration media for outside and return air prior to occupancy that provides at least a MERV of 11.

## **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 2007 *California Energy Code* by Sections A5.507.1.1.1 and A5.507.1.1.2.

**A5.507.1.1.1 Lighting.** Provide individual task lighting and/or daylighting controls for at least 90 percent of the building occupants.

**A5.507.1.1.2 Thermal comfort.** Provide individual thermal comfort controls for at least 50 percent of the building occupants by Items 1 and 2 in Section A5.507.1.1.2.

**A5.507.1.2 Multi-occupant spaces.** Provide lighting and thermal comfort system controls for all shared multi-occupant spaces.

**A5.507.2 Daylight.** Provide daylit spaces as required for toplighting and sidelighting in the 2007 *California Energy Code*. In constructing a design, consider Items 1 through 4 in Section A5.507.3.

**A5.507.3 Views.** Achieve direct line of sight to the outdoor environment via vision glazing between 2'6" and 7'6" above finish floor for building occupants in 90 percent of all regularly occupied areas.

**A5.507.3.1 Interior office spaces.** Entire areas of interior office spaces may be included in the calculation if at least 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.

## **Outdoor Air Quality**

**5.508.1 Ozone depletion and global warming reductions.** Installations of HVAC, refrigeration and fire suppression equipment shall comply with Sections 5.508.1.1 and 5.508.1.2.

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**A5.508.1.3 Hydrochlorofluorocarbons (HCFCs).** Install HVAC and refrigeration equipment that does not contain HCFCs.

**A5.508.1.4 Hydrofluorocarbons (HFCs).** Install HVAC complying with either of the following:

1. Install HVAC, refrigeration and fire suppression equipment that do not contain HFCs or that do not contain HFCs with a global warming potential greater than 150.
2. Install HVAC and refrigeration equipment that limit the use of HFC refrigerant through the use of a secondary heat transfer fluid with a global warming potential no greater than 1.

**At least one additional elective chosen from any Category is required**

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