A JURISDICTIONAL SURVEY AND ASSESSMENT OF THE INTERNATIONAL GREEN CONSTRUCTION CODE (IgCC) TO INFORM EVALUATION OF THE FEASIBILITY OF ADOPTING IgCC IN MASSACHUSETTS

Prepared for the Boston Society of Architects

July 22, 2011

July 22, 2011

Vernon Woodworth
Boston Society of Architects
52 Broad Street
Boston, MA 02109-4332

Dear Mr. Woodworth:

The Center for Code Reform is pleased to submit this Survey and Assessment of jurisdictions that have adopted or are considering adopting the International Green Construction Code (IgCC). As the International Code Council moves toward its final action hearings on the IgCC this November, momentum appears to be building for considering the IgCC as a workable supplement to the International Energy Conservation Code, widely adopted in conjunction with the American Recovery and Reinvestment Act of 2009. It is still early – even jurisdictions that have adopted the IgCC do not yet have experience with its administration and operation. Nor are there data on the actual performance of buildings built to IgCC standards. Nonetheless, as of today, those jurisdictions looking at or adopting the IgCC are enthusiastic about its potential to bring a level of uniformity to green building and at the same time allow for the types of local variations made necessary by physical and political conditions. We hope you will find the information and analysis presented here helpful in your evaluation of the feasibility of adopting the IgCC in Massachusetts.

Sincerely,

Phyllis Arnold
Executive Director
Center for Code Reform
parnold@codereform.org
917.515.2165

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Section I. Overview

By Letter Agreement dated May 24, 2011, the Boston Society of Architects (BSA) retained the Center for Code Reform (the Center) to undertake research into the International Green Construction Code (IgCC). Specifically, BSA sought information from jurisdictions around the country to inform its evaluation of the feasibility of adopting the IgCC in Massachusetts. BSA specified the following tasks, in priority order:

A. Identify jurisdictions that have adopted any version of the IgCC, and note which sections of the IgCC were adopted and which sections were not adopted.

B. Report on the enforcement structure proposed or in-place for the IgCC in these jurisdictions, and comment on relationship between the IgCC and existing codes.

C. Secure available documentation regarding the impacts of adoption (economic or other) as prepared or reviewed by the adopting jurisdiction.

D. Identify any jurisdictions currently evaluating IgCC adoption and describe the process such jurisdictions are using to undertake this process.

E. Summarize the training proposed or in-place for design professionals, building officials, contractors and others for IgCC compliance in the adopting jurisdiction.

The Center conducted its research on the internet and through telephone calls. We identified IgCC jurisdictions through discussions with the International Code Council (ICC) and a search of its database of state and local adoptions. We also used contacts provided by BSA. With the exception of Massachusetts, we posed the same set of questions to all jurisdictions, reflecting the areas of inquiry outlined in the scope of work. Before each discussion, we examined the jurisdiction's scheme for regulating building construction. For Massachusetts, we followed the trail of the Green Building Plan Commission, whose formation was mandated by the Green Communities Act of 2008, which in turn led to the Massachusetts Department of Energy Resources and a discussion of the regulatory framework in the Commonwealth with which any consideration of the IgCC must contend. See Section IV below.

The results of discussions with the jurisdictions contacted are reflected in Table 1. All sources are cited in the Table. Section II of the Survey outlines the framework under which the IgCC is being developed and its status. Section III summarizes the findings presented in Table 1. Section IV addresses Massachusetts. Finally, Section V makes several recommendations for BSA's next steps.

Section II. The IgCC

In a pioneering effort to codify the fundamentals of green construction, the IgCC is scheduled to be published as part of the 2012 International Family of Codes. It is expected to incorporate categories of sustainability and to provide some of the flexibility of the United States Green Building Council (USGBC) LEED rating systems as well as to offer ASHRAE's 189.1 High Performance Building Standard as a compliance path. The IgCC is designed to function as an overlay code – it presumes and does not replicate the requirements of the other International codes, but allows a jurisdiction to adopt more stringent requirements in the areas of site development and land use, water and energy conservation, materials and environmental quality, and commissioning, among other topics.

Each chapter of the IgCC is devoted to a sustainability topic following the outline of a LEED point system. While each chapter includes mandatory requirements, the IgCC also allows significant flexibility through "jurisdictional requirements" and "project electives." The adopting jurisdiction can determine which of the possible jurisdictional requirements it makes mandatory and also how many project electives are required to be achieved. The project electives are analogous to the points of a LEED rating system because the Project Team can determine which electives to pursue.

The IgCC is seen as the logical outcome of the process of market transformation initiated by the USGBC with the development of the LEED systems. Because the LEED systems are choice-driven rating systems, they do not lend themselves to enforcement as a code. But the implications of adopting a

construction code with a similarly encompassing scope are considerable for the design, construction, enforcement, and owner/occupant communities. As the consequences of the environmental impacts of human development become increasingly evident, the need for more sustainable construction and operation regulations becomes more urgent. While the IgCC will continue to evolve with each successive three-year cycle, the overall scope as a comprehensive approach to mandatory standards for sustainability has been established. The nature and pace of adoption and the readiness of the design, construction, enforcement, and owner/occupant communities to embrace the IgCC are now the key variables in the introduction of this new paradigm for code regulations.

Section III. Summary of Findings

The Center has completed discussions with four localities and four states that have adopted or are considering adopting the IgCC. We have also spoken with the Commonwealth of Massachusetts, the New Buildings Institute, and a proponent of the IgCC in Colorado. The results of these discussions are reflected in Table 1. This section pulls from the data in Table 1 common themes and patterns that together give a snapshot, as of July 2011, of the IgCC's standing nationally.

As a threshold matter, the IgCC[1] is not final. The International Code Council (ICC) will hold final action hearings in November 2011 and anticipates publication of the final text in March 2012. With the exception of Maryland, which adopted the final March 2012 version of the IgCC that has yet to be published, jurisdictions that have adopted the IgCC have adopted a non-final version of the text. Thus, as of today, there is some degree of uncertainty as to what "adopting the IgCC" may mean or entail.

With the exception of Fort Collins, Colorado and Rhode Island, the jurisdictions interviewed that have adopted the IgCC for private construction have made it optional, to be applied as an overlay to existing mandatory building codes[2]. Fort Collins selected provisions from the IgCC and incorporated them directly into its locally adopted building, plumbing, and energy codes, making them parts of those mandatory codes.[3] Rhode Island has adopted the IgCC for public buildings only, and mandates

[1] The IgCC's application is by definition limited to construction in and of commercial buildings. It is used here with that limitation.

[2] The term "overlay" is used here to mean independent of the other building codes in the jurisdiction. Fort Collins, Colorado and Keene, New Hampshire are exceptions to the overlay trend. Keene's adoption of the IgCC was effectively accomplished through its zoning code, rendering the IgCC dependent upon other law. Fort Collins, Colorado incorporated selected IgCC provisions directly into its building, plumbing, and energy codes. "Building code," when used in the text, is meant to capture all applicable codes regulating construction in the jurisdiction, whether they be I-codes or other form of code governing building, plumbing, fire, or mechanical and fuel gas systems.

[3] Thus, officials in Fort Collins make clear that the city has not "adopted" the IgCC at all, but rather has "greened" its existing codes. Its rationale for doing so is to make these provisions as much as possible a part of routine design, construction, and occupancy.

compliance from new construction over 5,000 square feet and from alterations over 10,000 square feet.[4]

Even though the IgCC itself is structured with a mandatory component, voluntary compliance is one way through which jurisdictions are trying to preempt opposition. Some building owners and developers, while aware of the benefits and marketing value of "green building," are reluctant to accept it as a mandate without data showing that green is cost-effective. Typically, a jurisdiction will commit to gathering data from projects that opt in to the IgCC program in order to support the next anticipated phase of code development, whether it be a wider scope of application, more stringent technical standards, or mandatory provisions. Oregon's state legislation expressly directs the implementing agency to review the operation of its Reach Code for items that can become part of the mandatory provisions of the state Building Code. An incremental approach of this sort also provides room for the fairly steep learning curve that both the professional community and building officials may have as they implement aspects of the IgCC.

Jurisdictions vary on the method used to adopt the IgCC. In state-wide jurisdictions, the state legislature generally will have enacted law directing the administrative adoption of green building options that satisfy a state-mandated standard. For example, the Rhode Island legislation, applicable only to public buildings undergoing construction of a certain scope, requires that all covered construction satisfy a LEED certified or equivalent high performance green building standard. The law authorizes a Green Building Advisory Committee to advise on implementation of the law. Rhode Island's Department of Administration, to which the Green Building Advisory Committee reports, will promulgate rules in phases. So far, it has adopted a rule establishing the IgCC has one of three equivalent compliance options.

[4] Because of its regulatory scheme and the sequencing of its implementation, Rhode Island's mandatory IgCC is in fact not capable of being enforced as a mandate at this time.

And in Oregon, state law mandates development of a reach code to increase the "energy efficiency" of buildings to achieve higher energy efficiency than that required by the state Building Code. The State's Building Codes Division has adopted parts of the IgCC through rule-making.

Finally, legislation in Maryland directly authorizes its Department of Housing and Community Development to adopt the IgCC. Once that agency adopts it administratively, the IgCC will be published as part of the state-wide Maryland Building Performance Standards.

Local legislative bodies have adopted the IgCC in especially creative ways. Phoenix, Arizona adopted it straight-out. Keene, New Hampshire chose the IgCC as one among several compliance standards for which zoning bonuses are possible in a specified zoning district. And Fort Collins, Colorado selected for incorporation into its building, plumbing, and energy codes IgCC provisions that advance its goals of moving toward green building standards and enhancing the quality of testing, measuring, and verifying outcomes.

Modifications to the IgCC in adopting jurisdictions have ranged from none (Keene, New Hampshire and Maryland) to slight (Boynton Beach, Florida and Phoenix, Arizona) to extensive (Fort Collins, Colorado and Oregon). In some cases, constraints arising from the terms of enabling legislation, inter-agency jurisdictional limitations, or the law of home rule operate to force agencies to delete whole chapters of the IgCC.

For example, Oregon's recent adoption of the IgCC as the Oregon Reach Code was limited in part by the state legislation's command to increase the "energy efficiency" of buildings to achieve higher energy efficiency than that required by the state Building Code. The law defines energy efficiency as the "use of construction and design standards, construction methods, products, equipment and devices to increase efficient use of, and reduce consumption of electricity, natural gas and fossil fuels." ORS §455.500. The Building Codes Division found it necessary to eliminate sizeable portions of

the IgCC as insufficiently related to the legislatively articulated "energy efficiency" standard. It deleted others as beyond its jurisdiction, which does not extend to transportation or water quality matters.

In a related vein, officials from the State of New York are engaged in a chapter-by-chapter analysis of the IgCC to identify potential conflicts with state law.

Enforcement of the IgCC, like that of the I-codes in general, relies heavily on third parties. Most of the jurisdictions surveyed plan to use registered design professional commissioning and other third party inspections, testing, and verification. Phoenix, Arizona expects additionally to amend its special inspection provisions to make the registered design professional in responsible charge of building energy simulation accountable for key energy and building system design.

In some jurisdictions, third party enforcement is supplemented with incentives: Boynton Beach, Florida is looking aggressively at such items as project recognition and fee reductions. Oregon has tied the new Reach Code provisions into state and federal tax incentives.

Finally, Keene, New Hampshire hopes to supplement its third party plan review scheme by relying on the availability of an owner's private right of action against a contractor for breach of the obligation to comply with law.

In all but one jurisdiction, stakeholders were part of the process before passage of the IgCC. Processes were often prescribed: Phoenix, Arizona used its established regulatory advisory boards; Oregon engaged in collaborative rulemaking; Rhode Island's Green Building Advisory Committee took shape after enactment of its authorizing legislation. Boynton Beach, Florida did the job without public participation of any sort. Officials there attribute the ability to have done so without opposition to the voluntary nature of the City's "guidelines."

Training is on the agenda in each of the jurisdictions, although few have yet developed its details. Generally, training is intended to be offered to the design and construction communities and to agency staff. Fort Collins, Colorado plans to train the private sector to perform newly required testing,

measurement, and verification tasks as well as building owners in light of that city's new operations and maintenance requirements. Both Fort Collins and Maryland will contract out for training services. Oregon is working on a web-based training program in conjunction with a local college. A number of jurisdictions mentioned the value of attaching continuing education credits to the training offered.

Several jurisdictions developed little or no record of material reviewed as part of the code development process. Boynton Beach, Florida and Rhode Island indicated they did not use any government-supported sample or study to inform their IgCC decisions. Several jurisdictions relied on anecdotal evidence brought to the table by stakeholders, including developers with LEED buildings. Keene, New Hampshire and Phoenix, Arizona expect to gather data from the first group of buildings that opts in to the IgCC scheme.

On the other hand, several jurisdictions either expressly addressed anticipated fiscal impacts or used hard data as part of the decision-making process. Maryland's state legislature produced a Fiscal and Policy Note that assessed state and local costs associated with adoption of the IgCC. In addition, while not produced in connection with the IgCC authorizing legislation, the 2010 Annual Report of Maryland's Green Building Council includes a report from its Green Building Costs Work Group that examined several other green building standards. Both of the Maryland documents are attached as Appendix 1.

The code development process in Fort Collins, Colorado was informed by actual usage data. Fort Collins's effort was managed by a unit of government housed within its public utilities organization, which offered both its data and its experience with utility incentive programs. As a result, the City had and used hard data about actual building performance.[5]

[5] Fort Collins's use of data reflecting actual usage directly addresses the issue of building performance. Indeed, Fort Collins's local amendments to its Building Code expand IgCC's Chapter 9 on commissioning, operation, and maintenance and thus embody its focus on such post-certificate of occupancy issues. The New Buildings Institute is leading research efforts into such "outcome-based" codes, which promise an alternative to traditional

Finally, Oregon undertook a required fiscal analysis based on information provided by building owners and registered design professionals with experience with LEED buildings and energy modeling. In addition, the public record in Oregon is replete with references to the documents on which the administrative action was based. Oregon's June 21, 2011 Notice of Public Hearing regarding adoption of the Oregon Reach Code expressly addresses the anticipated fiscal and economic impacts of adoption on both government and the private sector. It also contains a section titled "Documents Relied Upon, and where they are available," which links directly to source material. See **http://www.cbs.state.or.us/bcd/committees/11reachcode.html** (notices, agendas, minutes, archived videos, including over two years of Reach Committee meeting handouts covering items like composting toilets, passive house cost comparisons, and presentations on life cycle assessment). The Oregon document is attached as Appendix 3.

We asked those interviewed to look back and report on problematic issues encountered in the IgCC consideration or adoption process. Boynton Beach, Florida and Fort Collins, Colorado, both of which are on the verge of implementation, are dealing with operational issues – filing requirements in one case and the needed growth of a skilled third party evaluator industry in the other. Phoenix, Arizona bemoaned the lack of return on investment data. Oregon provided one of the more interesting observations. Officials there were less than fully prepared for the emergence of two distinct stakeholder communities: the green building people and the energy efficiency people. They found challenging the need to mediate between these constituencies, each of which had a different perception of what the Reach Code is and what it is designed to do. This divergence of communities is likely to take shape in a number of jurisdictions that are working with both energy and green building codes or programs.

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design and construction codes that effectively stop regulation at issuance of a certificate of occupancy. A copy of Fort Collins's local amendments to its Building Code is attached as Appendix 2. See especially §3604.1.

As can be seen from this summary, the jurisdictions interviewed are addressing some common issues in some common ways. Voluntary overlay codes are the most widely adopted so far. The use of an advisory stakeholder committee has become the norm, as has the embrace of third parties to test, measure, and verify. An IgCC adoption effort requires an assessment of the availability of economic and energy and water use data as well as development of a comprehensive training program for building officials, industry professionals, contractors, and building owners. Perhaps the greatest variability lies in the adoption method used by any one jurisdiction. Much depends on analysis of state law authority and the interplay of state and local law.

Section IV. Massachusetts

The Commonwealth of Massachusetts is or will soon be well-positioned to begin considering the IgCC. Ian Finlayson at the Massachusetts Department of Energy Resources (DOER) made clear that the Commonwealth supports the IgCC, but is grappling with mapping a path to its adoption. As a result, it may put off until 2015 any IgCC effort. In the interim, we can expect the Commonwealth to focus on developing its next Stretch Energy Code.

The obstacles for Massachusetts come from both the division of jurisdictional authority at the state level and from home rule. As you know, the jurisdiction of the Board of Building Regulations and Standards (BBRS) does not include plumbing. As a result, BBRS cannot itself assert authority over water regulation by adopting IgCC's plumbing provisions. The Building Code Coordinating Council, whose mandate is most recently reflected in Executive Order 518 (January 27, 2010), is charged with developing "a review protocol which [sic] will eliminate redundancy, minimize inconsistencies and conflicts and maximize the efficiency of the code promulgation process." Presumably, this body could help make the IgCC a reality at the state level.

However, Massachusetts also has a home rule problem. Certain parts of the IgCC touch on areas of local concern, such its site development provisions relative to local zoning. Assessing this issue and researching possible solutions is beyond the scope of this project. But it will need to be done.

The Zero Net Energy Advisory Council may be one logical venue for the legal analysis and strategic planning necessary to support IgCC adoption in Massachusetts. The Advisory Council is the successor body to the Zero Net Energy Task Force, which appears to have derived from the Green Building Plan Commission, established by the Green Communities Act. According to Ian, DOER chairs the Advisory Council, which meets three times yearly to review a range of issues arising from the prospect of IgCC adoption. In addition to the Advisory Council, state and Local bar associations may be another source of legal analysis.

Section V. Recommendations and Next Steps

As both the Commonwealth and stakeholders in Massachusetts approach consideration of the IgCC, they are in the fortunate position of having traveled at least part of the road with adoption of the Massachusetts Stretch Energy Code. The Stretch Code establishes the model of state-wide authorization for local adoptions and should prove helpful when introducing a similar concept in conjunction with the IgCC.

The discussion above makes obvious logical next steps in Massachusetts. We detail them here.

1. **Wait for the final IgCC.** It makes little sense so close to publication of the final IgCC to settle on a detailed strategy now, based on the current public versions of the text. While there is no reason to think the basic structure and operation of the IgCC will change at the final action hearings in November, there may be notable changes in its provisions. The following steps, however, should not wait.

2. **Start the legal work on jurisdictional and home rule issues.** Regardless of the content of the final IgCC provisions, its consideration by the Commonwealth will require resolution of jurisdictional and home rule questions. Working directly with the Building Code Coordinating Council, if possible, should help. The ability to offer proposed solutions will go a long way toward quieting any local opposition and to making it easy for DOER to take its next steps. See 4 below.

3. **Consider any options to the Stretch Code model.** The structure of the Massachusetts Stretch Energy Code fits neatly with the IgCC's internal structure of mandates and options and provides a ready precedent for the IgCC. Nonetheless, it is worth expressly affirming that this is the way to go, if the stakeholders so determine. If jurisdictional issues loom too large, it may be worth thinking about the Fort Collins approach of selecting IgCC provisions and integrating them directly into the mandatory Massachusetts codes.

4. **Assess the status and work of the Zero Net Energy Advisory Council and supplement if necessary.** To the extent some interested stakeholders have participated in the past on earlier incarnations of the Advisory Council**,** there is every reason to think they can re-join the effort. Inasmuch as this appears to be the body working within DOER on IgCC issues, it will be worth it. Other groups, including state and local bar associations, may be valuable partners and should also be considered.

5. **Start small. Get data.** Whichever way you cut it – voluntary versus mandatory, public versus private buildings, or a small set of selected provisions versus the entire IgCC - there are many reasons to start small and expand with subsequent revision cycles. Slicing and phasing the effort may offer a solution to some of the jurisdictional and home rule issues by focusing first on what is easy . If data are hard to come by, they will be available and can be gathered and analyzed through reporting requirements for the next round. There is still skepticism about the business model for green building and energy efficient operational directives; carefully crafted provisions and pilot studies can help address that issue.

6. **Bring the utilities into the process. Get data.** If the utilities have not yet been active at the table, they should be. They are good sources of energy and water use data and are likely to have or to have had incentive programs that can be leveraged for consumer buy-in.

7. **Develop an outreach plan early.** There is little question that stakeholders need to be courted and involved in the strategic planning and code development processes. In addition to the traditional constituencies of developers, design professionals, builders, green service providers, and building officials, consider adding building owners and occupants. There are many parts of the IgCC and of the overall consideration of green building and energy codes that ultimately bring one to questions of building operation and maintenance. For example, drafting performance-based compliance provisions, prescribing procedures for assessing energy demand and use, including post-occupancy commissioning, or adopting formulas for consumption based regulation all require some assessment or projection of a building's operation and maintenance. The sooner building owners and occupants are invited and buy into the code development process, the better.

8. **Don't underestimate the value of public outreach and participation.** Ultimately, in the absence of further federal dollars, the momentum for adoption of the IgCC or any other green building or strict energy efficiency standards will depend in part on public demand. The general population is sensitive to energy and other resource depletion issues, especially in metropolitan areas. Fueling that sensitivity through public outreach and education campaigns so as to nurture its growth into a full-fledged demand is essential if we are to move state and local legislatures to adopt increasingly higher design, construction, operation, and maintenance standards.

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Massachusetts is in the enviable position of having traveled the stretch code route before. The success of its Stretch Energy Code as a driver of stricter national standards and as a model for local flexibility provides a ready precedent for the IgCC. By giving localities the choice to opt in and, once

having opted in, to tailor the particular electives to their local circumstances, the IgCC as a stretch code offers technical uniformity and enables local and state governments to respond to technical and political changes as each occurs.

Table 1

Appendix 1 –Maryland Department of Legislative Services, Fiscal and Policy Note for HB 972, 2011 Session; Maryland Green Building Council 2010 Annual Report

Appendix 2 – Ordinance No. 030, 2011 of the Council of the City of Fort Collins

Appendix 3 – Oregon Building Codes Division Notice of Public Hearing for Adoption of 2011 Oregon Commercial Reach Code, June 21, 2011

Jurisdiction	Contact	Applicability	§§ adopted or not adopted	Enforcement Scheme	Relationship to Existing Codes	Documents reviewed for impacts	Process	Training	Biggest Issue
Boynton Beach, FL	Timothy Large, CBO Deputy Building Official (561) 742-6352 referred to e-mail 6/27 f/u Asst. Director Nancy Byrne 561-742-6372 referred to Call 7/5 Andrew P. Mack, Interim Building Official Macka@bbfl.us 561-742-6366	Florida Building Commission (st. body) regulates bldg. codes state-wide; BB adopted Green Building Program adapted from IgCC PV 2.0; adopted as handbook; voluntary; no need state legislation; will look to results to assess making mandatory	Slight mods – format-ting	3d party commission-ing; incentives – project recognition, expedited permitting – looking at refunding permit fees	Overlay of Fla. bldg. codes	none	All internal	ICC provided to staff and stakeholders	1st project about to go through; what sort of documents should they require?; IgCC references to IECC hard to correlate to Fla.

Jurisdiction	Contact	Applicability	§§ adopted or not adopted	Enforcement Scheme	Relationship to Existing Codes	Documents reviewed for impacts	Process	Training	Biggest Issue
Detroit, MI	Celeste Allen Novak 734 846-3903 e-mail 6/17/11 call 6/28; info recv'd 7/12	In early stages of development of High-Performance Green Buildings Action Plan authorized by mayor, applicable to city buildings, to assess energy and water use, and to set and move to performance targets; ASHRAE 189.1-2009							

Jurisdiction	Contact	Applicability	§§ adopted or not adopted	Enforcement Scheme	Relationship to Existing Codes	Documents reviewed for impacts	Process	Training	Biggest Issue
Fort Collins, CO	Doug Swartz dswartz@fcgov.com 970-221-6719 referred to Felix Lee flee@fcgov.com 970-416-2337 e-mail 6/17/11; call 7/11	Local amendments to State authorized, locally adopted I-codes - IPC, IBC, IECC – resulting in mandatory provisions. (Ord. Nos. 30, 31, 35 2011) Housed in city-owned public utility.	All local mods – very selective; focus on core principles – testing, measure-ment, verifica-tion; commis-sioning, opera-tions, and mainte-nance req. and enf. through reporting reqs. §3604	3d party inspections and certs	Direct amendments to existing codes	Largely anecdotal info from stakeholder participants, but had use data from utilities	Purposeful, tightly managed stakeholder process begun in response to City Council directive to look at green building, fiscal implication relegated to 2d place; est. 2%-4% cost increase across the board	Big issue now. Working towards 1/1/2012 implementati on date; RFP pending for training of evaluators	Creating the demand to trigger growth of 3d party evaluator industry; recognizing that IgCC as a whole was impractical, esp. energy component; too much for the schedule
Kayenta Township, AZ	e-mail 6/17/11								

Jurisdiction	Contact	Applicability	§§ adopted or not adopted	Enforcement Scheme	Relationship to Existing Codes	Documents reviewed for impacts	Process	Training	Biggest Issue
Keene, NH	Med Kopczynski mkopczynski@ci.keene.nh.us e-mail 6/17/11; call 6/24	IgCC is option for C buildings in the Sustainable Energy Efficient Development (overlay, established through zoning; zoning bonuses provided as incentive to use IgCC in SEED (Keene Code of Ordinances, Ch. 102, Articles XIII and XIV). IgCC one of three acceptable ratings systems - Green Globes and ICC 700.	No mods yet. Expect to modify as they gain exper-ience.	Through budget allocations; 3d parties do plan review; City does progress and final inspections. State law imposes on contractor obligation to comply with Building Code, if applicable – enforced privately.		City Council formed committee with stakeholders whose experience informed deliberation. No review of fiscal or economic data. Will use experience with SEED to inform next steps.	Committee traveled state-wide. Adopted as part of local zoning ordinance.	Planning to fold into general training for staff. Local professionals are very knowledge-able.	Getting the public engaged in above-code programs. Some parts of state don't have a building code at all; public must demand green /energy and it's a hard sell

Jurisdiction	Contact	Applicability	§§ adopted or not adopted	Enforcement Scheme	Relationship to Existing Codes	Documents reviewed for impacts	Process	Training	Biggest Issue
Maryland	Ed Landon, Director, Codes Administration – landon@mdhousing.org 410-514-7444 e-mail 6/27; call 6/28	Home rule state; State law, eff. 3/1/12 (2011 Session, HB 972); authorizes Department of Housing and Community Development (DHCD) to adopt IgCC (C) by regulation; localities authorized to adopt IgCC themselves or to modify, even loosen standards (except for accessibility and energy).	No mods; State adopted the IgCC version yet to be published.	None at the state level. Local enf. varies from very lax to very aggressive; 3d party inspections suffering with bad economy – who pays – localities determine; considerable modular construction for which State makes 3d party RA responsible for overseeing.	Once IgCC adopted administratively, it is published as part of the state-wide Maryland Building Performance Standards.		Green Building Council established by state law produced report and recs; Legislative and administrative hearings; no opposition (Ed surprised by that); USGBC and ICC testified; legislative champion	State contracts out and offers state-wide to industry and building officials; offers CEUs; money tight – expects green community to fund;	None! (no opp = not caring or already there?); revision cycles keep people thinking about energy and green

Jurisdiction	Contact	Applicability	§§ adopted or not adopted	Enforcement Scheme	Relationship to Existing Codes	Documents reviewed for impacts	Process	Training	Biggest Issue
Maryland (con't)		DHCD adopted administra-tively following public hearing. Voluntary only (tho localities can make mandatory); DHCD posts on website which counties have done what.							
Massachu-setts	Ian Finlayson Buildings & Climate Programs Manager Mass. Dept. of Energy Resources (617) 626-4910 ian.finlayson@state.ma.us call 6/30	See Survey Section IV							

Jurisdiction	Contact	Applicability	§§ adopted or not adopted	Enforcement Scheme	Relationship to Existing Codes	Documents reviewed for impacts	Process	Training	Biggest Issue
New Jersey	Darren Molnar-Port - State of NJ 609/884-7607 **dport@dca.state.nj.us** e-mail 6/27 msg 6/29								
New York	Ron Piester Ronald.Piester@dos.state.ny.us e-mail 6/23	NYS Dept. of State (DOS) reviewing IgCC for possible adoption by localities as more restrictive overlay to state codes (mandated state-wide except NYC) and energy code (mandated state-wide including NYC). State Code Council (established	DOS analyzing IgCC chapter by chapter to assess conflicts with state law as well as potential economic and political burdens				DOS hopes to provide expedited process for local adoption.		

Jurisdiction	Contact	Applicability	§§ adopted or not adopted	Enforcement Scheme	Relationship to Existing Codes	Documents reviewed for impacts	Process	Training	Biggest Issue
New York (con't)		by state law) must approve. Once IgCC gains traction through local adoption, DOS will move to state-wide adoption.							

Jurisdiction	Contact	Applicability	§§ adopted or not adopted	Enforcement Scheme	Relationship to Existing Codes	Documents reviewed for impacts	Process	Training	Biggest Issue
Oregon	Mark Heizer 503-373-0205 Building Codes Division (BCD) mark.r.heizer@state.or.us Aeron Teverbaugh Policy analyst BCD e-mail 6/17/11;call 6/22 Andrea Fouge andrea.j.fouge @state.or.us	State law - mandated reach code to increase the "energy efficiency" of buildings to achieve higher energy efficiency than that required by the state Building Code. ORS §455.500. Oregon Reach Code; separate C and R; C effective July 1, 2011. Wholly elective for buildings in adopting localities; R much easier than C to	Modified to eliminate local choices for mandates (except for high perfor-mance bldgs); modified project electives; deleted items either too expensive (eg water recovery) or not closely enough tied to "energy efficiency "(eg materials) or within	Localities enforce like any other code (progress inspections); intake forms created for 3d party certification that items function as designed and for 3d party and owner certification of electives completed. Designed to fit with state and federal tax incentive programs	Overlay – not intended to stand alone. BCD required to review for items that can move as mandate to state Building Code; BCD will get data from localities	Information from national committees, individuals involved with IgCC and ASHRAE, RDPs and owners with LEED and energy modeling experience; economic data from building owners (fiscal analysis required); market data on costs. BCD has modeling expert in-house. For R reach code, consortium of stakeholders generated consensus proposal	Collab. rulemaking; public meeting; advisory board draft of amends;	Relying on experts in the area; web-based in development with local college. BCD staff travel the state	Green building v. energy people – the divide was awkward; surprised that both groups so far beyond mandatory health and safety standards in Building Code; both groups have different perceptions of what ORC is and is intended to do. Home builders captured b/c energy efficiency is marketable

Jurisdiction	Contact	Applicability	§§ adopted or not adopted	Enforcement Scheme	Relationship to Existing Codes	Documents reviewed for impacts	Process	Training	Biggest Issue
Oregon (con't)		develop	the agency's authority (water quality, transpor-tation)						
Pennsylvan-ia	Maureen Guttman, AIA – State of PA 717/772-8946; **mguttman@state.pa.us** **e-mail 6/27** msg 6/29								

Jurisdiction	Contact	Applicability	§§ adopted or not adopted	Enforcement Scheme	Relationship to Existing Codes	Documents reviewed for impacts	Process	Training	Biggest Issue
Phoenix, AZ	Roger Rotundo General Inspect. Super. City of Phoenix; 602-534-7318; roger.rotundo@phoenix.gov e-mail 6/17/11 call 6/20/11	Phoenix Green Construction Code, eff. 7/1/11; applies to all construction except R and eqpt. and systems used for manufact. or industrial purposes. ICC 700 with mods for R; optional for all construction	Entire IgCC with slight mods – no appen-dices; no carbon footprint provision; instead prescribe % over Energy Code;	Pursuant to separate provisions (Building Construction Code Admin. provisions); progress inspections will incorporate green code items with checklist; rely on RDP commission-ing; will amend special inspection §§ to cover – RDP responsible	Overlay – not intended to stand alone	Difficult to find helpful dox, esp. on ROI; many metering reports prepared now; hopes to have owners compile usage/ROI data for stakeholders to present in next revision cycle; City will keep just database of green buildings	City staff took first pass, paid with fed $; green incentives introduced early (reduced permit fees & expedited plan review); Home Builders comment; → City Advisory Board (stakehold-ers; oversight) →subcom (worked with staff; held hearings)→ Advisory Board	State-wide training for building officials; plan exam training by discipline with checklist; inspector training with checklist; provided CEUs	No ROI data

Jurisdiction	Contact	Applicability	§§ adopted or not adopted	Enforcement Scheme	Relationship to Existing Codes	Documents reviewed for impacts	Process	Training	Biggest Issue
Phoenix, AZ (con't)							recs→recs Develop-ment Advisory Board→ recs City Council; Roger did "luncheon circuit" – no sig pushback		
Rhode Island	John (Jack) Leydon Building Code Commissioner Operations Management Department of Administration Jleyden@gw.doa.state.ri.us 401-222-3529 e-mail 6/17/11 call 6/20/11	2009 Green Buildings Act (Rhode Island General Laws 37-24-1 et seq. or 2009 S 0232) - public buildings only; NBs >5,000 sq. ft.; Alts > 10,000 sq. ft.; required to be designed and constructed	entire IgCC as one of three compli-ance options. Others are LEED cert. (any level), HP schools, Green Globes cert.	None yet; self-report. Compliance part of the Building Code only to the extent of adopted rules. GBAC working on Table 302 rules; until they are adopted, nothing to enforce. Protection from liability	Independent	No state-sponsored study or sample	Legislature heard testimony from around the country; no stakeholder input until after passage and then thru GBAC	State sponsored; underway – RDPs, builders, building officials	Opposition to LEED as only std; started with LEED silver standard and negotiated

Jurisdiction	Contact	Applicability	§§ adopted or not adopted	Enforcement Scheme	Relationship to Existing Codes	Documents reviewed for impacts	Process	Training	Biggest Issue
Rhode Island (con't)		to at least a LEED certified or equivalent high performance green building standard. Authorized Green Building Advisory Committee to advise on implementa-tion; meets monthly; Rules adopted October 2010 cover exception factors, equiv. stds., GBAC operation		for those projects that fail to meet the standards so long as "a good faith attempt was made to achieve the standard." §37-24-6. DOA expects to codify entire Green Buildings Act in rules and only then turn to private buildings.					

Jurisdiction	Contact	Applicability	§§ adopted or not adopted	Enforcement Scheme	Relationship to Existing Codes	Documents reviewed for impacts	Process	Training	Biggest Issue
Richland, WA	Kevin Rex krex@ci.richland.wa.us e-mail 6/17/11; e-mail rec'd 6/22; f/u e-mails last 6/30 No further info	Voluntary moving to mandatory over 10 year period							
Other	Jim Edelson Senior Project Manager New Buildings Institute 503.231.4665 jedelson@comcast.net e-mail 6/17/11 call 6/21/11	The New Buildings Institute is a non-profit dedicated to improving the energy performance of commercial buildings. It provides several forms of assistance to commercial building stakeholders, including governments and utilities, and has a codes program. Jim has been deeply involved in IgCC, including its predecessors, its development, and its implementation. He also played a key role in Oregon's effort to adopt a stretch code, having re-written their energy chapter. He shared his views on a number of key items. First, what *is* IgCC and what is its status? Jim notes that the final IgCC has not been published yet; final action hearings are scheduled for November 2011. Thus, the versions that have been made public are living, changing documents. Because of that, in Jim's view, these public versions are not reliable bases for developing a regulatory scheme and some jurisdictions have acted prematurely. That is not to say IgCC is not valuable; there is a clear need for a national model green code and IgCC, with its flexibility, is on the right path. It contains a wealth of material that goes beyond energy codes. But NBI recommends that, if possible, jurisdictions await the publication of the final IgCC before embracing it and making it their own. The fact that Massachusetts has already done a stretch energy code should help it deal with the IgCC once final. Jim sees state stretch or reach codes as a useful marriage between the technical and political domains. By giving localities the choice to opt in and, once having opted in, to tailor the particular electives to their circumstances, IgCC as a stretch code provides uniformity and enables governments to respond to both political and technical changes as each occurs.							

Other	Christopher J. Green, AIA – AIA CO 970/748-9474; **chris@agostudios.com** e-mail 6/28 call 7/5	Chris thinks it is too soon to adopt – must wait for final IgCC. The economy is a real impediment – people are reluctant to further burden the permitting process. Even so, leaders in different regions of Colorado are working on this. He's taken to using the term "resource conservation" rather than" green building" or "sustainability" as it is harder to oppose and tends to appeal to a broader political spectrum. Metropolitan areas are more likely to consider the IgCC. Their policy is more in tune, resource conservation has become part of the vernacular, and there are populations in cities to support the effort. Colorado's rural areas generally hold different policy views and are concerned about insufficient staff to administer. More and more information is surfacing that the incremental increase in construction costs is more than offset by reduced operation and maintenance costs. This bottom line is starting to take hold and can be used to market to tenants.

7/22/11

HB 972

Department of Legislative Services

Maryland General Assembly
2011 Session

FISCAL AND POLICY NOTE
Revised

House Bill 972 (Delegate Stein, *et al.*)
Environmental Matters Education, Health, and Environmental Affairs

Building Codes - International Green Construction Code

This bill authorizes the Department of Housing and Community Development (DHCD) to adopt by regulation the International Green Construction Code (IGCC). The bill also authorizes local governments to adopt IGCC and make amendments to IGCC.

The bill takes effect March 1, 2012.

Fiscal Summary

State Effect: Potential increase in project costs for any State building that is not required to meet the existing high-performance building standard, to the extent that DHCD adopts IGCC. DHCD workloads and expenditures increase minimally to evaluate the new code and to provide training for State and local building code personnel, but can likely be handled with existing budgeted resources.

Local Effect: Potential increase in project costs for local government buildings in any jurisdiction that adopts IGCC and requires its application to public building construction or renovation.

Small Business Effect: Potential meaningful beneficial impact on small business developers and contractors that specialize in the construction of green buildings, and any firm engaged in producing green building construction components, supplies, or materials. To the extent IGCC is adopted, small businesses could incur additional costs to comply with the code when constructing or renovating a building.

Analysis

Current Law: DHCD is required to adopt, as the Maryland Building Performance Standards (MBPS), the most recent version of the International Building Code (IBC), along with applicable modifications authorized in Title 12 of the Public Safety Article. Within 12 months of the release of each new version of IBC, DHCD is required to review the new version and consider modifications. DHCD is prohibited from adopting any modification that is more stringent than IBC, except that an energy conservation requirement may be more stringent than the International Energy Conservation Code (IECC).

A local jurisdiction may adopt local amendments to MBPS if the local amendments do not prohibit the minimum implementation and enforcement activities required by State law, or weaken the energy conservation and efficiency provisions. If a local amendment conflicts with MBPS, the local amendment prevails in the local jurisdiction.

Maryland's High Performance Buildings Act (Chapter 124 of 2008) requires that most new or renovated State buildings and new school buildings meet or exceed either the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) criteria for a Silver rating or a comparable rating according to a nationally recognized, accepted, and appropriate standard approved by the Department of Budget and Management and the Department of General Services. Chapters 527 and 528 of 2010 require that community college capital projects that receive State funds comply with the State's High Performance Building Act (*i.e.*, achieve at least a LEED Silver rating). Chapters 527 and 528 allow community colleges to receive a waiver from this requirement under the Act's existing procedures.

Chapters 115 and 116 of 2007 codified the Maryland Green Building Council, which had been established by executive order but had been dormant for several years. In December 2007, the council issued its first report with a list of recommendations that were subsequently codified in the High Performance Buildings Act. Chapters 224 and 225 of 2009 required the Maryland Green Building Council to evaluate high-performance building technologies, list the types of buildings that the technology should not be applied to, and report to the Governor on recommendations for the most cost-effective technology and how to expand green building in the State.

Maryland has also adopted several energy efficiency- and conservation-related building code standards deemed important to reducing greenhouse gas emissions and lowering energy costs. Chapter 294 of 2009 required DHCD to adopt IECC and to consider changes to IBC to enhance energy conservation and efficiency. The IECC residential building code is compliant with the federal Energy Conservation and Production Act, and has been adopted in the majority of states.

Background: IGCC is being developed by the International Code Council, in conjunction with the American Institute of Architects; ASTM International; the American Society of Heating, Refrigerating and Air-Conditioning Engineers; the U.S. Green Building Council; and the Illuminating Engineering Society to establish a model code focused on new and existing commercial buildings addressing green building design and performance. A final hearing on code development is scheduled for November 2011 and the 2012 Edition of IGCC is expected in 2012.

The International Code Council was established in 1994 as a nonprofit organization dedicated to developing a single set of comprehensive and coordinated national model construction codes. IBC has been adopted by all 50 states as well as thousands of local jurisdictions.

State Expenditures: To the extent DHCD adopts IGCC, project costs for State building construction or renovation that is not currently required to meet high-performance building standards may increase. Legislative Services advises that while it is not familiar with the technical details of IGCC, a survey of literature, including from the U.S. Green Building Council, generally indicates that IGCC is a baseline construction code similar in structure to IBC, but designed to perpetuate green building design. By contrast, LEED is not a building code, but rather a rating system that assigns points for incorporating a series of attributes within the design for a green building.

Local Expenditures: Local expenditures increase for any jurisdiction that adopts IGCC and elects to require its application to public buildings. Baltimore County advises that it is currently building all new projects to meet LEED certification, and therefore, the bill will have no impact. The City of Havre de Grace did not indicate whether it will adopt IGCC, but advises that if it does, there may be a negligible increase in expenditures to train building code inspectors.

Additional Information

Prior Introductions: None.

Cross File: None.

Information Source(s): Baltimore, Carroll, Cecil, and Montgomery counties; cities of Frederick and Havre de Grace; Department of Budget and Management; Department of General Services; Department of Housing and Community Development; U.S. Green Building Council; International Code Council; Department of Legislative Services

Fiscal Note History: First Reader - March 1, 2011
ncs/lgc Revised - House Third Reader/Updated Information - March 22, 2011
Revised - Enrolled Bill - May 4, 2011

Analysis by: Evan M. Isaacson

Direct Inquiries to:
(410) 946-5510
(301) 970-5510

MARYLAND GREEN BUILDING COUNCIL 2010 ANNUAL REPORT

MARYLAND
Smart, Green & Growing

Presented to Governor Martin O'Malley and the General Assembly

November 1, 2010

ON THE COVER: An architectural study model of the University of Baltimore's new John and Frances Angelos Law Center. Now under construction, the highly-visible law center is a pathbreaking project for the city, the legal community and the growing emphasis on sustainability — and for the thousands of young professionals who will pass through its doors on their way to productive careers in law, business, government and other key industries. Set to open in late 2012, the law center was designed by Stefan Behnisch, lead partner for Behnisch Architekten of Stuttgart, Germany, in partnership with Baltimore's Ayers/Saint/Gross.

Located at North Charles Street and Mount Royal Avenue, the law center is destined to be one of the greenest buildings in Maryland. It will feature innovative air handling systems, the active capture of light and water that would otherwise go to waste and the use of recycled materials throughout the construction phase. Current plans call for a LEED design rating of Gold; efforts are underway to push the rating to Platinum—which would make UB the only law school in the country to bear this status. Construction will generate an estimated 1,231 jobs, providing $60 million in compensation and $7.2 million in state and local tax revenue. In all, the project will drive $174.2 million in economic activity.

PRODUCTION CREDITS:

Stephen Gilliss, Architect, Maryland Department of General Services

Dave Humphrey, Special Projects Manager, Maryland Department of General Services

Gabriela Meneguelli, Graphic Design, Maryland Department of Human Resources

Carolyn Varney-Alvarado, Maryland Department of Housing and Community Development

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

Alvin C. Collins
Secretary

MARYLAND DEPARTMENT OF GENERAL SERVICES
OFFICE OF THE SECRETARY

November 1, 2010

The Honorable Martin O'Malley
Governor of Maryland

The Honorable Thomas V. Mike Miller, Jr.
President of the Senate

The Honorable Michael E. Busch
Speaker of the House of Delegates

The Honorable Members of the General
Assembly of Maryland

RE: Maryland Green Building Council Annual Report
High Performance Building Program in the State Annual Report

Ladies and Gentlemen:

The Maryland Green Building Council, created by Chapters 115 and 116 of the 2007 Laws of Maryland, is privileged to submit to you its fourth annual report.

During the past year the Maryland Green Building Council met on several occasions to review the progress of the higher performance building program in the State, and to develop information that will be relevant to policy makers during the upcoming months as they consider green building issues.

As you will see in the State High Performance Building Program section of this report, we are making notable advances throughout Maryland. Goodpaster Hall at St. Mary's College, which is the crown jewel of the program, continues to win awards. Of comparable significance is the John S. and James L. Knight Hall at the University of Maryland, College Park, home of the Philip Merrill College of Journalism, which was designed to meet the U.S. Green Building Council's LEED Gold standard. Numerous other projects are incorporating an array of sustainability features that are in accord with green building principles.

We established two work groups, one to review the existing literature regarding the cost of building green, and the other to identify existing green building rating systems and tools. These topics were picked to address issues that have been of the greatest interest to legislators in previous years. In addition, we invited representatives from several areas of interest – tourist accommodation, health care, affordable housing, climate change – to brief us on possible State-sanctioned green building policies that would be of benefit to them.

301 West Preston Street
Baltimore, Maryland 21201-2305
(410) 767-4960
FAX (410) 333-5480

Toll Free 1-800-449-4347
e-mail: Alvin.Collins@dgs.state.md.us
TTY users 1-800-735-2258

With the conclusion of the 2010 General Election, the successful candidates for Governor and the General Assembly will have the opportunity during the next four years to design and implement a preeminent green building program.

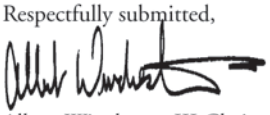
By establishing the Maryland Green Building Council in 2007, the previous General Assembly determined that higher performance buildings were preferred over conventional construction. This policy was reinforced in 2008 when legislation was approved requiring all new or significantly renovated, fully-funded or -owned, State buildings and schools to meet a high green building standard. This statute established State government as a leader in this field, and the private sector followed this lead by planning and constructing scores of buildings incorporating high performance features. So too, has the public responded. By demanding workplaces and homes that conserve energy, use sustainable materials, and create healthy working and living environments, consumers have created an emerging market for green materials and practices.

Much more needs to be done. In January 2011 when the General Assembly convenes for its annual session, there are likely to be dozens of bills concerned with green buildings. Some of these proposals will be narrow in scope, aiming to encourage sustainability principles within a particular economic sector or activity. Others may be far-reaching, designed to advance higher performance building across the entire sphere of new construction and renovation. All of them are likely to have fiscal impacts, in an era when a multitude of interests are competing for scarce government resources.

The challenge for those elected in 2010 will be to demonstrate continued leadership by accepting possible short-term sacrifice in return for substantial benefits in both the immediate and distant future. By approving policies that will promote affordable, sustainable, and healthy living environments in the places where we work and live, the Governor and the members of the 428th General Assembly will have the opportunity to place Maryland in the forefront of the green building field. I encourage you to be bold.

The members of the Maryland Green Building Council appreciate the opportunity you have afforded them to serve our State. We hope that our efforts have benefited and will continue to benefit you, the citizens of Maryland, and most importantly, our children, grandchildren, and many generations to come.

Respectfully submitted,



Albert Winchester III Chairman
Maryland Green Building Council

TABLE OF CONTENTS

Maryland Green Building Council Membership

APPOINTEES OF GOVERNOR MARTIN O'MALLEY

Albert 'Buz' Winchester, III
PO Box 129
4840 Riverside Drive
Galesville, MD 20765
410-867-1968
bmtwinchester@comcast.net

Mark M. Bundy, Ph.D.
1111 Kings Heather Drive
Mitchellville, MD 20721
301-785-3962
mmb_consulting@verizon.net

Anja S. Caldwell, Consultant
7711 Glenmore Spring Way
Bethesda, MD 20817
240-280-3140
anja@ecoipso.com

Peter C. Doo, Architect
531 Piccadilly Road
Towson, MD 21204
443-463-5859
peter@dooconsulting.net

David E. Pratt, Consultant
8924 Blade Green Lane
Columbia, MD 21045
410-715-2588
david.pratt@loraxllc.com

C. Denise Watkins, A.I.A
2539 Pickwick Road
Baltimore, MD 21207
410-448-2513
cdwatkins@cavtel.net

DEPARTMENT MEMBERS/DESIGNEES

Department of General Services
Alvin C. Collins, Secretary
Department of General Services
301 W. Preston Street Room 1401
Baltimore, MD 21201
410-767-4960
410-333-5480 fax
Alvin.Collins@dgs.state.md.us

Stephen Gilliss, Architect, DGS staff
410-767-4675
410-333-7558 fax
Stephen.Gilliss@dgs.state.md.us

Department of Budget and Management
Chad Clapsaddle, Executive Director
Office of Capital Budgeting
Department of Budget and Management
301 W. Preston Street, Suite 1209
Baltimore, MD 21201
410-767-4579
chadc@dbm.state.md.us

Maryland Energy Administration
Walt Auburn, Assistant Director
Energy Efficiency Programs
Maryland Energy Administration
1623 Forest Drive, Suite 300
Annapolis, MD 21403
410-260-7204
or: Betty Wilson 410-260-7752
wauburn@energy.state.md.us

Department of Housing and Community Development
Caroline Varney-Alvarado, Special Assistant
Office of the Secretary
Department of Housing and
Community Development
100 Community Place
Crownsville, MD 21032
410-514-7336
varney-alvarado@mdhousing.org

Department of Natural Resources
Sean McGuire, Natural Resources Planner
Office for a Sustainable Future
Department of Natural Resources
Tawes State Office Building
580 Taylor Avenue
Annapolis, MD 21401
410-260-8727
smcguire@dnr.state.md.us

Maryland Department of Planning
Matthew Power, Deputy Secretary
State Office Building
301 West Preston Street, Room 1101
Baltimore, MD 21201
410-767-4485
mpower@mdp.state.md.us

Maryland Department of Transportation
Meg Andrews, Environmental Planning Manager
Office of Planning & Capital Programming
7201 Corporate Center Drive
P.O. Box 548
Hanover, MD. 21076
410-865-1287
mandrews1@mdot.state.md.us

Maryland Department of the Environment
Susan Scotto, Director Adminitration Services
Montgomery Park Business Center
1800 Washington Boulevard
Baltimore, MD 21230-1718
410-537-3116
sscotto@mde.state.md.us

University System of Maryland
Mark Beck, Director of Capital Planning
University System of Maryland
3300 Metzerott Road
Adelphi, MD 20783
301-445-1984
mbeck@usmd.edu

Interagency Committee on School Construction
David Lever, Executive Director
Interagency Committee on School Construction
200 West Baltimore Street
Baltimore, MD 21201
410-767-0610
dlever@msde.state.md.us

INTRODUCTION

The 2010 Annual Report of the Maryland Green Building Council is being submitted to serve two essential purposes.

The first is to comply with the requirement contained in Chapter 116 of the 2007 Laws of Maryland that the Council report annually to the Governor and the General Assembly on the implementation and progress of the State High Performance Building Program. The plan for implementation of this program was submitted to executive and legislative leaders of the State in January 2008 and was enacted into law as Chapter 124 of the 2008 Laws of Maryland. As was done last year, this report will provide an update on the progress of this plan.

The second purpose is to fulfill the requirement of Chapter 224 of the 2009 Laws of Maryland that the Council provide recommendations concerning how to expand green building in the State and report on any progress that has been made during the preceding year. This statute expanded the responsibilities of the Council to all buildings in Maryland beyond schools and those specifically owned by the State.

In fulfilling its responsibility to assist policy makers in evaluating legislative and regulatory changes designed to advance the principles of building green, the Council established two work groups in the spring of 2010. The first group, chaired by Council member Mark Bundy, was charged with developing a comprehensive list of existing rating systems and tools that assist in achieving levels of greenness in higher performance buildings. The second, chaired by Council member David Pratt, was given the task of researching current data on the additional costs of achieving a LEED Silver rating as required under Maryland law. The reports of these work groups form a substantial portion of this report.

In addition to the activities of the work groups, the Council sought information during its regularly scheduled monthly meetings from several parties expressing interest in high performance buildings. The developer of the first LEED certified hotel in Baltimore City and representatives from the health care sector addressed the Council and shared their views on how the State can encourage building green in their areas of interest. The Council also had the opportunity to hear from officials representing the Department of Housing and Community Development (Housing Programs), the Department of General Services (Energy Performance and Conservation), and the Department of the Environment (Air Planning Program). The information provided at these briefings was helpful in assisting the Council draft this Report.

LEGISLATIVE REPORT:
2010 General Assembly Session

Submitted by: Albert 'Buz' Winchester III, Chairman

While the primary purpose of the Maryland Green Building Council is to recommend the most cost-effective green building technologies to be used in the State, it also acts in an advisory capacity to the Governor and members of the General Assembly to implement these recommendations. In order to perform this task, the Council reviews legislation that pertains to high performance building issues and provides assistance to policy makers when the General Assembly convenes and considers these bills.

The Council as presently constituted views its function as one of providing current and well-researched information and advice on green building to those who are responsible for enacting laws and regulations in this area. As such, it monitors proposed legislation and may comment on pertinent bills upon request.

Of specific interest to the Council in 2010 were two bills concerned with expanding the scope of the buildings required to meet a U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) Silver standard.

Senate Bill 215/House Bill 1040 sought to add capital projects funded partially with State money to the present law that covers only buildings funded fully by the State. The Council supported the concept of this legislation because it would expand what has proven to be a successful, cost-effective program to all recipients of State aid for their building projects. In order to address any perceived problems arising from the implementation of the bill, the Council offered to participate in a work group with other interested parties to seek solutions, but the work group did not convene and the bills did not move forward.

Senate Bill 234/House Bill 1044, legislation to include Community College capital projects in the State High Performance Building Program, which presently covers only State universities and colleges, also was supported by the Council and was enacted into law.

The Council also supported another piece of legislation, House Bill 224. This bill would prohibit a county from adopting or enforcing provisions of a local plumbing code that prohibits a system that recycles gray water, as defined in the State Plumbing Code. The proposal, which will help conserve scarce water resources without endangering public health, passed both houses unanimously and was signed by the Governor.

The only other measure on which the Council took a formal position in 2010 was Senate Bill 479. That legislation sought to place the Green Globes program of the Green Building Initiative on a par with LEED and, as amended, would have required the number of Council

members appointed by the Governor who are associated with Green Globes to be equal to those associated with LEED. The Council opposed this bill, citing its thorough review of the Green Globes program conducted during the summer of 2009, which found several deficiencies in that program. Despite this opposition the Senate approved the bill, but it did not pass because it failed to receive a favorable vote in the House Health and Government Operations Committee.

Several additional proposals that pertained to green buildings were reviewed and monitored by the Council, but were considered to be either outside the direct responsibility of the Council or more properly handled by other interested parties. These included:

- Senate Bill 656/House Bill 705: Energy Performance Ratings – State, County and Municipal Buildings;
- Senate Bill 693/House Bill 1164: Green Maryland Act of 2010;
- Senate Bill 713/House Bill 965: Public and Commercial Buildings – Energy Benchmarking and Disclosure;
- Senate Bill 814/House Bill 932: Public Schools – New Construction or Renovation – Children's Environmental Health;
- Senate Bill 910: Comprehensive Energy Plan;
- Senate Bill 925/House Bill 1112 – Carroll County – Green Building Tax Credit;
- Senate Bill 952/House Bill 1291 – Residential Home Sales – Disclosure of Utility Consumption; and,
- House Bill 1085 – Clean Energy Loan Program.

In January 2011, the General Assembly will begin a new four-year term. Given growing acknowledgement that building green has significant fiscal, environmental, and health benefits, it is likely that the number of bills submitted that deal with higher performance buildings will increase substantially. As it has done in the past, the Maryland Green Building Council is prepared to review these legislative proposals and provide policy makers with its opinions.

GREEN BUILDING COSTS REPORT

Submitted by: David Pratt, Chair, Cost Work Group

Overview

As the number of high performance green building projects increases across the State of Maryland and the rest of the country, there is a high level of interest in the cost 'premium/savings' of developing and maintaining high performance, green buildings. Currently, the Maryland Green Building Council is using two (2) percent as the cost 'premium' for developing to the LEED Silver rating required under Maryland law. While two (2) percent is a reasonable number based on current research, the work group would like to accumulate and refine State information on completed high performance buildings as it becomes available. This will allow the Council to track and communicate the associated 'premium' in a predictable fashion as projects are completed.

The Council's green building costs work group was formed with the primary goal of providing information to the Governor and the Maryland General Assembly on the costs of developing and maintaining State-owned high performance buildings. In this capacity, we envision being an ongoing resource to the Council, the General Assembly, the Governor, and the public, regarding the cost 'premium/savings' of high performance buildings.

Approach/Process

The work group was formed with the intent for its work to be an ongoing process. The objective for the first year report was to review current research, identify the relevant information available, identify important information that is missing, identify the costs to be tracked and recommend an ongoing reporting process. The work group was able to successfully meet our first year objectives.

The group reviewed several widely known reports on green building costs including:

- "Cost of Green Revisited: Reexamining the Feasibility and Cost Impact of Sustainable Design in the Light of Increased Market Adoption," (Davis Langdon, 2007), www.davislangdon.com.
- Morris, P., "Does Green Really Cost," (Davis Langdon, 2007).
- "The Cost & Benefit of Achieving Green Buildings," (Davis Langdon, 2007).
- Matthiessen, L., & Morris, P., "Costing Green: A Comprehensive Cost Database and Budgeting Methodology," (Davis Langdon, 2004).
- Kats, Gregory, "Greening Our Built World: Costs, Benefits, and Strategies," (Island Press: 2010)
- Kats, Gregory, "Greening America's Schools Costs and Benefits," (Capital E, 2006).

- Kats, Gregory, "A Report to California's Sustainable Building Task Force," (Capital E, 2003).

- Maryland Green Building Council, "2009 Annual Report," (2009).

- Maryland Green Building Council, "2008 Annual Report," (2008).

- Maryland Green Building Council, "2007 Annual Report," (2007).

The reports confirmed that the two (2) percent premium being used by the State to describe high performance 'cost premiums' is reasonable. Costs are continuing to decrease as more environmental products and services become available and experienced professionals become the norm in both the design and the construction fields.

An inventory was created and categorized to include State and public school system green buildings that are already completed and currently underway and that meet or exceed the State high performance building standard. It was anticipated that there might be some difficulty gathering cost premium information on State or school system projects that have already been completed (or are underway), since reporting this information was not a requirement. The work group was able to obtain limited 'cost premium' information on several completed projects, but only in a summarized fashion.

A baseline was established for cost categories that will be tracked on future projects. This will provide valuable information, but will require a leadership commitment for appropriate staff to report this information in a timely, organized fashion. Recommendations have been provided to require that this information be reported to the Council when the certification is completed. Once this process is firmly established, the cost work group will be able to report cost premiums on an ongoing basis.

Recommendations

The cost work group proposes the following recommendations:

1. All Maryland State-owned buildings developed to the high performance building standard should submit cost information to the Council at the completion of the project. This information should have costs broken out including the following:
    a. Certification fees
    b. Additional consulting fees (architect, engineer, LEED, etc.)
    c. Increase/decrease product/material costs (summarized at a total project level)
    d. Additional testing and/or required fees (IAQ, surveys, etc.)

2. All K through 12 State-funded public schools that are required to achieve high performance certification should submit cost information to the Council at the completion of the project. The costs are broken out with the same categories described above.

3. Cost information should be published on the Council's Web site.

GREEN BUILDING PROGRAMS REPORT

Submitted by: Mark Bundy, Chair; Green Building Programs Work Group

There are many recognized national and regional programs that relate to building green. Some of them are certification programs, some are guidelines, and others relate only to certain aspects of green such as energy efficiency or indoor air quality. As members of the General Assembly or the public at large see and hear about these programs, it is not always clear what these programs do (i.e., certify or just provide guidelines) or the kinds of projects for which they are appropriate. To begin to sort out what these programs do and how they may be applicable, the Maryland Green Building Council developed the following matrix. This matrix is a partial list of nationally- and regionally-recognized programs and is intended to provide a brief summary of what these programs do and the kinds of projects for which they may be most appropriate. Utilizing a matrix format will allow for easy updates and the inclusion of other or new programs as appropriate. Please note that this matrix is for informational purposes only. Programs listed in the matrix are not endorsed by the Council, nor are they being considered for endorsement by the Council.

Program	Commercial/ Retail	Residential New	Residential Renovation	Residential Gut Rehab	Multifamily	Community Planning	Schools
USGBC LEED New Construction Description: LEED for New Construction and Major Renovations is designed to guide and distinguish high-performance commercial and institutional projects, including office buildings, high-rise residential buildings, government buildings, recreational facilities, manufacturing plants and laboratories. http://www.usgbc.org/	X				X		
USGBC LEED Commercial Interiors Description: A benchmark for the tenant improvement market that gives the power to make sustainable choices to tenants and designers. http://www.usgbc.org/	X						

Program	Commercial/ Retail	Residential New	Residential Renovation	Residential Gut Rehab	Multifamily	Community Planning	Schools
USGBC LEED Core & Shell Description: Aids designers, builders, developers and new building owners in implementing sustainable design for new core and shell construction. Core and shell covers base building elements such as structure, envelope and the HVAC system. LEED for Core & Shell is designed to be complementary to the LEED for Commercial Interiors rating system, as both rating systems establish green building criteria for developers, owners and tenants. http://www.usgbc.org/	X						
USGBC LEED Homes Description: Promotes the design and construction of high-performance green homes. http://www.usgbc.org/		X		X	X (MidRise)		
USGBC LEED Neighborhood Development Description: Integrates the principles of smart growth, urbanism and green building into the first national program for neighborhood design. http://www.usgbc.org/						X	
USGBC LEED Schools Description: Recognizes the unique nature of the design and construction of K-12 schools and addresses the specific needs of school spaces. It addresses issues such as classroom acoustics, master planning, mold prevention and environmental site assessment. http://www.usgbc.org/							X

Program	Commercial/ Retail	Residential New	Residential Renovation	Residential Gut Rehab	Multifamily	Community Planning	Schools
USGBC LEED Healthcare Description: Promotes sustainable planning, design and construction for high-performance healthcare facilities, including inpatient and outpatient care facilities and licensed long-term care facilities. LEED for Healthcare may also be used for medical offices, assisted living facilities and medical education & research centers. LEED for Healthcare addresses issues such as increased sensitivity to chemicals and pollutants, traveling distances from parking facilities, and access to natural spaces. http://www.usgbc.org/	X						
USGBC LEED Retail Description: Recognizes the unique nature of retail design and construction projects and addresses the specific needs of retail spaces. http://www.usgbc.org/	X						
LEED for Existing Buildings Description: Helps building owners and operators measure operations, improvements and maintenance on a consistent scale, with the goal of maximizing operational efficiency while minimizing environmental impacts. http://www.usgbc.org/	X						

Program	Commercial/ Retail	Residential New	Residential Renovation	Residential Gut Rehab	Multifamily	Community Planning	Schools
Enterprise Foundation Green Communities Description: Green Communities is a national green building program developed for affordable housing. It focuses on the use of environmentally sustainable materials, reduction of negative environmental impacts and increased energy efficiency; and emphasizes designs and materials that safeguard the health of residents and locations that provide easy access to services and public transportation. Green Communities is designed to help developers, investors, builders and residents make the transition to a greener future for affordable housing. The program offers grants, loans, tax-credit equity, training and technical assistance to give developers and builders the resources they need to bring green projects to life. http://www.greencommunitiesonline.org/	X			X			
USGBC & ASID REGREEN Guidelines Description: The guidelines address the major elements of any green renovation project, including the site of the home, water efficiency, energy and atmosphere, material and resources, and indoor environmental quality. The REGREEN guidelines can be applied to a variety of home projects, from remodeling a kitchen to adding a major addition, from redoing a back yard to executing a gut rehab. Homeowners can either use the guidelines for their own do-it-yourself projects or visit with a professional who can apply REGREEN as a design guideline. http://www.regreenprogram.org/			X				

Program	Commercial/ Retail	Residential New	Residential Renovation	Residential Gut Rehab	Multifamily	Community Planning	Schools
NAHB Green Home Description: The National Association of Home Builders (NAHB) and the International Code Council (ICC) partnered to form to establish a standard definition of what is meant by "Green Building." The National Green Building Standard defines green building for single and multifamily homes, residential remodeling projects and site development projects while still allowing for the flexibility required for regionally-appropriate best green practices. http://www.nahbrc.com/technical/standards/greenbuilding.aspx		X	X	X	X		
Energy Star Homes Description: A home must meet strict guidelines for energy efficiency set by the U.S. Environmental Protection Agency (EPA), making them 20–30% more efficient than standard homes. Homes achieve this level of performance through a combination of energy–efficient improvements, including: Effective Insulation Systems, High–Performance Windows, Tight Construction and Ducts, Efficient Heating and Cooling Equipment, and ENERGY STAR Qualified Lighting and Appliances. To ensure that a home meets ENERGY STAR guidelines, third–party verification by a certified Home Energy Rater (or equivalent) is required. http://www.energystar.gov	X	X	X	X	X	X	

Program	Commercial/ Retail	Residential New	Residential Renovation	Residential Gut Rehab	Multifamily	Community Planning	Schools
American Lung Association Health House Program Description: A Health House® home gives you a new home that is a healthy, safe, durable, and energy efficient environment. The homes are built to the most stringent building standards in the U.S., which include site inspections during construction and performance testing upon completion. http://www.healthhouse.org/		X	X	X			
Earth Advantage Homes Description: New Homes certification program is a third-party certification program for builders that helps them create energy efficient, healthy and resource-wise homes that add value for the homebuyer and often typically at a premium. The Earth Advantage New Homes standard requires projects to achieve a minimum number of points on a scoring sheet covering five categories over the course of two verification visits, including energy efficiency, healthy indoor air quality, resource efficiency, environmental responsibility and water conservation. Earth Advantage also provides certificate programs in Remodeling and Community Development. http://www.earthadvantage.com		X	X	X		X	
Collaborative for High Performance Schools Description: CHPS has developed a best practices manual to help schools, districts and practitioners to achieve high performance design, construction and operation. http://www.chps.net							X

Program	Commercial/ Retail	Residential New	Residential Renovation	Residential Gut Rehab	Multifamily	Community Planning	Schools
Green Building Initiative/Green Globes Description: Green building guidance and assessment program for commercial buildings. Essential elements of the Green Globes system include: comprehensive environmental assessment protocol; software tools for online assessment; guidance for green construction and operations; assessors; and a rating/ certification system. http://www.thegbi.org/	X	X			X		
Passive House Description: The Passive House concept represents today's highest energy standard with the promise of slashing the heating energy consumption of buildings by an amazing 90%. Widespread application of the Passive House design would have a dramatic impact on energy conservation. www.passivehouse.us		X	X				
The Living Building Challenge The program is designed to challenge builders, owners, architects, engineers, and design professionals to build environmentally sound and self-sustaining buildings. There are requirements living buildings need in order to meet the challenge. Three of these are: A) It generates all of its own energy with renewable resources, B) It captures and treats all of its water on site and C) It uses resources efficiently and for maximum beauty. www.ilbi.org	X	X	X	X	X	X	X

Program	Commercial/ Retail	Residential New	Residential Renovation	Residential Gut Rehab	Multifamily	Community Planning	Schools
International Green Construction Code In 2009, the International Code Council launched the development of a new International Green Construction Code (IGCC) initiative, subtitled "Safe and Sustainable: By the Book," committed to developing a model code focused on new and existing commercial buildings addressing green building design and performance. http://www.iccsafe.org/cs/IGCC/Pages/default.aspx	X	X	X	X	X		X
ASHRAE Standard 189.1 The energy efficiency goal of Standard 189.1 is to provide significant energy reduction over that in ANSI/ ASHRAE/IESNA Standard 90.1-2007. It offers a broader scope than Standard 90.1 and is intended to provide minimum requirements for the siting, design and construction of high performance, green buildings. www.ashrae.org/greenstandard	X	X	X	X	X		X
Baltimore City Green Building Standards The STANDARDS are the regulations and process by which the City will ensure the design and construction of green buildings for public and private development in Baltimore. The STANDARDS are based on the US Green Building Council LEED® v3.0 (2009) Leadership in Energy and Environmental Design rating program, which has been adapted and customized to fit the development conditions, local market and sustainability goals of the City. http://www.baltimorehousing.org/permit_bcgbs	X	X			X		X

STATE HIGH PERFORMANCE BUILDING PROGRAM UPDATE

Submitted by: Stephen Gilliss, Department of General Services

Progress of the State High Performance Program

One of the State's original pilot projects, Goodpaster Hall at St. Mary's College, continues to receive accolades recently receiving sustainability awards from the Washington chapter of the USGBC and the Washington DC Chapter of AIA.

Goodpaster Hall at St. Mary's College of Maryland earned a Silver LEED rating and in 2010 received an award for "Excellence in Design" from the American Institute of Architects.

For Fiscal Year 2009, nine state capital projects qualified to be designed as High Performance Green Buildings and were funded for design. The current status of these projects is provided below.

- Alterations and renovations to the Lowe House of Delegates Building in Annapolis is a project of the Department of General Services. The complexity of the project has extended the completion of the design such that construction documents are anticipated to be completed in late 2010 with bidding to follow immediately after. The project is still on target to achieve LEED Silver certification.

- Morgan State University proposes to construct a new School of Business Complex at the Northwood Shopping Center. The complex will house the School of Business and Management including the Hospitality Management program. The complex will include classrooms, laboratories, faculty offices, conference/meeting rooms and technical support areas. This project is currently in design; however, construction funding has been delayed until at least FY 2013.

- The first of three proposed projects of the Department of Public Safety and Correctional Services is the 25,932 gross square feet vocational education building for inmates from the Western Correctional Institution and adjacent North Branch Correctional Institution in Allegany County. As of this writing, the project is under construction and five (5) percent complete. The project was designed by the architecture firm ATI Incorporated, is being built by Manekin Construction, and remains on target for LEED Silver certification.

- The new Women's Detention Center, located at the Baltimore Detention Center, will house 800 inmates and provide space for reception and court transfer, sleeping, dining, education, training, recreation, counseling, medical and mental health services and visitation. The design firm of AECOM Services Inc. was selected and is currently designing the project with completion of the design scheduled for late 2011.

- The new Youth Detention Facility is also to be constructed at the Baltimore Detention Center in Baltimore City. The project includes inmate housing, educational services, administration, program services (counseling, drug treatment, etc.), visitation, medical, recreation, and food services space for 180 youth who have been charged as adults. The design firm of PSA Dewberry Inc., with Penza Bailey Architects, designed the project. Bids have been received; however, as of this writing the approximately $69.3 million construction contract has not been awarded. The project is also on target to achieve a LEED Silver rating.

Governor O'Malley joins University of Baltimore President Robert L. Bogomolny and other dignitaries at the ground breaking for the John and Frances Angelos Law Center.

- On August 26, 2010, the new 190,000 square foot/$107 million, John and Frances Angelos Law Center broke ground. The building is anticipated to be one of the greenest buildings in Baltimore and the metropolitan region. It will feature innovative air handling systems, the active capture of light and water that would otherwise go to waste and the use of recycled materials throughout the construction phase. In addition, the law center will be an excellent example of Transit Oriented Development (TOD). The location will be adjacent to Baltimore's Penn Station, multiple bus lines, and situated in a pedestrian friendly location, which will reduce the number of single occupancy vehicle trips. Current plans call for a LEED rating of gold though efforts are underway to push the rating to platinum which would make University of Baltimore the only law school in the country to bear this status.

- The addition to and renovation of Pharmacy Hall at the University of Maryland Baltimore Campus has been completed and will provide additional classrooms, laboratories, office and study space. LEED certification is pending.

- The new Physical Sciences Complex on the College Park Campus is being designed to provide modern laboratory and office space for the Department of Physics, the Department of Astronomy, and the Institute for Physical Sciences and Technology (IPST). The new building will be completed in three phases. Phase I is currently under construction and scheduled to be completed in September 2012. The building has been designed to attain LEED Silver certification.

- The Department of Natural Resources Harriet Tubman Underground Railroad State Park in Dorchester County is currently under design by the architectural firm of GWWO Inc. of Baltimore. As of this writing the project is in the Construction Document phase of design.

The following projects were funded for design in Fiscal Year 2010; current status is provided.

- The Central Branch of the Enoch Pratt Free Library system in Baltimore City will be renovated as a State Library Resource Center for the Maryland State Department of Education. The 290,000 square foot project will improve building systems and life safety components. This project, along with the next one listed, is unique in that it is fully State funded, but is not State owned. It is currently in a reprogramming phase.

- The Western Maryland Regional Library located in Washington County serves Garrett, Allegany and Washington counties. The project will renovate and expand the facility to 84,000 gross square feet. Additional construction funding has been allocated in FY 2011. Bids were received in early October 2010 and are under review at this time with a contract award anticipated in early November 2010. The project is expected to meet LEED Silver requirements. Bushey Feight Morin Architects of Hagerstown was the architect.

- The Deer's Head Hospital Center located in Salisbury, Wicomico County, Maryland will add a new 7,800 gross square foot kidney dialysis wing, which will increase the number

and size of the existing dialysis stations and provide major functionality upgrades. The project is currently in the design development phase with design completion anticipated in April of 2011.

- The new State Public Health Laboratory to be constructed in Baltimore City for the Department of Health and Mental Hygiene will replace the existing outdated laboratories currently located at State Center. The 196,000 gross square foot project is to be State owned but funded through a public-private partnership arrangement. This project is currently starting the design development phase with design completion scheduled for March 30, 2011. The Architect for the project is HDR CUH2A.

- The Department of Juvenile Services has increased the size of its new secure detention center on the grounds of the Cheltenham Youth Facility in Prince George's County from 48 to 72 beds. The new facility will provide for housing, dietary services, education, somatic and behavioral health, recreation, administration, and support services for detained youths. The 95,000 gross square foot facility is in the Architectural Service Selection process in fee negotiation as of this writing with design scheduled to start in January 2011.

- The Department of General Services has procured the design/build team of Davis Bowen Friedel and Nason Construction Inc. to design and construct an addition to and renovation of the Salisbury Readiness Center in Wicomico County. The 25,000 gross square foot project will upgrade the existing building and provide new space for National Guard virtual simulation training, classrooms, physical fitness, medical training, and administration space at a cost of $9,353,800. The project is in the early construction document phase.

- The proposed Department of Public Safety and Correctional Services 159,000 gross square foot Jessup Community Correctional Facility will house 560 inmates in each of two minimum security compounds. The project will provide inmate transition services, educational, and recreational functions. This project is currently soliciting a design/build contractor and is anticipating awarding the contract in early 2011.

- The Department of Juvenile Services has been funded for property acquisition and preliminary design for a new 48 bed secure detention center to be located in Southern Maryland. The proposed Southern Maryland Regional Detention center will provide for housing, dietary services, education, somatic and behavioral health, recreation, administration and support services for detained youths. The project is currently in site selection phase.

- Another Department of Public Safety and Correctional Services project will construct the new Maryland Correctional Enterprises Upholstery and Reupholstery Plant at the North Branch Correctional Facility in Cumberland, Allegany County, Maryland. The 20,000 gross square foot project will house the furniture plant, which will employ 100 inmates. This project is a design/build project with P.J. Dick Incorporated as the contractor and ATI Inc. as the designer. The design was completed recently, and the team is moving into the construction phase on the $4.4 million project.

Anne Arundel Hall at St. Mary's College of Maryland is designed to attain LEED Gold certification.

- St. Mary's College of Maryland is designing the 38,282 gross square foot demolition and reconstruction of Anne Arundel Hall. The design development phase has just been completed. The current design projects that the building will attain LEED gold certification. The building incorporates ground source heating and cooling, green roofs as part of storm water management, and applies renewable and recycled construction materials technology. Construction is scheduled to begin in June 2012 with completion in December 2014 and is estimated to cost $29,163,000.

- In conjunction with the reconstruction of Anne Arundel Hall project, St. Mary's College of Maryland is designing the Historic St. Mary's City 11,711 gross square foot Maryland Heritage Interpretive Center. The design development phase has just been completed. The current design projects that the building will attain LEED gold certification. The building incorporates geo-thermal heating and cooling, green roofs as part of storm water management, and applies renewable and recycled construction materials technology. Construction is scheduled to begin in June 2015 with completion in December 2016 and is estimated to cost $14,182,000.

- Morgan State University has been funded for design for its new Center for the Built Environment and Infrastructure Studies. The 126,129 gross square foot building will house the University's Institute for Architecture and Planning, the Department of Civil Engineering, and the Institute for Transportation Studies. This building will be a most appropriate use of green building practices. This project has been funded for construction in the FY 2011 Capital Budget; however, a status update was not provided as of this writing.

- At Coppin State University in Baltimore City, a new 183,300 gross square foot Science and Technology Center will be constructed to house all science related disciplines including the Departments of Natural Sciences, Mathematics and Computer Science and Management Science and Economics. The project is currently in the schematic design phase with Cannon Design as the architects. The project is estimated to cost $81 million with construction expected to start in September 2012.

Coppin State University's Physical Education Complex is under final review by U.S. Green Building Council's for LEED Silver certification.

- Coppin State University's Physical Education Complex began construction in fall 2007 and was completed in January 2010. While not originally programmed to be LEED certified, the project is currently under final review by USGBC for LEED Silver certification. Of particular note, the project anticipates receiving innovation recognition for recycling 95% of the construction/demolition debris generated on site. Other green features include low-E glazing, a reflective roof membrane, energy efficient HVAC systems, motion lighting, and natural lighting. The 256,000 gross square foot multi-function building incorporates offices, classrooms, a natatorium, 4100 seat arena, auxiliary gyms, multi-purpose rooms, and a fitness center. This will be Coppin State's first LEED certified building.

- Salisbury University's new Perdue School of Business is a 112,762 gross square foot state-of-the-art facility to replace and expand the facilities currently housing the school. The proposed facility will be constructed on the site of the current University Police building and will contain classrooms, computer laboratories, faculty offices, conference and meeting rooms, and a technical support area. The facility will provide needed classroom space and will consolidate School of Business components currently spread throughout the campus. The project is currently under construction and scheduled to be substantially complete in June of 2011. LEED Gold certification is anticipated for this project.

- A new Maryland Fire and Rescue Institute (MFRI) North East Regional Training Center will be constructed to relocate operations to the Edgewood Arsenal. The 13,915 gross square foot project will provide office space, classroom space, and training props. Construction commenced in May of 2010 and is scheduled to be substantially complete by May of 2011.

- Towson University will be designing Phase II of the New Liberal Arts complex with FY 2010 funding. The 153,000 gross square foot project will join the completed Phase I project to consolidate and expand College of Liberal Arts units currently dispersed in other campus buildings. Funding for complete construction and equipment was authorized in the FY 2011 Capital Budget; however, a status update was not available as of this writing.

Projects funded for design or design/construction in the FY 2011 Capital Budget

- The Department of Health and Mental Hygiene has been funded for the design of a Secure Evaluation and Therapeutic Treatment (SETT) center adjacent to the Clifton T. Perkins Hospital Center in Howard County. The facility will house individuals with developmental disabilities who have been found by the courts to be incompetent to stand trial, not criminally responsible, or court ordered for pre-trial evaluation. The facility will provide housing in separate cottages and a main administrative building to house administration, office, therapy, and recreation facilities.

- Frostburg State University's Center for Communications and Information Technology will provide classroom, lab, and office space for this department. The 127,000 gross square foot building will create a modern facility for these related disciplines, alleviate future space shortages, and provide a spatial link between the campus radio and TV stations, academic computing and technology intensive disciplines, and will house a new planetarium for the university. The project includes the demolition of Tawes Hall.

- The UMBC Performing Arts and Humanities Facility (PAHF) Phase I (90,641 gross square feet) will relieve severely crowded space conditions in the existing Fine Arts Building and will replace the inadequate Theatre Building as well as consolidate programs currently dispersed throughout the campus. Functional areas include a 275-seat theater, a 65-seat black box theater, English writing labs, and office and meeting space. The project targets LEED credits in sustainable sites, water efficiency, indoor environmental quality, and will have a rainwater harvesting system and divert 50-75% of construction waste from landfill disposal. Concurrent with the construction of this project will be the development of a Green Education Program at UMBC. The project, which was scheduled to start construction in July of 2010 and be completed in July 2012, is estimated to cost $67,800,000. This project was funded for Phase I design completion and construction in the FY 2011 Capital Budget; however, a status update was not available as of this writing.

Other green projects not subject to the State program

In the interest of highlighting green building activity throughout the State, we have listed below several projects that were not subject to the State program, but which nonetheless were designed as high performance green buildings. Projects at USM sites were inspired by the University's participation in the American College and University Presidents' Climate Commitment program. Dormitory and student center projects are auxiliary projects funded by University of Maryland bonds, which are paid back through student rent and activity fees.

- On the campus of the University of Maryland, College Park, John S. & James L. Knight Hall was dedicated as the new home of the Philip Merrill College of Journalism in April 2010. The $30 million, 53,400-square-foot building combines high-tech classrooms, multimedia labs, offices and space for professional journalism centers in an inviting, open space. Knight Hall is built to carry the college into the 21st century in more ways than one -- it was also designed with sustainability in mind. Knight Hall was designed to meet the U.S. Green Building Council's LEED Gold standard, the first building on campus designed to meet that level.

Knight Hall, the new home of the Philip Merrill College of Journalism was designed to meet the U.S. Green Building Council's LEED Gold standard.

- Salisbury University has undertaken four residence hall renovation projects. Pocomoke and Manokin Halls are both 21,735 gross square foot, four-story residence halls constructed in 1967. The renovation includes rework in the central lobby, ADA entry and exterior steps/ramp, a new elevator addition, study lounge renovations, new student room reconfiguration with bathroom upgrades, new finishes throughout, new sprinkler and fire alarm systems, new living learning community room, cardio-room and study rooms, upgrades to front desk, staff offices, and a new addition to building entry to accommodate some of these requirements. Pocomoke Hall was completed in March 2010. Manokin Hall was substantially completed in July of 2010. Wicomico Hall is currently under construction and will be substantially complete in January of 2011. LEED Gold certification is anticipated for these projects. Nanticoke Hall includes renovation of a 36,290 GSF residence hall constructed in 1968. The scope includes a north addition, rework in the central lobby, a new elevator and student room reconfiguration for 157 beds with bathroom upgrades, new finishes throughout,

a new sprinkler system and ground source HVAC system. LEED Gold certification is anticipated for this renovation. The design for Nanticoke Hall is complete and the University is currently procuring construction services with an award anticipated in late November 2010.

- Frostburg State University began construction in September 2009 of the Lane Student Center Renovation and Expansion. The 65,687 gross square foot renovation and 8,000 gross square foot addition project will replace the existing assembly lounge, food service, book store, and meeting and student organization space. In addition to architectural and functional changes, the project will replace or improve existing building systems such as boilers, HVAC and electrical systems and emergency power, energy management elevators, fire protection, voice/data and finishes. Specific energy efficiency upgrades include the addition of variable frequency drives to the air handling system, increasing roof insulation and adding tinted windows to reduce solar heat gain. The project is scheduled to be completed in December 2010 and will be the first LEED certified building on the Frostburg Campus. The cost of the project is approximately $19.5 million. LEED Silver certification is anticipated.

- The University of Maryland Eastern Shore has renovated the 21,900 gross square foot Somerset Hall for the School of Pharmacy. The construction commenced in the fall of 2009 and was completed in August of 2010. The $6.5 million project will be the first LEED certified building on the UMES Campus. LEED Silver certification is anticipated.

- St. Mary's College completed the construction of the 11,181 gross square foot Muldoon River Center. This college-funded $4,900,000 construction project incorporated numerous green building technologies including ground source heating and cooling, reduced storm water runoff, recycled and renewable products, and increased thermal insulation. The ground source system was made possible from a gift from the St. Mary's College student body.

MARYLAND GREEN PUBLIC SCHOOLS UPDATE

Submitted by: David Lever, Executive Director, Public School Construction Program

Maryland's Interagency Committee on School Construction (the IAC), which administers the Maryland Public School Construction Program (the PSCP), promotes a number of policies and practices that support green building initiatives in Maryland's schools:

- *The High Performance Buildings Act of 2008* (Chapter 124, Maryland Laws of 2008; Senate Bill 208 / House Bill 376) requires that all new schools must achieve a rating of LEED Silver or equivalent from a nationally recognized accreditation entity. The State will contribute 50% of the extra local costs through FY 2014. As of January 2010 a total of 46 schools, including three renovation projects, had attained or were seeking LEED certification. Among them is the newly opened West Towson Elementary. The school's high performance features and practices include a green roof over the kindergarten rooms, wheatboard cubbies, bamboo doors, low flow plumbing fixtures, a light colored roofing material, and over 90% recycling of construction waste.

Governor Martin O'Malley tours the green roof at the new West Towson Elementary School -- the first LEED Silver certified school in the Baltimore County Public School system.

- *Department of General Services Energy Performance Standards* must be followed in all State-funded school construction projects, as well as DGS standards for life cycle cost analysis and roofing.

- *Conserving and Enhancing the Natural Environment on School Sites.* Since 1999, every major new school construction project must include site features that will conserve or enhance the natural environment and contribute to the environmental education program, including bio-retention areas, storm water management ponds, gardens, wetlands, forest trails, and meadows.

- *Communication.* The PSCP encourages high performance design initiatives through the promulgation of best practices at tri-annual facility planners meetings, publication of an annual report on high performance initiatives in Maryland schools, and its work on legislation to address the financing of sustainable improvements. The PSCP is linked to the Maryland Association for Environmental and Outdoor Education (MAEOE) Maryland Green Schools Program of the Maryland State Department of Education.

MARYLAND GREEN BUILDING COUNCIL
2010 ANNUAL REPORT

ORDINANCE NO. 030, 2011
OF THE COUNCIL OF THE CITY OF FORT COLLINS
AMENDING CHAPTER 5, ARTICLE II, DIVISION 2, OF THE
CODE OF THE CITY OF FORT COLLINS FOR THE PURPOSE OF
AMENDING THE 2009 INTERNATIONAL BUILDING CODE AS ADOPTED

WHEREAS, the City Council has determined that it is in the best interests of the health, safety and welfare of the City and its citizens to better align Fort Collins' built environment with community goals of improved indoor environmental quality, protection of the natural environment, reduced carbon emissions, reduced energy use and reduced water use; and

WHEREAS, City staff has conducted a significant public outreach program, working with three advisory committees comprised of representatives from the residential and commercial construction industries, housing industry, real estate and appraisal industries, construction recycling industry, specialized-trade contractors, and regional code officials; and

WHEREAS, on February 2, 2011, the substance of the amendments was presented to the Electric Board, and the Electric Board recommended approval of the amendments; and

WHEREAS, on February 3, 2011, the substance of the amendments was presented to the Affordable Housing Board, and the Affordable Housing Board recommended against approval of the amendments; and

WHEREAS, on February 9, 2011, the substance of the amendments was presented to the Landmark Preservation Commission, and the Landmark Preservation Commission recommended approval of the amendments; and

WHEREAS, on February 16, 2011, the substance of the amendments was presented to the Economic Advisory Commission, and the Economic Advisory Commission recommended approval of the amendments; and

WHEREAS, on February 16, 2011, the substance of the amendments was presented to the Natural Resources Advisory Board, and the Natural Resources Advisory Board recommended approval of the amendments; and

WHEREAS, on February 17, 2011, the substance of the amendments was presented to the Water Board, and the Water Board considered water related elements and recommended approval of those amendments; and

WHEREAS, on February 24, 2011, the substance of the amendments was presented to the Building Review Board, and the Building Review Board recommended against approval of these amendments; and

WHEREAS, on February 28, 2011, the substance of the amendments was presented to the Air Quality Advisory Board, and the Air Quality Advisory Board recommended approval of these amendments; and

WHEREAS, based on input obtained through this outreach process, together with City Council and advisory board review and comment, staff has developed proposed amendments to the 2009 International Building Code ("IBC") as set forth in this Ordinance; and

WHEREAS, the City Council has determined that it is in the best interests of the health, safety and welfare of the City and its citizens that the IBC as adopted be amended.

NOW, THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF FORT COLLINS as follows:

Section 1. That the opening paragraph of Section 5-27 of the Code of the City of Fort Collins is hereby amended to read as follows:

Sec. 5-27. Amendments and deletions to code.

The *2009 International Building Code* adopted § 5-26 is hereby amended to read as follows:

Section 2. That Subsection (16) of Section 5-27 of the Code of the City of Fort Collins is hereby amended by the addition of a new subparagraph which reads in its entirety as follows:

(16) ***Section 202. DEFINITIONS,*** is hereby amended to add the following definitions in alphabetical sequence as follows:

"The term "*COMMISSIONING*" is hereby added to read as follows:
"COMMISSIONING. A process to verify and document that the selected *building* and systems have been designed, installed, and function in accordance with the *construction documents*, manufacturers' specifications, and minimum code requirements."

"The term "*VOLATILE ORGANIC COMPOUND (VOC)*" is hereby added to read as follows:

"VOLATILE ORGANIC COMPOUND (VOC): "Any compound of carbon, excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate, which participates in atmospheric photochemical reactions. VOCs include a variety of chemicals, some of which may have short-and long-term adverse health effects emitted as gases from certain solids or liquids."

Section 3. That Section 5-27 of the Code of the City of Fort Collins is hereby amended by the addition of a new subsection (40) which reads in its entirety as follows:

"(40) **1405.13.3** ***Fenestration*** **installation.** For new construction, all *fenestration* installations shall be in accordance with American Architectural manufacturers Association (AAMA) Standards/Specifications for Windows, Doors and Skylights and shall be supervised and inspected by an individual certified as an Installation Master by Architectural Testing, Inc. (ATI), or other *approved agency*."

Section 4. That Section 5-27 of the Code of the City of Fort Collins is hereby amended by the addition of a new subsection which reads in its entirety as follows:

A new chapter is hereby added to read as follows:

"CHAPTER 36
SUSTAINABLE *BUILDING* CONSTRUCTION PRACTICES

SECTION 3601
GENERAL

3601.1 Scope. The provisions of this chapter shall govern sustainable *building* construction practices for new construction and additions that require a building permit, unless otherwise noted.

SECTION 3602
RESOURCE EFFICIENCY

3602.1 Construction waste management. For new *buildings*, a construction waste management plan acceptable to the Building Official that includes recycling of concrete, wood, metals and cardboard, is required at the time of application for a building permit. The construction waste management plan shall be implemented and conspicuously posted on the construction site. Substantive changes to the plan shall be subject to prior approval by the Building Official.

3602.2 Certified tropical hardwood. All tropical hardwoods used in new construction, additions and alterations requiring a building permit, shall be certified by the Forest Stewardship Council or other *approved agency*. Certification demonstrating compliance shall be required with delivery of such materials and shall be available for inspection.

"SECTION 3603
INDOOR ENVIRONMENTAL QUALITY (IEQ)

3603.1 Indoor Air Quality (IAQ)

3603.1.1 Heating, Ventilating, and Air Conditioning Design . Prior to and during construction, reasonable efforts shall be made to minimize the release and accumulation of debris and particulates, and the specific requirements of this section shall apply.

3603.1.1.1 Air handling system access. The arrangement and location of air handling system components including, but not limited to, air handler units, fans, coils and condensate pans shall allow access for cleaning and *repair* of the air handling surfaces of such components. Piping, conduits, and other *building* components shall not be located so as to obstruct the required access.

3603.1.1.2 Durability of air handling surfaces. Surfaces exposed to airflow within air handling systems shall be constructed of materials that are resistant to deterioration and will not break away, crack, peel, flake off, or show evidence of delamination or continued erosion when tested in accordance with the erosion test in UL 181.

3603.1.1.3 Airstream surfaces. Materials exposed to airflow within ducts, within air plenums, or on top of suspended ceilings, shall not break away, crack, peel, flake off, or show evidence of delamination or continued erosion when tested in accordance with the erosion test in UL 181.

3603.1.2 *Building* pollutant flush-out. After all interior finishes are installed, the *building* shall be flushed-out by ventilating at a minimum rate of 0.30 cfm per ft^2 of outside air or the design outdoor airflow rate determined from Chapter 4 of the IMC, whichever is greater, for at least 14 days while maintaining an internal temperature of at least 60°F, and relative humidity not higher than 60 percent. Occupancy shall be permitted to start one day after start of the flush-out, provided that flush-out continues for the full 14 days. The *building* shall not be "baked out" by increasing the temperature of the space above the occupied set point. Where continuous *ventilation* is not possible, the aggregate of flush-out periods shall be equivalent to 14 days of continuous *ventilation*. Flush-out reports shall be provided to the Building Official prior to approval.

Exception: All residential *buildings*.

3603.2 Low-volatile organic compound (VOC) materials. Construction materials, floor coverings and site-applied finishes, including sealants and adhesives, resilient flooring, carpeting and pad, site-applied paints, stains and varnishes, structural wood panels, hardwood veneer plywood, particle board and fiber board *building* products, and insulation shall meet specified *volatile organic compound (VOC)* emissions limits in accordance with relevant standards California Department of Public Health (CDPH) 01350; GREENGUARD Environmental Institute GGPS.001 standard for *building* materials and finishes; and Green Seal® standards. Documentation demonstrating compliance shall be required with delivery of such materials and shall be available for inspection.

Exception: For *alterations* to *existing buildings*, carpeting and pad, structural wood

panels, hardwood, veneer plywood, particle board and fiber board *building* products and insulation are not subject to this requirement.

3603.3 Acoustical control. Minimum requirements for exterior-to-interior sound transmission, interior sound transmission, and background sound levels in new construction and additions thereto, except as noted hereunder, shall be provided as specified herein.

3603.3.1 Sound transmission. *Buildings* and tenant spaces shall comply with the following sound transmission requirements:

Exceptions:

1. Portions of *buildings* or *structures* that have the interior environment open to the exterior environment.

2. Concession stands and toilet facilities in Group A-4 and A-5 occupancies.

3603.3.1.1 Exterior sound transmission. Where a Group A1, A3, E and I occupancy *building*, a Group B occupancy *building* used for educational purposes, or a Group R occupancy *building* is constructed at a location listed herein, the wall and roof-ceiling assemblies making up the *building thermal envelope* shall have a composite sound transmission class (STC_c) rating of 40 or greater in the following locations:

1. within 500 feet (300 m) of a multi-lane highway (road) designed for high-speed travel by large numbers of vehicles, and having no traffic lights, stop signs, nor other regulations requiring vehicles to stop, fire station, heavy industrial or manufacturing zone or facilities, commercial storage facility with back-up alarms, outdoor music amphitheater, or sports arena or stadium;

2. within 250 feet (150 m) of a truck route roadway containing four or more traffic lanes; or

3. within 1,000 feet (900 m) of an active railway.

3603.3.1.2 Interior sound transmission. Interior wall and floor/ceiling assemblies, separating interior rooms and spaces shall be designed in accordance with the following requirements:

1. Wall and floor-ceiling assemblies separating adjacent tenant spaces, tenant spaces and public places, hotel rooms, motel rooms, and patient rooms in nursing homes and hospitals and adjacent classrooms shall have a composite STC rating of 50 or greater.

2. Wall and floor-ceiling assemblies separating classrooms from rest rooms and showers shall have a composite STC rating of 53 or greater.

3. Wall and floor-ceiling assemblies separating classrooms from music rooms, mechanical rooms, cafeteria, gymnasiums, and indoor swimming pools shall have a composite STC rating of 60 or greater.

Exception: Residential Group R occupancies addressed in Section 1207 of this code.

3603.3.1.3 Background Sound. The average background sound levels within unoccupied rooms (from heating, ventilating and air conditioning and other *building* systems) shall be below the maximum A-weighted sound level for specific occupancies from Table 3603 below. This shall be confirmed by spot checks during the commissioning process.

TABLE 3603
MAXIMUM ALLOWABLE BACKGROUND SOUND IN ROOMS

Occupancy	Maximum A-weighted sound level (dB_a)
Small auditoriums (≤500 seats)	39
Large auditoriums, large live indoor theaters, and large churches (for very good speech articulation) (>500 seats)	35
TV and broadcast studios (close microphone pickup only)	35
Small live indoor theaters (≤ 500 seats)	35
Private residences:	
Bedrooms	39
Apartments	48
Family rooms and living rooms	48
Schools:	
Lecture and classrooms	
Core learning space with enclosed volume ≤ 20,000 cu ft (<566 cu m)	35
Core learning space with enclosed volume > 20,000 cu ft (>566 cu m)	40
Open-plan classrooms	35
Hotels/motels:	
Individual rooms or suites	44
Meeting/banquet rooms	44
Service support areas	57

Office *buildings*:	
Offices	
executive	44
small, private	48
large, with conference tables	44
Conference rooms	
Large	39
Small	44
Open-plan areas	48
Business machines, computers	53
Public circulation	57
Hospitals and clinics	
Private rooms	39
Wards	44
Operating rooms	44
Laboratories	53
Corridors	53
Public areas	52
Movie theaters ≤ 500 seats	48
Churches, small (≤500 seats)	44
Courtrooms	44
Libraries	48
Restaurants	52
Light maintenance shops, industrial plant control rooms, kitchens, and laundries	62
Shops and garages	67

SECTION 3604
COMMISSIONING, OPERATIONS & MAINTENANCE

3604.1 *Building commissioning.* For new *buildings* and *additions* with a gross floor of greater than 15,000 ft^2 (1,395 m^2), *commissioning* shall be performed in accordance with this section. A commissioning process shall be incorporated into the design and construction of the *building* project that verifies that the delivered *building* and its components, assemblies, and systems comply with the documented *owner project requirements* (OPR). Procedures, documentation, tools and training shall be provided to the *building* operating staff to sustain features of the *building* assemblies and systems for the service life of the *building*. This material shall be assembled and organized into a systems manual that provides necessary information to the *building* operating staff to operate and maintain all *commissioned* systems identified with the *building* project. The owner shall retain the system manual and final commissioning report described below. An electronic formatted copy of the final commissioning report shall be provided to the Building Official.

The following commissioning activities shall be completed prior to approval:

1. Designate an *approved* project *commissioning authority* (CxA) to lead, review, and oversee completion of the *commissioning* process activities.
2. The owner, in conjunction with the design team as necessary, shall develop the *owner's project requirements* (OPR) to guide the CxA. The OPR will be distributed to all parties

participating in the project programming, design, construction, and operations, and the *commissioning* team members.

3. The design team shall develop the *basis of design* (BOD).
4. The CxA shall review the both the *OPR* and *BOD* for clarity and completeness.
5. Construction phase *commissioning* requirements shall be incorporated into project specifications and other construction documents developed by the design team.
6. Develop and implement a *commissioning plan* containing all required forms and procedures for the complete testing of all equipment, systems, and controls included in Section 3604.1.1.
7. Verify the installation and performance of the systems to be *commissioned.*
8. Complete a final *commissioning* report satisfactory to the Building Official.
9. Verify the owner requirements for training operating personnel and *building* occupants are completed.
10. Verify that a system manual in a form satisfactory to the Building Official has been prepared. At a minimum, the system manual shall include operations and maintenance documentation and full warranty information, and shall provide operating staff the information needed to understand and operate the *commissioned* systems as designed.

3604.1.1 Systems. The following systems, if included in the *building* project, shall be *commissioned*:

1. heating, ventilating, air-conditioning, indoor-air-quality, and refrigeration systems and associated controls;
2. *building thermal envelope* systems, components, and assemblies to verify thermal, air, and moisture integrity;
3. all lighting controls and shading controls;
4. service water heating systems;
5. renewable energy systems; and
6. background sound levels."

Section 5. That Section 5-27 of the Code of the City of Fort Collins is hereby amended by the addition of a new subparagraph which reads in its entirety as follows:

Chapter 35 REFERENCED STANDARDS is hereby amended by adding the following additional referenced standard in alphabetical sequence:

"**CDPH** California Department of Public Health
1615 Capitol Avenue
Sacramento, CA 95814

CDPH 01350 Standard Method for Testing VOC emissions from indoor sources
Referenced in Amended 09 IBC Section **3603.2 Maximum Allowable Background Sound in Rooms**"

"**FSC** Forest Stewardship Council U.S. (FSC-US)
212 Third Avenue North, Suite 504
Minneapolis, MN 55401"

"**GEI** GREENGUARD Environmental Institute
2211 Newmarket Parkway, Suite 110
Marietta, GA 30067

GGPS.001.GREENGUARD IAQ Standard for *Building* Materials, Finishes and Furnishings Referenced in Amended 09 IBC Section **3603.2 Maximum Allowable Background Sound in Rooms**"

"Green Seal®
1001 Connecticut Avenue, NW
Suite 827
Washington, DC 20036-5525

GS-11 Paintings and Coatings
GS-43 Recycled Content Latex Paints
Referenced in Amended 09 IBC Section **3603.2 Maximum Allowable Background Sound in Rooms**"

Section 6. That all subsections in Section 5-27 of the Code of the City of Fort Collins are hereby renumbered in sequential order as they appear in the IBC.

Section 7. That the requirements set forth herein above will be effective as to all applications for building permits filed on or after January 1, 2012.

Introduced, considered favorably on first reading, and ordered published this 1st day of March, A.D. 2011, and to be presented for final passage on the 22nd day of March, A.D. 2011.

Mayor

ATTEST:

City Clerk

Passed and adopted on final reading on the 22nd day of March, A.D. 2011.

Mayor

ATTEST:

City Clerk

Building Codes Division **Notice of Public Hearing**

June 21, 2011

Working with Oregonians to ensure safe building construction while supporting a positive business climate.

Adoption of 2011 Oregon Commercial Reach Code

Opportunity for public input:

Those who would like to provide testimony may attend a public hearing on June 21, 2011 at 10:00 a.m. The hearing will be located at the Building Codes Division, Conference Room A. Written comments may also be submitted to the contact below. The last day to submit written comments is 5:00 p.m. June 24, 2011.

Live broadcast via the internet:

To view the public hearing live, click on "View live meeting"

Purpose of the rule:

These proposed rules establish a first of a kind "Reach Code" in Oregon. The proposed rules implement a portion of Senate Bill 79 (2009) requiring the adoption of a code separate from the state building code that is a set of optional construction standards designed to increase thee energy efficiency of buildings above the mandatory statewide building code. These proposed rules adopt the 2011 Oregon Commercial Reach Code (OCRC). The 2011 OCRC consists of the November 2010 International Green Construction Code public version 2.0 with Oregon amendments.

These proposed rules and the code would become effective July 1, 2011.

Citation:

Adopt: 918-465

To view the proposed amended code language, click the following:

Draft Oregon Commercial Reach Code

Matrix of code changes

History:

The OCRC established in Senate Bill 79 (2009), requires the Division to adopt a "Reach Code" encompassing construction methods and technology designed to increase energy efficiency over the mandatory codes for builders that choose to incorporate them. The bill defines energy efficiency broadly as "use of construction and design standards, construction methods, products, equipment and devices to increase efficient use of, and reduce consumption of electricity, natural gas and fossil fuels."

The Division opened the OCRC adoption and amendment process, established a timetable for receiving proposed code amendments, and convened the Oregon Reach Code Advisory Committee. The committee reviewed proposed code changes and provided input for the Division to consider prior to forwarding the proposed code to the Construction Industry Energy Board.

The Division has been working to align this code with state, local and federal incentive programs. The Oregon Department of Energy has drafted rules to allow the OCRC as an alternative path for buildings required to follow the State Energy Efficient Design program. Energy Trust of Oregon has communicated to the Division that incentives will be available at varying levels for OCRC buildings. The Energy Trust of Oregon also has incentives and expertise available to assist with modeling complex structures.

At the May 11, 2011 meeting, the Construction Industry Energy Board reviewed the proposed 2011 OCRC and recommended that the Division adopt the 2011 OCRC and move forward with rulemaking.

Contact:

If you have questions or need further information, please contact Hearing Officer Aeron Teverbaugh at 503-373-2160, or Aeron.Teverbaugh@state.or.us.

Secretary of State

NOTICE OF PROPOSED RULEMAKING HEARING*

A Statement of Need and Fiscal Impact accompanies this form.

Department of Consumer and Business Services, Building Codes Division	918
Agency and Division	Administrative Rules Chapter Number

Stephanie Snyder	PO Box 14470, Salem, OR 97309	(503) 373-7438
Rules Coordinator	Address	Telephone

RULE CAPTION

Adopts provisions for the Oregon Commercial Reach Code

Not more than 15 words that reasonably identify the subject matter of the agency's intended action.

June 21, 2011	10 a.m.	1535 Edgewater Street NW, Salem, OR 97304	Aeron Teverbaugh
Hearing Date	Time	Location	Hearings Officer

Auxiliary aids for persons with disabilities are available upon advance request.

RULEMAKING ACTION

Secure approval of new rule numbers (Adopted or Renumbered rules) with the Administrative Rules Unit prior to filing.

ADOPT: 918-465

AMEND:

REPEAL:

RENUMBER:

AMEND & RENUMBER:

Stat. Auth.: ORS 183.335, 455.020, 455.210, 455.496 & 455.500

Other Auth.:

Stats. Implemented: ORS 183.335, 455.020, 455.210 & 455.500

RULE SUMMARY

The proposed rules implement Senate Bill 79 (2009) requiring the director of the Department of Consumer and Business Services to adopt a code separate from the state building code that is a set of optional construction standards designed to increase the energy efficiency of buildings above the mandatory statewide code. The proposed rules adopt the second public version of the International Green Construction Code (IGCC) with significant Oregon specific amendments including provisions from the 2012 International Energy Conservation Code and ASHRAE 90.1 as the Oregon Commercial Reach Code (OCRC).

The Agency requests public comment on whether other options should be considered for achieving the rule's substantive goals while reducing the negative economic impact of the rule on business.

June 24, 2011 by 5 p.m.

Last Day for Public Comment (Last day to submit written comments to the Rules Coordinator)

	Patrick Allen	
Signature	Printed name	Date

Secretary of State

STATEMENT OF NEED AND FISCAL IMPACT

A Notice of Proposed Rulemaking Hearing or a Notice of Proposed Rulemaking accompanies this form.

Department of Consumer and Business Services, Building Codes Division 918

Agency and Division Administrative Rules Chapter Number

Adopts provisions for the Oregon Commercial Reach Code

Rule Caption (Not more than 15 words that reasonably identifies the subject matter of the agency's intended action.)

In the Matter of: Adopting 918-465

Statutory Authority: ORS 183.335, 455.020, 455.210, 455.496 & 455.500

Other Authority:

Stats. Implemented: ORS 183.335, 455.020, 455.210 & 455.500

Need for the Rule(s): Senate Bill 79 (2009) required the director of the Department of Consumer and Business Services to adopt a code separate from the state building code that is a set of optional construction standards designed to increase the energy efficiency of buildings above the mandatory statewide code. ORS 455.500 requires the director to review generally accepted codes and standards that achieve greater energy efficiency. The law further requires the division to adopt standards that are technically and economically feasible including codes and newly adopted standards for construction and the installation of products. Additionally, the Oregon Commercial Reach Code (OCRC) adopted under these proposed rules, must be used by the director in the establishment of a schedule and goals for continually increasing the energy efficiency of buildings in the state. The proposed OCRC must also provide reasonable safeguards for health, safety, welfare, comfort, and security of the residents of Oregon who are occupants and users of buildings, while furthering the use of modern methods, materials, and maximum energy conservation.

Documents Relied Upon, and where they are available: Construction Industry Energy Board meeting minutes from May 11, 2011, Oregon Reach Code Advisory Committee meeting minutes from March 31, April 14, April 28, May 12, June 9, July 7, July 21, August 18, Sept. 15, Sept. 29, Oct. 13, Nov. 3, Nov. 17, Dec. 1, Dec. 15, 2010 and Jan. 5, Jan. 19, Feb. 2, Feb. 16, March 2, March 16, March 23, and March 30, 2011; and draft rules are available from the division's rules coordinator located at 1535 Edgewater Street NW, Salem, OR 97304 and are available on the division's website at: www.bcd.oregon.gov .

Fiscal and Economic Impact: The division has determined that the OCRC adopted by the proposed rules will have some fiscal and economic impact on units of local government. State agencies may actually see a decrease in costs associated with high-performance requirements in other rules and statutes when they choose to build to the OCRC. Because it is an optional code for builders, any impact on small businesses and members of the public will likely be deemed as worth the cost based on other considerations, such as sustainability, marketing, or public recognition. Builders that would otherwise pursue high-performance certification may see decreased costs if they utilize the OCRC because of the lack of a certification cost. The impact to units of local government will likely result from a slight increase in the amount of review that building departments will be required to perform for buildings designed and constructed under the OCRC.

Builders pursuing the OCRC will likely be impacted by increased insulation requirements, higher fenestration ratings, lower thresholds for the installation of high efficiency mechanical systems and devices, and modeling requirements for buildings greater than 70,000 square feet. Projects pursuing the OCRC are required to pick two project electives that will vary in terms of cost of construction. Depending on the specific code provision, and the structure to which it is applied, these impacts may result in increased construction costs. These costs will likely be offset by reduced energy usage over 3 to 4 years. The increased energy efficiency provisions will likely result in additional construction costs of about .84 cents per square foot, or roughly a 1-2% increase in the overall cost of construction for the types of commercial and residential structures that opt to build under this code. There are incentives available that could reduce costs by .50 cents a square foot, bringing the increase down to less than a 1% increase in construction costs. An exact fiscal impact of these changes cannot be determined at this time because the impact is dependent upon the specifics of a particular building, including design variables, construction methods, building type, materials, the point at which the requirements are integrated into the design of the building, and the need for a third party to verify particular aspects. The proposed rules will have additional impact on state and local governments, including building officials and inspectors, and the general public, including building owners, developers, and contractors, in terms of training costs and the purchase of the 2011 edition of the Oregon Commercial Reach Code. The cost of the code book is estimated at approximately $39.00. The overall

impact of this cost cannot be determined at this time because it is unknown how many copies of the code book will be purchased, with an online version available for reference at no cost.

The OCRC is specific to increasing the energy efficiency of constructing and operating commercial structures. This increased energy efficiency should have a positive impact on both utilities and building operation costs.

Additionally, the Construction Industry Energy Board made the specific finding that the added cost, if any, is necessary to the health and safety of the occupants or the public, or is necessary to conserve scarce resources.

Statement of Cost of Compliance:

1. Impact on state agencies, units of local government and the public (ORS 183.335(2)(b)(E)):
The proposed rules will have some fiscal impact on state and local governments, including building officials and inspectors in terms of training costs and the purchase of the 2011 edition of the Oregon Commercial Reach Code book. Any impact to the general public, including building owners, developers, and contractors, will be related to the choice to pursue an OCRC certification. For members of the public who would otherwise pursue a high-performance certification, costs associated with utilizing the OCRC should be reduced, because of the lack of a certification fee, or similar, because of the requirement for some third party verification. There may be increased costs of inspections, but these are likely to be off-set to some extent by the use of third party testing and reports.

2. Cost of compliance effect on small business (ORS 183.336):
a. Estimate the number of small businesses and types of business and industries with small businesses subject to the rule:
This is an optional code, therefore no small business will be subject to its provisions unless they choose to pursue OCRC certification. Small businesses that may opt to build to the code adopted under these rules include commercial contractors, designers, engineers, architects, and others associated with the construction industry. There are an estimated 14,400 construction businesses in Oregon according to 2006 Census data; of those, approximately 13,700 qualify as "small businesses" with 50 or fewer employees. There is may be increased costs of inspections at the jurisdictional level and some associated costs of third party verification of particular components.

b. Projected reporting, recordkeeping and other administrative activities required for compliance, including costs of professional services:
This is an optional code, therefore no small business will be subject to its provisions unless they choose to pursue OCRC certification. The proposed rules do not impose any additional reporting or recordkeeping requirements. However, the need for additional professional services may increase, such as needing to hire an engineer or designer for HVAC systems, automatic controls, and envelope design or for modeling of the building's energy use. The exact cost of compliance cannot be determined at this time because it will vary depending on the type of construction the small business is engaged in. Some small businesses pursuing high-performance certification will see some increase in costs for these services, while others may see no impact.

c. Equipment, supplies, labor and increased administration required for compliance: This is an optional code, therefore no small business will be subject to its provisions unless they choose to pursue OCRC certification. The proposed rules may require additional equipment, supplies, or labor, or increased administration in order for a small business to obtain certification under the OCRC. Any additional equipment, labor or increased administration should be similar to or less than those required for other high-performance certifications.

How were small businesses involved in the development of this rule? Small businesses are represented on the Construction Industry Energy Board, who reviewed and approved the proposed rules.

Administrative Rule Advisory Committee consulted?: Yes
If not, why?:

Patrick Allen

Signature | Printed name | Date

DIVISION 465
REACH CODE

918-465-0010
Reasonable Notice to Interested Parties

Prior to the adoption, amendment or repeal of any rule, relating to the Oregon Commercial Reach Code or Oregon Residential Reach Code, the Building Codes Division shall provide notice of the proposed adoption, amendment or repeal:

(1) In the Secretary of State's Oregon Bulletin referenced in ORS 183.360, at least 21 days prior to the effective date of the proposed adoption, amendment or repeal; and

(2) By making the notice available to persons as established under ORS 183.335(8).

[Publications: Publications referenced are available for review at the agency.]

Stat. Auth.: ORS 183.335, 455.020 & 455.496
Stat. Implemented: ORS 183.335
Hist.: BCD

918-465-0020
Adopted Oregon Commercial Reach Code

Effective July 1, 2011, the 2011 Oregon Commercial Reach Code and referenced standards are adopted as the optional standards for the effective use of energy and the utilization of renewable energy technologies in the construction and design of buildings to provide approaches and techniques for achieving effective energy use and reducing negative impacts of the built environment.

[Publications: Publications referenced are available for review at the agency.]

Stat. Auth.: ORS 455.020, 455.496 & 455.500
Stat. Implemented: ORS 455.020 & 455.500
Hist.: BCD

918-465-0030
Amendments to the Oregon Commercial Reach Code

The Oregon Commercial Reach Code is adopted and amended pursuant to OAR chapter 918, division 8. Amendments to the Oregon Commercial Reach Code are placed in

this rule, with the section reference, a descriptive caption, and a short explanation of the amendment.

[Publications: Publications referenced are available for review at the agency.]

Stat. Auth.: ORS 185.335, 455.020 455.496 & 455.500
Stat. Implemented: ORS 183.335, 455.020 & 455.500
Hist.: BCD

918-465-0060
Fees for Plan Review and Permits

Fees for plan review and permits issued by the Division for construction, alteration and repair of prefabricated structures and of buildings and other structures as established by these rules and authorized by ORS 455.210, shall be determined in accordance with 918-460-0030, 918-440-0050, and 918-309-0030 through 918-309-0070 as appropriate.

[ED. NOTE: Exhibits referenced are available from the agency.]

Stat. Auth.: ORS 455.210
Stats. Implemented: ORS 455.210
Hist.: BCD

DRAFT

KTCF-12-11

RESOLUTION OF THE KAYENTA TOWNSHIP COMMISSION

Approving the Adoption of the 2010 International Green Construction Code.

WHEREAS:

1. The Kayenta Township Commission ("KTC") has the general authority and responsibility to govern for the welfare of the Kayenta Township ("Township") and its residents including the enactment of such ordinances, rules and regulations as it deems in the best interest of the Township; and
2. Pursuant to this authority, the KTC desires to adopt the 2010 International Green Construction Code (IGCC) on a voluntary basis Exhibit "A"; and
3. The IGCC green building design requirements for the Township have followed a selected compliance path exclusive for the Township, Exhibit "B"; and
4. The Township Building and Safety Department has gathered support and input from other Government agencies during development of the IGCC, Exhibit "C" ; and
5. The Township staff has allowed for adequate Public Notice time for comment Exhibit "D"; and
6. The development of the 2010 IGCC and brief narrative are attached as, Exhibit "E".

NOW, THEREFORE BE IT RESOLVED THAT:

1. The KTC hereby approves the adoption of the 2010 IGCC on a voluntary basis, Exhibit "A".
2. The KTC herby approves the Township Building & Safety Department to enforce the 2010 IGCC according to the requirements of, Exhibit "B".
3. The KTC hereby authorizes the Town Manager to execute the necessary documents needed on behalf of the Kayenta Township.
4. The KTC hereby authorizes its Chairperson to approve this resolution.

CERTIFICATION

I hereby certify that the foregoing resolution was duly considered by the Kayenta Township Commission at a duly called meeting at Kayenta, Navajo Nation (Arizona), at which a quorum was present and that same was passed by a vote of 4 in favor, 0 opposed, and 0 abstained, this 14th day of **February, 2011.**

Motion: Commissioner Bonnaha
Second: Commissioner Greyeyes

KAYENTA TOWNSHIP COMMISSION

Chairperson, Andre Cordero

EXHIBIT "A"

A MEMBER OF THE INTERNATIONAL CODE FAMILY®

IgCC

SAFE & SUSTAINABLE BY THE BOOK

INTERNATIONAL GREEN CONSTRUCTION CODE™

PUBLIC VERSION 2.0, NOVEMBER 2010

ASHRAE/USGBC/IES STANDARD 189.1-2009
STANDARD FOR THE DESIGN OF HIGH-PERFORMANCE GREEN BUILDINGS -
A JURISDICTIONAL COMPLIANCE OPTION OF THE IGCC

THE AMERICAN INSTITUTE OF ARCHITECTS

ICC INTERNATIONAL CODE COUNCIL

TABLE 302.1
REQUIREMENTS DETERMINED BY THE JURISDICTION

Section	Section Title or Description and Directives	Jurisdictional Requirements	
➔			
CH 3. JURISDICTIONAL REQUIREMENTS AND PROJECT ELECTIVES			
302.1 (2)	Optional compliance path – ASHRAE 189.1	☐ Yes	▶ No
302.1 (3)	Project Electives – The jurisdiction shall indicate a number between 1 and 14 to establish the minimum total number of project electives that must be satisfied.	9	
CH 4. SITE DEVELOPMENT AND LAND USE			
➔			
402.2.3	Conservation area	▶ Yes	☐ No
402.2.5	Agricultural land	▶ Yes	☐ No
402.2.6	Greenfields	▶ Yes	☐ No
402.3.2	Stormwater management	☐ Yes	▶ No
403.4.1	High occupancy vehicle parking	▶ Yes	☐ No
403.4.2	Low emission, hybrid and electric vehicle parking	☐ Yes	▶ No
405.1	Light pollution control	▶ Yes	☐ No
CH 5. MATERIAL RESOURCE CONSERVATION AND EFFICIENCY			
➔			
502.1	Minimum percentage of waste material diverted from landfills.	▶ 50% ☐ 65% ☐ 75%	
CH 6. ENERGY CONSERVATION AND EARTH ATMOSPHERIC QUALITY			
➔			
Table 602.1, 302.1, 302.1.1	*zEPI* of Jurisdictional Choice – The jurisdiction shall indicate a *zEPI* of 46 or less in Table 602.1 for each occupancy for which it intends to require enhanced energy performance.	See Table 602.1 and Section 302.1	
602.3.2.3	Total annual CO2e emissions limits and reporting	☐ Yes	▶ No

Section	Section Title or Description and Directives	Jurisdictional Requirements	
613.2	Post Certificate of Occupancy zEPI, energy demand, and CO2e emissions reporting	☐ Yes	▶ No
	CH 7. WATER RESOURCE CONSERVATION AND EFFICIENCY		
➔			
702.1.2	Enhanced plumbing fixture and fitting flow rate tier.	▶ Tier 1 ☐ Tier 2	
702.7	Municipal reclaimed water.	☐ Yes	▶ No
	CH 9. COMMISSIONING, OPERATION AND MAINTENANCE		
904.1.1.1	Periodic reporting	▶ Yes	☐ No
	CH 10. EXISTING BUILDINGS		
➔			
1006.4	Evaluation of existing buildings	▶ Yes	☐ No
	APPENDICES		
Appendix B	Greenhouse gas reduction in existing buildings	☐ Yes	▶ No
B103.1	Compliance level – The jurisdiction to select phases only where "Yes" is selected in the previous row.	☐ Phase 1 ☐ Phase 2 ☐ Phase 3 ☐ Phase 4	
B103.2	Where "Phase 1" is selected under Section B103.1 – jurisdiction to indicate the number of months to be used in association with Section B103.2.	_____ months	
B103.3	Where "Phase 2" is selected under Section B103.1 – jurisdiction to indicate the number of years and the percentage to be used in association with Section B103.3.	_____ years _____ %	
B103.4	Where "Phase 3" is selected under Section B103.1 – jurisdiction to indicate the number of years to be used in association with Section B103.4.	_____ years	
B103.5	Where " Phase 4" is selected above – jurisdiction to indicate the number of years and the percentage to be used in association with Section B103.5.	_____ years _____ %	
Appendix C	Sustainability measures	▶ Yes	☐ No
Appendix D	Enforcement procedures	▶ Yes	☐ No

SECTION 303
PROJECT ELECTIVES

303.1 Electives required. A total of not less than the number of *project electives* as indicated by the jurisdiction in Section 302.1(2) of Table 302.1 shall be selected by the owner. Such *project electives* shall be applied as mandatory requirements to the project and shall be indicated to the *code official* by means of completion of Table 303.1. Electives identified by the jurisdiction as being "not available" are not available for selection.

303.2 Additional elective. Where required in accordance with Section 705.1, the total number of *project electives* indicted in Table 302.1 shall be increased by one.

EXHIBIT "D"

KAYENTA TOWNSHIP
BUILDING & SAFETY DEPARTMENT
P.O. BOX 1490
KAYENTA, ARIZONA 86033
PHONE: (928) 697-8451 FAX: (928) 697-8461

November 23, 2010

PUBLIC NOTICE

The Kayenta Township Commission (KTC) has the authority and responsibility to govern for the welfare of the Kayenta Township (Township) and its residents, including the enactment of such ordinances, rules, and regulations as it deems in the best interest of the Township; and

Notice is hereby given; the Kayenta Township Building & Safety Department will be adopting the 2010 International Green Construction Code (IGCC) Public Version 1.0 on a voluntary basis. When development of the 2010 IGCC Public Version 2.0 is complete it will replace Public Version 1.0. The IGCC is intended to safeguard the environment, public health, safety, and general welfare of the community. Questions that concern this 30 day Public Notice period can be directed to Philbert Tso, Building Official at (928) 697-8451 ext. 233 or email: ptso@kayentatownship.net.

EXHIBIT "E"

2011 IGCC CODE DEVELOPMENT SCHEDULE

STEP IN CODE DEVELOPMENT CYCLE	DATE
2010 PUBLIC COMMENT HEARING ON COMMENTS SUBMITTED TO IGCC PUBLIC VERSION 1.0	August 14 – 22, 2010 The Westin O'Hare Hotel Rosemont, IL
DEADLINE FOR RECEIPT OF APPLICATIONS FOR THE 2011 IGCC CODE COMMITTEE (1)	October 1, 2010
WEB POSTING OF IGCC PUBLIC VERSION 2.0	November 3, 2010
DEADLINE FOR RECEIPT OF CODE CHANGE PROPOSALS TO IGCC PUBLIC VERSION 2.0	January 3, 2011
WEB POSTING OF "PROPOSED CHANGES TO IGCC PV 2.0"	March 25, 2011
DISTRIBUTION DATE OF "PROPOSED CHANGES TO IGCC PV 2.0" (CD distribution only)	April 25, 2011
IGCC CODE DEVELOPMENT HEARING (CDH)	**May 16 – 22, 2011** Sheraton Dallas Hotel Dallas, TX
WEB POSTING OF "REPORT OF THE PUBLIC HEARING"	June 27, 2011
DISTRIBUTION DATE OF "REPORT OF THE PUBLIC HEARING" (CD distribution only)	July 25, 2011
DEADLINE FOR RECEIPT OF PUBLIC COMMENTS	August 12, 2011
WEB POSTING OF PUBLIC COMMENTS "FINAL ACTION AGENDA"	September 16, 2011
DISTRIBUTION DATE OF PUBLIC COMMENTS "FINAL ACTION AGENDA" (CD distribution only)	October 14, 2011
FINAL ACTION HEARINGS (FAH)	November 2 – 6, 2011
ANNUAL CONFERENCES	October 25 – 31, 2010 Charlotte Convention Center Charlotte, NC October 30 – November 3, 2011 Phoenix Convention Center Phoenix, AZ
PUBLISH 2012 IGCC	March/2012

ORDINANCE G-5609

ORDINANCE AMENDING SECTION 9-1 OF THE PHOENIX CITY CODE BY ADOPTING THE INTERNATIONAL GREEN CONSTRUCTION CODE AND THE NATIONAL GREEN BUILDING STANDARD WITH CITY AMENDMENTS, AS VOLUNTARY CODES, AS PART OF THE PHOENIX BUILDING CONSTRUCTION CODE.

BE IT ORDAINED BY THE COUNCIL OF THE CITY OF PHOENIX as follows:

SECTION 1. The Phoenix City Code Section 9-1, The Phoenix Building Construction Code, is hereby amended by adopting the International Green Construction Code, Public Version 1.0 as a voluntary code in its entirety as if set forth herein at length, subject to amendments as set forth below in this ordinance, as a separate document of the Phoenix Building Construction Code.

SECTION 2. The City of Phoenix amendments to the International Green Construction Code, Public Version 1.0 as set forth in attached Exhibit A are hereby adopted, with deletions struck through and additions underlined.

SECTION 3. The Phoenix City Code Section 9-1, The Phoenix Building Construction Code, is hereby amended by adopting the 2008 National Green Building Standard as a voluntary code in its entirety as if set forth herein at length, subject to

amendments set forth below in this ordinance, as a separate document of the Phoenix Building Construction Code.

SECTION 4. The City of Phoenix amendments to the 2008 National Green Building Standard as set forth in Exhibit B are hereby adopted, with deletions struck through and additions underlined.

PASSED by the Council of the City of Phoenix this 20th day of April, 2011.

ACTING MAYOR

ATTEST:

Acting City Clerk

APPROVED AS TO FORM:

Acting City Attorney

REVIEWED BY:

City Manager

LMH:efl:909146;(CM73)(Item29) 4/20/2011

Amendments to Public Version 1.0 of the International Green Construction Code

CHAPTER 1
ADMINISTRATION

PART 1 – SCOPE AND APPLICATION

SECTION 101
GENERAL

101.1 Title. These regulations shall be known as the Phoenix Green Construction Code of ~~[NAME OF JURISDICTION]~~, hereinafter referred to as "this code."

101.2 Scope. The use of this code is optional, unless specifically required through ordinance by the city of Phoenix. The provisions of this code shall apply to the design, construction, *addition*, *alteration*, *change of occupancy*, movement, enlargement, replacement, *repair*, equipment, location, maintenance, removal and demolition of every *building* or *structure* or any appurtenances connected or attached to such *buildings* or *structures* and to the site on which the *building* is located . Occupancy classifications shall be determined in accordance with the *International Building Code*;

***

SECTION 102
APPLICABILITY

***

102.4.5 Reserved. ~~**Property maintenance.** The provisions of the *International Property Maintenance Code* shall apply to *existing structures* and premises; equipment and facilities; light, *ventilation*, space heating, sanitation, life and fire safety hazards; responsibilities of owners, operators and occupants; and occupancy of existing premises and *structures*.~~

***

102.4.8 Reserved. ~~**Wildland-urban interface.** The provisions of the *International Wildland-Urban Interface Code* shall apply to matters related to the mitigation of risk to life and *structures* from intrusion of fire from wildland fire exposures and fire exposures from adjacent *structures* and to mitigate *structure* fires from spreading to wildland fuels.~~

***

102.4.11 Zoning. The provisions of the Phoenix Zoning Ordinance ~~*International Zoning Code*~~ shall apply to matters governing zoning requirements related to the scope of this code.

***

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EXHIBIT A

TABLE 102.4.12
Residential Performance Requirements

Residential coverage issue	ICC 700 Requirement
Environmental Performance Level	Bronze, Silver, Gold or Emerald in accordance with Table 303[a]
Minimum energy efficiency requirements – Performance Path	Mandatory requirements of Section 701. Performance path requirements in accordance with Section 701.1.1 that exceed the baseline minimum performance required by the 2006 IECC by ~~30~~ 15 percent in accordance with 702.2 ~~(2)~~ (1) and a minimum of two practices from Section 704.

a. The environmental performance level in accordance with Table 303 of ICC 700 is to be determined by the *jurisdiction*.

***

PART 2 – ADMINISTRATION AND ENFORCEMENT

For all provisions governing administration and enforcement, refer to the Phoenix Building Construction Code – Administrative Provisions.

~~**SECTION 103**~~
~~**DUTIES AND POWERS OF THE CODE OFFICIAL**~~

~~**103.1 General.** The *code official* established in the *International Building Code* is hereby authorized and directed to enforce the provisions of this code. The *code official* shall have the authority to render interpretations of this code and to adopt policies and procedures in order to clarify the application of its provisions and how this code relates to other applicable codes and ordinances. Such interpretations, policies and procedures shall be in compliance with the intent and purpose of this code and other applicable codes and ordinances. Such policies and procedures shall not have the effect of waiving requirements specifically provided for in this code or other applicable codes and ordinances.~~

~~**103.2 Applications and permits.** The *code official* shall enforce compliance with the provisions of this code as part of the enforcement of other applicable codes and regulations, including the referenced codes listed in 102.4.~~

~~**103.3 Notices and orders.** The *code official* shall issue all necessary notices or orders to ensure compliance with this code.~~

~~**103.4 Inspections.** The *code official* shall make inspections, as required to determine code compliance, or the *code official* shall have the authority to accept reports of inspection by *approved agencies* or individuals. The *code official* is authorized to engage such expert opinion as deemed necessary to report upon unusual technical issues that arise, subject to the approval of the appointing authority.~~

~~**SECTION 104**~~
~~**CONSTRUCTION DOCUMENTS**~~

~~**104.1 Information on construction documents.** *Construction documents* shall be dimensioned and drawn upon suitable material. Electronic media documents are permitted to be submitted where *approved* by the *code official*. *Construction documents* shall be of sufficient~~

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clarity to indicate the location, nature and extent of the work proposed and show in detail that such work will conform to the provisions of this code and relevant laws, ordinances, rules and regulations, as determined by the *code official*. The *construction documents* shall contain a listing of the applicable *project electives* in accordance with Section 303, and shall include the applicable *commissioning* requirements in accordance with Section 903. Where special conditions exist, the *code official* is authorized to require additional *construction documents*.

SECTION 105
APPROVAL

105.1 General. This code is not intended to prevent the use of any material, method of construction, design, system, or innovative approach not specifically prescribed herein, provided that such construction, design, system or innovative approach has been *approved* by the *code official* as meeting the intent of this code and all other applicable laws, codes and ordinances.

105.2 Approved materials and equipment. Materials, equipment, devices and innovative approaches *approved* by the *code official* shall be constructed, installed and maintained in accordance with such approval.

105.2.1 Used materials and equipment. The use of used materials which meet the requirements of this code for new materials is permitted. Used equipment and devices shall not be reused unless tested to verify proper working condition and *approved* by the *code official*.

105.3 Modifications. Wherever there are practical difficulties involved in carrying out the provisions of this code, the *code official* shall have the authority to grant modifications for individual cases, upon application of the owner or owner's representative, provided the *code official* shall first find that special individual reason makes the strict letter of this code impractical and that the modification is in compliance with the intent and purpose of this code and that such modification does not lessen the minimum requirements of this code. The details of granting modifications shall be recorded and entered in the files of the department.

105.4 Alternative materials, design, innovative approach and methods of construction and equipment. The provisions of this code are not intended to prevent the installation of any material or to prohibit any design, innovative approach, or method of construction not specifically prescribed by this code, provided that any such alternative has been *approved*. An alternative material, design, innovative approach or method of construction shall be reviewed and *approved* where the *code official* finds that the proposed design is satisfactory and complies with the intent of the provisions of this code, and that the material, design, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this code. The details of granting the use of alternative materials, designs, innovative approach and methods of construction shall be recorded and entered in the files of the department.

105.4.1 Research reports. Supporting data, where necessary to assist in the approval of materials or assemblies not specifically provided for in this code, shall consist of valid research reports from *approved sources*.

105.4.2 Tests. Wherever there is insufficient evidence of compliance with the provisions of this code, or evidence that a material or method does not conform to the requirements of this code, or in order to substantiate claims for alternative materials or methods, the *code official* shall have the authority to require tests as evidence of compliance to be made at no

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expense to the *jurisdiction*. Test methods shall be as specified in this code or by other recognized test standards. In the absence of recognized and accepted test methods, the *code official* shall approve the testing procedures. Tests shall be performed by an *approved agency*. Reports of such tests shall be retained by the *code official* for the period required for retention of public records.

105.5 Compliance materials. The *code official* shall be permitted to approve specific computer software, work- sheets, compliance manuals and other similar materials that meet the intent of this code.

SECTION 106
PERMITS

106.1 Required. Any owner or authorized agent who intends to construct, enlarge, *alter, repair,* move, demolish, or change the occupancy of a *building* or *structure*, or to erect, install, enlarge, alter, repair, remove, convert or replace any energy, electrical, gas, mechanical or plumbing system, the installation of which is regulated by this code, or to cause any such work to be done, shall first make application to the *code official* and obtain the required *permit* under the applicable code or regulation relevant to the intended work. Separate *permits* shall not be issued under this code. Exemptions from *permit* requirements shall not be deemed to grant authorization for any work to be done in any manner in violation of the provisions of this code or any other applicable laws, codes or ordinances of this *jurisdiction*.

SECTION 107
FEES

107.1 Fees. Fees for *permits* shall be paid as required, in accordance with the schedule as established by the applicable governing authority for the intended work prescribed in an application.

SECTION 108
BOARD OF APPEALS

108.1 General. Appeals of orders, decisions or determinations made by the *code official* relative to the application and interpretation of this code shall be made to the Board of Appeals created under the applicable *International Code* of governing regulation.

108.2 Limitations on authority. An application for appeal shall be based on a claim that the true intent of this code or the rules legally adopted there under have been incorrectly interpreted, the provisions of this code do not fully apply or an equivalent or better form of construction is proposed. The board shall have no authority to waive requirements of this code.

108.3 Qualifications. The members of the board of appeals related to interpretation of this code shall be qualified by experience and training in the matters covered by this code and shall not be employees of the *jurisdiction*.

SECTION 109
CERTIFICATE OF OCCUPANCY

109.1 Use and occupancy. *Buildings* or *structures* shall not be used or occupied, and changes in the existing occupancy classification of a *building* or *structure* or portion thereof shall not be

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made, until the *code official* has issued a certificate of occupancy therefor as provided herein. Issuance of a certificate of occupancy shall not be construed as an approval of a violation of the provisions of this code or of other ordinances of the *jurisdiction*.

109.2 Certificate issued. After the *code official* inspects the *building* or *structure* and finds no violations of the provisions of this code or other laws that are enforced by the department of *building* safety, the *code official* shall issue a certificate of occupancy in accordance with the provisions of the *International Building Code*. The certificate of occupancy shall include a stipulation in accordance with Item 12 of Section 111.2 of the *International Building Code* that post occupancy requirements are to be completed in accordance with Chapter 9 of this code.

109.3 Temporary occupancy. The *code official* is authorized to issue a temporary certificate of occupancy before the completion of the entire work covered by the permit, provided that the building or structure or portion thereof is safe to occupy.

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Chapter 2
DEFINITIONS

***

SECTION 202
DEFINITIONS

***

TURFGRASS. Grasses that are regularly mowed and, as a consequence, form a dense growth of leaf blades, shoots and roots.

***

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CHAPTER 3
JURISDICTIONAL REQUIREMENTS AND PROJECT ELECTIVES

***

SECTION 302
JURISDICTIONAL REQUIREMENTS

***

TABLE 302.1
REQUIREMENTS DETERMINED BY THE JURISDICTION

Section	Section Title or Description and Directives	Jurisdictional Requirements	
	CH 1. ADMINISTRATION		
102.4.12 302.1 (1)	ICC 700 Environmental Performance Level - Select one box.	☒ Bronze ☐ Silver ☐ Gold ☐ Emerald	
	CH 3. JURISDICTIONAL REQUIREMENTS AND PROJECT ELECTIVES		
302.1 (2)	Optional compliance path – ASHRAE 189.1	☐ Yes	☒ No
302.1 (3)	Project Electives – The *jurisdiction* shall indicate a number between 0 and 14 to establish the minimum total number of *project electives* that must be satisfied.	10	
	CH 4. SITE DEVELOPMENT AND LAND USE		
402.2.1.2	Floodplain preservation	☐ Yes	☒ No
402.2.3	Conservation area	☒ Yes	☐ No
402.2.5	Agricultural land	☐ Yes	☒ No
402.2.6	Greenfields	☒ Yes	☐ No
403.4.1	High occupancy vehicle parking	☒ Yes	☐ No
403.4.2	Low emission, hybrid and electric vehicle parking	☒ Yes	☐ No
405.1	Light pollution control	☒ Yes	☐ No
	CH 5. MATERIAL RESOURCE CONSERVATION AND EFFICIENCY		
502.1	Enhanced construction material and waste management	☐ Yes	☒ No
502.1	Minimum percentage of waste material diverted from landfills – Select a percentage only where "Yes" is selected in the previous row.	N/A	
	CH 6. ENERGY CONSERVATION AND EARTH ATMOSPHERIC QUALITY		
602.1, 602.3, 602.3.2, 302.1.1	Enhanced energy performance - for buildings pursuing performance based compliance and buildings greater than 25,000 square feet in *total building floor area*	☐ Yes	☒ No
Table 602.1, 302.1, 302.1.1	*TANEU* of Jurisdictional Choice - Where "Yes" is selected in the previous row, the *jurisdiction* shall indicate a *TANEU* of 63 or less in Table 602.1 for each occupancy for which it intends to require enhanced energy performance.	~~See Table 602.1 and Section 302.1~~ N/A	

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Section	Section Title or Description and Directives	Jurisdictional Requirements	
602.3.2.4	Reduced CO2e emissions calculations and reporting	☐ Yes	☒ No
613.2	Post C. of O. *TANEU*, energy demand, and *CO2e* emissions reporting	☐ Yes	☒ No
CH 7. WATER RESOURCE CONSERVATION AND EFFICIENCY			
702.1.2	Enhanced plumbing fixture and fitting flow rates	☐ Yes	☒ No
702.1.2	Enhanced plumbing fixture and fitting flow rate tier – Select a tier only where "Yes" is selected in the previous row.	N/A	
702.7	Municipal reclaimed water.	☒ Yes	☐ No
CH 9. COMMISSIONING, OPERATION AND MAINTENANCE			
904.1.1.1	Periodic reporting	☐ Yes	☒ No
CH 10. EXISTING BUILDINGS			
1007.2	Demolition	☒ Yes	☐ No
1007.3	Sale of existing buildings and tenant spaces	☐ Yes	☒ No
1007.4	Evaluation of existing buildings	☒ Yes	☐ No
APPENDICES			
Appendix B	*Greenhouse gas* reduction in existing buildings	☐ Yes	☒ No
B103.1	Compliance level – The *jurisdiction* to select phases only where "Yes" is selected in the previous row.	N/A	
B103.2	Where "Phase 1" is selected under Section B103.1 – *jurisdiction* to indicate the number of months to be used in association with Section B103.2.	N/A	
B103.3	Where "Phase 2" is selected under Section B103.1 – *jurisdiction* to indicate the number of years and the percentage to be used in association with Section B103.3.	N/A	
B103.4	Where "Phase 3" is selected under Section B103.1 – *jurisdiction* to indicate the number of years to be used in association with Section B103.4.	N/A	
B103.5	Where " Phase 4" is selected above – *jurisdiction* to indicate the number of years and the percentage to be used in association with Section B103.5.	N/A	
Appendix C	Sustainability measures	☐ Yes	☒ No
Appendix D	Enforcement procedures	☐ Yes	☒ No

SECTION 303
PROJECT ELECTIVES

***

TABLE 303.1
PROJECT ELECTIVES CHECKLIST

Section	Description	Check the corresponding box to indicate each *project elective* selected.
CH 3. JURISDICTIONAL REQUIREMENTS AND PROJECT ELECTIVES		
~~304.1~~	~~Whole Building Life Cycle Assessment~~	☐
CH 4. SITE DEVELOPMENT AND LAND USE		
407.2.1	Flood hazard avoidance	☐
~~407.2.2~~	~~Agricultural land~~	☐
407.2.3	Infill site	☐
407.2.4	.Brownfield site	☐
407.2.5	Greenfield development	☐
407.2.6	Greenfield proximity to development	☐
407.2.7	Greenfield proximity to diverse uses	☐
407.3.1	Changing and shower facilities	☐
407.3.2	Long term bicycle parking and storage	☐
407.3.3	Preferred parking	☐
407.4.1	Site hardscape 1	☐
407.4.2	Site hardscape 2	☐
407.4.3	Site hardscape 3	☐
407.4.4	Roof covering	☐
407.5	Light pollution	☐
407.6	Existing building reuse project elective	☐
407.7	Native plant landscaping project elective	☐
407.8	Site restoration project elective	☐
CH 5. MATERIAL RESOURCE CONSERVATION AND EFFICIENCY		
507.2	Waste management (502.1 + 20%)	☐
507.3(1)	Reused, recycled content, recyclable, bio-based and indigenous materials (50%)	☐
507.3(2)	Reused, recycled content, recyclable, bio-based and indigenous materials (80%)	☐ (2 Electives)
507.4(1)	Multi-story building – footprint reduced by at least 45%	☐
507.4(2)	Multi-story buildings – footprint reduced by at least 70%	☐ (2 Electives)
507.5	Reduced building volume	☐
~~507.6.1~~	~~Service life – 100 year design service life category~~	☐
~~507.6.1~~	~~Service life – 200 year design service life category~~	☐ ~~(2 Electives)~~
~~507.6.2~~	~~Interior adaptability~~	☐
507.7	Moisture control	☐
CH 6. ENERGY CONSERVATION, EFFICIENCY AND EARTH ATMOSPHERIC QUALITY		

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Section	Description	Check the corresponding box to indicate each *project elective* selected.
~~613.3.1~~	~~Project *TANEU* is at least 7 points lower than required by Table 302.1.~~	~~☐~~
~~613.3.2~~	~~Project *TANEU* is at least 14 points lower than required by Table 302.1~~	~~☐ (2 Electives)~~
~~613.3.3~~	~~Project *TANEU* is at least 21 points lower than required by Table 302.1~~	~~☐ (3 Electives)~~
~~613.3.4~~	~~Project *TANEU* is at least 28 points lower than required by Table 302.1~~	~~☐ (4 Electives)~~
~~613.3.5~~	~~Project *TANEU* is at least 35 points lower than required by Table 302.1~~	~~☐ (5 Electives)~~
~~613.3.6~~	~~Project *TANEU* is at least 42 points lower than required by Table 302.1~~	~~☐ (6 Electives)~~
~~613.3.7~~	~~Project *TANEU* is at least 49 points lower than required by Table 302.1~~	~~☐ (7 Electives)~~
~~613.3.8~~	~~Project *TANEU* is at least 56 points lower than required by Table 302.1~~	~~☐ (8 Electives)~~
~~613.3.9~~	~~Project *TANEU* is at least 63 points lower than required by Table 302.1~~	~~☐ (9 Electives)~~
~~613.3.10~~	~~Project *TANEU* is at least 70 points lower than required by Table 302.1~~	~~☐ (10 Electives)~~
613.4	Building thermal envelope systems	~~☐~~
613.4.1	Building thermal envelope shall exceed the requirements of the IECC by 20%.	☐ (1 Electives)
613.4.2	Building thermal envelope shall exceed the requirements of the IECC by 25%.	☐ (2 Electives)
613.4.3	Building thermal envelope shall exceed the requirements of the IECC by 30%.	☐ (3 Electives)
613.4.4	Building thermal envelope shall exceed the requirements of the IECC by 35%.	☐ (4 Electives)
613.4.5	Building thermal envelope shall exceed the requirements of the IECC by 40%.	☐ (5 Electives)
613.4.6	Building thermal envelope shall exceed the requirements of the IECC by 45%.	☐ (6 Electives)
613.5	Mechanical systems	~~☐~~
613.5.1	Mechanical equipment	☐
613.5.2	Duct Insulation	☐
613.5.3	Duct Air Leakage Testing	☐
613.5.4	Service Water Heating Equipment	☐
613.6	Passive design	☐
613.7	Energy Metering and Monitoring	☐
613.8	Automated Demand Response Infrastructure	☐
613.9	Solar photovoltaic system rough-in	☐
613.10	Rough-ins for future solar hot water pre-heat	☐
613.11	Commercial food service equipment	☐
613.12	Permanent shading devices for fenestration	☐
613.13	Building envelope testing requirement	☐
CH 7. WATER RESOURCE CONSERVATION AND EFFICIENCY		

Section	Description	Check the corresponding box to indicate each *project elective* selected.
710.2.1	Fixture flow rates are one tier above that required by Table 302.1	☐
710.2.1	Fixture flow rates are two tiers above that required by Table 302.1.	☐ (2 Electives)
710.3	On-site wastewater treatment	☐
710.4	Non-potable outdoor water supply	☐
710.5	Non-potable water for plumbing fixture flushing	☐
710.6	Automatic fire sprinkler system	☐
710.7	Non-potable water supply to fire pumps	☐
710.8	Non-potable water for industrial process makeup water	☐
710.9	Efficient hot water distribution system	☐
710.10	Non-potable water for cooling tower makeup water	☐
710.11	Graywater collection	☐
CH 8 INDOOR ENVIRONMENTAL QUALITY AND COMFORT		
809.2.1	VOC emissions - flooring	☐
809.2.2	VOC emissions – ceiling systems	☐
809.2.3	VOC emissions- wall systems	☐
809.2.4	Total VOC limit	☐
809.3	Views to building exterior	☐

***

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CHAPTER 4
SITE DEVELOPMENT AND LAND USE

***

SECTION 402
PRESERVATION OF NATURAL RESOURCES

***

402.3.1 Predesign site inventory and assessment. The *registered design professional* in responsible charge for the project shall submit an inventory and assessment of the natural resources and baseline conditions of the *building site* to:

1. Determine the location of any protection areas identified in Section 402.2 that are located on, or adjacent to the *building site*;
2. Determine whether, and to the degree to which, the native soils and hydrological conditions of the *building site* have been disturbed and altered by previous use or development.~~; and~~
~~3. Identify invasive vegetation on the site.~~

***

402.3.3.1.1 Potable water. *Potable* water ~~shall not~~ may be used for landscape irrigation purposes.

~~**Exceptions:** *Potable* water is permitted to be used in irrigation systems as follows:~~

~~1. During the establishment phase of newly planted landscaping. The establishment phase shall be not longer than the following:~~
~~1.1. 3 years for trees~~
~~1.2. 2 years for shrubs~~
~~1.3. 1 year for herbaceous cover plants~~
~~2. To irrigate food production.~~
~~3. To supplement *non-potable* water irrigation of shade trees provided in accordance with~~
~~4. *Potable* water is *permitted* for landscape irrigation when *approved* by local ordinance or regulation.~~

***

402.3.5.6 Reserved. ~~**Invasive species.** Invasive species shall not be planted on a *building site*. Any *invasive plants* currently on the site shall be removed. Existing vegetation that is to be retained on a *building site* shall be protected as required by Section 402.3.5.2.~~

402.3.5.7 Turfgrass. Not more than 40 percent of the area of the vegetated area of the building site shall be planted with turfgrass. Calculations of the percentage shall not include vegetative roof areas, areas not external to the building, and areas not on the ground plane of the building.

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Exception: For schools or recreational facilities, the area dedicated to athletic fields is excluded from the calculation of the vegetated area.

~~**402.3.5.7**~~ **402.3.5.8 Documentation.** Documentation demonstrating compliance with Section 402.3.5 shall be provided as part of the submittal documents and during the construction and inspection process.

402.3.6 Building site waste management plan. A *building site* waste management plan shall be developed and implemented to recycle or salvage not less than 75 percent of the land-clearing debris and excavated soils. Land-clearing debris includes rock, trees, stumps and associated vegetation. The plan shall include provisions that address all of the following:

1. Materials to be diverted from disposal by efficient usage, recycling or reuse on the *building site* shall be specified.
2. Diverted materials shall not be sent to sites that are agricultural land, *floodplain* areas or greenfield sites where development is prohibited by Section 402.2.
3. Reserved. ~~The removal and disposal off-site of *invasive plant* species.~~
4. Where contaminated soils are removed, the methods of removal and location where the soils are to be treated and disposed.
5. The amount of materials to be diverted shall be specified and shall be calculated by weight or volume, but not both.

Construction materials and waste and *hardscape* materials removed during site preparation shall be managed in accordance with Section 502.1.

***

SECTION 404
HEAT ISLAND MITIGATION

***

404.2.2 Shading structures. Where shading is provided by a structural device or element, such device or element shall comply with all of the following:

1. Where open trellis-type free standing structures such as, but not limited to, covered walkways, and trellises or pergolas, are covered with ~~native~~ plantings, they shall be designed to achieve mature coverage within five years;
2. Parking shading *structures* shall comply with Section 404.3;
3. Shade provided onto the *hardscape* by an adjacent *building* or structure located on the same *lot* shall be calculated and credited toward compliance with this section based on the projected peak sun angle on the summer solstice.

404.2.3 Shade by trees. Where shading is provided by trees, such trees shall be selected and placed in accordance with all of the following:

1. Trees selected shall be those that are ~~native~~ conducive to the region and climate zone in which the project site is located. Plantings shall be selected and sited to produce a hardy and drought resistant vegetated area;
2. *Construction documents* shall be submitted that show the planting location and ~~anticipated five year~~ the mature canopy growth of all trees and ~~that~~ show the contributions of existing tree canopies; ~~and~~

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3. Shading calculations shall be shown on the *construction documents* demonstrating compliance with this section and shall include only those *hardscape* areas directly beneath the trees based on a ~~five-year growth~~ mature canopy. Duplicate shading credit shall not be granted for those areas where multiple trees shade the same *hardscape*.

***

SECTION 406
DETAILED SITE DEVELOPMENT REQUIREMENTS

***

406.4.2 Reserved. ~~**Restoration.** Soils disturbed during construction shall be restored in all areas that will not be covered by *buildings*, *structures* or *hardscapes*. Soil restoration shall comply with Sections 406.4.2.1 and 406.4.2.2.~~

~~**406.4.2.1 Organic matter.** To provide appropriate *organic matter* for plant growth and for water storage and infiltration, soils shall be amended with a mature, stable compost material so that not less than the top 12 inches of soil contains not less than 3 percent *organic matter*. Sphagnum peat or organic amendments that contain sphagnum peat shall not be used. Soil *organic matter* shall be determined in accordance with ASTM D2974 or USCC/TMECC 05.07A. Organic materials selected for on-site amendment or for blending of imported soils shall be renewable within a 50-year cycle.~~

~~**Exception:** Where the reference soil for a *building site* has an organic level depth other than 12 inches, soils shall be amended to *organic matter* levels and *organic matter* depth that are comparable to the site's reference soil.~~

~~**406.4.2.2 Additional soil restoration criteria.** In addition to compliance with Section 406.4.2.1, soil restoration shall comply with not less than three of the following criteria:~~

~~1. **Compaction.** Bulk densities within the root zone shall not exceed the densities specified in Table 406.4.2.2. The root zone shall be not less than 12 inches nor less than the site's reference soil, whichever results in the greater depth of measurement.~~
~~2. **Infiltration rates.** Infiltration rates or saturated hydraulic conductivity of the restored soils shall be comparable to the site's reference soil. Infiltration rates shall be determined in accordance with ASTM D3385 or ASTM D5093. For sloped areas where the methods provided in the referenced standards cannot be used successfully, alternate methods *approved* by the *code official* shall be permitted provided that the same method is used to test both reference soil and on-site soil.~~
~~3. **Soil biological function.** Where remediated soils are used, the biological function of the soils' mineralizable nitrogen shall be permitted as a proxy assessment of biological activity.~~
~~4. **Soil chemical characteristics.** Soil chemical characteristics appropriate for plant growth shall be restored. The pH, cation exchange capacity and nutrient profiles of the original undisturbed soil or the site's reference soil shall be matched in restored soils. Salinity suitable for regionally appropriate vegetation~~

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~~shall be established. Soil amendments and fertilizers shall be selected from those which minimize nutrient loading to waterways or groundwater.~~

~~TABLE 406.4.2.2~~
~~MAXIMUM CONE PENETROMETER READINGS~~

~~Surface Resistance (PSI)~~		~~Subsurface Resistance (PSI)~~	
~~All Textures Sand~~	~~Sand (includes loamy sand, sandy loam, sandy clay loam, and sandy clay)~~	~~Silt (includes loam, silt loam, silty clay loam, and silty clay)~~	~~Clay (includes clay loam)~~
~~110~~	~~260~~	~~260~~	~~225~~

***

SECTION 407
PROJECT ELECTIVES

***

407.2.2 Reserved. ~~Agricultural land project elective.~~ ~~Where Section 402.2.5 is not listed in Table 302.1 as a mandatory requirement, and where land within the *jurisdiction* is zoned for agricultural use, development of a *building site* that is not zoned for agricultural use shall be recognized as a *project elective*.~~

***

407.6 Existing building reuse project elective. The development of a building site on which an existing building is already located and in which not less than 75 percent of the existing core and shell of the structure will be reused shall be recognized as a project elective.

407.7 Native plant landscaping project elective. Where new landscaping is installed as part of a site plan or within the building site, and where 75 percent or more of the newly landscaped area is planted with native species, the landscaping shall be recognized as a project elective.

407.8 Site restoration project elective. Previously developed sites that restore 25 percent or more of the non-building footprint building site area with native or adaptive vegetation shall be recognized as a project elective.

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CHAPTER 5
MATERIAL RESOURCE CONSERVATION AND EFFICIENCY

***

SECTION 507
PROJECT ELECTIVES

***

507.6 Reserved. ~~**Service life project electives.** Service life *project electives* shall be in accordance with Sections 507.6.1 or 507.6.2.~~

~~**507.6.1 Building service life plan project electives.** Projects seeking building service life plan *project electives* in accordance with Table 303.1 and Section 303.4 shall comply with this section. A *building* service life plan (BSLP) in accordance with Section 505.1 shall be included in the *construction documents*. BSLP *project electives* shall be recognized in accordance with the criteria in Table 507.6.1.~~

~~**TABLE 507.6.1**~~
~~**PROJECT ELECTIVES FOR BUILDING SERVICE LIFE CATEGORIES AND MINIMUM COMPONENT SERVICE LIFE**~~

~~**PROJECT ELECTIVES**~~	~~**2**~~	~~**1**~~
~~**BUILDING DESIGN SERVICE LIFE CATEGORY**~~	~~**200 Years**~~	~~**100 Years**~~
~~**COMPONENT**~~	~~**COMPONENT MINIMUM DESIGN SERVICE LIFE (Years)**~~	
~~Structural elements and concealed materials and assemblies~~	~~200~~	~~100~~
~~Materials and assemblies where replacement is cost prohibitive or impractical~~	~~100~~	~~100~~
~~Major materials and assembles that are replaceable~~	~~40~~	~~40~~
~~Mechanical, electrical and plumbing equipment and systems~~	~~25~~	~~25~~
~~Site hardscape~~	~~75~~	~~50~~

~~**507.6.2 Interior adaptability project elective:** Projects seeking an interior adaptability *project elective* in accordance with Table 303.1 and Section 303.4 shall comply with this section. The interior adaptability plan required by Section 505.1.2.2 shall provide for use of at least 75 percent of interior *building* materials within the same *building* for a minimum of 35 years.~~

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CHAPTER 6
ENERGY CONSERVATION, EFFICIENCY AND ATMOSPHERIC QUALITY

***

SECTION 602
ENERGY PERFORMANCE~~, PEAK POWER AND REDUCED CO2e EMISSIONS~~

602.1 Reserved. ~~**Total annual net energy use (TANEU).** The *building* shall be designed and constructed to deliver a *total annual net energy use* (*TANEU*) not greater than the values shown in Table 602.1. *Buildings* complying with the *International Energy Conservation Code* shall be deemed to have a *TANEU* of 77.~~

~~**Table 602.1**~~
~~**Total Annual Net Energy Use by Building Occupancy Type**~~

~~**Building Occupancy Types**~~	~~**IgCC TANEU Point of Entry IECC** [a]~~	~~**TANEU of Jurisdictional Choice** [b]~~
~~Assembly: Groups A-1, A-2, A-3, A-4, A-5~~	~~70~~	~~--~~
~~Business: Group B~~	~~70~~	~~--~~
~~Educational: Group E~~	~~70~~	~~--~~
~~Factory and Industrial: Groups F-1, F-2~~	~~70~~	~~--~~
~~High Hazard: Groups H-1, H-2, H-3, H-4, H-5~~	~~70~~	~~--~~
~~Institutional: Groups I-1, I-2, I-3, I-4~~	~~70~~	~~--~~
~~Mercantile: Group M~~	~~70~~	~~--~~
~~Residential: Groups R-1, R-2, {R-3, R-4}~~	~~70~~	~~--~~
~~Storage: Groups S-1, S-2~~	~~70~~	~~--~~
~~Utility and Miscellaneous: Group U~~	~~70~~	~~--~~

~~a. Minimum acceptable performance for all *building* types and sizes.~~
~~b. Where the *jurisdiction* elects to adopt a greater threshold for energy efficiency, a TANEU of '63' is ten (10) percent better than the IgCC 'Point of Entry'. The *TANEU* of Jurisdictional Choice shall apply only to *buildings* pursuing performance based compliance in accordance with Section 602.3.2.~~

602.2 *International Energy Conservation Code*. *Buildings* shall comply with Sections 502.4, 503.2, 504 and 505 of the *International Energy Conservation Code*.

602.3 Compliance paths. *Buildings* shall meet either the prescriptive path of Section 602.3.1 or the performance path of Section 602.3.2 ~~over 25,000 square feet in *total building floor area* shall comply with Section 602.3.2. All other *buildings* shall comply with either Section 602.3.1 or Section 602.3.2~~.

Exception. *Alterations* shall comply with either Section 602.3.1 or Section 602.3.2

602.3.1 Prescriptive-based compliance. *Buildings* designed on a prescriptive basis shall comply with ~~the requirements of~~ Sections ~~604, 605,~~ 606, 607, 608, 609, ~~610,~~ and 611 ~~and 612~~ of this code, ~~and shall be deemed to have a *TANEU* of 70~~, and shall achieve a minimum 15% reduction in energy use when compared to the City's current energy code standards.

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602.3.2 Performance-based compliance. *Buildings* that are intended to comply on a performance basis shall comply with Sections ~~604, 605,~~ 609.6~~, 610,~~ and 611 ~~and 612~~ of this code.

602.3.2.1 Minimum performance. The *building* shall be designed and constructed to achieve a minimum 15% reduction in energy use when compared to the City's current energy code standards. ~~deliver a *total annual net energy use* (*TANEU*) not greater than the value shown in Table 602.1. The *TANEU* shall be calculated in accordance with Section 603.1.1. *Buildings* complying with the 2006~~ Calculation procedures and qualified software shall be approved by the authority having jurisdiction and meet the requirements of Section 506, Total Building Performance, of the *International Energy Conservation Code* ~~shall be deemed to have a *TANEU* of 100~~.

602.3.2.2 Reserved. ~~Building peak energy demand.~~ ~~*Buildings* shall be designed and constructed to limit peak energy demand during the *building's* anticipated peak consumption period in accordance with Section 603.1.2.~~

602.3.2.3 Reserved. ~~Reduced CO2e emissions calculations and reporting.~~ ~~Where reduced *CO2e emissions* calculations are required in Table 302.1, *CO2e* emissions calculations shall be performed in accordance with Sections 603.1.3 and 603.1.4. The emissions reduced by the proposed design, as compared to the standard reference design, shall be reported as determined in accordance with Equation 6-1.~~

~~(**Equation 6-1**) *CO2e emissions* associated with the *standard reference design* x *TANEU* of proposed *building* / 100~~

***

SECTION 603
RESERVED
~~ENERGY USE AND ATMOSPHERIC IMPACTS~~

~~**603.1 Determination of building annual energy use, peak energy demand and reduced CO2e emissions.** Where buildings are designed using the performance-based compliance path in accordance with Section 602.3.2, or are required to report *CO2e* emissions in accordance with Section 602.3.2.3, the methods for calculating and verifying annual energy use, peak energy demand, and reduced *CO2e emissions* shall be in accordance with this section.~~

~~**603.1.1 Annual energy use.** The annual energy use shall include all energy used for *building* functions covered by this code minus any renewable or waste energy covered under Section 603.1.1.1.~~
~~In calculating the annual energy use, electric power used by the *building* shall be converted to consistent units by multiplying the electric power use at the utility *meter* by the conversion factor in Table 603.1.1(1) based on the location of the *building*.~~

~~In calculating the annual energy use, fossil fuel used by the *building* shall be converted to consistent units by multiplying the fossil fuel use at the utility *meter* by the conversion factor in Table 603.1.1(2). The conversion factor for fossil fuels not listed shall be 1.1. Conversion factors for purchased district heating shall be 1.35 for hot water and 1.45 for steam. The~~

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conversion factor for district cooling shall be 0.33 times the value in Table 603.1.1.1(1) based on the eGRID Sub-region in which the *building* is located.

The amount of annual energy and the percentage of *building* annual energy use anticipated to be produced from *on-site renewable energy sources* shall be clearly indicated by the *registered design professional* on the *construction documents* along with relevant supporting compliance documentation.

603.1.1.1 TANEU determination. *Building total annual net energy use (TANEU)* shall be determined in accordance with Section 603.3 and Equation 6-2.

(**Equation 6-2**) TANEU = 77 x (PD - RE - WE) / RD

Where:

PD = Total annual energy delivered to the *proposed design* and consumed on site, as determined in accordance with Section 603

RE = Total annual energy savings from renewable energy derived on site

RD = Total annual energy used by a *standard reference design*, determined in accordance with Section 603

WE= Total annual energy savings from *waste energy recovery*

PD, RE, RD and WE shall all be expressed in consistent units of energy in accordance with Section 603.1.1.

603.1.2 Peak energy demand. Documentation shall be provided to demonstrate that the *proposed design* has a peak energy demand not greater than 0.90 times that of the *standard reference design*.

603.1.3 Annual direct and indirect CO2e emissions associated with on-site electricity. Where emissions calculations are required by the *jurisdiction* in Table 302.1, the emissions calculations shall be based on electric power for *building* functions covered by this code minus any renewable or recovered waste energy covered under Section 602.1.2. Emissions associated with electric power use shall be calculated by multiplying the electric power used by the *building* at the electric utility *meter* by the *CO2e* conversion factor in Table 603.1.3 based on the eGRID Sub-region in which the *building* is located.

603.1.4 Annual direct and indirect CO2e emissions associated with on-site use of non-renewable fuels. Emissions associated with the use of non-renewable fuels such as natural gas, fuel oil and, propane shall be calculated by multiplying the fossil fuel energy used by the *building* at the utility *meter* by the national emission factors in Table 603.1.4. Emissions associated with fossil fuels not listed shall be calculated by multiplying the fossil fuel used by the *building* at the utility *meter* by 250. Emissions associated with purchased district energy shall be calculated by multiplying the energy used by the *building* at the utility *meter* by 150 for hot water and steam, and for district cooling, the factors from Table 603.1.3 based on the eGRID Sub-region in which the *building* is located.

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~~Table 603.1.1(1)~~
~~Electricity Generation Energy Conservation Factors by eGrid Sub Region~~[a]

~~eGRID 2007 Sub-region Acronym~~	~~eGRID 2007 Sub-region Name~~	~~Energy Conversion Factor~~
~~AKGD~~	~~ASCC Alaska Grid~~	~~2.97~~
~~AKMS~~	~~ASCC Miscellaneous~~	~~1.76~~
~~ERCT~~	~~ERCOT All~~	~~2.93~~
~~FRCC~~	~~FRCC All~~	~~2.97~~
~~HIMS~~	~~HICC Miscellaneous~~	~~3.82~~
~~HIOA~~	~~HICC Oahu~~	~~3.14~~
~~MROE~~	~~MRO East~~	~~3.40~~
~~MROW~~	~~MRO West~~	~~3.41~~
~~NYLI~~	~~NPCC Long Island~~	~~3.20~~
~~NEWE~~	~~NPCC New England~~	~~3.01~~
~~NYCW~~	~~NPCC NYC/Westchester~~	~~3.32~~
~~NYUP~~	~~NPCC Upstate NY~~	~~2.51~~
~~RFCE~~	~~RFC East~~	~~3.15~~
~~RFCM~~	~~RFC Michigan~~	~~3.05~~
~~RFCW~~	~~RFC West~~	~~3.14~~
~~SRMW~~	~~SERC Midwest~~	~~3.24~~
~~SRMV~~	~~SERC Mississippi Valley~~	~~3.00~~
~~SRSO~~	~~SERC South~~	~~3.08~~
~~SRTV~~	~~SERC Tennessee Valley~~	~~3.11~~
~~SRVC~~	~~SERC Virginia/Carolina~~	~~3.13~~
~~SPNO~~	~~SPP North~~	~~3.53~~
~~SPSO~~	~~SPP South~~	~~3.05~~
~~CAMX~~	~~WECC California~~	~~2.61~~
~~NWPP~~	~~WECC Northwest~~	~~2.26~~
~~RMPA~~	~~WECC Rockies~~	~~3.18~~
~~AZNM~~	~~WECC Southwest~~	~~2.95~~

~~[a]Sources: EPA eGrid2007 version 1.1, 2005 data; EPA eGrid regional gross grid loss factors; EIA Table 8.4a (Sum tables 8.4band 8.4c) and Table 8.2c (Breakout of Table 8.2b), 2005 data.~~

~~Table 603.1.1(2)~~[a]
~~U.S. Average Building Fuels Energy Conversion Factors by Fuel Type~~

~~Fuel Type~~	~~Energy Conversion Factor~~
~~Natural Gas~~	~~1.09~~
~~Fuel Oil~~	~~1.13~~
~~LPG~~	~~1.12~~

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Table 603.1.3
Electricity Emission Rate by eGRID Sub-region[a]

eGRID 2007 Sub-region Acronym	eGRID 2007 Sub-region Name	2005 CO2e Rate (lbs/MWh)
AKGD	ASCC Alaska Grid	1270
AKMS	ASCC Miscellaneous	515
ERCT	ERCOT All	1417
FRCC	FRCC All	1416
HIMS	HICC Miscellaneous	1595
HIOA	HICC Oahu	1891
MROE	MRO East	1971
MROW	MRO West	1957
NYLI	NPCC Long Island	1651
NEWE	NPCC New England	999
NYCW	NPCC NYC/Westchester	874
NYUP	NPCC Upstate NY	774
RFCE	RFC East	1224
RFCM	RFC Michigan	1680
RFCW	RFC West	1652
SRMW	SERC Midwest	1966
SRMV	SERC Mississippi Valley	1094
SRSO	SERC South	1601
SRTV	SERC Tennessee Valley	1623
SRVC	SERC Virginia/Carolina	1220
SPNO	SPP North	2106
SPSO	SPP South	1780
CAMX	WECC California	768
NWPP	WECC Northwest	958
RMPA	WECC Rockies	1999
AZNM	WECC Southwest	1391

a. Sources: EPA eGRID2007 Version 1.1, 2005 data; EPA eGrid regional gross grid loss factor

Table 603.1.4
Fossil Fuel Emission Factors

Emission Rate[a, b] (lb/MMbtu HHV)	Natural Gas as Stationary Fuel	Fuel Oil as Stationary Fuel	Propane as Stationary Fuel
CO2e	137.35	200.63	162.85

a. 1 MMBtu = 1,000,000 Btu = 10 therms.
b. HHV = High Heating Value. To convert to kg, multiply the pound value by 0.454.

603.2 Documentation procedures. The documentation procedures for establishing the annual energy use of *commercial buildings* shall be in accordance with Section 506.4 of the *International Energy Conservation Code*.

603.3 Calculation procedures. The calculation procedures for establishing the annual energy use of *commercial buildings* shall be in accordance with Section 506.5 of the *International Energy Conservation Code*, except as required by this section and the modifications to Table 506.5.1(1) of the *International Energy Conservation Code*.

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Table 506.5.1(1) of the *International Energy Conservation Code* shall be modified as follows:

1. Replace the glazing row in the table with the following:

IECC Table 506.5.1(1)
Specification for the Standard Reference and Proposed Designs

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Glazing	Area: (a) The proposed glazing area; where the proposed glazing area is less than 40 percent of above-grade wall area. (b) 40 percent of above-grade wall area; where the proposed glazing area is 40 percent or more of the above-grade wall area. *U*-factor: from Table 502.3 SHGC: from Table 502.3 except that for climates with no requirement (NR) SHGC = 0.40 shall be used Shading is provided on the south, east, and west walls as required by 605.1.3.3. For *Greenfield* sites, window-wall ratio on the north and south walls is two times greater than on the east and west walls. For *Greenfield* sites, window-wall ratio on the north and south walls is two times greater than on the east and west walls.	As proposed As proposed As proposed As proposed

Add the following rows to the Table.

Table 506.5.1(1)
Specification for the Standard Reference and Proposed Designs

BUILDING COMPONENT CHARACTERISTICS	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Orientation	For *Greenfield* sites, twice as long on the east-west axis as on the north-south axis. For non-*Greenfield* sites, As proposed.	As proposed
Electrical Power	*Voltage drop* in branch circuits: 1.5% at design load *Voltage drop* in feeders: 1.5% at design load Distribution transformer efficiency, in accordance with Tables 609.8.1,1 (1), 609.8.1.1(2), and 609.8.1.1(3)	*Voltage drop* in branch circuits: 1.5% at design load As proposed As Proposed

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603.3.1 Performance-based compliance. The performance-based compliance for electrical systems shall be in accordance with Section 603.3.1.1.

603.3.1.1 Electrical system efficiency performance path. *Buildings* complying with Section 602.7 shall include electrical system efficiency in both the *proposed design* and the *standard reference design* in accordance with Equations 6-3, 6-4 and 6-5.

(**Equation 6-3**) Power delivered to the *building* = Power delivered to load / ESE

(**Equation 6-4**) $ESE = \sum (FE_4 \times FL_4/TL) + (FE_2 \times FL_2/TL) + \ldots$

(**Equation 6-5**) $FE_1 = 100\% - [0.525\% + (VDF_4 \times 0.35) + (100\% - TE_4)]$

ESE = total electrical system efficiency, in percent.
$FE_{1, 2...}$ = efficiency of each feeder, in percent.
$FL_{1, 2...}$ = design load on each feeder.
TL = total design load on all feeders.
$VDF_{1, 2...}$ = *voltage drop* of each feeder, in percent, at design load.
$TE_{1, 2...}$ = efficiency of the distribution transformer powering the feeder.

603.4 Qualified software for determinations of annual energy use. Calculation software tools and procedures used to comply with Section 603 shall include the capabilities identified in accordance with Section 506.6 of the *International Energy Conservation Code*.

603.5 Design professional in responsible charge of building energy simulation. For purposes of this section, and when it is required that documents be prepared by a *registered design professional*, the *code official* shall be authorized to require the owner to engage and designate on the *building permit* application a *registered design professional* who shall act as the *registered design professional in responsible charge of* building *energy simulation*. If the circumstances require, the owner shall designate a substitute *registered design professional in responsible charge of building energy simulation* who shall perform the duties required of the original *registered design professional in responsible charge of building energy simulation*. The *code official* shall be notified in writing by the owner if the *registered design professional in responsible charge of building energy simulation* is changed or is unable to continue to perform the duties.

SECTION 604
RESERVED
ENERGY METERING, MONITORING AND REPORTING

604.1 Purpose. *Buildings* that consume energy shall comply with Section 604. The purpose of this section is to provide requirements that will ensure that *buildings* are constructed or altered in a way that will provide the capability for their energy use, production and reclamation to be measured, monitored and reported. This includes the design of energy distribution systems so as to isolate load types, the installation of or ability to install in the future *meters*, devices and a data acquisition system, and the installation of or the ability to provide for public displays and other appropriate reporting mechanisms in the future.

All forms of energy delivered to the *building* and *building site*, produced on the *building site* or in the building and reclaimed at the *building site* or in the *building* shall be *metered* and all energy load types measured in accordance with this Section.

604.1.1 Buildings with Tenants. In *buildings* with tenants, the *metering* required by Section 604.4 shall be collected for the entire *building* and for each tenant individually. Tenants shall have access to all data collected for their space.

604.2 Intent. The intent of these requirements is to provide for the ongoing meterability, *metering*, measuring, reporting and display of the energy use, energy demand and emissions associated with the energy use of the whole *building* and its systems as required in Section 612 and, where required by Section 613.2, to verify ongoing compliance with the provisions of Sections 602 and 603.

604.3 Energy distribution design requirements and load type isolation. Energy distribution systems within, on or adjacent to and serving a *building* shall be designed such that each primary circuit, panel, feeder, piping system or supply mechanism supplies only one energy use type as defined in Sections 604.3.1 through 604.3.4. The load type served by each supply mechanism shall be clearly designated with the use served, and adequate space shall be provided for installation of *metering* equipment or other data collection devices, temporary or permanent, to measure these loads. The energy distribution system shall be designed to facilitate the collection of data for each of the *building* energy use categories in Section 604.4 and for each of the end use categories listed in Sections 604.3.1 through 604.3.4. Where there are multiple *buildings* on a *building site*, each *building* shall comply separately with the provisions of Section 604.

Exception: *Buildings* designed and constructed such that the total usage of each of the load types described in Sections 604.3.1through 604.3.4 shall be permitted to be measured through the use of installed sub-*meters* or other equivalent methods as *approved*.

604.3.1 HVAC system total energy use. This category shall include all energy used to heat, cool, and provide *ventilation* to the *building* including, but not limited to, fans, pumps, boiler energy, chiller energy and hot water.

604.3.2 Lighting system total energy use. This category shall include all interior and exterior lighting used in occupant spaces and common areas.

604.3.3 Energy used for building operations. This category includes all energy use by vertical transportation systems, automatic doors, motorized shading systems, ornamental fountains and *fireplaces*, swimming pools, snow-melt systems, and all other *building* operations.

604.3.4 Miscellaneous loads. Loads other than those specified in Sections 604.3.1 through 604.3.3.

604.4 Energy type metering. *Buildings* shall be provided with the capability to determine energy use and peak demand as provided in this section for each of the energy types specified in Sections 604.4.1 through 604.4.7. Utility energy *meters* shall be permitted to be used to collect whole *building* data, but, shall be equipped with a local data port connected to a data acquisition system in accordance with Section 604.5.

604.4.1 Gaseous fuels. Gaseous fuels including, but not limited to, natural gas, LP gas, coal gas, hydrogen, landfill gas, digester gas and biogas shall be capable of being *metered* at the *building site* to determine the gross consumption and peak demand of each different

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~~gaseous fuel by the *building* and each *building* on a *building site*. The installation of gas *meters* and related piping shall be in accordance with the *International Fuel Gas Code*.~~

~~**604.4.2 Liquid fuels.** Liquid fuels including, but not limited, to fuel oil, petroleum based diesel, kerosene, gasoline, bio-diesel, methanol, ethanol and butane shall be capable of being *metered* at the *building site* to allow a determination of the gross consumption and peak demand of each liquid fuel use by the *building* and each *building* on a *building site*. The installation of *meters* and related piping shall be in accordance with the *International Mechanical Code*.~~

~~**604.4.3 Solid fuels.** Solid fuels including, but not limited to coal, charcoal, peat, wood products, grains, and municipal waste shall be capable of having their use determined at the *building site* to allow a determination of the gross consumption and peak demand of each solid fuel use by the *building* and each *building* on a *building site*.~~

~~**604.4.4 Electric power.** Electric power shall be capable of being *metered* at the *building site* to allow a determination of the gross consumption and peak demand by the *building* and each *building* on a *building site*. The installation of electric *meters* and related wiring shall be in accordance with NFPA 70.~~

~~**604.4.5 District heating and cooling.** Hot water, steam, chilled water, and brine shall be capable of being *metered* at the *building site*, or where produced on the *building site*, to allow a determination of the gross consumption of heating and cooling energy by each *building* on a *building site*. Energy use associated with the production of hot water, steam, chilled water or brine shall be determined based on the fuel used.~~

~~**604.4.6 Combined heat and power.** Equipment and systems with a connected load greater than 125,000 *Btu*/hr providing combined heat and power (CHP) shall be capable of being *metered* to allow a determination of the gross consumption of each form of delivered energy to the equipment. The output of CHP shall be *metered* in accordance with the applicable portions of Section 604 based on the form(s) of output from the CHP.~~

~~**604.4.7 Renewable and waste energy.** Equipment and systems providing energy from renewable or waste energy sources in accordance with Section 603.1.1.1, or from which energy is included in the determination of the *building TANEU* shall be capable of being *metered* to allow a determination of the output of such equipment and systems in accordance with sections 604.4.7.1 through 604.4.7.5.~~

~~**604.4.7.1 Solar electric.** Equipment and systems providing electric power through conversion of solar energy directly to electric power shall be capable of being *metered* such that the peak electric power (kW) provided to the *building* and its systems or to off-site entities can be determined at 15 minute intervals and the amount of electric power (kWh) provided to the *building* and its systems can be determined at a minimum of hourly intervals.~~

~~**604.4.7.2 Solar thermal.** Equipment and systems providing heat to fluids or gases through the capture of solar energy shall be capable of being *metered* such that the peak thermal energy (*Btu*/hr) provided to the *building* and its systems or to off-site entities can be determined at 15 minute intervals and the amount of heat captured (*Btu*) for delivery to the *building* and its systems can be determined at a minimum of hourly intervals.~~

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604.4.7.3 Waste heat. Equipment and systems providing energy through the capture of waste heat shall be capable of being *metered* such that the amount of heat captured and delivered to the *building* and its systems can be determined at a minimum of hourly intervals.

604.4.7.4 Wind Power Systems. Equipment and systems providing electric power through conversion of wind energy directly to electric power shall be capable of being *metered* such that the peak electric power (kW) provided to the *building* and its systems or to off-site entities can be determined at 15 minute intervals and the amount of electric power (kWh) provided to the *building* and its systems can be determined at a minimum of hourly intervals.

604.4.7.5 Other renewable energy electric production systems. Equipment and systems providing electric power through conversion of other forms of renewable energy directly to electric power shall be capable of being *metered* such that the peak electric power (kW) provided to the *building* and its systems or to off-site entities can be determined at 15 minute intervals and the amount of electric power (kWh) provided to the *building* and its systems can be determined at a minimum of hourly intervals.

604.5 Energy load type sub-metering. For *buildings* that are 25,000 square feet in *total building floor area* and larger, all of the Energy Load Types as defined in Section 604.3 shall be *metered* through the use of sub-*meters* or other *approved*, equivalent methods meeting the capability requirements of section 604.4.

604.5.1 Buildings less than 25,000 square feet. For *buildings* that are less than 25,000 square feet in *total building floor area*, the energy distribution system shall be designed and constructed in such a way as to accommodate the future installation of sub-*meters* and other *approved* devices in accordance with Section 604.5. This includes, but is not limited to, providing access to distribution lines and ensuring adequate space for the installation of sub-*meters* and other *approved* devices.

604.6 Minimum energy measurement and verification. *Meters* sub-*meters*, and other *approved* devices installed in compliance with Sections 604.4 and 604.5 shall be connected to a data acquisition and management system capable of storing not less than 36 months worth of data collected by all *meters* and other *approved* devices and transferring the data in real time to a display as required in Section 604.7.

604.6.1 Annual emissions. The data acquisition and management system shall be capable of providing the data necessary to calculate the annual *CO2e emissions* associated with the operation of the *building* and its systems using the results of annual energy use measured in accordance with Section 604.6. The calculation shall be based on energy measured for each form of energy delivered to the site on an annual basis. Where reporting of emissions is required, it shall be in accordance with Section 603.

604.7 Energy display. A permanent, readily accessible and visible display shall be provided adjacent to the main *building* entrance or on a publicly available internet website. The display shall be capable of providing all of the following:

1. The current energy demand for the whole *building* level measurements, updated for each fuel type at the intervals specified in 604.4

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2. The average and peak demands for the previous day and the same day the previous year,

3. The total energy usage for the previous twelve (12) months.

SECTION 605
RESERVED
AUTOMATED DEMAND RESPONSE (AUTO-DR) INFRASTRUCTURE

605.1 Establishing an open and interoperable automated demand response (Auto-DR) infrastructure. Buildings that contain HVAC or lighting systems shall comply with this section. A *building energy management and control system* (*EMCS*) shall be provided and integrated with *building* HVAC systems controls and lighting systems controls to receive an open and interoperable *automated demand response* (*Auto-DR*) relay or internet signal. *Building* HVAC and lighting systems and specific *building* energy using components shall incorporate preprogrammed demand response strategies that are automated with a *demand response automation internet software* client.

Exception: *Buildings* located where the electric utility or regional *Independent System Operator* (ISO) or Regional Transmission Operator (RTO) does not offer a demand response program to *buildings* covered by this code.

605.2 Software clients. *Demand response automation internet software* clients shall be capable of communicating with a *demand response automation server* (DRAS).

605.3 Heating ventilating and air-conditioning (HVAC) systems. The *Auto-DR* strategy for HVAC systems shall be capable of reducing the *building* peak cooling HVAC demand by at least 25 percent when signaled from the electric utility, regional *Independent System Operator* (ISO) or Regional Transmission Operator (RTO), through any combination of the strategies and systemic adjustments, including, but not limited to the following:

1. Space temperature setpoint reset.
2. Increasing chilled water supply temperatures.
3. Increasing supply air temperatures for VAV systems.
4. Limiting capacity of HVAC equipment that has variable or multiple stage capacity control;
5. Cycling of HVAC equipment or turning off non-critical equipment;
6. Disabling HVAC in unoccupied areas.
7. Limiting the capacity of chilled water and refrigerant control valves.
8. Limiting the capacity of supply and exhaust fans.
9. Limiting the capacity of chilled water supply pumps.
10. Anticipatory control strategies to pre-cool in anticipation of a peak event.

605.3.1 Rebound avoidance. The *Auto-DR* strategy shall include logic to prevent a rebound peak. When the signal for *Auto-DR* is ended, a gradual return to normal HVAC equipment operations shall be part of the *Auto-DR* strategy, through any combination of the strategies and systemic adjustments, including, but not limited to the following:

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1. If close to the unoccupied period, the *Auto-DR* period shall be extended using a *rebound avoidance, extended Auto-DR control* strategy until the initiation of the unoccupied period.
2. *Rebound avoidance, slow recovery* control strategies, gradually increasing space temperature setpoints or a variance in the timing by cooling zone.
3. *Rebound avoidance, slow recovery* control strategies, gradually increasing zone supply air temperatures.
4. *Rebound avoidance, slow recovery* control strategies, gradually increasing chilled water temperatures.
5. *Rebound avoidance, sequential equipment* recovery strategies, gradually restoring *demand limited* equipment capacity.
6. *Rebound avoidance, sequential equipment recovery* strategies, gradually restoring equipment that was turned off during the *Auto-DR* period.
7. *Rebound avoidance, slow recovery control* strategies, gradually increasing capacity for air moving and pumping systems.
8. *Rebound avoidance, sequential equipment recovery* or *rebound avoidance, slow* recovery control where chilled water and other capacity control valves are sequentially or gradually allowed to return to normal operation, respectively.

605.4 Lighting. The *Auto-DR* system shall be capable of reducing total connected power of lighting in Group B, office spaces by not less than 30 percent.

Exceptions:

1. Police stations, prisons, fire stations, hospitals, and other first-responder facilities.
2. Luminaires on emergency circuits.
3. Luminaires located in emergency and life safety areas of a *building*.
4. Lighting in *buildings* that are less than 5,000 square feet in total area.
5. Luminaires located within a *daylight zone* that are dimmable and connected to *automatic daylight controls*.

605.5 Building component-specific strategies. The *Auto-DR* system shall be capable of reducing the aggregate electric loads associated with miscellaneous *building* equipment by not less than 25 percent through any combination of the demand shedding methods specified in Sections 605.5.1 through 605.5.6.

605.5.1 Ornamental fountain pumps. *Building equipment* shall have the capability to cycle on and off exterior and interior fountain pumps during an *Auto-DR* curtailment.

605.5.2 Supermarket refrigerated and freezer display cases. *Building equipment* shall have the capability to cycle on and off the anti-sweat heaters of refrigerated and freezer display cases during an *Auto-DR* curtailment.

Exceptions:

1. Refrigerated and freezer display case anti-sweat heaters controlled by a humidistat.
2. Refrigerated and freezer display case anti-sweat heaters in *building* equipped with a dehumidification system.

605.5.3 Electric vehicle chargers. Electric vehicle chargers shall be capable of shutting off or ramping down to trickle-charge mode.

Exception: Electric vehicle charger systems designed to take advantage of time-of-use rates during normal operation.

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~~**605.5.4 Commercial, manufacturing, industrial process loads.** The *registered design professional* shall identify process equipment loads capable of being shut off during an *AUTO-DR* curtailment period without spoiling the process or product quality.~~

~~**605.5.4.1 Cold storage.** Refrigeration loads for cold storage shall be shed during an *AUTO-DR* curtailment period by increasing the storage temperature setpoints or by unloading chillers.~~

~~**605.5.5 Elevator and escalator cycling.** Where four or more elevators in a single bank serve the same floors of a *building*, the elevator operating system shall be capable of parking at least two of the elevators in a low-power mode during the *Auto-DR* curtailment period after all passengers have disembarked these elevators. Where two or more pairs of co-located up and down escalators serve the same floors of a *building*, the escalator operationg system shall be capable of stopping at least one pair of the escalators in a low-power mode during the *Auto-DR* curtailment period once passengers are no longer on these escalators.~~

~~**605.5.6 Irrigation water pumps.** Water delivery systems that have large-scale storage water tanks shall be capable of being shut off during an *Auto-DR* curtailment period. A water measurement system interlocked with the pump control shall be installed such that water supply is available during the *Auto-DR* curtailment period.~~

SECTION 606
BUILDING ENVELOPE SYSTEMS

606.1 Prescriptive Compliance. Where buildings are designed using the prescriptive-based compliance path in accordance with Section 602.3.1, *building thermal envelope* systems shall comply with the provisions of the International Energy Conservation Code ~~for such systems~~ and the provisions of this section.

606.1.1 Insulation and fenestration criteria. The *building thermal envelope* shall exceed ~~meet~~ the requirements of Tables 502.2(1), 502.2(2) and 502.3 ~~606.1.1 noted below, based on the climate zone specified~~ in the *International Energy Conservation Code* by a minimum of 15%. ~~*Commercial buildings* or portions of *commercial buildings* enclosing Group R occupancies shall use the *R-values* from the "Group R" column of Table 606.1.1, as applicable. *Commercial buildings* or portions of *commercial buildings* enclosing occupancies other than Group R shall use the *R-values* from the "All other" column of Table 606.1.1, as applicable. *Buildings* with a vertical fenestration area or *skylight* area that exceeds that allowed in Table 606.1.1 shall comply with Section 506 of the *International Energy Conservation Code* provided that Sections 502.4, 503.2, 504, 505.2, 505.3, 505.4, 505.6 and 505.7 are satisfied.~~

606.1.2 Reserved. ~~**U-factor alternative.** An assembly with a *U-factor*, C-factor, or F-factor equal or less than that specified in Table 606 shall be permitted as an alternative to the *R-value* in Table 606.1.1, as applicable. *Commercial buildings* or portions of *commercial buildings* enclosing Group R occupancies shall use the *U-factor*, C-factor, or F-factor from the "Group R" column of Table 606, as applicable. *Commercial buildings* or portions of *commercial buildings* enclosing occupancies other than Group R shall use the *U-factor*, C-factor or F-factor from the "All other" column of Table 606.1.1, as applicable.~~

606.1.3 Reserved. ~~**Fenestration.** Fenestration shall comply with Table 606.1.1, based on the climate zone specified in the *International Energy Conservation Code*.~~

~~**606.1.3.1 Maximum area.** The vertical fenestration area, not including opaque doors, shall not exceed the percentage of the gross wall area specified in Table 606.1.1 based on the climate zone specified in the *International Energy Conservation Code*. The *skylight* area shall not exceed the percentage of the gross roof area specified in Table 606.1.1.~~

~~**606.1.3.2 Maximum U-factor and SHGC.** For vertical fenestration, the maximum *U-factor* and solar heat gain coefficient (SHGC) shall be as specified in Table 606.1.1, based on the window projection factor. For *skylights,* the maximum *U-factor* and solar heat gain coefficient (SHGC) shall be as specified in Table 606.1.1.~~

~~**606.1.3.3 Permanent shading devices for fenestration.** Vertical fenestration within 45 degrees of the nearest west, south, and east cardinal ordinate shall be shaded by permanent horizontal exterior projections with a *projection factor* greater than or equal to 0.25. Where different windows or glass doors have different *projection factor* values, they shall each be evaluated separately, or an area-weighted *projection factor* value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing at least one-half of the height of the glazing, except at *building* corners.~~

~~**Exceptions:**~~
1. ~~*Buildings* located in *hurricane-prone regions* in accordance with Section 1609.2 of the *International Building Code* or on any other building with a mean roof height exceeding that permitted by Table 1504.8 of the *International Building Code* based on the exposure category and basic wind speed at the *building site*.~~
2. ~~Windows located in a *building* wall that is within 18 inches of the *lot* line.~~
3. ~~Where equivalent shading of the fenestration is provided by *buildings*, *structures*, geological formations, or permanent exterior projections that are not horizontal, as determined by sun angle studies at the peak solar altitude on the spring equinox, and three hours before and after the peak solar altitude on the spring equinox.~~

~~**606.1.4 Air leakage.** Air leakage mitigation measures shall be provided in accordance with this section.~~

~~**606.1.4.1 Sealing of the building envelope.** The *building thermal envelope* shall be durably sealed to limit infiltration. The sealing methods between dissimilar materials shall allow for differential expansion and contraction. The following shall be caulked, gasketed, and weather-stripped and additionally sealed with an air barrier film or *approved* solid material in accordance with Section 606.1.4.1.1.~~
1. ~~All joints, seams and penetrations.~~
2. ~~Site-built windows, doors and *skylights*.~~
3. ~~Openings between window and door assemblies and their respective jambs and framing.~~
4. ~~Utility penetrations.~~
5. ~~Dropped ceilings or chases adjacent to the *building thermal envelope*.~~
6. ~~Knee walls.~~
7. ~~Walls and ceilings separating unconditioned spaces from conditioned spaces.~~

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8. Behind tubs and showers on exterior walls.
9. Common walls between *dwelling units*.
10. Roof access openings.
11. Spandrel areas and junctions.
12. Electrical and phone boxes on exterior walls except where the air barrier extends behind boxes or air-sealed-type boxes are installed.
13. HVAC register boots that penetrate the *building thermal envelope* except where sealed to subfloor or drywall.
14. Other sources of infiltration.
15. Where lighting fixtures with ventilation holes or other similar objects penetrate the continuous air barrier, provisions shall be made to maintain the integrity of the continuous air barrier.

606.1.4.1.1 Air barrier installation. The air barrier material shall be installed, free from holes and breaks, over all exterior walls. Where joints occur horizontally, the upper layer shall be lapped over the lower layer not less than 2 inches (51 mm). Where joints occur vertically, the layers shall be lapped not less than 6 inches (152 mm). The air barrier material shall be continuous to the top of walls, terminated at penetrations and *building* appendages, and taped in accordance with manufacturer's installation instructions.

606.1.4.2 Testing requirement. The *building* envelope tightness shall be considered acceptable where tested air leakage is less than 2.0 CFM/FT^2 [0.1094] m^3/hr/m^2 when tested at a pressure of 33.5 psf (50 Pa). Testing shall occur after rough-in and after installation of penetrations of the *building* envelope, including penetrations for utilities, HVAC, plumbing, and electrical equipment and appliances.

606.1.4.3 Outdoor air intakes and exhaust openings. Stair and elevator shaft vents and other outdoor air intakes and exhaust openings integral to the *building* envelope shall comply with Section 502.4.5 of the *International Energy Conservation Code* without exception.

606.1.4.4 Fireplaces. Wood-burning masonry *fireplaces* shall be provided with combustion air directly from the outdoors and with a means to tightly close off the chimney flue and combustion air outlets when the *fireplace* is not in use.

606.1.4.5 Vestibules. Doors that separate *conditioned space* from the exterior shall be protected with an enclosed vestibule, with all doors opening into and out of the vestibule equipped with self-closing devices. Vestibules shall be designed so that in passing through the vestibule it is not necessary for the interior and exterior doors to open at the same time.

Exceptions:
1. Doors to mechanical or electrical equipment rooms.
2. Doors opening directly from a *sleeping unit* or *dwelling unit*.
3. Revolving doors.
4. Doors used primarily to facilitate vehicular movement or material handling and adjacent personnel doors.

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~~TABLE 606.1.1~~
~~PRESCRIPTIVE BUILDING THERMAL ENVELOPE REQUIREMENTS~~

Prescriptive Building Envelope Requirements

Climate Zone	1			2			3			4			5			6			7			8		
Assemblies	NON-RES	RES	Semi-Ht	NON-RES	RES	Semi-Ht	NON-RES	RES	Semi-Ht	NON-RES	RES	Semi-Ht	NON-RES	RES	Semi-Ht	NON-RES	RES	Semi-Ht	NON-RES	RES	Semi-Ht	NON-RES	RES	Semi-Ht
	b/g Max.	b/g Max.	b/g Max.	b/g Max.	Assemb/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.	b/g Max.
OPAQUE ELEMENTS																								
Roofs	U- 0.02	U- 0.02	U- 0.081	U- 0.021	U- 0.017	U- 0.053	U- 0.021	U- 0.017	U- 0.053	U- 0.017	U- 0.017	U- 0.034	U- 0.017	U- 0.017	U- 0.034	U- 0.017	U- 0.017	U- 0.034	U- 0.017	U- 0.017	U- 0.027	U- 0.017	U- 0.017	U- 0.027
Walls, Above Grade	U- 0.064	U- 0.049	U- 0.186	U- 0.064	U- 0.049	U- 0.089	U- 0.064	U- 0.049	U- 0.089	U- 0.049	U- 0.036	U- 0.089	U- 0.042	U- 0.036	U- 0.084	U- 0.036	U- 0.032	U- 0.064	U- 0.036	U- 0.032	U- 0.064	U- 0.032	U- 0.032	U- 0.064
Walls, Below Grade	C- 1.140	C- 1.140	C- 1.140	C- 1.140	C- 1.140	C- 1.140	C- 0.119	C- 0.119	C- 0.140	C- 0.119	C- 0.119	C- 0.140	C- 0.119	C- 0.075	C- 0.140	C- 0.075	C- 0.054	C- 0.119	C- 0.063	C- 0.048	C- 0.119	C- 0.054	C- 0.039	C- 0.119
Floors	U- 0.033	U- 0.033	U- 0.282	U- 0.033	U- 0.033	U- 0.066	U- 0.033	U- 0.032	U- 0.051	U- 0.027	U- 0.022	U- 0.051	U- 0.022	U- 0.018	U- 0.051	U- 0.022	U- 0.018	U- 0.033	U- 0.018	U- 0.018	U- 0.033	U- 0.018	U- 0.018	U- 0.033
Slab-On-Grade Floors	F- 0.730	F- 0.730	F- 0.730	F- 0.730	F- 0.730	F- 0.730	F- 0.730	F- 0.540	F- 0.730	F- 0.520	F- 0.520	F- 0.730	F- 0.520	F- 0.510	F- 0.730	F- 0.510	F- 0.434	F- 0.730	F- 0.510	F- 0.434	F- 0.730	F- 0.430	F- 0.373	F- 0.730
Opaque Swinging Doors	U- 0.70	U- 0.50	U- 0.700	U- 0.70	U- 0.50	U- 0.700	U- 0.70	U- 0.50	U- 0.700	U- 0.50	U- 0.50	U- 0.700	U- 0.50	U- 0.50	U- 0.700	U- 0.50	U- 0.50	U- 0.700	U- 0.50	U- 0.50	U- 0.700	U- 0.50	U- 0.50	U- 0.700
FENESTRATION U-factor																								
Vertical Glazing, 0 to 30% of Wall	U- 0.32	U- 0.32	U- 0.83	U- 0.32	U- 0.32	U- 0.83	U- 0.28	U- 0.28	U- 0.77	U- 0.28	U- 0.28	U- 0.50	U- 0.28	U- 0.28	U- 0.45	U- 0.28	U- 0.28	U- 0.45	U- 0.20	U- 0.20	U- 0.28	U- 0.20	U- 0.20	U- 0.28
Skylight, 0 to 3% of Roof	U- 0.75	U- 0.75	U- 1.80	U- 0.75	U- 0.75	U- 1.80	U- 0.65	U- 0.65	U- 1.70	U- 0.60	U- 0.60	U- 1.15	U- 0.60	U- 0.60	U- 0.98	U- 0.60	U- 0.60	U- 0.85	U- 0.60	U- 0.60	U- 0.85	U- 0.60	U- 0.60	U- 0.85
FENESTRATION SHGC																								
Vertical Glazing, 0 to 30% of Wall	0.25	0.25	NR	0.25	0.25	NR	0.25	0.25	NR	0.26	0.26	NR	0.26	0.26	NR	0.35	0.35	NR	0.40	0.40	NR	0.40	0.40	NR
Skylight, 0 to 3% of Roof	0.35	0.35	NR	0.35	0.35	NR	0.35	0.35	NR	0.40	0.40	NR	0.40	0.40	NR	0.40	0.40	NR	NR	NR	NR	NR	NR	NR
MINIMUM FENESTRATION VT/SHGC																								
Vertical Glazing, 0 to 30% of Wall	1.30	1.30	NR	1.30	1.30	NR	1.30	1.30	NR	1.30	1.30	NR	1.30	1.30	NR	1.30	1.30	NR	1.30	1.30	NR	1.30	1.30	NR
Skylight, 0 to 3% of Roof	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR

[a] ~~In Sky Type 'C' locations (Figure 608.5) the *building* roof area for *skylights* shall not to exceed five percent.~~

SECTION 607
BUILDING MECHANICAL SYSTEMS

607.1 Prescriptive compliance. Where buildings are designed using the prescriptive-based compliance path in accordance with Section 602.3.1, *building* mechanical systems shall meet the provisions of the *International Energy Conservation Code* Tables 503.2.3(1) through 503.2.3(11) ~~for such systems~~ and the provisions of this section.

607.2 HVAC equipment performance requirements. HVAC equipment shall comply with sections 607.2.1 through 607.2.3.

607.2.1 Equipment covered by Federal standards. Equipment covered by Federal minimum efficiency standards shall exceed ~~meet~~ the minimum efficiency requirements of the *International Energy Conservation Code* Tables 503.2.3(1) through 503.2.3(11) by at least 15%.

***

607.3 Reserved. ~~**Ventilation.** *Ventilation*, either natural or mechanical, shall be provided in accordance with Chapter 4 of the *International Mechanical Code*. Where mechanical *ventilation* is provided, the system shall provide the capability to reduce the outdoor air supply to the minimum required by Chapter 4 of the *International Mechanical Code*, or the minimum required by Section 6.3 of ASHRAE 62.1.~~

607.4 Duct and plenum insulation, sealing and testing. Supply and return air ducts and plenums, and air handlers and filter boxes shall be insulated and sealed in accordance with the *International Energy Conservation Code* except as noted herein.

607.4.1 Testing. Joints, longitudinal and transverse seams and connections in ductwork and plenums shall be leak-tested in accordance with the SMACNA *HVAC Air Duct Leakage Test Manual* and the rate of air leakage (CL) shall be less than or equal to 6.0 as determined in accordance with the following equation. ~~*International Energy Conservation Code* Equation 5-2.~~

$$CL = F \times P^{0.65}$$

Where:

F = the measured leakage rate in cfm per 100 square feet of duct surface.

P = the static pressure of the test.

607.5 Reserved. ~~**HVAC piping insulation.** Piping in HVAC systems shall be thermally insulated in accordance with Table 607.5. *Building* cavities and interstitial framing spaces shall be large enough to accommodate the combined diameter of the pipe plus the insulation, plus any other objects in the cavity that the piping must cross.~~

~~**Exceptions:**~~

1. ~~Factory-installed piping within HVAC equipment tested and rated in accordance with Section 607.2.~~
2. ~~Piping conveying fluids having a design operating temperature range between 60°F and 105°F.~~
3. ~~Piping conveying fluids not heated or cooled such as roof and condensate drains, cold water supply, and natural gas piping.~~
4. ~~Where heat gain or heat loss will not increase energy usage such as liquid refrigerant piping.~~
5. ~~Piping having an outside diameter of 1 inch or less, associated with strainers, control valves, and balancing valves.~~

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TABLE 607.5
MINIMUM PIPE INSULATION THICKNESS[a]

Fluid	Conductivity Btu-in./(h-ft^2-F)	Wall Thickness[d] of Pipe Insulation Relative to Nominal Pipe Diameter[b,c]
Steam	0.27—0.34	Double
Hot Water	0.22—0.29	Same
Chilled Water	0.22—0.28	Same

a. Piping with a nominal diameter larger than ¼ inch shall be insulated.
b. The proportions in this column apply to all nominal pipe diameters greater than ¼ inch and less than or equal to 2 inches. For nominal pipe diameters larger than 2 inches, outside diameter, the minimum wall thickness of the insulation shall be equal to the wall thickness required for 2 inch pipe.
c. For insulation outside the stated conductivity range, the minimum thickness shall be determined as follows: $T = r\{(1 + t/r)^{K/k} - 1\}$.
Where:
T = minimum insulation thickness (in.).
r = actual outside radius of pipe (in.).
t = insulation thickness listed in the table for applicable fluid temperature and pipe size.
K = conductivity of alternate material at mean rating temperature indicated for the applicable fluid temperature (Btu·in./h·ft2·°F)
k = the upper value of the conductivity range listed in the table for the applicable fluid temperature.
d. These thicknesses are based on energy efficiency considerations only.

607.6 Reserved. Economizers. Economizers shall meet the requirements of the *International Energy Conservation Code*, except as noted herein.

607.6.1 Economizer systems. Each cooling system that has a fan shall include either an air or water economizer meeting the requirements of Section 607.6.1.1 or 607.6.1.2, respectively.

Exception: Economizers are not required for the following.
1. Individual fan-cooling units with a supply capacity less than the minimum listed in Table 607.6.1(1).
2. Systems that require filtration equipment in order to meet the minimum *ventilation* requirements of Chapter 4 of the *International Mechanical Code*.
3. In Group I-2, Hospitals, and Group B, Ambulatory health care facilities, where more than 75 percent of the air designed to be supplied by the system is to spaces that are required to be humidified above 35 F dew-point temperature to comply with applicable codes or accreditation standards. In all other occupancies, where more than 25 percent of the air designed to be supplied by the system is to spaces that are designed to be humidified above 35°F dew-point temperature to satisfy process needs.
4. Systems that include a condenser heat recovery system that has the capacity to provide sixty percent of the peak heat rejection load at design conditions;
5. Systems that serve *residential* spaces where the system capacity is less than five times the requirement listed in Table 607.6.1(1).
6. Systems that serve spaces having a sensible cooling load at design conditions, excluding transmission and infiltration loads, of less than or equal to transmission and infiltration losses at an outdoor temperature of 60°F.
7. Systems expected to operate less than 20 hours per week.
8. Where the use of *outdoor air* for cooling will affect supermarket open refrigerated casework systems.
9. Where the cooling *efficiency* meets or exceeds the *efficiency* improvement requirements in Table 607.6.1(2).

TABLE 607.6.1(1) ECONOMIZER REQUIREMENTS

CLIMATE ZONES	ECONOMIZER REQUIREMENT
1A, 1B	No requirement
2A, 2B, 3A, 3B, 3C, 4A, 4B, 4C, 5A, 5B, 5C, 6A, 6B, 7, 8	Economizers on all cooling systems having a capacity ≥ 54,000 Btu/h[a]

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For SI: 1 British thermal unit per hour = 0.293 W.

a. The total capacity of all systems without economizers shall not exceed 480,000 Btu/h per *building*, or 20 percent of the building's air economizer capacity, whichever is greater.

607.6.1.1 Air economizers. Air economizers shall be designed in accordance with Sections 607.6.1.1.1 through 607.6.1.1.4.

607.6.1.1.1 Design capacity. Air economizer systems shall be capable of modulating *outdoor air* and return air dampers to provide up to 100 percent of the design supply air quantity as *outdoor air* for cooling.

607.6.1.1.2 Control signal. Economizer dampers shall be capable of being sequenced with the mechanical cooling equipment and shall not be controlled by only mixed air temperature.

Exception: The use of mixed air temperature limit control shall be permitted for systems controlled from space temperature, such as single-zone systems.

607.6.1.1.3 High-limit shutoff. Air economizers shall be capable of automatically reducing *outdoor air* intake to the design minimum *outdoor air* quantity when *outdoor air* intake will no longer reduce cooling energy usage. High-limit shutoff control types for specific climates shall be chosen from Table 607.6.1.1.3(1). High-limit shutoff control settings for these control types shall be those listed in Table 607.6.1.1.3(2).

607.6.1.1.4 Relief of excess outdoor air. Systems shall provide a means to relieve excess *outdoor air* during air economizer operation to prevent over-pressurizing of the *building*. The relief air outlet shall be located to avoid recirculation into the *building*.

TABLE 607.6.1(2)
EQUIPMENT EFFICIENCY PERFORMANCE EXCEPTION FOR ECONOMIZERS

CLIMATE ZONES	COOLING EQUIPMENT EFFICIENCY IMPROVEMENT[a]
2A	17% Efficiency Improvement
2B	21% Efficiency Improvement
3A	27% Efficiency Improvement
3B	32% Efficiency Improvement
4A	42% Efficiency Improvement
4B	49% Efficiency Improvement

a. Where a unit is rated with an IPLV, IEER, or SEER, the minimum values for these metrics must be increased by the percentage listed in the table in order to eliminate the required air or water economizer. Where a unit is rated only with a full load metric such as EER or COP cooling, these metrics must be increased by the percentage shown.

TABLE 607.6.1.1.3(1)
HIGH-LIMIT SHUTOFF CONTROL OPTIONS FOR AIR ECONOMIZERS

CLIMATE ZONES	ALLOWED CONTROL TYPES	PROHIBITED CONTROL TYPES
1b, 2b, 3b, 3c, 4b, 4c, 5b, 5c, 6b, 7, 8	Fixed dry bulb Differential dry bulb Electronic enthalpy[a] Differential enthalpy Dew-point and dry-bulb temperatures	Fixed enthalpy
1a, 2a, 3a, 4a	Fixed enthalpy Electronic enthalpy[a] Differential enthalpy Dew-point and dry-bulb temperatures	Fixed dry bulb Differential dry bulb
All other climates	Fixed dry bulb Differential dry bulb Fixed enthalpy	-

	Electronic enthalpy[a] Differential enthalpy Dew-point and dry-bulb temperatures	

a. Electronic enthalpy controllers are devices that use a combination of humidity and dry-bulb temperature in their switching algorithm.

TABLE 607.6.1.1.3(2)
HIGH-LIMIT SHUTOFF CONTROL SETTING FOR AIR ECONOMIZERS

DEVICE TYPE	CLIMATE	REQUIRED HIGH LIMIT (ECONOMIZER OFF WHEN)	
		EQUATION	DESCRIPTION
Fixed dry bulb	1b, 2b, 3b, 3c, 4b, 4c, 5b, 5c, 6b, 7, 8, 5a, 6a, 7a	T_{OA}>75°F	Outdoor air temperature exceeds 75°F
	All other zones	T_{OA}>70°F	Outdoor air temperature exceeds 70°F
		T_{OA}>65°F	Outdoor air temperature exceeds 65°F
Differential dry bulb	1b, 2b, 3b, 3c, 4b, 4c, 5a, 5b, 5c, 6a, 6b, 7, 8	T_{OA}>T_{RA}	Outdoor air temperature exceeds return air temperature
Fixed enthalpy	All	h_{OA}> 28 Btu/lb[a]	Outdoor air enthalpy exceeds 28 Btu/lb of dry air[a]
Electronic Enthalpy	All	(T_{OA}, RH_{OA}) > A	Outdoor air temperature/RH exceeds the "A" setpoint curve[b]
Differential enthalpy	All	h_{OA}> h_{RA}	Outdoor air enthalpy exceeds return air enthalpy
Dew-point and dry bulb temperatures	All	DP_{OA}>55°F or T_{OA}>75°F	Outdoor air dry bulb exceeds 75°F or outside dew point exceeds 55°F (65 gr/lb)

a. At altitudes substantially different than sea level, the Fixed Enthalpy limit shall be set to the enthalpy value at 75°F and 50 percent relative humidity. As an example, at approximately 6000 ft elevation the fixed enthalpy limit is approximately 30.7 Btu/lb.

b. Setpoint "A" corresponds to a curve on the psychometric chart that goes through a point at approximately 75°F and 40 percent relative humidity and is nearly parallel to dry-bulb lines at low humidity levels and nearly parallel to enthalpy lines at high humidity levels.

607.6.2 Economizer systems for complex HVAC equipment. Economizer systems for complex HVAC equipment shall be designed in accordance with Sections 607.6.2.1 through 607.6.2.4.

607.6.2.1 Design capacity. Water economizer systems shall be capable of cooling supply air by indirect evaporation and providing up to 100 percent of the expected system cooling load at *outdoor air* temperatures of 50°F dry bulb / 45° wet bulb and below.

Exception: Systems in which a water economizer is used and where dehumidification requirements cannot be met using outdoor air temperatures of 50°F dry bulb/ 45°F wet bulb must satisfy 100 percent of the expected system cooling load at 45°F dry bulb/40°F wet bulb.

607.6.2.2 Maximum pressure drop. Pre-cooling coils and water-to-water heat exchangers used as part of a water economizer system shall either have a water-side pressure drop of less than 15 ft of water or a secondary loop shall be created so that the coil or heat exchanger

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~~pressure drop is not seen by the circulating pumps when the system is in the normal cooling non-economizer mode.~~

~~**607.6.2.3 Integrated economizer control.** Economizer systems shall be integrated with the mechanical cooling system and shall be capable of providing partial cooling whether or not additional mechanical cooling is required to meet the remainder of the cooling load.~~

~~**607.6.2.4 Economizer heating system impact.** HVAC system design and economizer controls shall be such that economizer operation does not increase the *building* heating energy use during normal operation.~~

~~**Exception:** Economizers on VAV systems that cause zone level heating to increase because of reduction in supply air temperature.~~

607.7 **Reserved.** ~~**Variable air volume (VAV) fan control.** Individual fans with motors of 1.0 horsepower (0.746 kW) or greater shall be one of the following:~~

~~1. Driven by a mechanical or electrical variable speed drive;~~
~~2. Driven by a vane-axial fan with variable-pitch blades; or~~
~~3. Provided with controls or devices that will result in fan motor demand of not more than 30 percent of its design wattage at 50 percent of design airflow when static pressure set point equals one-third of the total design static pressure, based on manufacturer's certified fan data.~~

~~Static pressure sensors used to control VAV fans shall be placed in a position such that the controller set point is not greater than one-third of the total design fan static pressure, except for systems with direct digital control. If this results in the sensor being located downstream of major duct splits, multiple sensors shall be installed in each major branch to ensure that the static pressure can be maintained in each branch.~~
~~For systems with direct digital control of individual *zone* boxes reporting to the central control panel, the static pressure set point shall be reset based on the *zone* requiring the most pressure. The set point shall be reset lower until one *zone* damper is wide open.~~

~~**Exception:** Systems without zone dampers are exempt from the static pressure reset requirements.~~

607.8 Kitchen exhaust systems. Kitchen exhaust systems shall meet the provisions of ~~the *International Energy Conservation Code* except as noted herein~~ this section.

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607.9 **Reserved.** ~~**Laboratory exhaust systems.** Laboratory exhaust systems shall meet the provisions of the *International Energy Conservation Code* except as noted herein.~~

~~**607.9.1 Laboratory exhaust systems.** *Buildings* with laboratory exhaust systems having a total exhaust rate greater than 5,000 cfm shall be provided at least one of the following features:~~

~~1. A VAV laboratory exhaust and room supply system capable of reducing exhaust and makeup air flow rates to the minimum required in the *International Mechanical Code*~~
~~2. A heat recovery system to precondition makeup air from laboratory exhaust such that the percentage that the exhaust and makeup air flow rates can be reduced from design conditions plus the *sensible recovery effectiveness percentage* totals at least 50 percent.~~
~~3. Direct makeup auxiliary air supply equal to at least 75 percent of the exhaust air flow rate capable of being heated and cooled to the design temperatures specified in Section 302.1 of the *International Energy Conservation Code*.~~

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SECTION 608
BUILDING SERVICE WATER HEATING SYSTEMS

608.1 Prescriptive compliance. Where buildings are designed using the prescriptive-based compliance path in accordance with Section 602.3.1 service water heating systems shall meet the provisions of the *International Energy Conservation Code* ~~for such systems~~ and the provisions of this section.

608.2 Service water heating (SWH) equipment performance requirements. Service water heating equipment shall comply with Sections 608.2.1 and 608.2.2.

608.2.1 Equipment covered by Federal standards. Equipment covered by Federal minimum efficiency standards shall exceed ~~meet~~ the minimum efficiency requirements of Table 504.2 of the *International Energy Conservation Code* by at least 15%.

608.2.2.1 Water heater controls for dwelling units. All Water heaters installed in *dwelling units* in *buildings* covered by this code shall be equipped with external water temperature thermostat controls. The controls shall allow the occupant to set the water temperature at a setting that is below 100 °F and greater than or equal to 50 °F.

608.3 Reserved. ~~**Pools, hot tubs and spas.** Pools, hot tubs and spas shall meet the efficiency requirements of the *International Energy Conservation Code*.~~

~~**608.3.1 Pools in conditioned space.** For pools that are located within the conditioned space, at least 25 percent of the annual energy consumption of pool operation and at least 50 percent of the peak design space heating, *ventilation*, and cooling requirements for the space in which the pool is located shall be met by at least one of the following:~~

~~1. An on-site renewable energy system(s)~~
~~2. A heat recovery system.~~

608.4 Reserved. ~~**Snowmelt systems.** Snow melt systems shall comply with the requirements of the *International Energy Conservation Code*. Hydronic systems shall supplement at least 25 percent of the design snow melting total annual consumption measured in *Btu*/ft^2, energy per unit area. Electric systems shall supplement at least 50 percent of the design snow melt peak load demand. These requirements shall be met by one or more of the following:~~

~~**Exception:** Emergency service ingress and egress.~~
~~1. An on-site renewable energy system(s)~~
~~2. A heat recovery system.~~

608.5 Reserved. ~~**Rough-ins for future solar hot water pre-heat.** Plumbing, electrical and control systems shall be designed and constructed in accordance with Sections 608.5.1 and 608.5.2 to provide for the future installation of a solar water heating system that will be capable of providing at least 50 percent of the energy needed for all systems listed below:~~

~~1. Service Water Heating for kitchen, laundry and bathing.~~
~~2. Pool Water Heating.~~
~~3. Spa Water Heating.~~
~~4. Hot Tub Water Heating.~~

~~**608.5.1 Solar thermal hot water system piping rough-in.** Conduit(s), sleeve(s) or other pathway(s) shall be installed for a minimum of two runs of piping from the future site for *solar thermal* to the location of the service water heating equipment. The conduit(s), sleeve(s) or other pathway(s) shall have internal dimensions large enough to allow the piping and insulation to be~~

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~~easily installed, removed and replaced. The minimum diameter of the piping shall be ¾ inch nominal and the tubing shall be certified to handle sustained temperatures above 180F. Insulation shall be sized in accordance with Section 607.5.~~

~~**608.5.2 Solar Electric hot water system electrical rough-in.** Conduit not less than ¾ inch in size shall be installed from the future site for solar electric to the electric service panel or room that provides the electric service to the water heating equipment that will be served by the solar electric hot water system. Conduit not less than ¾ inch in size shall be installed to provide for control wiring.~~

~~**608.5.2.1 Conduit size.** Conduit not less than ¾ inch in size shall be installed from the future *solar thermal* or solar electric site to the location of the service water heating equipment and the *storage tank* to provide for control wiring.~~

~~**608.5.2.2 Terminations.** Conduits, sleeves and pathways installed in accordance with this section shall terminate near the *solar thermal* or solar electric sites and shall be readily accessible.~~

~~**608.5.2.3 Space for future storage tank.** Space for a future storage tank shall be identified and reserved. This space shall be large enough to accommodate storage for a *solar thermal* system sized to provide 50 percent solar fraction, with an area of at least ten square feet.~~

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608.7 Service water heating piping insulation. Service water heating piping shall be thermally insulated in accordance with ~~Table 607.5~~ the *International Energy Conservation Code*. Where hot water *distribution piping* is installed within attics and crawlspaces, the insulation shall continue to cover the pipe for a distance of at least 6 inches (152 mm) beyond the *building thermal envelope.* Where hot water *distribution piping* is installed within walls, the insulation must completely surround the pipe with at least 1 inch of insulation. Where hot water piping is installed in a wall of insufficient width to accommodate the pipe and insulation levels of ~~Table 607.5~~ the *International Energy Conservation Code*, the insulation thickness shall be permitted to have the maximum thickness that the wall can accommodate, but not less than ½-inch thick.

Exceptions:

1. Factory-installed piping within service water heating equipment tested and rated in accordance with ~~Section 607.5~~ test procedures referenced in the *International Energy Conservation Code*.

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SECTION 609
BUILDING ELECTRICAL POWER AND LIGHTING SYSTEMS

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609.10 Verification of lamps and ballasts. Prior to issuance of a *certificate of occupancy*, the field inspector shall confirm the installation of lighting control devices, type and quantity; luminaires, type and quantity; lamps, type, wattage and quantity, and ballasts, type and performance for at least one representative luminaire of each type consistent with the *International Energy Conservation Code*, and the *approved construction documents*~~, and where energy modeling is performed in accordance with Section 603. Where a discrepancy is found, energy calculations and any modeling performed in accordance with Section 603 shall be revised and resubmitted~~.

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SECTION 610
RESERVED
SPECIFIC APPLIANCES AND EQUIPMENT

610.1 General. This section provides requirements for the efficiency of appliances and equipment installed in the *building* or on the *building site* and shall be applicable to buildings using the prescriptive-based compliance path in accordance with Section 602.3.1 and the performance-based compliance path in accordance with Section 602.3.2. Permanent appliances and equipment shall meet the provisions of Section 610.2, and portable appliances and equipment shall meet the provisions of Section 610.3.

Exception: Appliances and equipment in compliance with Sections 606 through 609 and those listed in Table 610.1 are not required to comply with either Section 610.2 or 610.3

Table 610.1
Appliances and Equipment Covered by Federal Efficiency Standards

Residential products	**Commercial products**
Battery chargers[a]	Beverage vending machines[a]
Clothes dryers	Commercial clothes washers
Clothes washers	Ice makers
Dehumidifiers	Refrigerators and freezers (packaged)
Dishwashers	Supermarket refrigerators
Refrigerators, refrigerator-freezers, and freezers	Walk-in coolers and freezers
Microwave ovens[a]	
Room air conditioners	
Ranges and ovens	

[a] These products currently have no Federal standard(s). NOTE: U.S. Department of Energy rulemakings are underway or scheduled.

610.2 Permanent appliances and equipment. Appliances and equipment not exempted in Section 610.1 that are permanently connected to the *building* energy supply system(s) shall meet the provisions of Sections 610.2.1 through 610.2.5 as applicable. Such appliances and equipment shall be *listed* and *labeled* and installed in accordance with the manufacturer's installation instructions and the provisions and terms of their listing, the *International Energy Conservation Code*, *International Fuel Gas Code*, *International Mechanical Code*, *International Plumbing Code* and *International Building Code*, and shall be provided with controls and energy monitoring systems as required by this code. Compliance shall be documented, verified and *approved* by the *code official* during field inspection.

610.2.1 Elevators. Elevator systems shall comply with sections 610.2.1.1 through 610.2.1.2.3.

610.2.1.1 Lighting. Light sources for the cab interior shall have an efficacy greater than or equal to 50 lumens/watt.

610.2.1.2 Power conversion system. *Power conversion systems* for *traction elevators* shall comply with sections 610.2.1.2.1 through 610.2.1.2.3. Non-traction elevator systems shall have equivalent efficiency. Elevators moving for less than 0.5 hours/day are exempt from the *power conversion system* requirements.

610.2.1.2.1 Motor. Either induction motors with a Class IE2 efficiency rating, as defined by IEC EN 60034-30, or alternative technologies, such as permanent magnet synchronous motors that have equal or better efficiency, shall be used.

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610.2.1.2.2 Transmission. Transmissions shall not reduce the efficiency of the combined motor/transmission below that shown for the Class IE2 motor. Gearless machines are assumed to have 100 percent transmission efficiency.

610.2.1.2.3 Drive. Potential energy released during motion shall be recovered.

610.2.1.3 Ventilation. Cab *ventilation* fans shall have an efficacy greater than or equal to 3.0 CFM per watt (0.085 m^3/min./watt).

610.2.1.4 Standby mode. When the elevator is stopped, not occupied, and with doors closed, lighting, *ventilation*, and car displays shall be capable of being de-energized within 5 minutes of stopping, and re-energized prior to opening the doors. Power will cease to be applied to the door motor after the elevator is stopped, lighting is de-energized, and no one is in the car, and re-energized upon the next passenger arrival. In *buildings* with multiple elevators serving the same floors, one or more elevators shall switch to sleep, low power, mode during periods of low traffic.

610.2.1.5 Guides. All elevator car guides shall be of the roller type, in order to reduce frictional energy losses. Counterweights with sliding guides shall be balanced in order to minimize frictional losses associated with the counterweight guides.

610.2.2 Escalators and moving walkways. Escalators and moving walkways shall comply with Sections 610.2.2.1 through 610.2.2.5.

610.2.2.1 Lighting. Light sources, including, but not limited to, balustrade lighting, comb-plate lighting and step demarcation lighting, shall have an efficacy of not less than 50 lm/W.

610.2.2.2 Drive system. The gearbox shall have a rated efficiency greater than or equal to 94 percent at full load. Either induction motors with a class IE3 efficiency rating, as defined by IEC EN 60034-30, or permanent magnet synchronous motors shall be used.

610.2.2.3 Energy recovery. Down-running escalators equipped with direct variable frequency drives shall use regenerative drives and return recovered energy to the power grid.

610.2.2.4 Handrails. Handrails shall use friction-reducing measures, such as, but not limited to, rollers in newels.

610.2.2.5 Standby mode. During *standby mode*, escalators and moving walkways shall be automatically slowed to not more than 50 percent of nominal speed. Escalators and moving walkways shall be turned off when the *building* is unoccupied or outside of *facility operations*. In locations where multiple escalators serve the same passenger load, one or more escalators shall have the capability of being turned off in response to reduced occupant traffic.

610.2.3 Commercial food service equipment. Not less than 50 percent of the aggregate rated power allocated to commercial food service equipment shall be ENERGY STAR-eligible food service equipment including, but not limited to, open deep-fat fryers, hot food holding cabinets, reach-in refrigerators and freezers, solid door refrigerators and freezers defined by ENERGY STAR. Steam cookers, dishwashers, griddles, and convection gas and electric ovens, shall be ENERGY STAR qualified.

610.2.4 Conveyors. Motors associated with conveyors shall be sized to meet the expected load and designed to run within 90 percent of capacity at all times the conveyor is expected to operate. Conveyor motors shall be provided with sleep mode controls. Two-speed motors and adjustable-speed drives shall be provided where load weights are expected to vary. *Readily accessible*

~~controls shall be provided to allow for *manual* shut off of the conveyor when it is not needed. Conveyor systems shall be designed to use gravity feed when conditions allow and arranged such that long straight runs are provided with as few drives as possible.~~

~~**610.3 Portable appliances and equipment.** Appliances and equipment not exempted in Section 610.1 and that are not permanently connected to the *building* energy supply systems shall meet the provisions of Section 610.3.1. Such appliances and equipment shall be *listed* and *labeled*, installed in accordance with the manufacturer's installation instructions, and provided with controls and energy monitoring systems as required by this code. Compliance shall be documented and verified by the *approved agency* designated by the adopting agency, during the *commissioning* or operational phase of the *building*.~~

~~**610.3.1 ENERGY STAR appliances and equipment.** The *building* owner or, in tenant-occupied *buildings*, each tenant, shall maintain on-site a list of installed portable ENERGY STAR-eligible appliances and equipment indicating the corresponding rated power of each of the following items and whether each such item is an ENERGY STAR-qualified item:~~

1. ~~Residential service appliances, including, but not limited to, humidifiers and room air cleaners.~~
2. ~~Commercial service appliances, including, but not limited to, clothes washers and dryers.~~
3. ~~Consumer electronics, including, but not limited to, battery charging systems, audio and video appliances, cordless phones, digital to analog converters, set top boxes, televisions, and external power adaptors.~~
4. ~~Office machines and equipment, including, but not limited to, computers, copiers, digital duplicators, displays, multi-function devices, network equipment servers, voice-mail systems, fax machines, mailing machines, desktop monitors, printers, scanners and water coolers;~~

~~**610.3.2 Aggregate rated power.** The aggregate rated power of all ENERGY STAR-qualified portable appliances and equipment in the *building* or, in tenant-occupied *buildings*, in each tenant space, as identified by Section 610.3.1 shall constitute at least 50 percent of the aggregate rated power of all portable appliances and equipment in the *building* or tenant space, respectively. Such a list shall be made available to the *code official upon request*.~~

SECTION 611
BUILDING RENEWABLE ENERGY SYSTEMS

611.1 Renewable energy systems requirements. *Buildings* that consume energy shall comply with this section. Each *building* or surrounding lot or *building site* where there are multiple *buildings* on the *building site* shall be equipped with one or more renewable energy systems in accordance with this section.

Renewable energy systems shall meet the requirements of Section 611.2 for *solar photovoltaic* systems, or 611.3 for wind systems, or 611.4 for solar water heating systems, ~~or 611.5 for *solar thermal* systems, or 611.6 for other renewable energy systems,~~ and ~~611.7~~ 611.5 for performance monitoring and *metering* of these systems as *approved* by the code official. Other renewable energy systems shall be approved by the *Building Official.*

Exceptions:

1. *Buildings* or *building sites* where there are multiple *buildings* on the *building site* providing at least two percent of the total estimated annual energy use of the *building*, or collective *buildings* on the site, with on-site renewable energy using a combination of renewable energy generation systems meeting the requirements of Section 611.2, 611.3, or 611.4~~, 611.5 or 611.6~~.

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~~2. Where at least four percent of the total annual *building* energy consumption from renewable generation takes the form of a five-year commitment to *renewable energy credit* ownership, confirmed by the code official.~~

~~3. Where the combined application of on-site generated renewable energy and a commitment to *renewable energy credit* ownership as confirmed by the code official, totals not less than four percent of the total annual *building* energy consumption from renewable generation.~~

611.1.1 Building performance-based compliance. *Buildings* and surrounding property or *building sites* when there are multiple *buildings* on the *building site*, that seek compliance with this code in accordance with Section 602.3.2, performance-based compliance, shall be equipped with one or more renewable energy systems that have the capacity to provide not less than two percent of the total calculated annual energy use of the *building*, or collective *buildings* on the site~~, with on-site renewable energy in accordance with Section 603~~.

611.1.2 Building prescriptive compliance. *Buildings* and surrounding property or *building sites* when there are multiple *buildings* on the *building site*, which seek compliance with this code in accordance with Section 602.3.1, Prescriptive compliance, shall be equipped with one or more renewable energy systems that have the capacity to provide not less than two percent of the total estimated annual energy use of the *building*, or collective *buildings* on the *building site*, with on-site renewable energy by calculation demonstrating that on-site renewable energy production has a rating of at least 1.75 *Btu*/hr or at least 0.50 watts per square foot of conditioned floor area, and using any single or combination of renewable energy generation systems meeting the requirements of Sections 611.2, 611.3, or 611.4~~, 611.5 or 611.6~~.

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611.3 Wind energy systems. Wind energy systems shall be designed, constructed and sized to provide not less than two percent of the total estimated annual electric energy consumption of the *building*, or collective *buildings* on the *building site* in accordance with Section 611.1.1 or 611.1.2; or cover the maximum available gross *building* roof area excluding rooftop or *building site* obstructions such as *skylights*, penthouses and trees.

~~**Exception.** Wind energy systems are not permitted to be used to comply with section 611.1 *for buildings* located in areas with average annual wind speeds less than 14.5 mph (6.5 m/s) where measured at the 80m (262 ft.) height or in areas having a wind power classification of Class 3 or less where measured at the 50m (164 ft.) height, in accordance with Figures 611.3(1) through 611.1(5).~~

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611.4 Solar water heating equipment. Not less than ten percent of the *building's* annual estimated hot water energy usage shall be met by on-site solar water heating equipment.

Exceptions:

1. Solar water heating equipment is not required at building sites where *solar insolation* totals not more than 3.5 (kW/m^2/day) in accordance with ~~Table~~ Figure 611.4.
2. ~~On site solar water heating equipment is not required where at least five (5) percent of *renewable energy credit* ownership is confirmed by the code official.~~
3. 2. For the occupancy Groups identified, not less than five percent of the *building's* annual estimated hot water energy usage shall be met by on-site solar water heating equipment.
   1. Group A-2, restaurants and banquet halls;
   2. Group F, laundries;
   3. Group R-1, transient boarding houses, hotels and motels;

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4. Group R-2 *buildings*;
5. Group A-3, health clubs and spas
6. Group I-2, hospitals, mental hospitals and nursing homes.

611.5 Renewable energy system performance monitoring and metering. Renewable energy systems shall be *metered* and monitored in accordance with Sections 611.5.1 and 611.5.2.

611.5.1 Metering. Separately from the *building's* electrical *meter*, renewable energy systems shall be *metered* to measure the amount of renewable energy generated on the *building site* ~~in accordance with Section 604~~.

611.5.2 Monitoring. Renewable energy systems shall be monitored to measure the peak energy generated by the renewable energy systems during the *building's* anticipated peak consumption period ~~in accordance with Section 604~~.

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SECTION 612
ENERGY SYSTEMS COMMISSIONING AND COMPLETION

612.1 Mechanical systems commissioning and completion requirements. *Buildings* that consume energy shall comply with this section. Prior to passing the final mechanical inspection, the *registered design professional* shall provide evidence of mechanical systems *commissioning* and completion in accordance with the *International Energy Conservation Code* and the provisions of this Section.

Drawing notes shall clearly indicate provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the owner and made available to the *code official* upon request ~~in accordance with Sections 612.1.4 through 612.1.6~~.

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612.1.3 Functional performance testing. Functional performance testing shall be in accordance with the requirements of Sections 612.1.3.1, 612.1.3.2, and 612.1.3.3.

612.1.3.1 Equipment. Equipment functional performance testing shall demonstrate the installation and operation of components, systems, and system-to-system interfacing relationships in accordance with *approved* plans and specifications such that operation, function, and maintenance serviceability for each of the commissioned systems is confirmed. Testing shall include all specified modes of control and *sequence of operation*, including under full-load, part-load and all of the following emergency conditions:

1. Each mode as described in the *sequence of operation*;
2. Redundant or *automatic* back-up mode;
3. Performance of alarms; and
4. Mode of operation upon a loss of power and restoration of power.

~~**Exception:** Unitary or packaged HVAC equipment listed in *International Energy Conservation Code* Tables 503.2.3 (1) through (3), that do not require supply air economizers.~~

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612.1.5 Completion requirements. The *construction documents* shall specify that the ~~*construction documents*~~ requirements described in this Section be provided to the *building* owner within 90 days of the date of receipt of the *certificate of occupancy*.

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612.1.5.2 Manuals. An operating ~~manual~~ and ~~a~~ maintenance manual in accordance with industry-accepted standards shall be provided and shall include all of the following:

1. Submittal data stating equipment size and selected options for each piece of equipment requiring maintenance.

2. Manufacturer's operation manuals and maintenance manuals for each piece of equipment requiring maintenance, except equipment not furnished as part of the *building* project. Required routine maintenance shall be clearly identified.

3. Names and addresses of at least one *service agency*.

4. HVAC controls system maintenance and calibration information, including wiring diagrams, schematics, and control sequence descriptions. Desired or field-determined set-points shall be permanently recorded on control drawings at control devices or, for digital control systems, in programming comments.

5. A complete narrative of how each system is intended to operate, including recommended set-points.

6. Control sequence descriptions for lighting, domestic hot water heating and all renewable energy systems complete with a description of how these systems connect to, and are controlled in conjunction with, the overall building system.

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612.1.5.4 Final commissioning report. A complete report of test procedures and results identified as "Final Commissioning Report" shall be completed and provided to the building owner. The report shall include ~~and~~ all of the following ~~shall include~~:

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612.2.2 Verification. The *approved agency* conducting *commissioning* shall verify that controls have been installed in accordance with the *approved construction documents*. Any discrepancies shall be reviewed for compliance with Section 609 and the requirements of sections ~~502.2, 502.3 and 502.4~~ 505.2 of the *International Energy Conservation Code*.

612.2.3 Commissioning. Lighting controls shall be commissioned in accordance with this Section.

612.2.3.1 Occupant sensors. It shall be verified that the functional testing in accordance with International *Energy Conservation Code* Section 505.2.4 has been performed.

612.2.3.2 Automatic daylight controls. *Automatic daylight controls* shall be commissioned in accordance with all of the following:

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1. It shall be verified that the placement and orientation of each sensor is consistent with the manufacturer's installation instructions. If not, the sensor shall be relocated or replaced.

2. Control systems shall be ~~calibrated to maintain light levels identified~~ initially calibrated to meet settings and design intent established in the *construction documents*;

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612.2.3.4 Dimming systems with preset scenes. For programmable dimming systems it shall be verified that *automatic* shutoff and *manual* overrides are working and that programming is complete. Prior to programming, all lamps shall ~~have been in operation, at full output, for 100 hours or~~ be seasoned in accordance with the recommendations of the lamp manufacturer's ~~installation instructions, whichever is less~~.

***

612.2.5 Post occupancy commissioning. The *commissioning* activities in Section 612.2.3 shall be repeated 18 months after issuance of the certificate of occupancy. Control devices that are not functioning properly shall be repaired or replaced. Adjustments to calibration settings shall be documented. This documentation shall be provided to the *building* owner.

612.3 Building envelope systems commissioning and completion requirements. Prior to issuance of a *certificate of occupancy*, the *registered design professional* shall provide evidence of *building thermal envelope* systems *commissioning* and completion to the building owner in accordance with the *International Energy Conservation Code* and the provisions of this section.

~~Drawing notes~~ Construction documents shall specify the provisions for *commissioning* and completion requirements in accordance with this section and are permitted to refer to specifications for further requirements. Copies of all documentation shall be given to the building owner and made available to the *code official* upon request in accordance with Sections 612.3.1 through 612.3.2.

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SECTION 613
JURISDICTIONAL REQUIREMENTS & PROJECT ELECTIVES

***

613.2 Reserved. ~~**Post certificate of occupancy TANEU, energy demand, and CO2e emissions reporting.** Where the jurisdiction indicates in Table 302.1 that ongoing post certificate of occupancy *TANEU*, energy demand and *CO2e emissions* reporting is required, and where the jurisdiction has indicated in Tables 302.1 and 602.1 that enhanced energy performance in accordance with Section 602.1 or reduced *CO2e emissions* in accordance with Section 602.4 is required, *TANEU*, energy demand, and *CO2e emissions* reporting shall be provided in accordance with this Section.~~

~~**613.2.1 Purpose.** The purpose of this section is to provide for the uniform reporting and display of the *total annual net energy use*, peak demand for each energy form and emissions associated with *building* operations and *building sites*.~~

~~**613.2.2 Intent.** The intent of these requirements is to provide for the ongoing reporting and display of the *total annual net energy use*, peak energy demand and emissions associated with operation of the *building* and its systems to document ongoing compliance with the provisions of Sections 602 and 603.~~

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613.2.3 Reporting. Reports in accordance with Sections 613.2.3.1 through 613.2.3.3 shall be generated.

613.2.3.1 Annual net energy use. The *TANEU* associated with the operation of the *building* and the *buildings* on the site, as determined in accordance with Section 603.1.1, shall be reported by the *building* owner or the owner's registered agent to the [insert name of appropriate state or local government agency to be responsible for collecting reported information].

Where there are multiple *buildings* on a *building site*, each *building* shall have its *TANEU* reported separately. Where there are energy uses associated with the *building site* other than the *buildings* on the site, the *TANEU* for the *building site* shall be reported separately.
Energy use for the previous year shall cover the complete calendar year and be reported on, or before, March 1st of the following year.

613.2.3.2 Peak monthly energy demand reporting. The peak demand of all energy forms serving each *building* and the *building site*, as determined in accordance with Section 603.1.2, shall be reported by the *building* owner or the owner's registered agent to the [insert name of appropriate state or local government agency to be responsible for collecting reported information].

Where there are multiple *buildings* on a *building site* each *building* shall have its energy demand reported separately. Where there are energy uses associated with the *building site* other than the *buildings* on the site, the energy demand for the *building site* shall be reported separately.
Monthly energy demand data for the previous year shall cover the complete calendar year and be reported on, or before, March 1st of the following year.

613.2.3.3 Annual CO2e emissions reporting. The annual emissions associated with the operation of the *building* and its systems, as determined in accordance with Section 603.1.3, shall be reported by the *building* owner or the owner's registered agent to the [insert name of appropriate state or local government agency to be responsible for collecting reported information].

Where there are multiple *buildings* on a *building site* each *building* shall have its annual emissions reported separately. Where there are energy uses associated with the *building site* other than the *buildings* on the site, the annual *CO2e emissions* for the *building site* shall be reported separately.
Emissions reported for the previous year shall cover the complete calendar year and be reported on, or before, March 1st of the following year.

613.3 Reserved. TANEU reduction project electives. *Project electives* for *buildings* pursuing Performance-based compliance in accordance with Section 602.3.2 shall be in accordance with Sections 613.3.1 through 613.3.10. *TANEU* reductions shall not be recognized for *buildings* designed prescriptively in accordance with Section 602.3.1. *Building TANEU* shall be determined in accordance with Section 603.

613.3.1 Seven point reduction in TANEU. *Building TANEU* determined in accordance with Section 603 shall be at least 7 points lower than the maximum value allowed in Section 602.

613.3.2 Fourteen point reduction in TANEU. *Building TANEU* determined in accordance with Section 603 shall be at least 14 points lower than the maximum value allowed in Section 602.

613.3.3 Twenty-one point reduction in TANEU. *Building TANEU* determined in accordance with Section 603 shall be at least 21 points lower than the maximum value allowed in Section 602.

~~**613.3.4 Twenty-eight point reductions in TANEU.** *Building TANEU* determined in accordance with Section 603 shall be at least 28 points lower than the maximum value allowed in Section 602.~~

~~**613.3.5 Thirty-five point reductions in TANEU.** *Building TANEU* determined in accordance with Section 603 shall be at least 35 points lower than the maximum value allowed in Section 602.~~

~~**613.3.6 Forty-two point reductions in TANEU.** *Building TANEU* determined in accordance with Section 603 shall be at least 42 points lower than the maximum value allowed in Section 602.~~

~~**613.3.7 Forty-nine point reductions in TANEU.** *Building TANEU* determined in accordance with Section 603 shall be at least 49 points lower than the maximum value allowed in Section 602.~~

~~**613.3.8 Fifty-six point reductions in TANEU.** *Building TANEU* determined in accordance with Section 603 shall be at least 56 points lower than the maximum value allowed in Section 602.~~

~~**613.3.9 Sixty-three point reductions in TANEU.** *Building TANEU* determined in accordance with Section 603 shall be at least 63 points lower than the maximum value allowed in Section 602.~~

~~**613.3.10 Seventy point reductions in TANEU.** *Building TANEU* determined in accordance with Section 603 shall be at least 70 points lower than the maximum value allowed in Section 602.~~

613.4 Building thermal envelope systems project elective. *Buildings* seeking a *building thermal envelope* system *project elective* in accordance with Table 303.1 and Section 303.4 shall be in accordance with sections 613.4.1 through 613.4.6. ~~comply with this section~~. One *project elective* point will be granted for each successive level of increase.

613.4.1 The building thermal envelope shall exceed the requirements of the IECC by 20%.

613.4.2 The building thermal envelope shall exceed the requirements of the IECC by 25%.

613.4.3 The building thermal envelope shall exceed the requirements of the IECC by 30%.

613.4.4 The building thermal envelope shall exceed the requirements of the IECC by 35%.

613.4.5 The building thermal envelope shall exceed the requirements of the IECC by 40%.

613.4.6 The building thermal envelope shall exceed the requirements of the IECC by 45%.

613.5 Mechanical systems project elective. Mechanical systems *project electives* for *buildings* designed prescriptively in accordance with Section 602.3.1 and *buildings* pursuing performance-based compliance in accordance with Section 602.3.2 shall be in accordance with Sections 613.5.1 through 613.5.4.

613.5.1 Mechanical equipment. Mechanical equipment shall exceed the minimum efficiency values of the *International Energy Conservation Code* by 25% ~~meet sections 613.5.1.1 through 613.5.1.4~~ to achieve the mechanical systems *project elective,* or the equipment shall meet ENERGY STAR criteria.

~~**613.5.1.1 Heating equipment.** For heating equipment, the part-load efficiency of the equipment shall be at least 10 percent greater than the part-load efficiencies shown in the applicable tables of Section 606, the *International Energy Conservation Code*, or ASHRAE 90.1, or the equipment shall meet ENERGY STAR criteria, as applicable.~~

~~**613.5.1.2 Cooling equipment.** For cooling equipment, the part-load efficiency of the equipment shall be at least 10 percent greater than the part-load efficiencies shown in the applicable tables of Section 606, the *International Energy Conservation Code*, or ASHRAE 90.1, or the equipment shall meet ENERGY STAR criteria.~~

~~**613.5.1.3 Geothermal heat pumps.** Geothermal heat pumps shall meet the provisions of Table 613.5.1.3 based on the applicable referenced test procedure.~~

~~**613.5.1.4 Multi-stage geothermal heat pumps.** The efficiency of multi-stage geothermal heat pumps shall meet the provisions of Table 613.5.1.3 based on the applicable referenced test procedure.~~

~~**Table 613.5.1.3**~~
~~**Energy-Efficiency Criteria for Geothermal Heat Pumps**~~

~~**Product Type**~~	~~***Minimum* EER**~~	~~***Minimum* COP**~~	~~**Test Procedure**~~
~~Water-to-Air Closed-loop~~	~~14.1~~	~~3.3~~	~~ISO 13256-1~~
~~Water-to-Air Open-loop~~	~~16.2~~	~~3.6~~	~~ISO 13256-1~~
~~Water-to-Water Closed-loop~~	~~15.1~~	~~3.0~~	~~ISO 13256-2~~
~~Water-to-Water Open-loop~~	~~19.1~~	~~3.4~~	~~ISO 13256-2~~
~~Direct Expansion (DX) or Direct GeoExchange (DGX)~~	~~15.0~~	~~3.5~~	~~AHRI 870~~

613.5.2 Duct Insulation. Ducts shall be insulated to R-8 minimum where located in unconditioned spaces and R-11 minimum where located outside of the *building structure*. Where located within a *building* envelope assembly, the duct or plenum shall be separated from the *building* exterior or unconditioned or exempt spaces by a minimum of R-8 insulation.

613.5.3 Duct system testing. Joints, longitudinal and transverse seams and connections in ductwork and plenums shall be leak-tested in accordance with the SMACNA *HVAC Air Duct Leakage Test Manual* and shall have a rate of air leakage (CL) 20% less than that required by Section 607.4.1 ~~or equal to 12 as determined in accordance with equation 5-2 of the *International Energy Conservation Code*~~.

~~**606.5.3.1**~~ **613.5.3.1 Documentation.** Documentation shall be furnished by the designer demonstrating that representative sections totaling at least 50 percent of the duct area have been tested and that all tested sections meet the requirements of Section 613.5.3.

613.5.4 Service water heating (SWH) equipment. Service water heating equipment shall be in accordance with Section 613.5.4.1.

613.5.4.1 SWH efficiency. The efficiency of the service water heating equipment must be at least ~~10~~ 20 percent greater than the efficiencies shown in the *International Energy Conservation Code,* ~~and ASHRAE 90.1~~ or the service water heating equipment shall be ENERGY STAR qualified.

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613.7 Energy Metering and Monitoring. Ensure that *buildings* are constructed or altered in a way that will provide the capability for their energy use, production and reclamation to be measured, monitored and reported. This includes the design of energy distribution systems so as to isolate load types, the installation of or ability to install in the future *meters*, devices and a data acquisition system, and the installation of or the ability to provide for public displays and other appropriate reporting mechanisms in the future.

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All forms of energy delivered to the *building* and *building site*, produced on the *building site* or in the building and reclaimed at the *building site* or in the *building* shall be *metered* and all energy load types measured.

613.8 Establish an open and interoperable automated demand response infrastructure. Provide a *building energy management and control system* (*EMCS*) integrated with *building* HVAC systems controls and lighting systems controls to receive an open and interoperable *automated demand response* (*Auto-DR*) relay or internet signal. *Building* HVAC and lighting systems and specific *building* energy-using components shall incorporate preprogrammed demand response strategies that are automated with a *demand response automation internet software* client.

613.9 Solar photovoltaic system rough-in. Conduit, raceways, sleeves or other pathways shall be installed for a run to the solar photovoltaic system locations. Conduits and raceways shall be sized in conformance with NFPA 70 for a system capable of providing at least 50 percent of the energy required by the building.

613.9.1 Terminations. Conduits, raceways, sleeves and pathways installed in accordance with this section shall terminate near the solar photovoltaic system sites and near the electrical service section equipment.

613.10 Rough-ins for future solar hot water pre-heat. Plumbing, electrical and control systems shall be designed and constructed in accordance with Sections 608.5.1 and 608.5.2 to provide for the future installation of a solar water heating system that will be capable of providing at least 50 percent of the energy needed for all systems listed below:

1. Service Water Heating for kitchen, laundry and bathing.
2. Pool Water Heating.
3. Spa Water Heating.
4. Hot Tub Water Heating.

613.10.1 Solar thermal hot water system piping rough-in. Conduit(s), sleeve(s) or other pathway(s) shall be installed for a minimum of two runs of piping from the future site for *solar thermal* to the location of the service water heating equipment. The conduit(s), sleeve(s) or other pathway(s) shall have internal dimensions large enough to allow the piping and insulation to be easily installed, removed and replaced. The minimum diameter of the piping shall be ¾ inch nominal and the tubing shall be certified to handle sustained temperatures above 180F. Insulation shall be sized in accordance with Section ~~607.5~~ 608.7.

613.10.2 Solar ~~Electric~~ thermal hot water system electrical rough-in. Conduit not less than ¾ inch in size shall be installed from the future site for solar ~~electric~~ thermal to the electric service panel or room that provides the electric service to the water heating equipment that will be served by the solar ~~electric~~ thermal hot water system. Conduit not less than ¾ inch in size shall be installed to provide for control wiring.

613.10.2.1 Conduit size. Conduit not less than ¾ inch in size shall be installed from the future *solar thermal* or solar electric site to the location of the service water heating equipment and the *storage tank* to provide for control wiring.

613.10.2.2 Terminations. Conduits, sleeves and pathways installed in accordance with this section shall terminate near the *solar thermal* or solar electric sites and shall be readily accessible.

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613.10.2.3 Space for future storage tank. Space for a future storage tank shall be identified and reserved. This space shall be large enough to accommodate storage for a *solar thermal* system sized to provide 50 percent solar fraction, with an area of at least ten square feet.

613.11 Commercial food service equipment. Not less than 50 percent of the aggregate rated power allocated to commercial food service equipment shall be ENERGY STAR-eligible food service equipment including, but not limited to, open deep-fat fryers, hot food holding cabinets, reach-in refrigerators and freezers, solid door refrigerators and freezers defined by ENERGY STAR. Steam cookers, dishwashers, griddles, and convection gas and electric ovens, shall be ENERGY STAR qualified.

613.12 Permanent shading devices for fenestration. Vertical fenestration within 45 degrees of the nearest west, south, and east cardinal ordinate shall be shaded by permanent horizontal exterior projections with a *projection factor* greater than or equal to 0.25. Where different windows or glass doors have different *projection factor* values, they shall each be evaluated separately, or an area-weighted *projection factor* value shall be calculated and used for all windows and glass doors. Horizontal projections shall extend laterally beyond the edge of the glazing at least one-half of the height of the glazing, except at *building* corners.

Exceptions:

1. *Buildings* located in *hurricane-prone regions* in accordance with Section 1609.2 of the *International Building Code* or on any other building with a mean roof height exceeding that permitted by Table 1504.8 of the *International Building Code* based on the exposure category and basic wind speed at the *building site*.
2. Windows located in a *building* wall that is within 18 inches of the *lot* line.
3. Where equivalent shading of the fenestration is provided by *buildings*, *structures*, geological formations, or permanent exterior projections that are not horizontal, as determined by sun angle studies at the peak solar altitude on the spring equinox, and three hours before and after the peak solar altitude on the spring equinox.

613.13 Building envelope testing requirement. The building envelope air tightness shall be considered to be acceptable where the tested air leakage is less than 0.25 cfm/ft² (4.57 m³/hr/m²) when tested at a pressure of .30 in w.c. (75 Pa). Testing shall occur after rough-in and after installation of penetrations of the *building* envelope, including penetrations for utilities, HVAC, plumbing, and electrical equipment and appliances. Testing shall be done in accordance with ASTM E779.

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CHAPTER 7
WATER RESOURCE CONSERVATION AND EFFICIENCY

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SECTION 702
FIXTURES, FITTINGS, EQUIPMENT AND APPLIANCES

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TABLE 702.1.1(1)
REFERENCE FIXTURE AND SUPPLY FITTING WATER CONSUMPTION

Plumbing Fixture or Supply Fitting	Flow Rate or Volume[b]	Duration	Daily Uses Per Occupant	Occupants[h]	Daily Volume Gallon per day
Shower head [a]	2.5 gpm[e]	5 min.	1	Note c	
Lavatory faucet, private	2.2 gpm[d]	0.25 min.	3		
Lavatory, public (metered)	0.25 gpc[f]	1 cycle	3		
Lavatory, public (nonmetered)	0.5 gpm[d]	0.25 min.	3		
Kitchen and bar sink faucets (non-residential)	2.2 gpm[d]	4 min.	1		
Urinal	1.0 gpc[f]	1 cycle	2/male		
Water closet	1.6 gpc[f]	1 cycle	1/male[g]	males	
			3/female	females	
				Total Reference Water Use (R) (gal/day)	
For SI: 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.					

a. A hand-held shower spray is considered to be a showerhead.
b. Consumption tolerances shall be determined from referenced standards.
c. For shower heads, the number of occupants shall be based upon the anticipated number of shower users.
d. Flow at 60 psi
e. Flow at 80 psi
f. Gallons per cycle (gpc)
g. The daily use per male occupant shall be 3 where urinals are not installed
h. The number of occupants shall be that number used to determine the required number of plumbing fixtures in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

TABLE 702.1.1(2)
DESIGN FIXTURE AND SUPPLY FITTING WATER CONSUMPTION

Plumbing Fixture or Supply Fitting	Flow Rate or Volume[bg]	Duration	Daily Uses Per Occupant	Occupants [f]	Daily Volume Gallon per day
Shower head [a]		5 min.	1	Note c	
Lavatory faucet, private		0.25 min.	3		
Lavatory, public (metered)		1 cycle	3		
Lavatory, public (nonmetered)		0.25 min.	3		
Kitchen and bar sink faucets (non-residential)		4 min.	1		
Urinal		1 cycle	2/male		
Water closet [d]		1 cycle	1/male[e]	males	
			3/female	females	
				Total Design Water Use (D)(gal/day)	

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Plumbing Fixture or Supply Fitting	Flow Rate or Volume[bg]	Duration	Daily Uses Per Occupant	Occupants [f]	Daily Volume Gallon per day
For SI: 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.					

a. A hand-held shower spray is considered to be a shower head.
b. Consumption tolerances shall be determined from referenced standards.
c. For shower heads, the number of occupants shall be based upon the anticipated number of shower users.
d. Gravity-flush High-Efficiency Water Closets (HETs) shall be certified to the current WaterSense High-Efficiency Toilet Specification.
e. The daily use per male occupant shall be 3 where urinals are not installed.
f. The number of occupants shall be that number used to determine the required number of plumbing fixtures in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.
g. Where *non-potable* water is supplied to a fixture, enter zero in this column for that fixture.

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SECTION 704
WATER TREATMENT DEVICES AND EQUIPMENT

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704.1.3 Waste connections. Waste water from water softener regeneration shall not discharge to *reclaimed water* collection systems and shall discharge in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

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704.2 Reverse osmosis water treatment systems. Point-of-use reverse osmosis treatment systems shall comply with NSF 58. The discharge pipe from a reverse osmosis drinking water treatment unit shall connect to the *building* drainage system in accordance with Section ~~611.2~~ 603.4.13 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code. Point-of-use reverse osmosis systems shall be equipped with an automatic shutoff valve that prevents the production of reject water when there is no demand for treated water.

SECTION 705
SPECIFIC WATER CONSERVATION MEASURES

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705.2 Metering. Water *meters* shall be required for *building* water consumed from any source. Each *potable* and reclaimed source, and each onsite water system, shall be *metered* separately. *Meters* shall be installed in accordance with the requirements of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code. Each *meter* shall be required to be capable of communicating water consumption data remotely.

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TABLE 705.2.1
METERING REQUIREMENTS

APPLICATION	REQUIREMENTS
Irrigation	Irrigation systems that are automatically controlled shall be *metered*.
Tenant Spaces	Tenant spaces that consume water shall be *metered* individually.
Onsite Water Collection Systems	The makeup water lines supplying onsite water collection systems shall be *metered*.
Ornamental Water Features	Ornamental water features with a permanently installed water supply shall be required to utilize a *meter* on makeup water supply lines.

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APPLICATION	REQUIREMENTS
Pools and Spas	Indoor and outdoor pools and spas shall be required to utilize a *meter* on makeup water supply lines.
Cooling Towers	Cooling towers or groups of towers shall be required to utilize a *meter* on makeup water and blow-down water supply lines.
Steam Boilers	The makeup water supply line to steam boilers having a rating of 1,000,000 BTU/h or greater shall be metered.
Industrial Processes	Industrial processes consuming more than 1,000 gallons per day on average shall be *metered* individually.
Evaporative Coolers	Evaporative coolers supplying in excess of 0.6 gpm, on average, makeup water shall be metered.
Fluid Coolers and Chillers	Water-cooled fluid coolers and chillers that do not utilize closed-loop recirculation shall be *metered*.
Roof Spray Systems	Roof spray systems for irrigating vegetated roofs or thermal conditioning shall be *metered*.

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SECTION 707
RAINWATER COLLECTION AND DISTRIBUTION SYSTEMS.

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707.3 Potable water connections. Where a *potable* system is connected to a *rainwater collection and conveyance system*, the *potable* water supply shall be protected against backflow in accordance with Section ~~608~~ 603 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

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707.5 Installation. Except as provided for in this section, all systems shall be installed in compliance with the provisions of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code and manufacturer's instructions.

707.6 Applications. Untreated *rainwater* shall be utilized in accordance with Section 702 and local codes. Treated *rainwater* shall be utilized in accordance with Section 706 or *potable* water provisions of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code, as applicable, and as permitted by local codes.

***

707.11 Trenching requirements. All water service piping, including piping containing *rainwater*, shall be separated from the *building* sewer by 5 feet (1524 m) of undisturbed or compacted earth. Water service pipes, *potable* and *non-potable*, shall not be located in, under or above cesspools, septic tanks, septic tank drainage fields or seepage pits. Buried *rainwater* collection and *distribution piping* shall comply with the requirements of Section ~~306~~ 315 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for support, trenching, bedding, backfilling, and tunneling.

Exceptions:

1. The required separation distance shall not apply where the bottom of the water service pipe within 5 feet (1524 mm) of the sewer is a minimum of 12 inches (305 mm) above the top of the highest point of the sewer and the pipe materials shall comply with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for such applications.
2. Water service pipe is permitted to be located in the same trench with a *building* sewer, provided such sewer is constructed of materials that comply with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for such installations.

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3. The required separation distance shall not apply where a *potable* or *non-potable* water service pipe crosses a sewer pipe provided the water service pipe is sleeved to at least 5 feet (1524 mm) horizontally from the sewer pipe centerline on both sides of such crossing with pipe materials that comply with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for such applications.
4. Irrigation piping located outside of a *building* and downstream of the backflow preventer is not required to meet the trenching requirements where *rainwater* is used for outdoor applications.

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707.12.3.2 Size. Gutters and downspouts shall be installed and sized in accordance with Section 1106.~~6~~ of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code and local rainfall rates.

***

707.12.4.1 Joints. Collection piping conveying *rainwater* shall utilize joints *approved* for use with the *distribution piping* and appropriate for the intended applications as specified in the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

707.12.4.2 Size. Collection piping conveying *rainwater* from collection surfaces shall be sized in accordance with local Chapter 11 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code and local rainfall rates.

707.12.4.3 Labeling and marking. Additional marking of *rainwater* collection piping shall not be required beyond that required for sanitary drainage, waste, and vent piping by the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

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707.12.7.2 Materials. Where water is collected onsite, it shall be collected in an *approved* tank constructed of durable, nonabsorbent and corrosion-resistant materials. Where collected water is to be treated to *potable* water standards, tanks shall not be constructed of recycled materials and shall be constructed of materials in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code. *Storage tanks* shall be constructed of materials compatible with the type of disinfection system used to treat water upstream of the tank and used to maintain water quality within the tank.

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707.12.7.4 Makeup water. Where an uninterrupted supply is required for the intended application, *potable* or municipally supplied reclaimed or recycled water shall be provided as a source of makeup water for the *storage tank*. The *potable* or reclaimed or recycled water supply shall be protected against backflow by means of an air gap not less than 4 inches (102 mm) above the overflow or an *approved* backflow device in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code. There shall be a full-open valve located on the makeup water supply line to the *storage tank*. Inlets to *storage tank* shall be controlled by fill valves or other automatic supply valves installed so as to prevent the tank from overflowing and to prevent the water from dropping below a predetermined level.

707.12.7.5 Overflow. The *storage tank* shall be equipped with an overflow pipe having the same or larger area as the sum of the areas of all tank inlet pipes. The overflow pipe shall be trapped and shall be discharged in a manner consistent with storm water runoff requirements of the *jurisdiction* and at a sufficient distance from the tank to avoid damaging the tank foundation.

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The overflow drain shall not be equipped with a shutoff valve. A minimum of one cleanout shall be provided on each overflow pipe in accordance with Section ~~708~~ 707 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

***

707.12.7.7 Venting. Tanks shall be provided with a vent sized in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code and based on the diameter of the tank influent pipe. Tank vents shall not be connected to sanitary drainage system vents.

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707.12.7.10 Drain. A drain shall be located at the lowest point of aboveground storage tanks and shall discharge in a manner consistent with the storm water runoff requirements of the *jurisdiction* and at a sufficient distance from the tank to avoid damaging the tank foundation. A minimum of one cleanout shall be provided on each drain pipe in accordance with Section ~~708~~ 707 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

***

707.12.10 Vent piping. *Storage tanks* shall be provided with a vent in accordance with the requirements of Section 707.12.7.7. Vents shall be sized in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code, based on the aggregate diameter of *storage tank* influent pipe(s). Vents shall be protected from contamination by means of a U-bend installed with the opening directed downward or an *approved* cap. Vent outlets shall extend a minimum of 4" above grade, or as necessary to prevent surface water from entering the *storage tank*. Vent openings shall be protected against the entrance of vermin and insects in accordance with the requirements of Section 707.8.

707.12.11 Pumping and control system. Mechanical equipment including pumps, valves and filters shall be easily accessible and removable in order to perform *repair*, maintenance and cleaning. Where collected *rainwater* is to be treated to *potable* water standards, the pump and all other pump components shall be *listed* and *approved* for use with *potable* water systems. Pressurized water shall be supplied at a pressure appropriate for the application and within the range specified by the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code. Where water could be supplied at an excessive pressure, a pressure-reducing valve shall be installed in accordance with the requirements of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

***

707.12.11.3 Water-pressure reducing valve or regulator. Where the *rainwater* pressure supplied by the pumping system exceeds 80 psi (552 kPa) static, a pressure-reducing valve shall be installed to reduce the pressure in the *reclaimed water* distribution system piping to 80 psi (552 kPa) static or less. Pressure-reducing valves shall be specified and installed in accordance with Section ~~604.8~~ 608 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

***

707.12.12.1 Materials. *Distribution piping* conveying *rainwater* shall conform to the standards and requirements specified by the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for *non-potable* or *potable* water, as applicable.

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707.12.12.2 Joints. *Distribution piping* conveying *rainwater* shall utilize joints *approved* for use with the *distribution piping* and appropriate for the intended applications as specified in the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

707.12.12.3 Size. *Distribution piping* conveying *rainwater* water shall be sized in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for the intended application or.

***

707.13.1 Drainage and vent tests. The testing of *rainwater* collection piping, overflow piping, vent piping and *storage tank* drains shall be conducted in accordance with ~~Section 312 of~~ the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

707.13.2 Reserved. ~~**Drainage and vent final test.** A final test shall be applied to the *rainwater* collection piping, overflow piping, *storage tank*, and tank vent piping in accordance with Section 312.4 of the *International Plumbing Code*.~~

707.13.3 Water supply system test. The testing of makeup water supply piping and *rainwater distribution piping* shall be conducted in accordance with ~~Section 312.5 of~~ the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

707.13.4 Inspection and testing of backflow prevention assemblies. The testing of backflow preventers and *backwater valves* shall be conducted in accordance with ~~Section 312.10 of~~ the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

***

SECTION 708
GRAYWATER SYSTEMS

***

708.3 Potable water connections. Where a *potable* water system is connected to a *graywater* system, the *potable* water supply shall be protected against backflow in accordance with Section ~~608~~ 603 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

***

708.5 Installation. Except as provided for in this section, all systems shall be installed in compliance with the provisions of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code and manufacturer's instructions, as applicable.

***

708.10 Trenching requirements. Water service piping, including piping containing *graywater*, shall be separated from the *building* sewer by 5 feet (1524 m) of undisturbed or compacted earth. *Graywater* piping shall be separated from *potable* water piping underground by 5 feet (1524 m) of undisturbed or compacted earth. *Non-potable* water service pipes shall not be located in, under or above cesspools, septic tanks, septic tank drainage fields or seepage pits. Buried *graywater* piping shall comply with the requirements of Section ~~306~~ 315 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for support, trenching, bedding, backfilling, and tunneling.

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Exceptions:

1. The required separation distance shall not apply where the bottom of the *graywater* service pipe within 5 feet (1524 mm) of the sewer is a minimum of 12 inches (305 mm) above the top of the highest point of the sewer and the pipe materials comply with the requirements of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for such applications.

2. The required separation distance shall not apply where the bottom of the *potable* water service pipe within 5 feet (1524 mm) of the *graywater* pipe is a minimum of 12 inches (305 mm) above the top of the highest point of the *graywater* pipe and the pipe materials comply with the requirements of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for such applications.

3. Water service pipe is permitted to be located in the same trench with a *building* sewer, provided that such sewer is constructed of materials that comply with the requirements of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for such applications.

4. The required separation distance shall not apply where a *potable* or *non-potable* water service pipe crosses a sewer pipe provided that the water service pipe is sleeved to at least 5 feet (1524 mm) horizontally from the sewer pipe centerline on both sides of such crossing with pipe materials that comply with the requirements of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for such applications.

5. The required separation distance shall not apply where a *potable* water service pipe crosses a *graywater* pipe provided that the *potable* water service pipe is sleeved for a distance of at least 5 feet (1524 mm) horizontally from the centerline of the *graywater* pipe on both sides of such crossing with pipe materials that comply with the requirements of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for such applications.

***

708.12.1.1 Prohibited graywater sources. Wastewater containing urine or fecal matter shall not be diverted to *graywater* systems and shall discharge to the sanitary drainage system of the *building* or premises in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code. Water from reverse osmosis system reject water, water softener discharge water, kitchen sink wastewater, dishwasher wastewater, and wastewater discharged from wet-hood scrubbers shall not be collected for reuse within a *graywater* system.

708.12.2 Traps. Traps serving fixtures and devices discharging wastewater to *graywater* reuse systems shall have a liquid seal of not less than 2 inches (51 mm) and not more than 4 inches (102 mm). Where a trap seal is subject to loss by evaporation, a trap seal primer valve shall be installed in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

***

708.12.3.1 Joints. Collection piping conveying untreated *graywater* shall utilize joints *approved* for use with the *distribution piping* and appropriate for the intended applications as specified in the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

708.12.3.2 Size. Collection piping conveying *rainwater* from collection surfaces shall be sized in accordance with storm drainage sizing requirements specified in the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

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708.12.3.3 Labeling and marking. Additional marking of untreated *graywater* collection piping shall not be required beyond that required for sanitary drainage, waste, and vent piping by the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

***

708.12.6.5 Makeup water. Where an uninterrupted supply is required for the intended application, *potable* or municipally supplied reclaimed/recycled water shall be provided as a source of makeup water for the *storage tank*. The *potable* or reclaimed/recycled water supply shall be protected against backflow by means of an air gap not less than 4 inches (102 mm) above the overflow or an *approved* backflow device in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code. There shall be a full-open valve located on the makeup water supply line to the *storage tank*. Inlets to *storage tank* shall be controlled by fill valves or other automatic supply valves installed so as to prevent the tank from overflowing and to prevent the water level from dropping below a predetermined point. Where makeup water is provided, the water level shall not be permitted to drop below the *rainwater* inlet or the intake of any attached pump.

708.12.6.6 Overflow. The *storage tank* shall be equipped with an overflow pipe having the same or larger area as the sum of the areas of all reservoir inlet pipes. The overflow pipe shall be trapped and shall be indirectly connected to the sanitary drainage system. The overflow drain shall not be equipped with a shutoff valve. A minimum of one cleanout shall be provided on each overflow pipe in accordance with Section ~~708~~ 707 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

***

708.12.6.8 Venting. The tank shall be provided with a vent sized in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code and based on the diameter of the tank influent pipe. The reservoir vent shall not be connected to sanitary drainage system vents.

***

708.12.6.11 Drain. A drain shall be located at the lowest point of the *storage tank* and shall be indirectly connected to the sanitary drainage system. The total area of all drains shall not be smaller than the total area of all overflow pipes. A minimum of one cleanout shall be provided on each drain pipe in accordance with Section ~~708~~ 707 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

***

708.12.8 Vent piping. *Storage tanks* shall be provided with a vent in accordance with the requirements of Section 708.12.6.8. Vents shall be sized in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code, based on the aggregate diameter of *storage tank* influent pipes. Open vents shall be protected from contamination by means of a U-bend installed with the opening directed downward or an *approved* cap. Vent outlets shall extend a minimum of 4 inches above grade, or as necessary to prevent surface water from entering the *storage tank*. Vent openings shall be protected against the entrance of vermin and insects in accordance with the requirements of Section 708.8.

708.12.9 Pumping and control system. *Mechanical equipment* including pumps, valves and filters shall be accessible and removable in order to perform *repair*, maintenance and cleaning. Pressurized water shall be supplied at a pressure appropriate for the application and within the range specified by the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code. Where water

could be supplied at an excessive pressure, a pressure-reducing valve shall be installed in accordance with the requirements of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

***

708.12.9.3 Water-pressure reducing valve or regulator. Where the *rainwater* pressure supplied by the pumping system exceeds 80 psi (552 kPa) static, a pressure-reducing valve shall be installed to reduce the pressure in the *reclaimed water* distribution system piping to 80 psi (552 kPa) static or less. Pressure-reducing valves shall be specified and installed in accordance with Section ~~604.8~~ 608 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

708.12.10 Distribution pipe. *Distribution piping* shall comply with Sections 708.12.10.1 through 708.12.10.4.

708.12.10.1 Materials. *Distribution piping* conveying *graywater* shall conform to standards and requirements specified by the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for *non-potable* water.

708.12.10.2 Joints. *Distribution piping* conveying *graywater* shall utilize joints *approved* for use with the *distribution piping* and appropriate for the intended applications as specified in the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

708.12.10.3 Size. *Distribution piping* conveying *graywater* water shall be sized in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for the intended application or applications.

***

708.13 Tests and inspections. Tests and inspections shall be performed in accordance with Sections 708.13.1 through 708.13.9.

708.13.1 Drainage and vent test. A pressure test shall be applied to the *graywater* collection piping, overflow piping, *storage tank*, *storage tank* drainage piping and tank vent piping in accordance with ~~Section 312 of~~ the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

708.13.2 Reserved. ~~**Drainage and vent final test.** A final test shall be applied to the *graywater* collection piping, overflow piping, *storage tank*, and tank vent piping in accordance with Section 312.4 of the *International Plumbing Code*.~~

708.13.3 Water supply system test. The testing of makeup water supply piping and *rainwater distribution piping* shall be conducted in accordance with ~~Section 312.5 of~~ the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

708.13.4 Inspection and testing of backflow prevention assemblies. The testing of backflow preventers and *backwater valves* shall be conducted in accordance with ~~Section 312.10 of~~ the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

***

SECTION 709
RECLAIMED WATER SYSTEMS

***

709.3 Potable water connections. Connections between a *reclaimed water* system and a *potable* water system shall be protected against backflow in accordance with Section ~~608~~ 603 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

709.4 Installation. Except as provided for in this section, systems shall be installed in compliance with the provisions of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code and manufacturer's instructions, as applicable.

***

709.7 Water-pressure reducing valve or regulator. Where the *reclaimed water* pressure supplied to the *building* exceeds 80 psi (552 kPa) static, a pressure-reducing valve shall be installed to reduce the pressure in the *reclaimed water* distribution system piping to 80 psi (552 kPa) static or less. Pressure-reducing valves shall be specified and installed in accordance with Section ~~604.8~~ 608 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

709.8 Trenching requirements. Water service piping, including piping containing *reclaimed water*, shall be separated from the *building* sewer by 5 feet (1524 m) of undisturbed or compacted earth. *Reclaimed water* piping shall be separated from *potable* water piping underground by 5 feet (1524 m) of undisturbed or compacted earth. *Reclaimed water* service pipes shall not be located in, under or above cesspools, septic tanks, septic tank drainage fields or seepage pits. Buried *reclaimed water* piping shall comply with the requirements of Section ~~306~~ 315 of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for support, trenching, bedding, backfilling, and tunneling.

Exceptions:

1. The required separation distance shall not apply where the bottom of the *reclaimed water* service pipe within 5 feet (1524 mm) of the sewer is a minimum of 12 inches (305 mm) above the top of the highest point of the sewer and the pipe materials comply with the requirements of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for the application.

2. The required separation distance shall not apply where the bottom of the *potable* water service pipe within 5 feet (1524 mm) of the *reclaimed water* pipe is a minimum of 12 inches (305 mm) above the top of the highest point of the *reclaimed water* pipe and the pipe materials comply with the requirements of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for the application.

3. Water service pipe is permitted to be located in the same trench with a *building* sewer, provided such sewer is constructed of materials that comply with the requirements of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for the application.

4. The required separation distance shall not apply where a *potable* or *non-potable* water service pipe crosses a sewer pipe provided the water service pipe is sleeved to at least 5 feet (1524 mm) horizontally from the sewer pipe centerline on both sides of such crossing with pipe materials that comply with the requirements of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for the application.

5. The required separation distance shall not apply where a *potable* water service pipe crosses a *reclaimed water* pipe provided the *potable* water service pipe is sleeved to at least 5 feet (1524

mm) horizontally from the *reclaimed water* pipe centerline on both sides of such crossing with pipe materials that comply with the requirements of the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for the application.

***

709.9.1.1 Materials. *Distribution piping* conveying *reclaimed water* shall conform to standards and requirements specified by the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for *non-potable* water.

709.9.1.2 Joints. *Distribution piping* conveying *reclaimed water* shall utilize joints *approved* for use with the *distribution piping* and appropriate for the intended applications as specified in the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

709.9.1.3 Size. *Distribution piping* conveying *reclaimed water* shall be sized in accordance with the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code for the intended application.

***

709.10.1 Water supply system test. The testing of makeup water supply piping and *reclaimed water distribution piping* shall be conducted in accordance with ~~Section 312.5 of~~ the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

709.10.2 Inspection and testing of backflow prevention assemblies. The testing of backflow preventers shall be conducted in accordance with ~~Section 312.10 of~~ the ~~*International Plumbing Code*~~ 2006 Uniform Plumbing Code.

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CHAPTER 8
INDOOR ENVIRONMENTAL QUALITY AND COMFORT

***

SECTION 802
BUILDING CONSTRUCTION FEATURES, OPERATIONS AND MAINTENANCE FACILITATION

***

802.3 Durability ~~and cleanability~~ of air handling surfaces. Surfaces exposed to airflow within air handling systems shall be constructed of ~~metal except where made of nonporous~~ materials that are resistant to deterioration and will not break away, crack, peel, flake off, or show evidence of delamination or continued erosion when tested in accordance with the erosion test in UL 181. ~~that could cause release of particles into the air stream. Surfaces exposed to airflow shall not have cracks or crevices where dust can accumulate and shall be easily cleaned.~~

***

~~**802.5 Insulation materials above suspended ceilings and in air plenums** Fibrous insulating materials with exposed friable fibers shall not be installed above suspended ceilings, on top of suspended ceiling panels or in air plenums.~~

802.5 Airstream surfaces. Materials exposed to airflow within ducts, within air plenums, or on top of suspended ceilings, shall not break away, crack, peel, flake off, or show evidence of delamination or continued erosion when tested in accordance with the erosion test in UL 181.

SECTION 803
HVAC SYSTEMS

***

803.1.3 Construction phase ductless system or filter. Where spaces are conditioned during the construction phase, space conditioning systems shall be of the ductless variety, or filters for ducted systems shall be rated at MERV ~~13~~ 8 or higher and system equipment shall be designed to be compatible. Duct system design shall account for pressure drop across the filter.

~~**803.2 Temperature and humidity.** The temperature and humidity in occupied spaces shall comply with ASHRAE 55.~~

803.2 Thermal environmental conditions for human occupancy. Buildings shall be designed in compliance with ASHRAE 55 –04, Sections 6.1, "Design," and 6.2, "Documentation."

Exception: Spaces with special requirements for processes, activities, or contents that require a thermal environment outside of that which humans find thermally acceptable, such as food storage, natatoriums, shower rooms, saunas, and drying rooms.

803.3 Environmental tobacco smoke control. ~~Where the *jurisdiction* permits tobacco smoking by the occupants within *buildings* or tenant spaces, the *building* spaces and HVAC systems shall be designed in accordance with all of the following:~~

~~1. Spaces in which smoking is permitted shall be completely separated from all other spaces by enclosing walls, floors and ceilings constructed to resist the passage of smoke.~~

~~2. Spaces in which smoking is permitted shall be served by HVAC systems that are independent of HVAC systems that serve other spaces.~~

~~3. Egress doors in spaces in which smoking is permitted shall be self-closing.~~

~~4. Spaces in which smoking is permitted shall be ventilated as required for smoking lounges in accordance with Table 403.3 of the *International Mechanical Code* and shall be maintained at a negative pressure with respect to adjacent spaces of not less than 7 pa.~~

Smoking shall not be allowed inside of buildings. Signage stating such shall be posted within 10 ft (3 m) of each building entrance. Any exterior designated smoking areas shall be located not less than 25 ft (7.5 m) away from building entrances, outdoor air intakes, and operable windows.

803.4 Isolation of pollutant sources. The isolation of pollutant sources related to print, copy and janitorial rooms, garages, and hangars ~~and vented hoods~~ shall be in accordance with Section ~~808.4.1~~ 803.4.1.

803.4.1 Print, copy and janitorial rooms and garages. Enclosed rooms or spaces that are greater than 200 square feet in area and that are used as a print or copy facility, janitorial room, repair garage or aircraft hangar where the use of chemicals occurs shall comply with all of the following:

1. The enclosing walls shall extend from the floor surface to the under side of the floor, ~~or~~ roof deck or solid ceiling above and shall be constructed to resist the passage of airborne chemical pollutants.
2. Doors in the enclosing walls shall be automatic or self-closing.
3. An HVAC system shall be provided that: provides separate exhaust airflow to the outdoors at a rate of not less than 0.50 cfm per square foot; that maintains a negative pressure of not less than 7 pa within the room; and that prohibits the recirculation of air from the room to other portions of the *building*.

803.5 ~~Ductless system and f~~Filters. Filters for ~~ducted space~~ air conditioning systems shall be rated at MERV ~~6~~ 11 or higher and system equipment shall be designed to be compatible. The ~~duct~~ air handling system design shall account for pressure drop across the filter.

SECTION 804
SPECIFIC INDOOR AIR QUALITY & POLLUTANT CONTROL MEASURES

804.1 Fireplaces and appliances. Where located within *buildings*, *fireplaces*, solid fuel-burning appliances, vented decorative gas appliances, ~~gas *fireplaces*~~, vented gas *fireplace* heaters and decorative gas appliances for installation in *fireplaces* shall comply with Sections 804.1.1 through ~~804.1.7~~ 804.1.6. Unvented room heaters and unvented decorative appliances, including alcohol burning, shall be prohibited.

***

804.1.3 Gas fireplaces. ~~Gas *fireplaces*~~ Vented decorative gas appliances and vented gas fireplace heaters shall be ~~equipped with permanently fixed glass fronts or gasketed doors and shall be *listed* in accordance with CSA Z21.50/CSA 2.22 and CSA Z21.88a/CSA 2.33a, respectively~~ direct-vented and listed in accordance with ANSI Z21.50/CSA 2.22 and ANSI Z21.88/CSA 2.33, respectively.

***

804.1.6 Biomass appliances. Biomass fireplaces, stoves and inserts shall be *listed* in accordance with ASTM E1509. Biomass boilers and furnaces shall be *listed* in accordance with CSA B366.1-2009 or UL391.

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804.1.7 Masonry heaters. Masonry Heaters shall be *listed* in accordance ASTM E1602 and shall comply with Section 2112.1 of the *International Building Code*.

804.2 Reserved. Radon mitigation. *Buildings* in High Radon Potential (Zone 1) locations, as determined by Figure 804.2(1) and Table 804.2 shall comply with Sections 804.2.1 through 804.2.10.

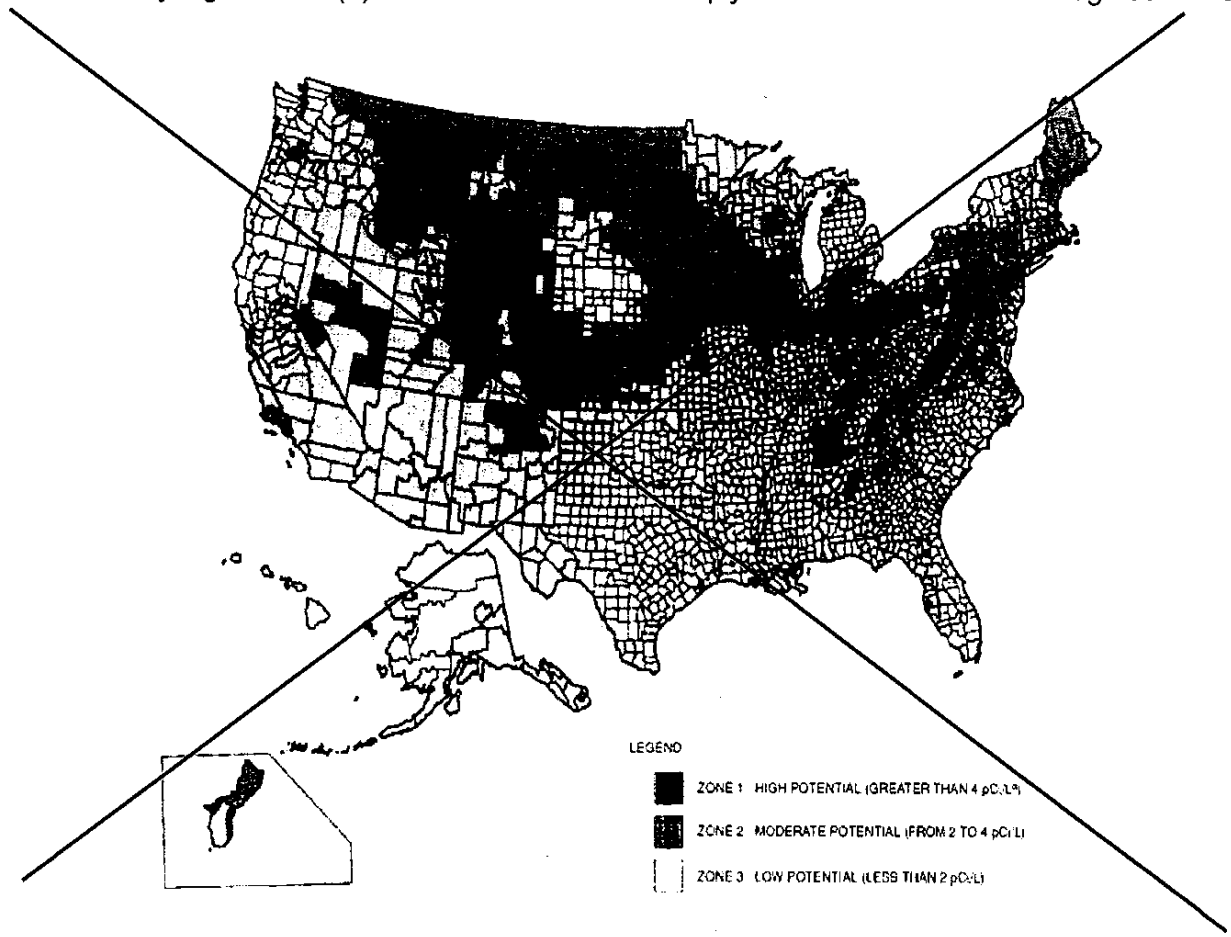

FIGURE 804.2
EPA MAP OF RADON ZONES

a. pCi/L standard for picocuries per liter of radon gas. EPA recommends that all homes that measure 4 pCi/L and greater be mitigated

The United States Environmental Protection Agency and the United States Geological Survey have evaluated the radon potential in the United States and have developed a map of radon zones designed to assist code officials in deciding whether radon-resistant features are applicable in new construction.

The map assigns each of the 3,141 counties in the United States to one of three zones based on radon potential. Each zone designation reflects the average short-term radon measurement that can be expected to be measured in a building without the implementation of radon control methods. The radon zone designation of highest priority is Zone 1. Table 804.2 lists the Zone 1 counties illustrated on the map. More detailed information can be obtained from state specific booklets (EPA 402-R-93-021 through 070) available through State Radon Offices or from U.S. EPA Regional Offices.

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TABLE 804.2—continued
HIGH RADON POTENTIAL (ZONE 1) COUNTIES[a]

ALABAMA
ALABAMA
ALABAMA
Calhoun
Clay
Cleburne
Colbert
Coosa
Franklin
Jackson
Lauderdale
Lawrence
Limestone
Madison
Morgan
Talladega
CALIFORNIA
Santa Barbara
Ventura
COLORADO
Adams
Arapahoe
Baca
Bent
Boulder
Chaffee
Cheyenne
Clear Creek
Crowley
Custer
Delta
Denver
Dolores
Douglas
El Paso
Elbert
Fremont
Garfield
Gilpin
Grand
Gunnison
Huerfano
Jackson
Jefferson
Kiowa
Kit Carson
Lake
Larimer
Las Animas
Lincoln
Logan
Mesa
Moffat
Montezuma
Montrose
Morgan
Otero
Ouray
Park
Phillips
Pitkin
Prowers
Pueblo
Rio Blanco
San Miguel
Summit
Teller
Washington
Weld
Yuma

CONNECTICUT
Fairfield
Middlesex
New Haven
New London

GEORGIA
Gebb
De Kalb
Fulton
Gwinnett

IDAHO
Benewah
Blaine
Boise
Bonner
Boundary
Butte
Camas
Clark
Clearwater
Custer
Elmore
Fremont
Gooding
Idaho
Kootenai
Latah
Lemhi
Shoshone
Valley

ILLINOIS
Adams
Boone
Brown
Bureau
Calhoun
Carroll
Cass
Champaign
Coles
De Kalb
De Witt
Douglas
Edgar
Ford
Fulton
Greene
Grundy
Hancock
Henderson
Henry
Iroquois
Jersey
Jo Daviess
Kane
Kendall
Knox
La Salle
Lee
Livingston
Logan
Macon
Marshall
Mason
McDonough
McLean
Menard
Mercer
Morgan
Moultrie
Ogle
Peoria
Piatt
Pike
Putnam
Rock Island
Sangamon
Schuyler
Scott
Stark
Stephenson
Tazewell
Vermilion
Warren
Whiteside
Winnebago
Woodford

INDIANA
Adams
Allen
Bartholomew
Benton
Blackford
Boone
Carroll
Cass
Clark
Clinton
De Kalb
Decatur
Delaware
Elkhart
Fayette
Fountain
Fulton
Grant
Hamilton
Hancock
Harrison
Hendricks
Henry
Howard
Huntington
Jay
Jennings
Johnson
Kosciuske
Lagrange
Lawrence
Madison
Marion
Marshall
Miami
Monroe
Montgomery
Noble
Orange
Putnam
Randolph
Rush
Scott
Shelby
Steuben
St. Joseph
Tippecanoe
Tipton
Union
Vermillion
Wabash
Warren
Washington
Wayne
Wells
White
Whitley

IOWA
All Counties

KANSAS
Atchison
Barton
Brown
Cheyenne
Clay
Cloud
Decatur
Dickinson
Douglas
Ellis
Ellsworth
Finney
Ford
Geary
Gove
Graham
Grant
Gray
Greeley
Hamilton
Haskell
Hodgeman
Jackson
Jewell
Johnson
Keary
Kingman
Kiowa
Lane
Leavenworth
Lincoln
Logan
Marion
Marshall
McPherson
Meade
Mitchell
Nemaha
Ness
Norton
Osborne
Ottawa
Pawnee
Phillips
Pottawatomie
Pratt
Rawlins
Republic
Rice
Riley
Rooks
Rush
Russell
Saline
Scott
Sheridan
Sherman
Smith
Stanton
Thomas
Trego
Wallace
Washington
Wichita
Wyandotte

KENTUCKY
Adair
Allen
Barren
Bourbon
Boyle
Bullitt
Casey
Clark
Cumberland
Fayette
Franklin
Green
Harrison
Hart
Jefferson
Jessamine
Lincoln
Marion
Mercer
Metcalfe
Monroe
Nelson
Pendleton
Pulaski
Robertson
Russell
Scott
Taylor
Warren
Woodford

MAINE
Androscoggin
Aroostook
Cumberland
Franklin
Hancock
Kennebec
Lincoln
Oxford
Penobscot
Piscataquis
Somerset
York

MARYLAND
Baltimore
Calvert
Carroll
Frederick
Harford
Howard
Montgomery
Washington

MASS.
Essex
Middlesex
Worcester

MICHIGAN
Branch
Calhoun
Cass
Hillsdale
Jackson
Kalamazoo
Lenawee
St. Joseph
Washtenaw

MINNESOTA
Becker
Big Stone
Blue Earth
Brown
Carver
Chippewa
Clay
Cottonwood
Dakota
Dodge
Douglas
Faribault
Fillmore
Freeborn
Goodhue
Grant
Hennepin
Houston
Hubbard
Jackson
Kanabec
Kandiyohi
Kittson
Lac Qui Parle
Le Sueur
Lincoln
Lyon
Mahnomen
Marshall
Martin
McLeod
Meeker
Mower
Murray
Nicollet
Nobles
Norman
Olmsted
Otter Tail
Pennington
Pipestone
Polk
Pope
Ramsey
Red Lake
Redwood
Renville
Rice
Rock
Roseau
Scott
Sherburne
Sibley
Stearns
Steele
Stevens
Swift
Todd
Traverse
Wabasha
Wadena
Waseca
Washington
Watonwan
Wilkin
Winona
Wright
Yellow Medicine

MISSOURI
Andrew
Atchison
Buchanan
Cass
Clay
Clinton
Holt
Iron
Jackson
Nodaway
Platte

MONTANA
Beaverhead
Big Horn
Blaine
Broadwater
Carbon
Carter
Cascade
Chouteau
Custer
Daniels
Dawson
Deer Lodge
Fallon
Fergus
Flathead
Gallatin
Garfield
Glacier
Granite
Hill
Jefferson
Judith Basin
Lake
Lewis and Clark
Liberty
Lincoln
Madison
McCone
Meagher
Mineral
Missoula
Park
Phillips
Pondera
Powder River
Powell
Prairie
Ravalli
Richland
Roosevelt
Rosebud
Sanders
Sheridan
Silver Bow
Stillwater
Teton
Toole
Valley
Wibaux

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Yellowstone
National Park

NEBRASKA
Adams
Boone
Boyd
Burt
Butler
Cass
Cedar
Clay
Colfax
Cuming
Dakota
Dixon
Dodge
Douglas
Fillmore
Franklin
Frontier
Furnas
Gage
Gosper
Greeley
Hamilton
Harlan
Hayes
Hitchcock
Hurston
Jefferson
Johnson
Kearney
Knox
Lancaster
Madison
Nance
Nemaha
Nuckolls
Otoe
Pawnee
Phelps
Pierce
Platte
Polk
Red Willow
Richardson
Saline
Sarpy
Saunders
Seward
Stanton
Thayer
Washington
Wayne
Webster
York

NEVADA
Carson City
Douglas
Eureka
Lander
Lincoln
Lyon
Mineral
Pershing
White Pine
NEW

HAMPSHIRE
Carroll

NEW JERSEY
Hunterdon
Mercer
Monmouth
Morris
Somerset
Sussex
Warren

NEW MEXICO
Bernalillo
Colfax
Mora
Rio Arriba
San Miguel
Santa Fe
Taos

NEW YORK
Albany
Allegany
Broome
Cattaraugus
Cayuga
Chautauqua
Chemung
Chenango
Columbia
Cortland
Delaware
Dutchess
Erie
Genesee
Greene
Livingston
Madison
Onondaga
Ontario
Orange
Otsego
Putnam
Rensselaer
Schoharie
Schuyler
Seneca
Steuben
Sullivan
Tioga
Tompkins
Ulster
Washington
Wyoming
Yates

N. CAROLINA
Alleghany
Buncombe
Cherokee
Henderson
Mitchell
Rockingham
Transylvania
Watauga

N. DAKOTA
All Counties

OHIO
Adams
Allen
Ashland
Auglaize
Belmont
Butler
Carroll
Champaign
Clark
Clinton
Columbiana
Coshocton
Crawford
Darke
Delaware
Fairfield
Fayette
Franklin
Greene
Guernsey
Hamilton
Hancock
Hardin
Harrison
Holmes
Huron
Jefferson
Knox
Licking
Logan
Madison
Marion
Mercer
Miami
Montgomery
Morrow
Muskingum
Perry
Pickaway
Pike
Preble
Richland
Ross
Seneca
Shelby
Stark
Summit
Tuscarawas
Union
Van Wert
Warren
Wayne
Wyandot

PENNSYLVANIA
Adams
Allegheny
Armstrong
Beaver
Bedford
Berks
Blair
Bradford
Bucks
Butler
Cameron
Carbon
Centre
Chester
Clarion
Clearfield
Clinton
Columbia
Cumberland
Dauphin
Delaware
Franklin
Fulton
Huntingdon
Indiana
Juniata
Lackawanna
Lancaster
Lebanon
Lehigh
Luzerne
Lycoming
Mifflin
Monroe
Montgomery
Montour
Northampton
Northumberland
Perry
Schuylkill
Snyder
Sullivan
Susquehanna
Tioga
Union
Venango
Westmoreland
Wyoming
York

RHODE ISLAND
Kent
Washington

S. CAROLINA
Greenville

S. DAKOTA
Aurora
Beadle
Bon Homme
Brookings
Brown
Brule
Buffalo
Campbell
Charles Mix
Clark
Clay
Codington
Corson
Davison
Day
Deuel
Douglas
Edmunds
Faulk
Grant
Hamlin
Hand
Hanson
Hughes
Hutchinson
Hyde
Jerauld
Kingsbury
Lake
Lincoln
Lyman
Marshall
McCook
McPherson
Miner
Minnehaha
Moody
Perkins
Potter
Roberts
Sanborn
Spink
Stanley
Sully
Turner
Union
Walworth
Yankton

TENNESEE
Anderson
Bedford
Blount
Bradley
Claiborne
Davidson
Giles
Grainger
Greene
Hamblen
Hancock
Hawkins
Hickman
Humphreys
Jackson
Jefferson
Knox
Lawrence
Lewis
Lincoln
Loudon
Marshall
Maury
McMinn
Meigs
Monroe
Moore
Perry
Roane
Rutherford
Smith
Sullivan
Trousdale
Union
Washington
Wayne
Williamson
Wilson

UTAH
Carbon
Duchesne
Grand
Piute
Sanpete
Sevier
Uintah

VIRGINIA
Alleghany
Amelia
Appomattox
Augusta
Bath
Bland
Botetourt
Bristol
Brunswick
Buckingham
Buena Vista
Campbell
Chesterfield
Clarke
Clifton Forge
Covington
Craig
Cumberland
Danville
Dinwiddie
Fairfax
Falls Church
Fluvanna
Frederick
Fredericksburg
Giles
Goochland
Harrisonburg
Henry
Highland
Lee
Lexington
Louisa
Martinsville
Montgomery
Nottoway
Orange
Page
Patrick
Pittsylvania
Powhatan
Pulaski
Radford
Roanoke
Rockbridge
Rockingham
Russell
Salem
Scott
Shenandoah
Smyth
Spotsylvania
Stafford
Staunton
Tazewell
Warren
Washington
Waynesboro
Winchester
Wythe

WASHINGTON
Clark
Ferry
Okanogan
Pend Oreille
Skamania
Spokane
Stevens

W. VIRGINIA
Berkeley
Brooke
Grant
Greenbrier
Hampshire
Hancock
Hardy
Jefferson
Marshall
Mercer
Mineral
Monongalia
Monroe
Morgan
Ohio
Pendleton
Pocahontas
Preston
Summers
Wetzel

WISCONSIN
Buffalo
Crawford
Dane
Dodge
Door
Fond du Lac
Grant
Green
Green Lake
Iowa
Jefferson
Lafayette
Langlade
Marathon
Menominee
Pepin
Pierce
Portage
Richland
Rock
Shawano
St. Croix
Vernon
Walworth
Washington
Waukesha
Waupaca
Wood

WYOMING
Albany
Big Horn
Campbell
Carbon
Converse
Crook
Fremont
Goshen
Hot Springs
Johnson
Laramie
Lincoln
Natrona
Niobrara
Park
Sheridan
Sublette
Sweetwater
Teton
Uinta
Washakie

a. EPA recommends that the county testing be supplemented with other available State and local data to further understand the radon potential of Zone 1 areas.

804.2.1 Subfloor preparation. A layer of gas-permeable material shall be placed under all concrete slabs and other floor systems that directly contact the ground and are within the walls of the occupied spaces of the building, to facilitate future installation of a sub-slab depressurization system, if needed. The gas-permeable layer shall consist of one of the following:

1. A uniform layer of clean aggregate, a minimum of 4 inches (102 mm) thick. The aggregate shall consist of material that will pass through a 2-inch (51 mm) sieve and be retained by a $^{4}/_{4}$-inch (6.4 mm) sieve.
2. A uniform layer of sand (native or fill), a minimum of 4 inches (102 mm) thick, overlain by a layer or strips of geotextile drainage matting designed to allow the lateral flow of soil gases.
3. Other materials, systems or floor designs with demonstrated capability to permit depressurization across the entire sub-floor area.

804.2.2 Soil-gas-retarder. A minimum 6-mil (0.15 mm) [or 3-mil (0.075 mm) cross-laminated] polyethylene or equivalent flexible sheeting material shall be placed on top of the gas-permeable layer prior to casting the slab or placing the floor assembly to serve as a soil-gas-retarder by bridging any cracks that develop in the slab or floor assembly and to prevent concrete from entering the void spaces in the aggregate base material. The sheeting shall cover the entire floor area with separate sections of sheeting lapped at least 12 inches (305 mm). The sheeting shall fit closely around any pipe, wire or other penetrations of the material. All punctures or tears in the material shall be sealed or covered with additional sheeting.

804.2.3 Entry routes. Potential radon entry routes shall be closed in accordance with Sections 804.2.3.1 through 804.2.3.10.

804.2.3.1 Floor openings. Openings around bathtubs, showers, water closets, pipes, wires or other objects that penetrate concrete slabs or other floor assemblies shall be filled with a polyurethane caulk or equivalent sealant applied in accordance with the manufacturer's recommendations.

804.2.3.2 Concrete joints. All control joints, isolation joints, construction joints and any other joints in concrete slabs or between slabs and foundation walls shall be sealed with a caulk or sealant. Gaps and joints shall be cleared of loose material and filled with polyurethane caulk or other elastomeric sealant applied in accordance with the manufacturer's recommendations.

804.2.3.3 Condensate drains. Condensate drains shall be trapped or routed through nonperforated pipe to daylight.

804.2.3.4 Sumps. Sump pits open to soil or serving as the termination point for sub-slab or exterior drain tile loops shall be covered with a gasketed or otherwise sealed lid. Sumps used as the suction point in a sub-slab depressurization system shall have a lid designed to accommodate the vent pipe. Sumps used as a floor drain shall have a lid equipped with a trapped inlet.

804.2.3.5 Foundation walls. Hollow block masonry foundation walls shall be constructed with either a continuous course of *solid masonry*, one course of masonry grouted solid, or a solid concrete beam at or above finished ground surface to prevent passage of air from the interior of the wall into the living space. Where a brick veneer or other masonry ledge is installed, the course immediately below that ledge shall be sealed. Joints, cracks or other openings around all penetrations of both exterior and interior surfaces of masonry block or wood foundation walls below the ground surface shall be filled with polyurethane caulk or equivalent sealant. Penetrations of concrete walls shall be filled.

804.2.3.6 Dampproofing. The exterior surfaces of portions of concrete and masonry block walls below the ground surface shall be dampproofed.

804.2.3.7 Air-handling units. Air-handling units in crawl spaces shall be sealed to prevent air from being drawn into the unit.

Exception: Units with gasketed seams or units that are otherwise sealed by the manufacturer to prevent leakage.

804.2.3.8 Ducts. Ductwork passing through or beneath a slab shall be of seamless material unless the air-handling system is designed to maintain continuous positive pressure within such ducting. Joints in such ductwork shall be sealed to prevent air leakage.

804.2.3.9 Crawl space floors. Openings around all penetrations through floors above crawl spaces shall be caulked or otherwise filled to prevent air leakage.

804.2.3.10 Crawl space access. Access doors and other openings or penetrations between *basements* and adjoining crawl spaces shall be closed, gasketed or otherwise filled to prevent air leakage.

804.2.4 Passive submembrane depressurization system. In buildings with crawl space foundations, the following components of a passive sub-membrane depressurization system shall be installed during construction.

Exception: Buildings in which an *approved* mechanical crawl space ventilation system or other equivalent system is installed.

804.2.4.1 Ventilation. Crawl spaces shall be provided with vents to the exterior of the building.

804.2.4.2 Soil-gas-retarder. The soil in crawl spaces shall be covered with a continuous layer of minimum 6-mil (0.15 mm) polyethylene soil-gas-retarder. The ground cover shall be lapped a minimum of 12 inches (305 mm) at joints and shall extend to all foundation walls enclosing the crawl space area.

804.2.4.3 Vent pipe. A plumbing tee or other *approved* connection shall be inserted horizontally beneath the sheeting and connected to a 3- or 4-inch diameter (76 mm or 102 mm) fitting with a vertical vent pipe installed through the sheeting. The vent pipe shall be extended up through the building floors, terminate at least 12 inches (305 mm) above the roof in a location at least 10 feet (3048 mm) away from any window or other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings.

804.2.5 Passive subslab depressurization system. In *basement* or slab-on-grade buildings, the following components of a passive sub-slab depressurization system shall be installed during construction.

804.2.5.1 Vent pipe. A minimum 3-inch diameter (76 mm) ABS, PVC or equivalent gas-tight pipe shall be embedded vertically into the sub-slab aggregate or other permeable material before the slab is cast. A "T" fitting or equivalent method shall be used to ensure that the pipe opening remains within the sub-slab permeable material. Alternatively, the 3-inch (76 mm) pipe shall be inserted directly into an interior perimeter drain tile loop or through a sealed sump cover where the sump is exposed to the sub-slab aggregate or connected to it through a drainage system.

The pipe shall be extended up through the building floors, terminate at least 12 inches (305 mm) above the surface of the roof in a location at least 10 feet (3048 mm) away from any window or

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~~other opening into the *conditioned spaces* of the building that is less than 2 feet (610 mm) below the exhaust point, and 10 feet (3048 mm) from any window or other opening in adjoining or adjacent buildings.~~

~~**804.2.5.2 Multiple vent pipes.** In buildings where interior footings or other barriers separate the sub-slab aggregate or other gas-permeable material, each area shall be fitted with an individual vent pipe. Vent pipes shall connect to a single vent that terminates above the roof or each individual vent pipe shall terminate separately above the roof.~~

~~**804.2.6 Vent pipe drainage.** All components of the radon vent pipe system shall be installed to provide positive drainage to the ground beneath the slab or soil gas retarder.~~

~~**804.2.7 Vent pipe accessibility.** Radon vent pipes shall be accessible for future fan installation through an *attic* or other area outside the *habitable space*.~~

~~**Exception:** The radon vent pipe need not be accessible in an *attic* space where an *approved* roof top electrical supply is provided for future use.~~

~~**804.2.8 Vent pipe identification.** All exposed and visible interior radon vent pipes shall be identified with at least one *label* on each floor and in accessible *attics*. The *label* shall read: "Radon Reduction System."~~

~~**804.2.9 Combination foundations.** Combination *basement*/crawl space or slab-on-grade/crawl space foundations shall have separate radon vent pipes installed in each type of foundation area. Each radon vent pipe shall terminate above the roof or shall be connected to a single vent that terminates above the roof.~~

~~**804.2.10 Power source.** To provide for future installation of an active sub-membrane or sub-slab depressurization system, an electrical circuit terminated in an *approved* box shall be installed during construction in the *attic* or other anticipated location of vent pipe fans. An electrical supply shall also be accessible in anticipated locations of system failure alarms.~~

804.3 Building flush out. After all interior finishes are installed, the *building* shall be flushed-out by supplying continuous *ventilation* with all air handling units at their maximum outdoor air rate for at least 14 days while maintaining an internal temperature of at least 60°F, and relative humidity not higher than 60 percent. Occupancy shall be permitted to start 7 days after start of the flush-out, provided that flush-out continues for the full 14 days. The *building* shall not be "baked out" by increasing the temperature of the space. Where continuous *ventilation* is not possible, the aggregate of flush-out periods shall be equivalent to 14 days of continuous *ventilation*.

Exceptions:

1. Group S, F, H and U occupancies shall not be required to comply with this section.
2. A building shall not be required to be flushed-out where it is tested for indoor air quality and the testing results indicate that the levels of VOC's are acceptable.

SECTION 805
ASBESTOS USE PREVENTION

805.1 Scope. The use of ~~and installation of~~ materials containing asbestos in *building* construction shall be prohibited. ~~prevented by *building* design and construction control measures in accordance with Section 805.1.1.~~

~~**805.1.1 Project specifications.** Project specifications shall prohibit the use of and installation of asbestos-containing products in the *building*. The *building* design team shall be familiar with products in the market place that are known to or might contain asbestos.~~

SECTION 806
MATERIAL EMISSIONS & POLLUTANT CONTROL

***

806.3 Architectural paints and coatings. A minimum of 85 percent by weight or volume, of site-applied interior architectural coatings shall comply with *VOC* content limits in Table 806.3(1) or the alternate emissions limits in Table 806.3(2). The exempt compound content shall be determined by ASTM D3960-~~05~~.

Table 806.3(2) architectural coating alternate emissions standards compliance shall be determined utilizing test methodology incorporated by reference in the ~~CA/DHS/EHLB/R-174 *Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers* dated July 15, 2004 including Addendum 2004-1~~ CDPH/EHLB/STANDARD METHOD V.1.1 "Standard Method For The Testing And Evaluation Of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers Version 1.1" dated February 2010. The alternative emissions testing shall be performed by a laboratory that has the ~~CA/DHS/EHLB/R-174~~ CDPH/EHLB/STANDARD METHOD V 1.1 test methodology in the scope of its ISO 17025 Accreditation.

806.4 Flooring A minimum of 85 percent of the total area of flooring installed within the interior of the *building* shall comply with the requirements of Table 806.4(2). Where flooring with more than one distinct product layer is installed, the emissions from each layer shall comply with these requirements. The test methodology used to determine compliance shall be from ~~CA/DHS/EHLB/R-174 *Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers* dated July 15, 2004 including Addendum 2004-1~~ CDPH/EHLB/STANDARD METHOD V.1.1 "*Standard Method For The Testing And Evaluation Of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers Version 1.1*" dated February 2010. The emissions testing shall be performed by a laboratory that has the ~~CA/DHS/EHLB/R-174~~ CDPH/EHLB/STANDARD METHOD V 1.1 test methodology in the scope of its ISO 17025 Accreditation.

Where post manufacture coatings or surface applications have not been applied, the flooring listed in Table 806.4(1) shall be deemed to comply with the requirements of Table 806.4(2).

806.5 Acoustical ceiling tiles and wall systems. A minimum of 85 percent of acoustical ceiling tiles and wall systems, by square feet, shall comply with the requirements of Table 806.5(2). Where ceiling and wall systems with more than one distinct product layer are installed, the emissions from each layer shall comply with these requirements. The test methodology used to determine compliance shall be from ~~CA/DHS/EHLB/R-174 *Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers* dated July 15, 2004 including Addendum 2004-1~~ CDPH/EHLB/STANDARD METHOD V.1.1 "*Standard Method For The Testing And Evaluation*

Of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers Version 1.1" dated February 2010. The emissions testing shall be performed by a laboratory that has the ~~CA/DHS/EHLB/R-174~~ CDPH/EHLB/STANDARD METHOD V 1.1 test methodology in the scope of its ISO 17025 Accreditation.

Where post manufacture coatings or surface applications have not been applied, the ceiling or wall systems listed in Table 806.5(1) shall be deemed to comply with the requirements of Table 806.5(2).

806.6 Insulation. A minimum of 85 percent of insulation shall comply with the requirements of Table 806.6. The test methodology used to determine compliance shall be from ~~CA/DHS/EHLB/R-174 *Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers* dated July 15, 2004 including Addendum 2004-1~~ CDPH/EHLB/STANDARD METHOD V.1.1 *"Standard Method For The Testing And Evaluation Of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers Version 1.1"* dated February 2010. The emissions testing shall be performed by a laboratory that has the ~~CA/DHS/EHLB/R-174~~ CDPH/EHLB/STANDARD METHOD V 1.1 test methodology in the scope of its ISO 17025 Accreditation.

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SECTION 807
SOUND TRANSMISSION

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807.2 Exterior sound transmission. Where Group A1, A3, E and I occupancy *buildings*, Group B occupancy *buildings* used for educational purposes, or Group R are constructed at the locations listed in Items 1 through 4, the wall and roof-ceiling assemblies making up the *building* envelope shall have a sound transmission class (STC) or outdoor-indoor transmission class (OITC) of not less than 50 and the windows within the *building* envelope walls shall have a sound transmission class (STC) or outdoor-indoor transmission class (OITC) of not less than 30. Where the sound transmission is field tested, the sound transmission shall be not less than 45 STC or OITC for wall and roof-ceiling assemblies and not less than 25 STC or OITC for windows. Transmission classes shall be determined in accordance with ASTM E90 for sound transmission class (STC) values or ASTM E1332 for outdoor-indoor transmission class (OITC) values.

1. Within 1000 feet (300 m) of a freeway, fire station, fuel dispensing facility, factory, industrial or manufacturing zone or facilities, commercial storage facility, or sports arena or stadium.
2. Within 500 feet (150 m) of a roadway containing 4 or more traffic lanes.
3. ~~Within 5 miles (8 km) of a commercial airport~~ Within the published DNL 65 dBA noise contour associated with a commercial airport, or where such information is lacking, within 5 miles (8 km) of a commercial airport.
4. Within 3,000 feet (900 m) of an active railway.

***

SECTION 808
DAYLIGHTING

***

808.3 Daylighting of building spaces. Not less than 50 percent of the total floor area in *regularly occupied spaces* shall be located within a *daylit area* that complies with either Section 808.3.1 or Section 808.3.2. *Buildings* required to have more than 25,000 square feet of *daylit area* shall comply with Section 808.3.2.

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Exception: Where *exterior walls* or roofs are ~~*fully obstructed or partially obstructed*~~, the required *daylit area* shall be modified in accordance with Equation 8-1.

required *daylit area* ≥ 50% x TDP **(Equation 8-1)**

The total daylight potential (TDP) is a weighted average of the individual daylight potentials for each floor:

$TDP = \sum(DP_1 \times TF_1/TF) + (DP_2 \times TF_2/TF) + \ldots$

~~$DP_1 = UW_1/TW_1 + [(1 - UW_1/TW_1) \times (UR_1/TR_1)]$~~

~~$UW_{1,2,...}$ = The *unobstructed exterior* wall area for each floor.~~

~~$TW_{1,2,...}$ = The exterior wall area for each floor.~~

~~$UR_{1,2,...}$ = The *unobstructed roof area* immediately above each floor.~~

$DP_1 = 1 - [(OW_1 / TW_1) / [(OR_1 / TR_1)]$

$OW_{1,2,...}$ = The length of *obstructed exterior wall* for each floor.

$TW_{1,2,...}$ = The total length of exterior wall area for each floor.

$OR_{1,2,...}$ = The *obstructed roof area* immediately above each floor.

$TR_{1,2,...}$ = The total roof area immediately above each floor.

$FA_{1,2,...}$ = The floor area of each floor.

TF = The total floor area of all floors.

***

SECTION 809
PROJECT ELECTIVES

***

809.2.4. Total VOC limit project elective. Where projects are intended to qualify for a "*total VOC* limit" *project elective* in accordance with Table 303.1 and Section 303.4, a minimum of 50 percent of all products addressed in Sections 806.2, 806.3, 806.4, 806.5 and 806.6 shall have a *Total Volatile Organic Compounds* (*TVOCs*) emission limit of ≤ 500 ug/m³. The test methodology used to determine compliance shall be from CDPH/EHLB/Standard Method V1.1 Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers Version 1.1 dated February 2010. ~~CA/DHS/EHLB/R-174 *Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers* dated July 15, 2004 including Addendum 2004-1.~~ The emissions testing shall be performed by a laboratory that has the CDPH/EHLB/Standard Method V1.1 ~~CA/DHS/EHLB/R-174~~ test methodology in the scope of its ISO 17025 Accreditation.

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809.3 Views to building exterior project elective. Where projects are intended to qualify for a "views to *building* exterior" *project elective* in accordance with Table 303.1 and Section 303.4, ~~a direct line of sight to vision glazing shall be provided for not less than 75 percent of the floor area in *regularly occupied spaces* that are within 40 feet of an *exterior wall* in the *building* envelope. The direct line of sight shall be measured at a height of 42 inches above the finished floor of the space~~ not less than 75 percent of the floor area in regularly occupied spaces shall have a direct line of sight to the exterior through clear vision glazing. A total of not less than 45 square feet of clear vision glazing in the exterior wall or roof shall be visible. The direct line of sight shall originate at a height of 42 inches above the finished floor of the space, shall terminate at the clear vision glazing in the exterior wall or roof, and shall be less than 40 feet in length.

Exception: Where the direct line of sight is less than 25 feet in length, a total of not less than 18 square feet of clear vision glazing in the exterior wall or roof shall be visible.

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CHAPTER 9
COMMISSIONING, OPERATION AND MAINTENANCE

***

SECTION 903
COMMISSIONING

903.1 General. Where application is made for construction as described in this section, the *registered design professional in responsible charge* or *approved agency* as identified by the *registered design professional in responsible charge,* shall perform *commissioning* during construction and after occupancy as required by Table 903.1. Where Table 903.1 specifies that *commissioning* is to be done on a periodic basis, the *registered design professional* in responsible charge shall provide a schedule of periodic *commissioning* with the submittal documents that shall be reviewed and *approved* by the *code official*. *Commissioning* shall meet the special inspection process requirements detailed in Section 1704 of the *International Building Code.*

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CHAPTER 10
EXISTING BUILDINGS

***

SECTION 1003
ALTERATIONS TO EXISTING BUILDINGS

***

1003.3.3 Heating, ventilation and air conditioning. Heating, *ventilation* and air conditioning systems and equipment shall be in accordance with the following:

***

4. Furnace combustion units shall have been cleaned and tuned within one year prior to the ~~*change of occupancy*~~ *alteration*. Filters shall be replaced in accordance with the furnace manufacturer's recommendations. Where central heat is intended to be replaced with individual electric space heaters, the application for the electrical *permit* shall include documentation demonstrating that the new electric heaters will not consume more energy than the existing nonelectric heater(s).

5. Boiler systems shall have been cleaned and tuned within one year prior to the ~~*change of occupancy*~~ *alteration*.

***

7. Chiller systems shall have been cleaned and tuned within one year prior to the ~~*change of occupancy*~~ *alteration*.

***

1003.3.4 Service water systems. Service water systems and equipment shall be in accordance with the following:

1. Water heater and hot water *storage tanks* shall have a combined minimum total of external and internal insulation of ~~R-6~~ R-16.

***

1003.3.8 Swimming pools and spas. Swimming pools and spas and their equipment shall be in accordance with the following:

***

2. Heaters shall be cleaned and tuned for efficiency within one year prior to the ~~*change of occupancy*~~ *alteration*.

***

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SECTION 1006
RELOCATED STRUCTURES
RESERVED

~~**1006.1 Conformance.** *Structures* relocated into or within the *jurisdiction*, other than *historic buildings*, shall comply with the provisions of Section 1003.2.~~

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Amendments to the National Green Building Standard – ICC 700

***

601.1 Conditioned floor area. Conditioned floor area, as defined by ICC IRC ~~and calculated in accordance with NAHBRC Z765,~~ is limited. ~~Dwelling unit size is to be calculated in accordance with NAHBRC Z765.~~ Only the conditioned floor area for stories above grade plane is to be included in the calculation.		
	***	
(5)	Greater than 4,000 square feet (372 m2)	
	(For every ~~100~~ 500 square feet (9.29 m2) over 4,000 square feet (372 m2), one point is to be added in Table 303, Category 7 for each performance level.	**Mandatory**

***

~~602.3.1 Where required by the ICC IRC or IBC for habitable and usable spaces below grade, exterior drain tile is installed.~~	~~Mandatory~~

***

602.6 Finished Grade. All lot drainage shall comply with the requirements of Chapter 32A of the Phoenix City Code. ~~Finish grade at all sides of a building is sloped to provide a minimum of 6 inches of fall within 10 feet of the edge of the building. Where lotlines, wlls, slopes, or other physical barriers prohibit 6 inches of fal within 10 feet, the final grade is sloped away from the edge of the building at a minimum slope of 5 percent and the water is directed to drains or swales to ensure drainage away from the structure.~~

***

~~**602.9. Water-resistive barrier.** Where required by the ICC IRC or IBC, a water-resistive barrier and/or drainage plane system is installed behind exterior veneer and/or siding.~~	~~Mandatory~~

***

~~**602.10 Ice barrier.** In areas where there has been a history of ice forming along the eaves causing a backup of water, an ice barrier is installed in accordance with the ICC IRC or IBC at roof eaves and extends at a minimum of 24 inches (610 mm) inside the exterior wall line of the building.~~

***

704.3.1.1(8) Reserved ~~The south face of windows have a SHGC of 0.40 or higher.~~

***

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EXHIBIT B

802.2 ~~Composting or w~~Waterless ~~toilets and/or~~ urinals. ~~Composting or w~~Waterless ~~toilets or~~ urinals are in accordance with the following:
~~(For water closets, points awarded for either Section 802.2 or 801.6, not both)~~

(1) Gold and Emerald levels: All ~~water closets and~~ urinals are in accordance with either Section 802.2 or Section 801.6.

(2) ~~Composting or w~~Waterless ~~toilet and/or~~ urinal is installed.

(3) All ~~toilets and~~ urinals are in accordance with Section 802.2(2).

***

901.2.1

(2) (a) Reserved. ~~Wood-burning fireplaces are equipped with gasketed doors designed to operate with the doors closed, outside combustion air, and a means is provided for sealing the flue to minimize interior air (heat) loss when not in operation.~~

***

1003.1 (2) A local green building program certificate ~~as well as a copy of the National Green Building Standard™, as adopted by the Adopting Entity,~~ and the individual measures achieved by the building.

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ORDINANCE NO. 3946

AN ORDINANCE OF THE COUNCIL OF THE CITY OF SCOTTSDALE, MARICOPA COUNTY, ARIZONA, ADDING A NEW CHAPTER 31, ARTICLE V TO THE SCOTTSDALE REVISED CODE RELATING TO THE BUILDING CODE ADOPTING THE "INTERNATIONAL GREEN CONSTRUCTION CODE, PUBLIC VERSION 2.0", INCLUDING APPENDICES, AND ADOPTING "THE CITY OF SCOTTSDALE AMENDMENTS TO THE INTERNATIONAL GREEN CONSTRUCTION CODE, PUBLIC VERSION 2.0."

NOW, THEREFORE, BE IT ORDAINED by the City Council of the City of Scottsdale, Arizona, as follows:

Section 1. New Section 31-131 of the Scottsdale Revised Code shall be known as the "Green Building Code" and read as follows:

Sec. 31-131. Adoption.

The following documents are adopted by reference and shall be the Green Building Code of the city.

(1) The International Green Construction Code, Public Version 2.0, as published by the International Code Council, Inc., is hereby declared a public record by Resolution No. 8701 of the City of Scottsdale, and hereby referred to, adopted and made a part hereof as if fully set out in this ordinance. Three (3) copies of the same shall at all times remain in the Office of the City Clerk and be open to inspection.

(2) Section 31-132 of the Scottsdale Revised Code, which shall read as specified in that certain document entitled "The City of Scottsdale Amendments to the International Green Construction Code, Public Version 2.0," declared to be a public record by Resolution No. 8701 of the City of Scottsdale, is hereby referred to, adopted and made a part hereof as if fully set out in this Ordinance. Three (3) copies of the same shall at all times remain in the Office of the City Clerk and be open to inspection.

Section 2. Any person found guilty of violating this Ordinance shall, in addition to any other applicable penalty, is subject to the following:

105.6 Suspension or revocation. The building official is authorized to suspend or revoke a permit issued under the provisions of this code wherever the permit is issued in error or on the basis of incorrect, inaccurate or incomplete information, or in violation of any ordinance or regulation or any of the provisions of this code.

110.4 Revocation. The building official is authorized to, in writing, suspend or revoke a certificate of occupancy or completion issued under the provisions of this code wherever the certificate is issued in error, or on the basis of incorrect information supplied, or where it is determined that the building or structure or portion thereof is in violation of any ordinance or regulation or any of the provisions of this code.

113.4 Violation penalties. Any person who violates a provision of this code or fails to comply with any of the requirements thereof or who erects, constructs, alters or repairs a building or structure in violation of the approved construction documents or directive of the building official, or of a permit or certificate issued under the provisions of this code, shall be subject to penalties as prescribed by law.

Section 3. The repeal of any provision of the Scottsdale Revised Code effectuated by this Ordinance does not affect the rights and duties that matured or penalties that were incurred and proceedings that were begun before the effective date of this Ordinance.

Section 4. If any section, subsection, sentence, clause, phrase or portion of this ordinance or any part of these amendments to the International Green Construction Code adopted herein by reference is for any reason held to be invalid or unconstitutional by the decision of any court of competent jurisdictions, such decision shall not affect the validity of thee remaining portions thereof. If there is any conflict or inconsistency between the provisions of this ordinance, the more restrictive provisions apply.

Section 5. The effective date of this ordinance shall be thirty (30) days after its adoption.

PASSED AND ADOPTED BY THE Council of the City of Scottsdale, Maricopa County, Arizona this 5th day of July, 2011.

ATTEST:

Carolyn Jagger
City Clerk

CITY OF SCOTTSDALE
An Arizona municipal corporation

W. J. "Jim" Lane
Mayor

APPROVED AS TO FORM:
OFFICE OF THE CITY ATTORNEY

Bruce Washburn, City Attorney
By: Joe Padilla, Sr. Assistant City Attorney