

Chicago Green Homes Program Guide



Version 2.0
April 2009

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An Introduction to the **Chicago Green Homes Program**

Version 2.0

April, 2009

INTRODUCTION

The residential construction industry uses vast quantities of this nation's resources. Through practicing greater environmental sensibility, we can positively, and with lasting and meaningful impact, construct buildings that use fewer resources to build and operate, have a reduced impact on the environment and influence the direction of developing technologies and materials.

The purpose of the *Chicago Green Homes Program* is to encourage residential builders, developers and homeowners to use technologies, products and practices that will:

- Provide greater energy efficiency
- Provide healthier indoor air,
- Reduce water usage,
- Preserve natural resources, and
- Improve durability and reduce maintenance.
- Reduce waste and pollution

INCENTIVES

THE ENVIRONMENT

The intent of these guidelines is to provide a framework to reduce the environmental impact of single-family homes and multi-family buildings by those who develop and live in these buildings.

OWNERS/OCCUPANTS

There are also benefits for homeowners and occupants who own and live in a green residence. Primary benefits that owners/occupants of green residences realize compared to owners/occupants of conventional residences include:

- Improved energy efficiency meaning comfort and savings for the owner/occupant less pollution for the earth
- Healthier indoor air means comfort, health, and peace of mind for the occupants
- Reduced water usage means savings for the owner/occupant, less strain on rivers and lakes
- Preserving natural resources means leaving more for future generations to enjoy
- Durable, reduced maintenance materials mean a longer life for the residence, savings and more leisure time for the owner/occupant

The process of green building does not end when construction is complete. In fact, the long-term performance of the building is dependent on owners and occupants; which is why it is critical that they be educated to operate and maintain the residence properly.

DEVELOPERS & BUILDERS

The health of the environment is a common concern in our society. The *Chicago Green Homes Checklist* and this Guide provide the tools to build homes and multi-family buildings that speak to this concern, giving buyers and renters a choice in the marketplace, and builders and developers a way to distinguish their product.

The Chicago Department of Buildings (DOB) has developed an expedited permit process for projects that incorporate comprehensive green building strategies. For more information and eligibility requirements visit the City of Chicago's website:

www.cityofchicago.org/buildings

Look for *Green Permit Program* under *Permit Programs*.

PROGRAM OVERVIEW

The *Chicago Green Homes Program* applies to residential projects in four categories: Single-Family Home New Construction (including town homes), Single-Family Home Major Renovation (including town homes), Multi-Family Building New Construction (less than 80 feet in height) and Multi-Family Building Major Renovation (less than 80 feet in height).

Chicago Green Homes Program Certification is for whole buildings only. Partial buildings or additions alone do not qualify for certification. Major renovations of existing single-family homes and existing multi-unit buildings that include additions are permitted. If the area of the addition is less than or equal to 25% of the project's gross square footage, the project must use the renovation checklist. If the area of the addition is greater 25% of the project's gross square footage, the project must use the new construction checklist.

The *Chicago Green Homes Checklist* and the Guide are organized by the following categories:

- 100 Sustainable Sites
- 200 Energy Efficiency
- 300 Materials
- 400 Health and Safety
- 500 Resource Conservation
- 600 Homeowner Education
- 700 Innovation

It is important to note that green building products and systems should be integrated into the design of the project at the beginning of the process. It is much more difficult to incorporate these items as an "after thought" once building design has already started.

It is also helpful to view the building holistically. Many of the products and systems represented here impact other building systems. It is only by analyzing the entire building that a sensible and efficient design can be achieved.

Point System

There are three different green building levels available to applicants to rate their projects: CGH ★ , CGH ★★ and CGH ★★★.

The points for each line item to be used are added to determine point values for a project.

Though participation in the program is largely voluntary, participation may be required for projects reviewed by various City agencies including the Department of Community Development, the Department of Zoning and Land Use Planning, and the Chicago Housing Authority (CHA). Required point levels will be determined by the individual departments.

Points Required for the Three Different Levels of Green Building

| CGH | ★ | ★★ | ★★★ |
|--------------------------------|-----|-----|-----|
| Single-Family New Construction | 200 | 300 | 350 |
| Single-Family Renovation | 200 | 250 | 300 |
| Multi-Family New Construction | 200 | 300 | 350 |
| Multi-Family Renovation | 200 | 250 | 300 |

PART ONE – CHICAGO GREEN HOMES CHECKLIST

The *Chicago Green Homes* Checklist is the scorecard which outlines all of the available line items for each category. Four versions of the Checklist are available based on the project and construction types:

- Single-Family New Construction
- Single-Family Renovation
- Multi-Family New Construction
- Multi-Family Renovation

The Checklist is the list of green building features from which designers, developers and builders choose their building options (note that not all options are available for each of the project/construction types). Each entry includes a reference number, the line item title (feature title), the point value being pursued and comments or other information provided by the applicant to verify that the line item (feature) was implemented.

Currently, the *Chicago Green Homes* Checklist is the basis for program certification by the City of Chicago. Projects submitted may be subject to audit by the Chicago Green Homes Program.

PART TWO – CHICAGO GREEN HOMES GUIDE

Though the Guide is not intended to be a training manual, it is recognized that many checklist line items will need further explanation. The Guide further explains each concept, referenced by number for each line item, and contains an entry with the following subheadings:

| | |
|--------------------------------|--|
| Feature: | Line item title. |
| Point Value: | The number of points available for each item. |
| Description: | Explains the intent of the item and may include information regarding the resultant environmental impact. Photos are often included to help facilitate the line item’s implementation. |
| Verification: | Required documentation for each line item, such as drawings, specifications, name of the responsible party, test reports, certificates, calculations and manuals. If a specification is not written for a project, notes on the drawings may be substituted. |
| Additional Information: | Books, websites, articles and technical guides are referenced to provide additional information related to the line item. Great care was taken to make sure that URLs were correct at the time of publication, however, these will very likely change over time. |

CERTIFICATION PROCESS

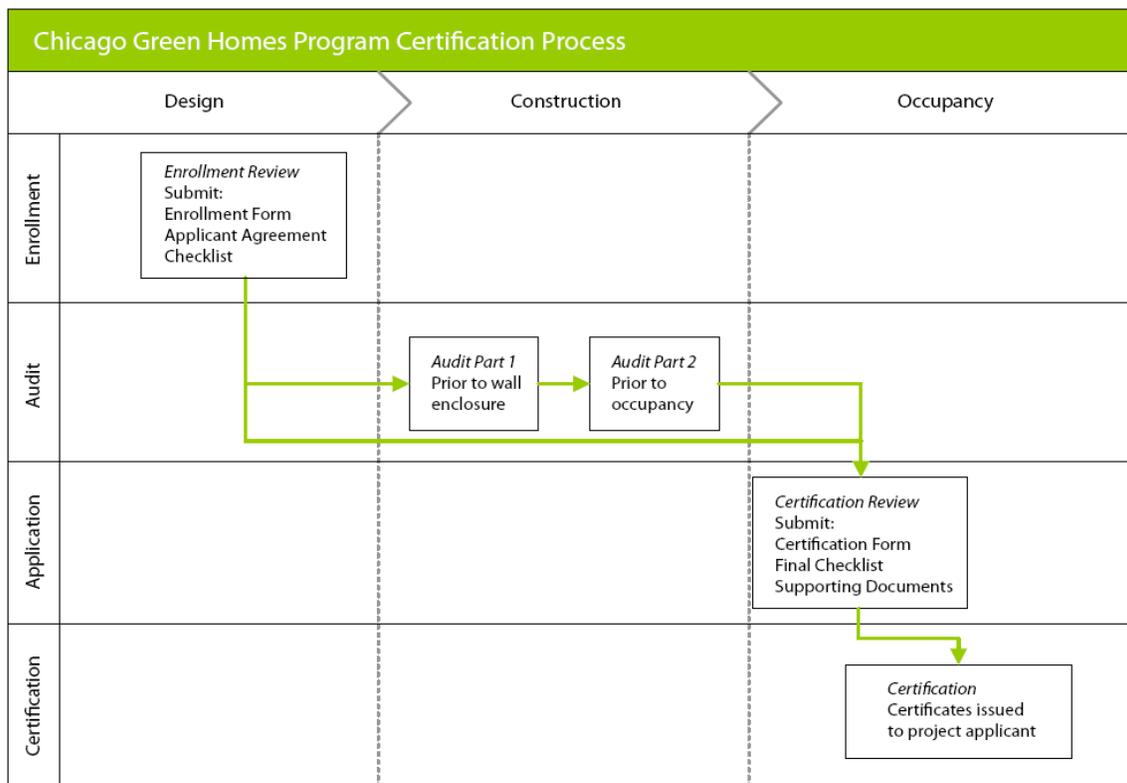
At the time of Enrollment into the *Chicago Green Homes* Program, applicants must complete and submit the following forms:

- Applicant Agreement
- Checklist (with verification items documented)
- Enrollment Form

It is assumed that, in many cases, the Checklist provided when the project enrolls in the program will change as the project moves from design to construction.

The Chicago Green Homes Program will select projects to undergo a two-part construction audit. This two-part audit includes a “prior to wall enclosure” and a “prior to occupancy” field verification at the project site. Applicants will be notified once enrollment for the project has been completed if their project has been selected for the two-part audit.

Additionally, the applicant should keep the Checklist and additional verification documentation on file for a period of two years after receipt of certification, for possible post-certification audit by the City of Chicago. Invoices should be collected during the construction process and saved along with other verification materials. In the event of a post-certification audit, this material may be required as additional documentation for points that are under review.



At the end of construction, applicants must complete and submit the Certification Form, a final version of the Checklist (reflecting any changes made during the design and construction process following enrollment), and supporting documentation (including drawings, specifications, test reports, certificates, calculations and manuals as necessary) for the project’s application for Certification. This information will be reviewed by the *Chicago Green Homes* Program and applicants will be given an opportunity to clarify any items questioned in the review. The applicant can expect to receive a response from the review team within two weeks of the submission date.

A *Chicago Green Homes* Certificate will be issued by the City of Chicago based on the appropriate point level achieved. This certificate, along with a copy of the submitted checklist, is to be passed on to the homeowner/occupant upon completion of the project.

For more information contact:

Chicago Center for Green Technology: 312-746-9642
www.cityofchicago.org/environment/GreenTech

You may also email your questions to:
ChicagoGreenHomes@cityofchicago.org

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- **Built Green® Colorado** (www.builtgreen.org) for the use of their Checklist and Guide book that formed the basis of the *Chicago Green Homes Program*.
- **Leadership in Energy and Environmental Design (LEED)**; US Green Building Council (www.usgbc.org) for use of their Checklist and Guide, primarily those items related to good site design.

In addition, The City of Chicago acknowledges the *Chicago Green Homes Program* committee that provided direction and insight to the development of both the Checklist and Guide.

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DISCLAIMER

The Chicago Green Homes Program is an evolving program and applicants are encouraged to provide feedback on how to improve the program. Applicants should be aware that the Program and its requirements are being evaluated regularly to ensure the greatest level of impact as the City of Chicago works to green the residential building market.

This publication is intended as a guide for designers, builders, owners and others involved in or interested in green building products and practices for residential design, development and construction. These guidelines represent the current thinking and approaches to green building, based on the experience and research of experts in the field. Due to the nature of this developing industry, it is not possible to be exhaustive and it is intended only to be a guide.

Nothing in this publication should be construed as an endorsement, warranty (express or implied) or guarantee by the City of Chicago, or any persons or organizations involved in the creation of this publication, of anything contained herein.

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100 Sustainable Sites

100 Erosion & Sedimentation Control

100.R1

FEATURE: Design site for erosion and sedimentation control

POINT VALUE: Required

DESCRIPTION: In order to satisfy this requirement, an erosion and sedimentation control plan for the project site during construction (and demolition when applicable) must be developed. The goal of this plan is to meet the following objectives:

- Prevent loss of soil during construction via stormwater runoff and/or wind erosion, including the protection of topsoil stockpiled for reuse.
- Prevent sedimentation of storm sewer or receiving streams.
- Prevent polluting the air with dust and particulate matter.



To achieve these objectives, the plan must conform to the United States Environmental Protection Agency (EPA) Document No. EPA 832/R-92-005 (September 1992), "Stormwater Management for Construction Activities", Chapter 3. Multiple strategies that may be used to meet the objectives of this requirement (including temporary and permanent seeding, mulching, earth dikes, silt fencing, sediment traps, sediment basins, preservation of natural vegetation, and geotextiles) are fully detailed in the referenced EPA standard.

VERIFICATION: **Enrollment Review:** Provide plan note(s), details, specifications, and/or an erosion and sedimentation control plan that conforms to the referenced EPA standard to ensure that the project will execute erosion and sedimentation control strategies during all construction (and demolition when applicable) activities.

Certification Review: None.

ADDITIONAL INFO: Erosion is a natural process in which soil and rock material is loosened and removed. Human activities can accelerate erosion by removing vegetation, compacting or disturbing the soil, changing natural drainage patterns, and by covering the ground with impermeable surfaces. These activities, commonly associated with construction sites, result in larger quantities of water moving more quickly across a site, which can carry more sediment and other pollutants to rivers, streams and storm sewer systems. Sedimentation decreases water quality and accelerates the aging process of lakes, rivers and streams. An erosion and sedimentation control plan for the project site during construction can help to mitigate some of these effects.

"Storm Water Management for Construction Activities", Chapter 3 (USEPA Document No. EPA 832R92005), U.S. Environmental Protection Agency Office of Water: www.epa.gov/OW

Internet download link for Chapter 3 (72 pages):
www.epa.gov/npdes/pubs/chap03_conguide.pdf

Download site for all sections of referenced EPA document:
nepis.epa.gov/EPA/html/Pubs/pubtitleOW.htm

110 Site Selection

110.1

FEATURE: Rehabilitate an existing building

POINT VALUE: 20 points possible

15 for reuse of 75% structure and shell

OR

20 for reuse of 75% structure and shell AND 75% of exterior finish

DESCRIPTION: To receive these points, the project must rehabilitate an existing building by reusing at least 75% of the structure and shell (exterior framing, excluding window assemblies and non-structural roofing material). Retained percentage must be calculated based on exterior surface area.

Fifteen points are given if a minimum of 75% of the existing building structure and shell are maintained. An additional 5 points may be taken if at least 75% of the exterior finish is also maintained.

As an example, a load-bearing masonry building that is being rehabbed and is retaining at least 75% of the masonry would receive 20 points. A wood frame structure that is being rehabbed would receive 20 points if a minimum of 75% of the existing building structure and shell are being retained and more than 75% of the exterior finish is also being retained. If the existing exterior finish is being replaced (or less than 75% of the exterior finish is being retained), the wood frame structure will receive 15 points. If the exterior finish is being replaced with an environmentally preferable exterior finish as identified in feature 350.1, points may be taken for the appropriate credit item in feature 350.1 as well.

VERIFICATION: **Enrollment Review:** Provide plan note, calculation, and/or drawings that clearly indicate that the project will reuse 75% of the structure, shell, and exterior finish (when applicable).

Certification Review: None.

110.2

FEATURE: Develop/Redevelop an infill site within an Empowerment Zone or TIF District

POINT VALUE: 5

DESCRIPTION: To receive these points, the project site must be located in an Empowerment Zone or TIF district.

VERIFICATION: **Enrollment Review:** Provide an area plan indicating the boundaries of the Empowerment Zone or TIF district with the project site highlighted.

Certification Review: None

ADDITIONAL INFO: Chicago Department of Zoning, Interactive Zoning Map:
maps.cityofchicago.org/website/zoning/viewframe.htm

110.3

FEATURE: **Redevelop a Brownfield Site**

This feature is only applicable to single-family or multi-family new construction projects.

POINT VALUE: 12

DESCRIPTION: To receive these points, the project must develop on a site documented as contaminated (by means of an ASTM E1903-97 Phase II Environmental Site Assessment) or classified as a Brownfield by a local, state or federal government agency. Site contamination must be remediated as part of the redevelopment.

VERIFICATION: **Enrollment Review:** Provide a copy of the pertinent sections of the ASTM E1903-97 Phase II Environmental Site Assessment documenting the site contamination or provide a letter from a local, state or federal regulatory agency confirming that the site is classified as a Brownfield by that agency. A Phase I study may also be provided. In addition, provide a declaration of the damage that exists (or existed) on the site and describe the method of remediation that will be implemented.

Certification Review: None.

ADDITIONAL INFO: Tax incentives and property cost savings may be available by selecting a Brownfield site. Site remediation plans typically include cleanup strategies such as pump-and-treat, bioreactors, land farming, and/or methods of in-situ remediation. See *ASTM E1903-97 Phase II Environmental Site Assessment*

ASTM International: www.astm.org

EPA Sustainable Redevelopment of Brownfields Program: www.epa.gov/brownfields

Chicago Brownfields Initiative:
egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/Brownfields_Report_Final_Low_Rez.pdf

110.4

FEATURE: **Develop a site within ¼ mile of community-based open space**

POINT VALUE: 5

DESCRIPTION: To receive these points, the project site must be located within ¼ mile of a publicly-accessible or community-based open space that is at least ¼ acre in size. The open space requirement can be met by either a ¼ acre or greater open space or two smaller open spaces totaling ¼ acre or greater.

The open space(s) must consist predominately of softscapes such as soil, grass, shrubs, and trees AND must be specifically intended for recreational use.

VERIFICATION: **Enrollment Review:** Provide an area plan in the drawings highlighting the project site and the community-based open space. Indicate distances between the project site and the open space.

Certification Review: None.

ADDITIONAL INFO: Chicago Park District: www.chicagoparkdistrict.com

Chicago's Greening Network: www.greenetchicago.org

National Recreation and Park Association: www.nrpa.org

120 Alternate Transportation

120.1

FEATURE: Develop a site that is within ½ mile of public transportation

POINT VALUE: 7

DESCRIPTION: To receive these points, the project site must be located within ½ mile of a commuter rail or subway station, or two or more public bus line stops.



VERIFICATION: **Enrollment Review:** Provide an area plan or transit map in the drawings highlighting the project site and the rail/subway stations and/or bus line stops. Indicate distances between the project site and the stations and/or bus line stops.

Certification Review: None

ADDITIONAL INFO: Metra: metrarail.com/

Chicago Transit Authority: transitchicago.com/

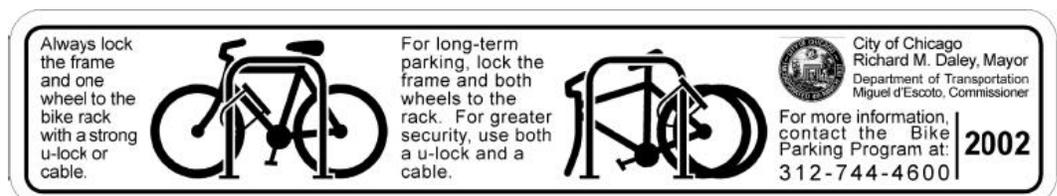
Regional Transit Authority: www.rtachicago.com/

120.2

FEATURE: Provide bicycle-securing areas exceeding that required by zoning
This feature is only applicable to multi-family new construction and renovation projects.

POINT VALUE: 7

DESCRIPTION: To receive these points, the project must provide covered, secured bicycle racks or indoor storage facilities in common areas that can accommodate two bicycles for every unit up to eight in the building, and one bicycle for every additional unit over eight. Secure areas are lockable, gated, walled, or otherwise physically and visually isolated areas.



VERIFICATION: **Enrollment Review:** Provide plan note or drawings that clearly indicate the location and number of bicycle storage spaces for securing bicycles.

Certification Review: None.

120.3

FEATURE: **Provide accommodations for alternative fuel vehicles**
This feature is only applicable to multi-family new construction and renovation projects.

POINT VALUE: 2

DESCRIPTION: To receive these points, the project must provide preferred parking for alternative fuel vehicles for **10%** of the total vehicle parking capacity, including but not limited to, plug-in hybrid, electric, fuel cell, and natural gas powered vehicles **OR** the project must provide alternative fuel refueling stations for **10%** of the total vehicle parking capacity, including but not limited to recharge facilities for electric and plug-in hybrid vehicles and liquid or gaseous fueling facilities.

For preferred parking accommodations, parking spots that are available for purchase by occupants cannot be included in the calculations for these points.

For alternative fuel refueling stations, it is suggested that parking spaces assigned to a unit that include electric vehicle (or plug-in hybrid) plug-in facilities be metered to the tenant of the unit.

VERIFICATION: **Enrollment Review:** Provide specifications and a site plan highlighting the preferred parking for alternative fuel vehicles and/or alternative-fuel refueling stations. Provide calculations demonstrating that these facilities accommodate 10% or more of the total vehicle parking capacity.

Certification Review: None.

ADDITIONAL INFO: Alternative fuel vehicle is defined by the Energy Policy Act (EPAAct) as any dedicated, flexible fuel, or dual-fuel vehicle designed to operate on at least one alternative fuel. Alternative fuels include:

- Compressed natural gas (CNG)
 - Ethanol
 - Biodiesel (b20 blend or higher)
 - Propane
 - Methanol
 - Hydrogen
 - Electricity (including solar energy)
-

120.4

FEATURE: **Provide preferred parking for carpooling or a car sharing program**
This feature is only applicable to multi-family new construction and renovation projects.

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must size parking capacity to meet, but not exceed, minimum local zoning requirements **AND** provide preferred parking for carpools for 10% of the on-site vehicle parking provided for commercial use (only applicable to projects that include commercial space) **OR** provide a car sharing program membership for eligible building occupants;

OR

Add no new parking for rehabilitation projects AND provide preferred parking for carpools for 10% of the on-site vehicle parking provided for commercial use (only applicable to projects that include commercial space)

OR

For projects with no onsite parking, provide a car sharing membership for all eligible building occupants. Car sharing vehicle(s) may be located on or off site, however, vehicles located off site must be located within a 1/2 mile walking distance of the project site.

VERIFICATION:

Enrollment Review: Provide parking requirements as outlined in zoning and a site plan indicating the number of parking spaces provided (or indicating that no new parking capacity will be added for rehabilitation projects, unless required by zoning) AND highlighting preferred carpool spaces for 10% of the on-site vehicle parking provided for commercial use (only applicable to projects that include commercial space) OR provide proof of enrollment in a car sharing program.

Certification Review: None.

ADDITIONAL INFO:

“IllinoisCarpool.org” – Lieutenant Governor of Illinois carpooling site: www.illinoiscarpool.org

“Carsharing.net” – a non-profit educational and promotional site for car sharing: www.carsharing.net/

“I-GO Car Sharing” – a Chicago-based non-profit committed to economical and environmentally sound transportation choices: www.igocars.org/

“Zip Car” – the World’s largest car sharing company: zipcar.com

130 Reduced Site Disturbance

130.1

FEATURE: Protect/Restore habitat areas within the site (25% minimum of site area)

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must protect or restore a minimum of 25% of the site area by either maintaining existing habitat-providing native vegetation

OR

replacing impervious surfaces and non-native vegetation with habitat-providing native vegetation (see feature 542.5).



Green roof area may be included in restored habitat area calculations if the green roof plantings (see feature 152.2) meet the definition of native vegetation.

It is recommended that an assessment of site use, soil characteristics, drainage patterns, microclimate, and existing flora and fauna be undertaken to facilitate a more holistic and sustainable landscape planting design. Multiple species of native vegetation are encouraged to promote biodiversity.

VERIFICATION:

Enrollment Review: Provide a site plan or landscape plan highlighting the areas to be protected or restored and describing the protection or restoration measures (including a list of plant species). Include area calculations demonstrating that 25% or more of the site area (excluding the building footprint) is being protected or restored through the maintenance or addition of habitat-providing native vegetation.

Certification Review: None.

ADDITIONAL INFO:

The US Environmental Protection Agency’s “Landscaping with Native Plants Fact Sheet” for the Midwest Region: www.epa.gov/greenacres/nativeplants/factsht.html

North American Native Plant Society: www.nanps.org

Plant Native – an organization dedicated to making the use native plants and nature-scaping mainstream: www.plantnative.org

Chicago Nature and Wildlife Plan: search egov.cityofchicago.org/

National Wildlife Federation’s “Backyard Wildlife Habitat Program”: www.nwf.org/backyard/

The City of Chicago’s “A Guide to Stormwater Best Management Practices”: egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/GuideToStormwaterBMPs.pdf

130.2

FEATURE:

Conserve on-site vegetated open space

POINT VALUE:

5

DESCRIPTION:

To receive these points, the project must provide vegetated open space (in addition to required setbacks) that exceeds the local zoning’s open space requirement for the site by 50%. If no open space requirement exists, designate 25% of total site area (property area) as vegetated open space.

Green roof area may be included in vegetated open space calculations (see feature 152.2).

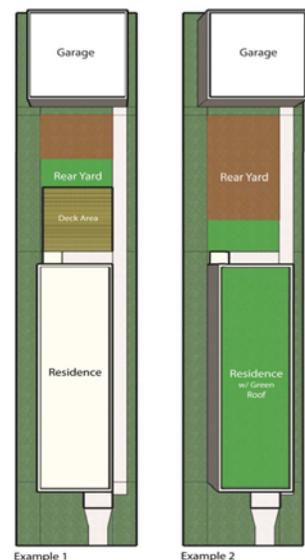
VERIFICATION:

Enrollment Review: Provide a copy of the local zoning requirements highlighting the criteria for open space (typically only rear yard open space is required) and indicate on a site plan or landscape plan the provided vegetated open space for the project including a calculation to confirm that the project has provided vegetated open space that exceeds the required open space by 50% OR that 25% of the site area is vegetated open space when no open space requirement exists.

Certification Review: None.

ADDITIONAL INFO:

Chicago Department of Zoning, Interactive Zoning Map: <http://maps.cityofchicago.org/website/zoning/viewframe.htm>



130.3

FEATURE: Encourage on-site produce gardening

POINT VALUE: 10

DESCRIPTION: To receive these points, the project must provide garden space on site for produce gardening. A minimum of 30 square feet per dwelling unit must be dedicated to food producing plants (including annuals, perennials, shrubs, and trees) to comply.

Growing your own fruits and vegetables reduces both the environmental and economic impact of our food consumption. Consideration should be given to topsoil quality, site drainage, access to sunlight, and garden protection when establishing a produce garden.



VERIFICATION: **Enrollment Review:** Provide a site plan or landscape plan highlighting the area(s) dedicated for produce gardening.

Certification Review: Provide information in the Home Manual (see feature 610.R1) that includes tools and resources for produce growth and maintenance specific to urban gardening.

ADDITIONAL INFO: Midwest Permaculture: www.midwestpermaculture.com

Garfield Park Conservatory: www.garfieldconservatory.org

Information on the City of Chicago Composting Ordinance:
www.cityofchicago.org/environment Click on Initiatives & Programs, then Composting Ordinance

Chicago Botanic Garden: www.chicagobotanic.org

National Gardening Association: www.garden.org

130.4

FEATURE: Design for bird safety

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must include one or more of the methods described below to enhance the bird safety of the building for at least 75% of all glazed openings within windows and doors.

The following methods may be used to enhance bird safety in building design:

- a) Reduce sky or habitat reflection of the window/door surface using:
 - awnings, overhangs, or sunshades
 - reduced- or low-reflectivity glass (0 to 10% reflectivity)
 - glass that is angled 40 degrees (preferred) to 20 degrees (minimum) from vertical – orient to reflect ground or surrounding buildings instead of sky or habitat

- b) Provide visual cues that indicate the window/door is a barrier, placed on the outside of window/door including the following:
 - insect screen (year-round)
 - fritted or patterned glass (with patterns spaced less than 4 inches apart when oriented vertically or 2 inches apart when oriented horizontally)
 - decals, stickers, or window film to form pattern or design (spaced less than 4 inches apart when oriented vertically or 2 inches apart when oriented horizontally)
 - louvers, shutters or similar structure
- c) Use transparent glass that is demonstrated to be bird-safe including but not limited to glass with a UV coating in the range of 300-400 nanometers, which birds can see but humans cannot.

VERIFICATION:

Enrollment Review: Provide plan note(s) on construction documents and a summary of bird-safe measures to be implemented on the project's submitted CGH checklist. Projects must verify that approved bird-safe measures will be implemented to address at least 75% of the project's glazed openings within windows and doors.

Certification Review: None.

ADDITIONAL INFO:

Chicago is along a migratory flyway and serves as an important stopover point for approximately 8 million birds migrating through the city each autumn and spring. Resident and migratory birds are an important part of our ecosystem. They control insect populations and other pests, pollinate flowers and bring nature into many people's lives.

Every year, over a million birds are killed or injured in Chicago from colliding with buildings. Many of those collisions are caused because birds see reflections of sky or habitat in the window or they cannot tell that glass is a solid object to be avoided. Windows and doors that provide a view through the house, such as narrow corridors and corner windows, give the impression that there is a clear path through the building. Just as CTA bus shelters have patterned glass to help people see the glass walls of the structure, homes can incorporate bird safe windows and doors to help birds see - and avoid - glass windows and doors

Chicago's Bird Agenda and Bird-Safe Building Design Guide:
www.cityofchicago.org/Environment; see "Publications" section

Bird-Friendly Development Guidelines, City of Toronto, and Bird-Friendly Development Rating System and Acknowledgement Program: www.toronto.ca/lightout/

NYC Audubon - Bird-Safe Building Guidelines: www.nycaudubon.org

Birds and Buildings Forum: www.birdsandbuildings.org

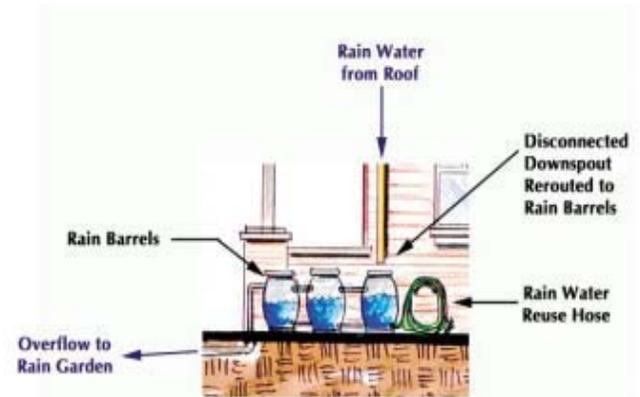
140 Stormwater Management

140.R1

FEATURE: Capture and reuse stormwater on-site

POINT VALUE: Required

DESCRIPTION: In order to satisfy this requirement, a project must use rain barrels, cisterns, or other rainwater catchment systems to capture and reuse stormwater on site.



The Chicago Building Code may require a site drainage and/or storage overflow connection to the storm sewer as part of the catchment system. Applicant will be informed during permitting if a connection is required, and will confirm satisfaction of the requirement during project certification as necessary.

VERIFICATION: **Enrollment Review:** Provide plan note(s) on site plan, details, and/or specifications identifying how stormwater will be captured on site for reuse to reduce potable water consumption for irrigation (and to reduce stormwater runoff into the combined sewer system). Calculations to determine the landscape irrigation requirements are recommended for sizing the rainwater catchment system, however, they are not required for this submittal.

Certification Review: None.

ADDITIONAL INFO: Capturing site stormwater for reuse can reduce potable water requirements for irrigation. When specifying and installing a rainwater catchment system to capture stormwater from the roof or the site, take advantage of gravity flows whenever possible. Metal, clay, or concrete-based roofing materials are recommended to avoid degrading water quality with contaminants from roofing material. The filtration of debris from the collected stormwater to allow for use in irrigation can be achieved through graded screens, filters, or biofiltration strategies.

See "A Guide to Estimating Irrigation Needs of Landscape Plantings" for a detailed methodology for calculating irrigation needs for a variety of landscape types:
www.owue.water.ca.gov/docs/wucols00.pdf

The City of Chicago's "Managing Stormwater at Home":
egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/ManagingStormwater_Home.pdf

The City of Chicago's "A Guide to Stormwater Best Management Practices":
egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/GuideToStormwaterBMPs.pdf

The Chicago Center for Green Technology (CCGT):
egov.cityofchicago.org/Environment/GreenTech/

American Rainwater Catchment Systems Association: www.arcsa.org

National Climate Data Center: www.ncdc.noaa.gov/oa/climate/aasc.html

140.1

FEATURE: Reduce site's overall net imperviousness (NI):

POINT VALUE: 7 points possible

- 7 Sites currently above 50% NI; decrease NI by 25%
OR
7 Sites currently at or below 50% NI; do not increase NI.

DESCRIPTION: To receive these points, the project must reduce or avoid the addition of new impervious surfaces on site. Impervious surfaces promote runoff of precipitation instead of infiltration into the subsurface (part of the natural hydrological cycle for the Chicago region).

If the existing site's net imperviousness is greater than 50%, design the site and building using materials and systems that result in a 25% decrease in the net imperviousness of the entire site area (property area) including the building footprint.

OR

If the existing site's net imperviousness is less than or equal to 50%, design the site and building using materials and systems that do not increase the net imperviousness of the entire site area (property area) including the building footprint.

Design the site to maintain natural hydrological cycles by promoting infiltration on site. Specify green roofs, rain gardens, pervious paving, or other materials or systems that minimize the amount of impervious surface in order to reduce the rate and quantity of stormwater runoff. The net imperviousness (NI) or degree of runoff potential can be estimated for the different surface materials on site using the typical runoff coefficients below.

Net imperviousness (NI) equals the calculated total impervious area (in square feet) of all site surfaces as seen in plan view (from above) divided by the total site area (in square feet). The total impervious area is determined by multiplying the total surface area of each material by the runoff coefficient of that material. Basic calculations may be done with the following coefficients. A civil engineer is not required for residential projects. A sample calculation has been provided in Table 140.1.

Typical Runoff Coefficients

| | |
|---|---|
| Pavement, Asphalt 0.95 | Turf, Flat (0 - 1% slope) 0.25 |
| Pavement, Concrete 0.95 | Turf, Average (1 - 3% slope) 0.35 |
| Pavement, Brick 0.85 | Turf, Hilly (3 - 10% slope) 0.40 |
| Pavement, Gravel 0.75 | Turf, Steep (> 10% slope) 0.45 |
| Pavement, Porous Unit Pavers (<5% slope) 0.50 | Vegetation, Flat (0 - 1% slope) 0.10 |
| Pavement, Porous Concrete (<5% slope) 0.30 | Vegetation, Average (1 - 3% slope) 0.20 |
| Pavement, Porous Asphalt (<5% slope) 0.40 | Vegetation, Hilly (3 - 10% slope) 0.25 |
| Roofs, Conventional 0.95 | Vegetation, Steep (> 10% slope) 0.30 |
| Roof, Green Roof (< 4 in) 0.50 | Vegetation, Filtration Basin 0.00 |
| Roof, Green Roof (4 - 8 in) 0.30 | Vegetation, Rain Garden (0 - 1% slope) 0.05 |
| Roof, Green Roof (9 - 20 in) 0.20 | Vegetation, Bioswale (1 - 3% slope) 0.20 |
| Roof, Green Roof (> 20 in) 0.10 | Vegetation, Filter Strip (< 10% slope) 0.25 |

VERIFICATION: **Enrollment Review:** Provide site plan and net imperviousness (NI) calculations (existing and proposed) demonstrating a 25% decrease in net imperviousness (for site's currently above 50% NI) OR demonstrating no increase in net imperviousness (for site's currently at or below 50% NI). The square footage of the building footprint (typically roof area) must be included in the NI calculations.

Certification Review: None.

ADDITIONAL INFO: Sample Calculation (Table 140.1):

Table 140.1

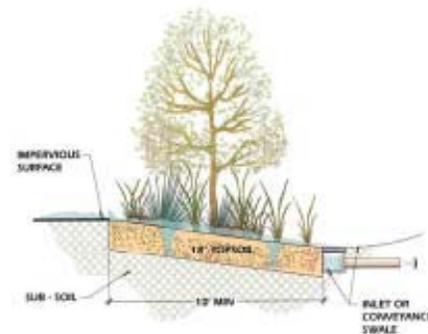
| Percentage Change in Net Imperviousness (NI of site greater than 50%) | | |
|---|--------------------------------------|------------------------|
| | Area (sf) x Runoff Coefficient | |
| | Existing | Proposed |
| Roof (Conventional) | 808(.95) = 767.6 | 208(.95) = 197.6 |
| Roof (3" Green Roof) | - | 600(.5) = 300 |
| Sidewalk (Concrete) | 392.5(.95) = 372.88 | 392.5(.95) = 372.88 |
| Turf (Flat) | 1832(.25) = 458 | 600(.25) = 150 |
| Planting Bed (Vegetation, Flat) | - | 1232(.10) = 123.2 |
| Total Site Area (sf) | 3032.5 | 3032.5 |
| Total Area (sf) x Runoff Coefficient | 1598.48 | 1143.68 |
| Net Imperviousness (NI) | 1598.48/3032.5 = 0.527 | 1143.68/3032.5 = 0.377 |
| % Net Imperviousness (NI) | .527 x 100 = 52.7% | .377 x 100 = 37.7% |
| Percentage Decrease in NI | 1 - (.377/.527) x 100 = 28.5% | |

140.2

FEATURE: Remove 80% total suspended solids (TSS) from stormwater runoff

POINT VALUE: 10

DESCRIPTION: To receive these points, the project must construct site stormwater treatment systems to remove 80% of the average annual post-development total suspended solids (TSS) based on the average annual loadings from all storms less than or equal to the 2-year/24-hour storm. Total Suspended Solids (TSS) are particles or flocs that are too small or light to be removed from storm water via gravity settling. Suspended solid concentrations are typically removed via filtration.



Projects can remove 80% of the average annual post-development total suspended solids (TSS) by implementing Best Management Practices (BMPs) outlined in Chapter 4, Part 2 (Urban Runoff), of the United States Environmental Protection Agency's (EPA's) *Guidance Specifying Management Measures for Sources of Non-Point Pollution in Coastal Waters*, January 1993 (Document No. EPA-840-B-92-002).

Stormwater management strategies that infiltrate 100% of the stormwater runoff on site from a 2-year/24 hour storm are assumed to remove 100% of TSS.

VERIFICATION: **Enrollment Review:** Provide plan note(s) on site plan, details, and/or specifications identifying the stormwater management Best Management Practices or other measures that comply with those outlined in the referenced EPA document for at least 80% removal of the average annual post-development total suspended solids (TSS).

Certification Review: None.

ADDITIONAL INFO: Install stormwater treatment systems such as Filtration Basins, Rain Gardens, Vegetated Filter Strips, or Bioswales (grass swales) to treat stormwater volumes leaving the site. Filtration

Basins and Rain Gardens remove sediment and pollutants from stormwater runoff through infiltration of stormwater into the ground. Filtration Basins typically use a filter media such as sand or gravel to aid in the removal of pollutants. A sediment trap or biofiltration (such as a vegetated filter strip) is often used to remove sediment from stormwater before filtering through a Filtration Basin to avoid clogging of the Filtration Basin filter media. Bioswales (grass swales) and Vegetated Filter Strips are used to convey stormwater and utilize vegetation to filter sediment and pollutants from stormwater and promote infiltration as stormwater slowly travels through them. See *Guidance Specifying Management Measures for Sources of Non-Point Pollution in Coastal Waters, January 1993* (Document No. EPA 840B92002)

Document No. EPA 840B92002 Internet location: www.epa.gov/owow/nps/MMGI

Hard copy or microfiche (entire document, 836 pages) National Technical Information Service (order # PB93-234672), www.ntis.gov, (800) 553-6847

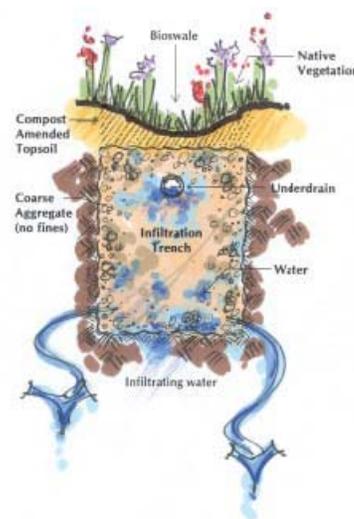
U.S. Environmental Protection Agency Office of Water, www.epa.gov/OW

140.3

FEATURE: Install rain gardens to reduce stormwater runoff

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must install rain gardens to help manage stormwater and promote infiltration on site. Rain gardens are a simple form of bioinfiltration. Bioinfiltration systems are shallow, landscaped depressions used to promote absorption and infiltration of stormwater runoff. To qualify as a rain garden, the vegetated area provided must receive runoff from adjacent impervious surfaces. The use of parking lot islands as rain gardens to aid in runoff pollutant removal and runoff volume reduction is an increasingly common practice and has proven to be a very effective use of this stormwater best management practice (BMP).



The Chicago Building Code may require a site drainage connection to the storm sewer. Applicant will be informed during permitting if a connection is required, and will confirm points during building certification as necessary.

It is recommended that an assessment of the soil permeability and infiltration capacity of the site be undertaken to ensure effective site stormwater management strategies.

VERIFICATION: **Enrollment Review:** Provide plan note(s) on site plan, details, and/or specifications identifying rain garden design to help manage stormwater on site (reduce stormwater runoff).

Certification Review: None.

ADDITIONAL INFO: The City of Chicago's "A Guide to Stormwater Best Management Practices": egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/GuideToStormwaterBMPs.pdf

The City of Chicago's "Rain Garden Brochure": egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/Rain_Garden_Brochure_012505.pdf

140.4

FEATURE: Use permeable materials for at least 40% of driveways, patios, and walkways

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must use permeable paving materials for at least 40% of driveway, patio, and walkway area within the site area to allow water to soak into the ground (infiltrate) and reduce stormwater runoff. Typical permeable paving materials include porous concrete, porous asphalt, and permeable unit pavers. Brick, flagstone, and other types of stone or unit paver may also be used if pervious materials (sand, small coarse aggregate with no fines, etc.) are used in the spaces in between. Spaces between stones or unit pavers should average at least a ¼" wide to allow for infiltration. Gravel (coarse aggregate with little or no fines) is another acceptable permeable material.

It is recommended that an assessment of the soil permeability and infiltration capacity of the site be undertaken to ensure effective site stormwater management strategies.

VERIFICATION: **Enrollment Review:** Provide plan note(s) on site plan, details, and/or specifications identifying the paving materials and their location on the site and verifying that permeable paving materials are used for at least 40% of driveway, patio, and walkway areas on site.

Certification Review: None.

ADDITIONAL INFO: The City of Chicago's "A Guide to Stormwater Best Management Practices":
egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/GuideToStormwaterBMPs.pdf

"Landscape Design", Green Industries of Colorado, Best Management Practices:
www.greenco.org/

"Porous Pavement: A Win-Win Stormwater Strategy", Environmental Building News, September 2004: www.buildinggreen.com

150 Heat Island Reduction

151 Non-Roof

151.1

FEATURE: Provide shade for at least 40% of non-roof impervious surfaces (within 5 years)

POINT VALUE: 7

DESCRIPTION: To receive these points, the project must demonstrate that vegetation (or shading devices when applicable) will be sufficient to provide shade to 40% of the non-roof impervious surfaces at grade within the site area. Shading calculations must be based on the conditions at noon on June 21st and the estimated growth of the vegetation 5 years after project completion.

Vegetation can be used shade buildings and pavements from solar radiation and cool the air through evapotranspiration. Provide shade using native or adapted (climate-tolerant) trees, large shrubs and non-invasive vines. Trellises and other exterior structures can support vegetation to shade parking lots, walkways and plazas. Deciduous trees allow buildings to benefit from solar heat gain during the winter months while providing shade during the summer months.

On sites or locations within the site area where tree planting is not possible, architectural shading devices that block direct sunlight radiance may be used.

Note that for the purposes of this feature, permeable materials used to satisfy 140.4 that have less than 50% pervious area are considered impervious. Pervious materials used to satisfy 151.4 (50% or greater pervious area) are not considered impervious and should not be included in the area calculation for non-roof impervious surfaces.

VERIFICATION: **Enrollment Review:** Provide plan note(s) on site plan, details, and/or specifications identifying vegetation (or shading devices when applicable) and areas on non-roof impervious surface. Indicate areas that will be shaded as measured at noon on June 21st verifying that shade will be provided for 40% of the non-roof impervious surfaces at grade within the site area.

Certification Review: None.

151.2

FEATURE: Use materials with a solar reflectance index (SRI) of 29 for at least 40% of non-roof impervious surfaces

POINT VALUE: 7

DESCRIPTION: To receive these points, the project must use materials with a solar reflectance index (SRI) of equal to or greater than 29 for at least 40% of the non-roof impervious surface on site.

SRI values for typical paving materials are listed in the following table (table 151.2).

Table 151.2

| Material | SRI Value |
|---------------------------|------------------|
| New Gray Concrete | 35 |
| Weathered Gray Concrete* | 19 |
| New White Concrete | 86 |
| Weathered White Concrete* | 45 |
| New Asphalt | 0 |
| Weathered Asphalt | 6 |

*Note that reflectance of surfaces can be maintained with cleaning. Typical pressure washing of cementitious materials can restore reflectance close to original value. Weathered values are based on no cleaning.

VERIFICATION: **Enrollment Review:** Provide plan note(s) on site plan and/or specifications identifying that at least 40% of the non-roof impervious surface on site will be constructed of materials with a solar reflectance index (SRI) of 29.

Certification Review: None.

ADDITIONAL INFO: U.S. Environmental Protection Agency: www.epa.gov/heatisland

Lawrence Berkeley National Laboratory – Heat Island Group: www.eetd.lbl.gov/HeatIsland

151.3

FEATURE: Provide covered parking for at least 50% of spaces

POINT VALUE: 7

DESCRIPTION: To receive these points, the project must provide covered parking for 50% or more of the parking spaces provided on site. Roofing of structures covering parking must either be vegetated or meet the solar reflectance index requirements identified in feature 152.1.

Covered parking reduces the area of hardscape materials that have the potential to create heat island effect due to low solar reflectance index (see feature 151.2). Covered parking spaces include garages, carports, attached, and “tuck-under” or stacked underground parking.

VERIFICATION: **Enrollment Review:** Provide plan note(s) on site plan and/or specifications identifying that at least 50% of the parking spaces on site are covered and that the roofing of structures covering parking is either vegetated or meets the solar reflectance index requirements identified in feature 152.1.

Certification Review: None.

151.4

FEATURE: Provide 50% pervious material for at least 50% of non-covered parking area

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must provide pervious material (50% pervious or greater) for over 50% of the non-covered parking area.

VERIFICATION: **Enrollment Review:** Provide plan note(s) on site plan identifying that at least 50% of the non-covered parking spaces on site will be paved with a 50% pervious pavement system, such as an open-grid pavement system.

Certification Review: None.

ADDITIONAL INFO: Pervious Surface Calculation Instruction:

- Calculate total parking area of the project. Parking includes parking spaces and driving lanes. Exclude parking spaces that do not receive direct sun (e.g., underground parking and covered parking spaces), sidewalks, roadways and other impervious surfaces that cannot support vehicle loads.
- Calculate parking area that is designed with pervious paving materials. A minimum of 50% of the total parking area must be comprised of paving materials that are more than 50% pervious.



152 Roofing

152.1

FEATURE: Use roofing materials with a high solar reflectance index (SRI) for at least 75% of the total roof area

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must provide roofing materials having a solar reflectance index (SRI) equal to or greater than the values in the table below (Table 152.1a) for at least 75% of the total roof area. The solar reflectance index (SRI) of a material is determined based on both the solar reflectance (albedo) and emissivity of that material.

Table 152.1a

| Roof Type | Slope | SRI Value |
|-------------------|--------|-----------|
| Low-Sloped Roof | < 2:12 | 78 |
| Steep-Sloped Roof | > 2:12 | 29 |

VERIFICATION: **Enrollment Review:** Provide specifications and/or plan note(s) on site plan or roof plan indicating that at least 75% of the roofing materials have a solar reflectance index (SRI) equal to or greater than the values in Table 152.1 for at least 75% of the total roof area.

Certification Review: None.

ADDITIONAL INFO: Solar Reflectance Index (SRI) for Typical Roofing Materials (Table 152.1b). This table is for reference only. See manufacturer's information for actual SRI values.

Table 152.1b

| Generic Roofing Materials | SRI Value |
|--------------------------------------|-----------|
| Gray EPDM | 21 |
| Gray Asphalt Shingle | 22 |
| Unpainted Cement Tile | 25 |
| White Granular Surface Bitumen | 28 |
| Red Clay Tile | 36 |
| Light Gravel on Built-Up Roof | 37 |
| Aluminum | 38 |
| White-Coated Gravel on Built-Up Roof | 79 |
| White Coating on Metal Roof | 82 |
| White EPDM | 84 |
| White Cement Tile | 90 |
| White Coating – 1 Coat, 8 mils | 100 |
| PVC White | 104 |
| White Coating – 2 Coats, 20 mils | 107 |

Source: LBNL Cool Roofing Materials Database

Lawrence Berkeley National Laboratory – Heat Island Group-Cool Roofs:
eetd.lbl.gov/HeatIsland/CoolRoofs/

Lawrence Berkeley National Laboratory – Cool Roofing Materials Database:
eetd.lbl.gov/CoolRoofs

Cool Roof Rating Council: www.coolroofs.org.

U.S. Environmental Protection Agency ENERGY STAR® Roofing Products:
www.energystar.gov/index.cfm?c=roof_prods.pr_roof_products

152.2

FEATURE: Provide a green roof system (10% minimum of total roof area)

POINT VALUE: 20 points possible

- 4** 10% of total roof area
- 8** 20% of total roof area
- 12** 30% of total roof area
- 16** 40% of total roof area
- 20** 50% of total roof area

DESCRIPTION: To receive these points, the project must install a green roof system on at least 10% of the total roof area (including garage roofs).

4 points will be awarded if 10% of total roof area has a green roof system. 4 additional points will be received for every additional 10% of roof area having a green roof system, up to 50%. For example, 20% of total roof area would receive 8 points, 30% would receive would receive 12 points and so forth. For all percentages between the 10% benchmarks, points will not be prorated and will be rounded down to the nearest benchmark. 20 is the maximum number of points awarded for this credit for green roof systems covering over 50% of the total roof area.



VERIFICATION:

Enrollment Review: Provide specifications and/or plan note(s) on site plan or roof plan indicating that at least 10% (or the amount for which points have been taken) of the total roof area (including garage roofs) will be a green roof system.

Certification Review: None.

ADDITIONAL INFO:

Green roofs minimize the heat island effect and have aesthetic and ecological value. Green roofs are vegetated surfaces that capture rainwater and return a portion of it back to the atmosphere through evapotranspiration, which cools the surrounding air. Vegetated rooftops experience lower peak temperatures - 60 to 100 °F compared to 190 °F for traditional rooftops - because the vegetation contains moisture and converts solar radiation into plant material rather than storing it as heat. Green roofs can save energy used for heating and cooling. Some green roofs require plant maintenance and are considered active gardens ("rooftop gardens"), while other green roofs have grasses and plants that require little or no maintenance or watering. All types of green roofs require periodic inspection but are expected to have longer lifetimes than conventional roofs because the underlying waterproof membrane is shielded from the effects of ultraviolet radiation and weather.

www.greenroofs.com (an independent clearinghouse for information about vegetated roofs)

The City of Chicago's "A Guide to Rooftop Gardening":

egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/GuidetoRooftopGardening_v2.pdf

The City of Chicago's "A Guide to Stormwater Best Management Practices":

egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/GuideToStormwaterBMPs.pdf

160 Light Pollution Reduction

160.1

FEATURE: Design lighting to reduce light pollution

POINT VALUE: 5 points possible

- 3 Full-cutoff exterior lighting fixtures (available for single-family projects only)
OR
5 Incorporate all performance-based lighting measures (available for all project types)**

DESCRIPTION: To receive 3 points, the project must incorporate full cutoff lighting fixtures (luminaires) for all exterior lighting **and** include interior window coverings or operable shading for all windows and skylights.

OR

To receive 5 points, the project must incorporate all of the following performance-based lighting measures:

Lighting Design Measures

- Meet or provide lower light levels and uniformity ratios than those recommended by the Illuminating Engineering Society of North America (IESNA) *Recommended Practice Manual: Lighting for Exterior Environments* (RP-33-99).
- All exterior luminaires (lighting fixtures) with more than 1000 initial lamp lumens must be shielded
- All exterior luminaires (lighting fixtures) with more than 3500 initial lamp lumens must meet the Full Cutoff IESNA Classification.
- The maximum candela value of all exterior lighting shall fall within the property
- Any luminaire within a distance of 2.5 times its mounting height from the property boundary shall have shielding such that no light from that luminaire crosses the property boundary
- The maximum candela value of all interior lighting shall fall within the building (not out through windows)

Design for the lowest possible light levels while addressing safety, security, access, way finding, identification and aesthetics. Minimize or eliminate lighting of architectural and landscape features. Where lighting is required for safety, security, egress or identification, utilize downlighting techniques rather than uplighting. In all cases, controls should be used wherever possible to turn off lighting after normal operating hours.

VERIFICATION: **Enrollment Review:** Provide specifications, lighting fixture schedules, and/or plan note(s) on site plan indicating the required lighting design measures.

Certification Review: None.

ADDITIONAL INFO: Full cutoff fixture - a fixture that allows no emission of light above a horizontal plane through the fixture. Shielding is often applied to a fixture to achieve full cutoff criteria.

Light Pollution is defined as waste light from building sites that produces glare, is directed upward to the sky, or is directed off the site. Light Pollution is most commonly caused by stray light from unshielded light sources and light reflecting off surfaces that enters the atmosphere where it illuminates and reflects off dust, debris and water vapor to cause an effect known as "sky glow." Light pollution can substantially limit visual access to the night

sky, compromise astronomical research, and adversely affect nocturnal environments. Stray light that enters the atmosphere does not increase nighttime safety or security and needlessly consumes energy and natural resources

Light Trespass is a type of Light Pollution directed into an adjacent building or site. Light trespass is commonly thought of as “the light shining in my window.” It is defined as obtrusive light that produces glare or becomes a nuisance due to quantitative, directional or spectral attributes. Light trespass can cause annoyance, discomfort, distraction or a loss of visibility.

Illuminating Engineering Society of North America (IESNA): www.iesna.org

International Dark Sky Association (IDSA): www.darksky.org

Lighting Research Center: www.lrc.rpi.edu

200 Energy Efficiency

200 Minimum Energy Efficiency

200.R1

- FEATURE:** Chicago Energy Conservation Code, Chicago Building Code, Chapter 18-13
- POINT VALUE:** Required
- DESCRIPTION:** In order to satisfy this requirement, the project building(s) must meet the Chicago Energy Conservation Code, Chicago Building Code, Chapter 18-13. User-friendly software such as REScheck™ may be used for residential compliance.
- VERIFICATION:** **Enrollment Review:** Provide a compliance statement by a Registered Energy Professional (REP) on the submitted construction documents.
Certification Review: None.
- ADDITIONAL INFO:** City of Chicago Department of Buildings (DOB): www.cityofchicago.org/buildings
-

200.R2

- FEATURE:** Achievement of the minimum number of required points within the 200 - Energy Efficiency category of the Chicago Green Homes Program
- POINT VALUE:** Required
- DESCRIPTION:** In order to satisfy this requirement, the project must make a commitment to addressing issues of energy efficiency in the design and construction of their residential project by achieving a minimum number of points within the 200 - Energy Efficiency category as specified in Table 200.R2 below.

Table 200.R2 Minimum required points for category 200 by date of program enrollment

| Enrollment Date | Total Points (Category 200) |
|------------------------------|-----------------------------|
| April 2009 – December 2011 | 100 |
| January 2011 – December 2013 | 150 |

Applicants have the flexibility to pursue the specific energy efficient strategies and features most appropriate for their utilized to meet this requirement. The requirement can be met through any combination of envelope improvements, mechanical system improvements, water heating features, appliance selection, and/or lighting improvements.

- VERIFICATION:** **Enrollment Review:** Provide verification on the submitted CGH checklist of the project’s pursuit of energy efficiency features sufficient to achieve the required minimum number of points within the 200 - Energy Efficiency category.
Certification Review: Responsible party to sign-off on the Certification Form declaring that the project has achieved the required minimum number of points within the 200 - Energy Efficiency category.

200.R3

| | |
|-------------------------|--|
| FEATURE: | HVAC system commissioning (common mechanical systems only) This feature is only applicable to multi-family buildings with a common mechanical system, renovation or new construction. |
| POINT VALUE: | Required |
| DESCRIPTION: | <p>In order to satisfy this requirement, the project must engage a commissioning authority and adopt a commissioning plan to verify and ensure that the HVAC system is designed, installed and calibrated to operate as intended. Implement the following fundamental best practice commissioning procedures:</p> <ul style="list-style-type: none">• Engage a commissioning team that does not include individuals directly responsible for project design or construction management.• Review the design intent and the basis of design documentation.• Incorporate commissioning requirements into the construction documents.• Develop and utilize a commissioning plan.• Verify installation, functional performance, training, and operation and maintenance documentation.• Complete a commissioning report. |
| VERIFICATION: | <p>Enrollment Review: Provide commissioning requirements as part of construction documents. The commissioning authority must be identified on the project’s submitted CGH checklist.</p> <p>Certification Review: Provide HVAC System Commissioning Report by qualified third-party commissioning agent to confirm that the system(s) were commissioned as outlined in construction documents and that any necessary corrective action has been taken.</p> |
| ADDITIONAL INFO: | <p>Federal Energy Management Program “Building Commissioning Guide”: www1.eere.energy.gov/femp/pdfs/29267-9.2.pdf</p> <p>Whole Building Design Guide: www.wbdg.org/project/buildingcomm.php</p> <p>Building Commissioning Association: www.bcx.org/</p> <p>“ASHRAE Guideline 1.1-2007 - The HVAC Commissioning Process”: www.ashrae.org</p> |

210 Energy Use Reduction

210.1

FEATURE: Home ENERGY STAR® rating

POINT VALUE: 40 points possible

- 30 ENERGY STAR® Energy Index of 85 or lower OR ENERGY STAR® Builder's Option Package (BOP)
OR
40 ENERGY STAR® Energy Index of 75 or lower



DESCRIPTION: To receive these points, the project must receive an energy-rating index of 85 or lower (performance path) or the project must be built according to the ENERGY STAR® Builder's Option Package (prescriptive path). Projects achieving 75 or lower for the energy-rating index will receive an additional 10 points.

Any home three stories or less can earn the ENERGY STAR label if it has been verified to meet EPA's guidelines, including: single family, attached, and low-rise multi-family homes; manufactured homes; systems-built homes (e.g., SIP, ICF, or modular construction); log homes, concrete homes; and even existing retrofitted homes.

VERIFICATION: **Enrollment Review:** Identify qualified Energy Star rater for the project on the project's submitted CGH checklist or provide verification of compliance with the ENERGY STAR® Builder's Option Package (BOP).

Certification Review: Provide Home Energy Rating Report or Certificate by qualified third-party rater to confirm that target rating was achieved.

ADDITIONAL INFO: The U.S. EPA has defined ENERGY STAR® criteria for homes that allow homebuyers to identify homes meeting a high level of energy efficiency. Homes can be certified as meeting these criteria by a qualified third-party energy rater. There are two ways to meet the ENERGY STAR® Homes criteria: build the home according to the Builder's Option Package (BOP) or have the home rated and receive an energy Rating Index of 85 or lower. The RESNET-defined energy-rating index is based on the referenced version of the International Energy Conservation Code (IECC). An energy-rating index of 100 may be interpreted as meeting the referenced version of the IECC. Each one point reduction in the energy rating index is a one percent improvement in general energy efficiency.

To be certified under the BOP, a qualified third-party energy rater will inspect the progress of the home's construction at appropriate times to certify that the project includes the required energy measures defined in the BOP for the Chicago region. For a home to be rated, building plans are submitted to a home energy rater for review and the energy rater follows the project to observe that the project complies with the plans.

Energy Star: www.energystar.gov

Illinois Association of Energy Raters: www.ilenergyraters.org

210.2

FEATURE: LEED Certification

POINT VALUE: 40 points possible

10 LEED Certified, OR
20 LEED Silver, OR
30 LEED Gold, OR
40 LEED Platinum



DESCRIPTION: To receive these points, the project must obtain a LEED certification. 10 to 40 points may be earned depending upon the level of LEED certification obtained. LEED Programs are administered by the US Green Building Council.

VERIFICATION: **Enrollment Review:** Identify LEED rating system (LEED for Homes, LEED for New Construction, etc.) on the project's submitted CGH checklist and provide proof of project registration with the United States Green Building Council (USGBC).

Certification Review: Provide LEED Certificate or other verification of final project certification rating.

ADDITIONAL INFO: US Green Building Council: www.usgbc.org

210.3

FEATURE: Meet Illinois Department of Commerce and Economic Opportunity (ILDCEO) Minimum Energy Standards

POINT VALUE: 20

DESCRIPTION: To receive these points, the project must meet the Minimum Energy Standards established by the Illinois Department of Commerce and Economic Opportunity (ILDCEO) for the *Energy Efficient Affordable Housing Construction Program*. Prescriptive energy efficiency standards from the current Chicago Energy Conservation Code (effective April 22, 2009) may exceed those identified in the ILDCEO Minimum Energy Standards. All projects must comply with the Chicago Energy Conservation Code (see feature 200.R1).

Projects should be sure to follow the current Minimum Energy Standards from the Illinois Department of Commerce and Economic Opportunity at the time of Chicago Green Homes Program enrollment. The June 2008 ILDCEO energy standards are provided below for reference only.

ILDCEO Minimum Energy Standards (June 2008)

I. Insulation

- Sidewalls R-21 (new) or R-19 (rehab) full cavity blown insulation
- Attic R-44
- Foundations
 - Slab-on-grade R-10 full slab & perimeter insulation
 - Basement R-10 exterior or interior foundation insulation
 - R-19 full ceiling insulation over unconditioned basement (rehab)
 - R-19 foundation wall insulation if units located in basement

(multi-family/ rehab)
Crawl Space (walls) R-10 exterior or interior foundation wall insulation, or
Crawl space (floor) R-21

II. Windows

- Double glazed with low-E coating (maximum U-value of 0.35 for window unit)

III. Air Sealing

- All penetrations through shell sealed with caulk or foam
- Seal drywall to framing members on exterior walls
- Caulk base of drywall to subfloor
- Completed units not to exceed 0.5 air changes/hour as measured with blower door

IV. Mechanical

- Furnace Sealed combustion/direct vent, minimum 90% AFUE with an electronically commutated motor or equivalent advanced air handler
- Boiler Sealed combustion/direct vent minimum 88% AFUE
- Water Heater Sealed combustion/direct vent, minimum 60% EF or sealed combustion/direct vent 88% for central water heater
- Air Conditioner Minimum SEER 14.0
- Duct Sealing All duct joints (supply and return) sealed with duct mastic
All ducts and pipes located in conditioned areas

V. Ventilation

- Bathroom exhaust fans must be ENERGY STAR rated
- Bathroom exhaust fans must provide a minimum 75 CFM at 0.25" of static pressure
- Bathroom exhaust fans must have a sone rating no higher than 1.5
- Bathroom exhaust fans must be controlled by a mechanical timer, fan-delay switch or other approved method
- Kitchen exhaust fans must provide a minimum of 150 CFM
- All exhaust fans must vent to outside the building

VI. Appliances

- Refrigerators must be ENERGY STAR rated (if provided)
- Dishwashers must be ENERGY STAR rated (if provided)
- Clothes washers must be ENERGY STAR rated (if provided)

VII. Lighting

- Minimum of six (6) interior fluorescent fixtures. All interior fixtures must be fluorescent in units with less than six (6) interior fixtures. All common area and exterior lighting to be fluorescent or approved equivalent.

VERIFICATION:

Enrollment Review: Provide plan note(s) and/or specifications identifying the current Minimum Energy Standards as established by the ILDCEO for the *Energy Efficient Affordable Housing Construction Program*.

Certification Review: Responsible party to sign-off on the Certification Form declaring that the project has met the Minimum Energy Standards established by the ILDCEO for the *Energy Efficient Affordable Housing Construction Program* as were current at the time of Chicago Green Homes Program enrollment.

ADDITIONAL INFO:

Illinois Department of Commerce and Economic Opportunity:
www.commerce.state.il.us/dceo/Bureaus/Energy_Recycling/Energy/Energy+Efficiency/housing_energy_program.htm

210.4

| | |
|-------------------------|---|
| FEATURE: | Optimize building and window orientation for passive solar heating ($\geq 20\%$ of space heating requirement) |
| POINT VALUE: | 10 |
| DESCRIPTION: | To receive these points, the project must demonstrate that the passive solar contribution to the home's space heating requirement is calculated to be at least 20% using an approved design tool such as the Sustainable Buildings Industry Council's <i>Energy-10</i> software. |
| VERIFICATION: | Enrollment Review: Provide passive solar heating calculations that demonstrate that at least 20% of the home's space heating requirement will be met through passive solar heating strategies. Certification Review: None. |
| ADDITIONAL INFO: | Built Green® Colorado: www.builtgreen.org Sustainable Building Industry Council: www.sbicouncil.org Energy-10 Software, Sustainable Buildings Industry Council: sbicouncil.org/displaycommon.cfm?an=1&subarticlenbr=112 <i>Passive Solar Design</i> (NAHB Research Center fact sheet): www.toolbase.org/PDF/DesignGuides/passivesolar design.pdf "The Passive Solar Energy Book" by Edward Mazria: www.mazria.com/publications.html |

210.5

| | |
|-------------------------|---|
| FEATURE: | Optimize building and window orientation to reduce summer solar heat gain |
| POINT VALUE: | 8 |
| DESCRIPTION: | To receive these points, the following two criteria must be met. <ul style="list-style-type: none">- The total area of east and west facing window glazing must not exceed 5% of total floor area- At least 80% of the window glazing area must face north and/or south. <p>The intent of this feature is to minimize the amount of east and west glazing in order to avoid potential overheating and comfort problems during the summer months.</p> |
| VERIFICATION: | Enrollment Review: Provide site and building plans indicating the window glazing area (in square feet) per building orientation to confirm that 80% of the window glazing by area faces north or south. Certification Review: None. |
| ADDITIONAL INFO: | Built Green® Colorado: www.builtgreen.org Sustainable Building Industry Council: www.sbicouncil.org "The Passive Solar Energy Book" by Edward Mazria: www.mazria.com/publications.html |

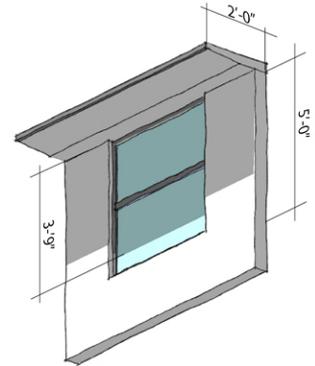
210.6

FEATURE: Provide overhangs and/or shading devices to reduce summer solar heat gain through south-facing windows

POINT VALUE: 10

DESCRIPTION: To receive these points, the project must include overhangs and/or other shading devices designed to shade at least 75% of total south-facing window area during the heat of the summer day. Careful consideration of window placement and/or overhang and shading device design is important to accomplishing this.

Projects may use a default two-foot overhang or shading device OR determine the overhang or shading device size using shading studies. A two-foot overhang over a south-facing window will cast a five-foot shadow over the window at solar noon on August 1st. Overhangs/shading devices can reduce heat gained through windows by as much as 75%, allowing cooling equipment to be downsized as part of a holistic building design.



VERIFICATION: **Enrollment Review:** Provide building plans and wall sections indicating window locations and overhangs/shading devices on the south elevation.

Certification Review: None.

ADDITIONAL INFO: Overhang Design:
<http://www.susdesign.com/overhang/index.html>
NAHB Research Center for PATH, "Durability by Design"
http://www.huduser.org/publications/pdf/durability_by_design_art1.pdf
"Concepts in Thermal Comfort" by David M. Egan

210.7

FEATURE: Exceed Chicago Energy Conservation Code per Simulated Performance Alternative criteria

POINT VALUE: 50 points possible

5 Exceeds by 5%
10 Exceeds by 10%
15 Exceeds by 15%
20 Exceeds by 20%
25 Exceeds by 25%
30 Exceeds by 30%

- 35 Exceeds by 35%**
- 40 Exceeds by 40%**
- 45 Exceeds by 45%**
- 50 Exceeds by 50%**

DESCRIPTION: To receive these points, the project must exceed the Chicago Energy Conservation Code per the Simulated Performance Alternative criteria described in section 18-3-404 of the Chicago Energy Conservation Code (effective April 22, 2009).

VERIFICATION: **Enrollment Review:** Provide preliminary energy model (computer simulation) results indicating that the project (proposed design) exceeds a standard reference design (code compliant base design) by the target percentage for which points have been taken.

Certification Review: Provide final energy model results to confirm that the targeted energy savings were achieved in the computer simulation.

ADDITIONAL INFO: City of Chicago Department of Buildings (DOB): www.cityofchicago.org/buildings

The US Department of Energy, Energy Efficiency and Renewable Energy (EERE) Building Energy Software Tools Directory: apps1.eere.energy.gov/buildings/tools_directory/alpha_list.cfm

The US Department of Energy’s Quick Energy Simulation Tool (eQUEST): www.doe2.com/equest/

Energy-10 Software, Sustainable Buildings Industry Council: sbicouncil.org/displaycommon.cfm?an=1&subarticlenbr=112

211 Exterior Walls

211.1

FEATURE: Reduce thermal bridging with continuous envelope insulation

POINT VALUE: 10 points possible

- 5 R-5 over 90% of net wall area**
- OR**
- 10 R-10 over 90% of net wall area**

DESCRIPTION: To receive these points, the project must include continuous insulation (e.g. insulated sheathing) outside the primary wall cavity over 90% or more of the exterior wall area (excluding the area of windows and doors). To comply, the continuous envelope insulation must result in a total exterior wall insulation R-value or exterior wall assembly R-value that exceeds the specified R-values required by the Chicago Energy Conservation Code.



Exterior wall insulated sheathing provides additional insulating value of R-5 or better and helps minimize thermal bridging in exterior walls. Insulated sheathing seams should be vertical and lapped, or taped with a high-quality product to improve infiltration control. Use of a high R-value sheathing of an inch thick or more is recommended for maximum performance benefit; thinner material may be flimsy and damaged during installation. As a general rule, it is worthwhile to place as much insulation as possible outside the wall cavity.

Point may also be taken for feature 340.2 if HCFC-free foam insulation sheathing is used.

VERIFICATION: **Enrollment Review:** Provide wall sections and/or specifications identifying the type and R-value of continuous insulation in the exterior building envelope and confirms that the total exterior wall insulation R-value or exterior wall assembly R-value exceeds the specified R-values required by the Chicago Energy Conservation Code.

Certification Review: None.

ADDITIONAL INFO: "Builder's Guide", Energy and Environmental Building Association's (EEBA): www.eeba.org

211.2

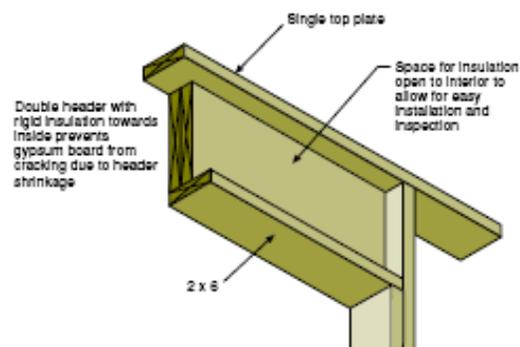
FEATURE: Reduce thermal bridging with insulated headers (R-13 insulation)

POINT VALUE: 10

DESCRIPTION: To receive these points, the project must include insulated headers with at least R-13 insulation for all exterior wall penetrations that require a header.

Pre-engineered, insulated headers are available. Headers may also be minimized or eliminated if Optimal Value Engineering (OVE) framing is used in non-load bearing wood frame exterior walls for openings less than 4 feet wide.

Points may also be taken for insulated headers in masonry buildings and for construction methods that do not require headers such as Insulated Concrete Forms (ICF) construction.



VERIFICATION: **Enrollment Review:** Provide wall sections and/or specifications identifying the construction and R-value(s) of the insulated headers provided in the exterior building envelope.

Certification Review: None.

ADDITIONAL INFO: "Builder's Guide", Energy and Environmental Building Association's (EEBA): www.eeba.org

211.3

FEATURE: Minimum R-21 exterior wall insulation or equivalent wall assembly R-value

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must include R-21 wall cavity insulation in exterior walls (for wood frame construction).

To comply when light-gauge steel frame exterior walls or mass walls (as defined by CECC section 18-13-402.2.3) are used reference Table 211.3 below.

Table 211.3 Exterior Wall Insulation Requirements¹

| Wood Frame R-value | Light-gauge Steel Frame (cold-formed) R-value | Mass Wall R-value ² |
|--------------------|---|--------------------------------|
| R-21 or R-13 + 6 | R-25 + 8 or R-19 + 9 or R-13 + 10 | R-18 |

¹Cavity insulation R-value is listed first followed by continuous insulation R-value

²50% of the required insulation R-value must be located on the exterior of or integral to the wall

A calculated wall assembly R-value may be used to meet the intent of this credit feature as long as the wall both meets the Chicago Energy Conservation Code prescriptive requirements (effective April 22, 2009) and the assembly R-value is equivalent or greater than the R-value(s) required above. The calculated wall assembly R-value must take thermal breaks into account (e.g. light-gauge steel studs).

VERIFICATION: **Enrollment Review:** Provide wall sections and/or specifications identifying the construction and R-value(s) of the exterior walls/building envelope.

Certification Review: None.

ADDITIONAL INFO: "Builder's Guide", Energy and Environmental Building Association's (EEBA): www.eeba.org

City of Chicago Department of Buildings (DOB): www.cityofchicago.org/buildings

212 Air Sealing

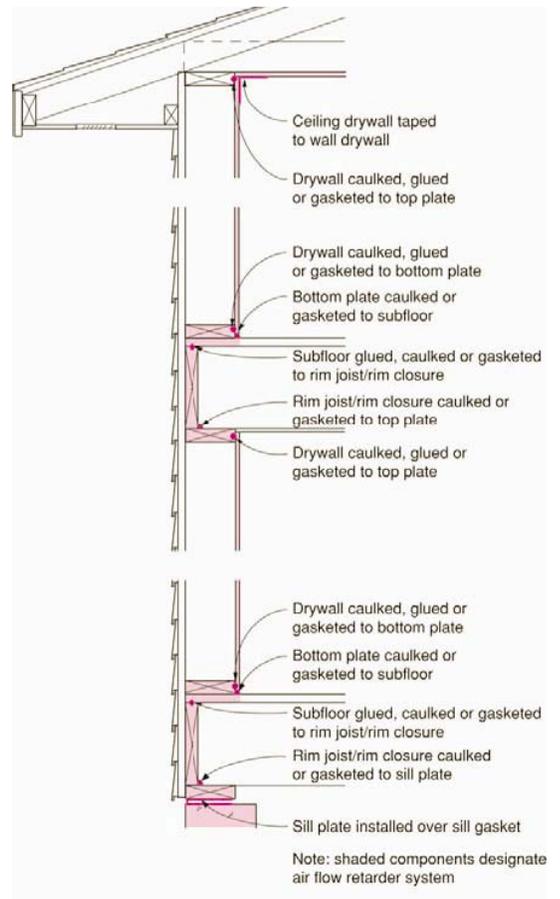
212.1

FEATURE: Advanced air sealing

POINT VALUE: 10

DESCRIPTION: To receive these points, the project must include all applicable **advanced** air sealing measures from the list below. These air sealing measures are in addition to those required by the Chicago Energy Conservation Code.

- Rim joists caulked to plates and subfloors.
 - Joints between rim joist members also caulked.
 - Bottom plates caulked to subfloor.
 - Drywall caulked or glued (continuous beads) or gasketed to top and bottom plates on exterior walls.
 - Drywall caulked or glued (continuous beads) or gasketed to window and door rough openings.
 - Drywall caulked to corners or glued (continuous beads) or gasketed to interior partition studs on exterior walls.
 - Foam/seal all penetrations in exterior walls, floors and ceilings to garages and crawl spaces.
 - Seal all penetrations in floor and plate areas from plumbing, heating, and electrical work.
 - Seal all attic bypasses prior to attic insulation. Bypasses should be sealed with foam or caulk. Attic bypasses include openings around chimneys, flues, and soil stacks. Other bypasses include joints around fan housings, conduit penetrations, and junction boxes.
- Insulate and air seal attic hatches.



All code **required** air sealing measures are outlined in section 18-13-402.4 of the Chicago Energy Conservation Code (effective April 22, 2009).

VERIFICATION: **Enrollment Review:** Provide plan and wall section note(s) and/or specifications including all applicable air sealing measures (advanced and required).

Certification Review: None.

ADDITIONAL INFO: City of Chicago Department of Buildings (DOB): www.cityofchicago.org/buildings

212.2

FEATURE: Blower door test not to exceed 0.25 CFM50/ft² of building envelope area

POINT VALUE: 10

DESCRIPTION: To receive these points, the project must undergo a blower door test and not exceed .25 cubic feet per minute, at 50 pascals of pressure difference, per square foot of building envelope area.

This feature is typically pursued by projects in order to verify the effectiveness of the air sealing measures provided.

For multi-family buildings, a representative sample of units may be tested rather than testing every unit.

VERIFICATION: **Enrollment Review:** Identify the blower door test provider for the project and provide assurance that the test report will be provided to builder and/or owner.

Certification Review: Provide blower door test report to verify that the project did not exceed 0.25 CFM50/ft².



ADDITIONAL INFO: A blower door is a fan/door testing device that creates a controlled pressure difference between the inside and outside of a home by varying the speed of the fan. Leaky homes require higher fan speeds to produce a given pressure difference than do tighter homes. The blower door is useful in quantifying the degree of leakiness of a home (i.e., how “tight” the home is) and helps in identifying where leakage occurs, thereby directing additional air sealing work if needed.

Air tightness of a home is measured in units of cubic feet of air at a 50 pascal (Pa) pressure difference (CFM50) between the inside and outside of a home (1 Pa is equivalent to 0.004 inches of water column). The CFM50 of a house is divided by the square footage of the building envelope area. Envelope area includes the gross square footage of the building shell that encloses the conditioned area. Below grade walls and floors are included if part of the conditioned space of the home.

The blower door test is done when the building is substantially complete and can be done by an Energy Rater or other qualified blower door technician (see websites below for more information). If additional air sealing is required, the work may be included as part of the “punch-list”.

Illinois Association of Energy Raters: www.ilenergyraters.org

Energy Star - Air Sealing Diagnostic Tools:
www.energystar.gov/index.cfm?c=home_sealing.hm_improvement_diagnostic

Excess air leakage can be a significant portion of the overall heat loss of a home. Just as properly insulating a home will reduce heat loss, so will properly air sealing a home. Air sealing prevents uncomfortable drafts for the occupants. Air sealing helps elevate interior surface temperatures, reducing the possibility of moisture condensation and mold growth. Finally, air sealing protects the integrity of insulation. Cold air moving through insulation reduces its effectiveness.

Oikos - Advanced Air Sealing: oikos.com/library/airsealing/index.html

Energy Star - Thermal Bypass Checklist:

www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/Thermal_Bypass_Inspection_Checklist.pdf

"Builder's Guide", Energy and Environmental Building Association's (EEBA): www.eeba.org

212.3

FEATURE: Sill plate gasket (wood frame construction only)

POINT VALUE: 6 points possible

3 Sill plate sealed with gasket,

OR

6 Sill plate sealed with gasket with integral moisture barrier

DESCRIPTION: To receive these points, the project must be wood frame construction and include a qualified sill plate gasket such as a continuous foam sill gasket (not spray foam) installed under the entire sill plate. EPDM or other rubber-like materials are preferred and are proven to provide a consistent seal. Sill gaskets made of foam with bubbles or of fiberglass do not qualify as they tend not to spring back when placed under pressure and may provide an inconsistent seal.

Additional points may be taken for the use of sill plate gaskets with integral moisture barrier technologies. Some sill gaskets integrate adhesive "flaps" that overlap the joint between the stem wall/foundation and the sheathing forming a moisture barrier. Sill gaskets used in conjunction with separate taping of the same joints to form a moisture barrier may also be used.

VERIFICATION: **Enrollment Review:** Provide plan and wall section note(s) and/or specifications identifying the type of qualifying sill plate gasket provided.

Certification Review: None.

ADDITIONAL INFO: Energy Star - Thermal Bypass Checklist:
www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/Thermal_Bypass_Inspection_Checklist.pdf

Oikos - Advanced Air Sealing: oikos.com/library/airsealing/index.html

"Builder's Guide", Energy and Environmental Building Association's (EEBA): www.eeba.org

213 Attic & Roof

213.1

FEATURE: Minimum R-52 Roof insulation or equivalent roof assembly R-value

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must include a minimum of R-52 roof cavity (or attic) insulation.

Install a minimum of R-52 insulation in the roof. If the insulation is installed in an unfinished (unconditioned) attic space, install the insulation between and over the floor joists. If the insulation is installed in a finished (conditioned) attic space, install the insulation between the studs of interior walls between conditioned and unconditioned space, between the studs and rafters of exterior walls and roof and over ceilings with unconditioned spaces above.

A calculated roof assembly R-value may be used to meet the intent of this credit feature as long as the roof insulation both meets the Chicago Energy Conservation Code prescriptive requirements (effective April 22, 2009) and the assembly R-value is equivalent or greater than R-52. The calculated roof assembly R-value must take thermal breaks into account.

Note that any allowed exterior wall or roof construction including but not limited to structural insulated panels (SIPs) may be used to comply with this credit feature, however, they must demonstrate comparable R-value (ignoring thermal mass or infiltration effects).

VERIFICATION: **Enrollment Review:** Provide wall section note(s) and/or specifications identifying the type and R-value of insulation in the roof or attic space.

Certification Review: None.

ADDITIONAL INFO: "Builder's Guide", Energy and Environmental Building Association's (EEBA): www.eeba.org

City of Chicago Department of Buildings (DOB): www.cityofchicago.org/buildings

214 Foundations

214.1

FEATURE: Insulated precast concrete foundation (R-19 or greater foundation wall assembly)

POINT VALUE: 10

DESCRIPTION: To receive these points, the project must include an insulated precast concrete foundation with a foundation wall assembly R-value of R-19 or greater.

Insulated precast concrete foundations walls are cast and cured in a controlled factory environment. A typical panelized foundation can be erected in four to five hours, usually by bolting the panels together on site, without need of a concrete pour. The precast panels often come with rigid



insulation already installed and furring strips pre-attached to the stud face to further simplify site construction. Panels range in size from 2 to 12 feet in width and 8 to 12 feet in height. They are typically installed by a crane, which lifts the panels into place on top of 4-6 inches of compacted stone. The stone facilitates sub-slab drainage and transfers the load from the foundation wall.

Installers should be experienced with assembling prefabricated foundation panels. Some companies only allow certified installers to deliver and erect their systems. Once panels are erected, sealed, and bolted together, the basement slab can be poured. Floor joists above the foundation are conventionally installed and provide some of the bracing for the foundation walls. Once braced by the slab and floor system, backfilling against the walls can take place.

VERIFICATION: **Enrollment Review:** Provide wall section and/or specifications identifying the insulated precast concrete foundations with a foundation wall assembly R-value of R-19 or greater.

Certification Review: None.

ADDITIONAL INFO: Partnership for Advancing Housing Technology: www.pathnet.org

American Concrete Institute International (ACI): www.aci-int.org

National Precast Concrete Association: www.precast.org

Portland Cement Association: www.cement.org/homes/ch_bs_panelsystems.asp

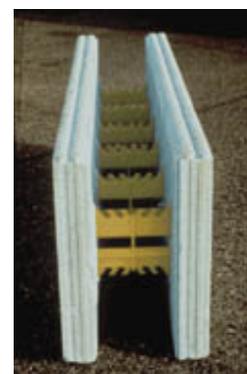
214.2

FEATURE: **Insulating Concrete Forms (ICFs) (R-19 or greater foundation wall assembly)**

POINT VALUE: 10

DESCRIPTION: To receive these points, the project must include an insulating concrete form (ICFs) foundation with a foundation wall assembly R-value of R-19 or greater.

Insulating concrete forms (ICFs) provide an efficient means of building insulated poured concrete foundations, walls, floors, and roof decks. ICFs are permanent forms with integral insulation. Most ICFs are made from expanded polystyrene (EPS) foam produced with a non-ozone-depleting blowing agent. Other permanent forms are made from a composite of wood waste and cement or of EPS beads and cement. The environmental advantages of ICF walls include higher R-values and reduced concrete content compared with conventionally formed concrete walls. For comparison purposes, "steady-state" R-values should be used when that information is available.



VERIFICATION: **Enrollment Review:** Provide wall section and/or specifications identifying the insulated concrete form foundation with a foundation wall assembly R-value of R-19 or greater.

Certification Review: None.

ADDITIONAL INFO: Insulating Concrete Form Association: www.forms.org

"Builder's Guide", Energy and Environmental Building Association's (EEBA): www.eeba.org

214.3

FEATURE: Frost-protected shallow foundation (FPSF) (R-19 or greater foundation wall assembly)

POINT VALUE: 15

DESCRIPTION: To receive these points, the project must include a frost-protected shallow foundation (FPSF) with a foundation wall assembly R-value of R-19 or greater.



Typical foundations are installed below the frost line to prevent “frost heaving”. A FPSF uses insulation to raise the frost line just below grade allowing foundations as shallow as 12 inches. Insulation installed horizontally from the foundation is used to keep the soil warm. Good site drainage is also required to keep water from soaking in and around the foundation.

FPSF has been used in Europe for over 40 years. The Council of American Building Officials (CABO) approved FPSF in 1995 and the National Association of Home Builders has promoted it for over 10 years.

Using shallow foundations (above the frost line) may reduce the amount of concrete required because the frost line has been modified.

Shallow foundations may require approval from the *Committee on Building Standards and Tests*.

VERIFICATION: **Enrollment Review:** Provide wall section and/or specifications identifying the frost protected shallow foundation with a foundation wall assembly R-value of R-19 or greater.

Certification Review: None.

ADDITIONAL INFO: NAHB Research Center, Revised Guide to Frost-Protected Shallow Foundations: www.nahbrc.org

Partnership for Advancing Housing Technology: www.pathnet.org

214.4

FEATURE: Minimum R-15 basement foundation insulation

POINT VALUE: 12 points possible

8 Full height interior foundation wall insulation to R-15
OR

12 R-15 insulated exterior or interior foundation wall to the footer

DESCRIPTION: To receive these points, the project must include a minimum of R-13 basement foundation insulation.

Exterior foundation wall insulation is preferred to interior insulation from a moisture management perspective. Foundation walls must be covered on the exterior with R13 foam insulation from the top of the wall to the footing to comply (12 points). Several product-types are appropriate for this application, with extruded polystyrene (XPS) being the most common. EPS or “bead board” should not be used in exterior applications without appropriate protection. One of the challenges with this application is protecting the section of insulation that is above-grade from UV degradation and physical damage. Several products exist to suit this purpose, from self-adhering membranes to lengths of fiber-cement board.

If using interior foundation wall insulation, the top of the foundation wall and sill plate should be thoroughly air sealed before insulating. If using vinyl faced blankets, hold the bottom edge of the blanket six inches above the floor. If interior basement wall insulation is continuous from the sill plate to the top of footing, 12 points may be taken. If interior basement wall insulation is continuous from the sill plate to the top of the basement, 8 points may be taken.

To claim this credit when both basement and unvented crawlspace conditions exist, you must also meet the requirements of credit feature 214.5 for the crawl space condition.

VERIFICATION: **Enrollment Review:** Provide wall section note(s) and/or specifications identifying the type and R-value of the basement wall foundation insulation.

Certification Review: None.

ADDITIONAL INFO: “Builders Field Guide”, Energy and Environmental Building Association: www.eeba.org

214.5

FEATURE: **Minimum R-20 conditioned crawl space foundation insulation**

POINT VALUE: **8**

DESCRIPTION:

To receive these points, the project must include a minimum of R-20 crawl space foundation wall insulation for conditioned crawl spaces.

The foundation walls of conditioned crawl spaces should be insulated to R-20 using the same installation methods required in feature 214.4, “Minimum R-15 basement foundation insulation”. In addition, the crawl space must not be vented. A continuous 6 mil ground cover must also be installed. Seams of the ground cover should be lapped and sealed with sheathing tape. The perimeter of the ground cover should be sealed and secured to the foundation wall. No points are given if the crawl space is vented.



To claim this credit when both basement and unvented crawlspace conditions exist, you must also meet the requirements of credit feature 214.4 for the basement condition.

VERIFICATION: **Enrollment Review:** Provide wall section note(s) and/or specifications identifying the type and R-value of the crawl space foundation wall insulation.

Certification Review: None.

ADDITIONAL INFO: "Builders Field Guide", Energy and Environmental Building Association: www.eeba.org

214.6

FEATURE: Minimum R-15 slab-on-grade insulation

POINT VALUE: 8 points possible

- 4 R-15 slab edge insulation and first 6 feet of slab perimeter insulated to R-15
- OR
- 8 R-15 slab edge and full slab insulation

DESCRIPTION: To receive these points, the project must include a minimum of R-15 slab edge insulation (where the slab adjoins an unconditioned space or the outside) AND either full slab R-15 insulation (8 points) or R-15 slab insulation for the first 6 feet of the slab perimeter (4 points).

VERIFICATION: **Enrollment Review:** Provide wall section note(s) and/or specifications identifying the type and R-value of the slab-on-grade or basement slab insulation (when radiant floors are used).

Certification Review: None.

ADDITIONAL INFO: "Builders Field Guide", Energy and Environmental Building Association: www.eeba.org

215 Windows

215.1

FEATURE: NFRC rated high-performance windows (75% of window area)

POINT VALUE: 10 points possible

- 5 Window Unit U-value ≤ 0.31
- OR
- 10 Window Unit U-value ≤ 0.28

DESCRIPTION: To receive these points, the project must include Low-E windows with a U-value no higher than 0.31 (5 points) or 0.28 (10 points) for at least 75% of the window area.

The U-value must be for the window unit and not the "center of glass" U-value. Window unit U-value accounts the heat transfer characteristics of the window frame whereas the center-of-glass U-value does not.

Low-E means that a low emissive coating has been added, usually to the outside surface of the interior pane of a double-pane window. The low-E coating improves the U-value of the window.

| | | | |
|--|---|---|---|
|  National Fenestration Rating Council® CERTIFIED | World's Best Window Co. Millennium 2000® Vinyl-Clad Wood Frame Double Glazing • Argon Fill • Low E Product Type: Vertical Slider | | |
| ENERGY PERFORMANCE RATINGS | | | |
| U-Factor (U.S./I-P) | Solar Heat Gain Coefficient | | |
| 0.31 | 0.32 | | |
| ADDITIONAL PERFORMANCE RATINGS | | | |
| Visible Transmittance | Air Leakage (U.S./I-P) | | |
| 0.51 | 0.2 | | |
|  |  |  |  |
| U-Factor | Solar Heat Gain Coefficient | Visible Transmittance | Air Leakage |

VERIFICATION: **Enrollment Review:** Provide window schedule and/or specifications identifying the U-value of the specified NFRC-rated windows.

Certification Review: None.

ADDITIONAL INFO: The National Fenestration Rating Council (NFRC) is a non-profit, public/private organization created by the window, door and skylight industry. It is comprised of manufacturers, suppliers, builders, architects and designers, specifiers, code officials, utilities and government agencies. NFRC's primary goal is to provide accurate information to measure and compare the energy performance of window, door or skylight products.

ENERGY STAR®: www.energystar.gov

National Fenestration Rating Council: www.nfrc.org

Energy Efficient Window Collaborative: www.efficientwindows.org

215.2

FEATURE: **NFRC rated window with SHGC value no higher than 0.55 (75% of window area)**

POINT VALUE: **3**

DESCRIPTION: To receive these points, the project must include windows with a solar heat gain coefficient (SHGC) of no higher than 0.55 that comprise at least 75% of the window area.

The SHGC is the fraction of solar radiation admitted through a window or skylight, both directly transmitted, and absorbed and subsequently released inward. It is expressed as a number between 0 and 1. The lower a window's solar heat gain coefficient, the less solar heat it transmits, and the greater the window's shading ability. A SHGC of 0.55 means that 55% of the available solar heat is coming through the window.

VERIFICATION: **Enrollment Review:** Provide window schedule and/or specifications identifying the SHGC of the specified NFRC-rated windows.

Certification Review: None.

ADDITIONAL INFO: ENERGY STAR®: www.energystar.gov

National Fenestration Rating Council: www.nfrc.org

Efficient Windows Collaborative: www.efficientwindows.org

215.3

FEATURE: Use heat gain and/or heat loss reduction strategies on windows

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must incorporate heat gain and/or heat loss reduction strategies on building windows such as those described below.

Heat gain reduction strategies must be used to address at least 75% of all west, south, and east facing window area to comply. Common heat gain reduction strategies include the use of

- exterior-mounted sunscreens
- operable insulated exterior window coverings (insulated shutters, panels, etc.)
- operable awnings and shutters
- rolling slat-type shutters.

OR

Heat loss reduction strategies must be used to address at least 75% of all building window area to comply. Many of the same strategies used for reducing heat gain work well for reducing heat loss. Common heat loss reduction strategies include the use of

- operable insulated interior window coverings (honeycomb or quilted shades, traditional curtains, etc.)
- rolling slat-type shutters – that create an air space and insulate the window
- and other insulated exterior shutters or panels that can significantly reduce heat lost through windows.

Additional strategies such as the use of insulated translucent composite panels on the exterior allow daylight to enter while decreasing heat transfer.

Heat gain reduction and heat loss reduction strategies can reduce heat gains/losses in building by 20% or more. Energy savings is dependent on occupant operation and effective use of the strategies in place.

VERIFICATION: **Enrollment Review:** Provide plans, elevations, finish schedules and/or specifications identifying the specified heat gain and/or heat loss reduction strategies and confirming that the measures are applied to the required percentage of window area on the required building elevations.

Certification Review: None.

ADDITIONAL INFO: Overhang Design: www.susdesign.com/overhang/index.html

NAHB Research Center for PATH, “Durability by Design”

“Concepts in Thermal Comfort” by David M. Egan

220 Mechanical Systems

220.1

FEATURE: HVAC system commissioning for single family homes

This feature is only applicable to single family new and renovation projects.

POINT VALUE: 15

DESCRIPTION: To receive these points, the project must provide the HVAC system commissioning activities as described below.

Poor design and installation of HVAC system components can cause substantial energy waste. If the HVAC system is designed and installed properly, the commissioning process merely verifies that all is well.

The following tests are required for commissioning single-family homes. A brief description of each test follows.

- Duct leakage testing,
- Combustion appliance zone (CAZ) testing,
- Combustion safety testing,
- Air conditioning charge, and
- Duct system flows and pressures.



Duct leakage testing is performed using a Duct Blaster™ or equivalent type fan (shown image above). The fan is connected to the duct system at the air handler cabinet. With all the registers and grills temporarily sealed, duct leakage is measured by either pressurizing or depressurizing the duct system and measuring the fan flow. Duct leakage can be no more than 10% of system airflow when pressurized to 25 Pascals with the fan.

Pressure imbalances are measured with **combustion appliance zone (CAZ) testing**. Pressure imbalances in the combustion zone can be subtle but quite dangerous. If the CAZ pressure with respect to the outside of a home is negative to even -3 pascals (0.012" wc), natural draft combustion appliances may backdraft, leaving products of combustion in the CAZ rather than up the chimney. If there is leakage in the return air system, combustion gases may be swept through the furnace and into the living areas of the home. In extreme cases (e.g., more than 8 pascals of negative pressure) flame rollout can occur. Negative pressure in basements or crawl spaces can also bring radon and other soil gases into the home's conditioned envelope.

Combustion safety testing involves measuring draft, steady state efficiency, carbon monoxide (CO) and temperature rise across a furnace heat exchanger. Thermostat anticipator setting, combustion appliance's burners and wiring should also be inspected.

Air conditioning charge should be within an ounce of the manufacturer's specification. When the charge is appropriate, the AC system will have temperatures and flows within guidelines provided by the manufacturer.

Duct system flow measurements ensure that neither too much nor too little airflow is reaching areas of the home. Ideally, a flow hood should be used to match flow with the results from the Manual D procedure (see 221.4), but in practice this may be accomplished by taping off each supply register at a time and measuring relative pressures when the air handler is running. Adjustments may be made by balancing dampers at each duct's takeoff from the supply plenum or by adjusting vanes at registers.

Duct system pressure measurements determine if there is supply air restriction by measuring pressure differences between the main body of the house and each room. Remediation should be undertaken if pressure differences are greater than 3 pascals (0.012" wc). A broad hint at how much doors should be undercut or how large transfer grills should be may be determined by slowly opening the door to a room while observing the pressure gauge. When the reading descends to 3 pascals, the size of the opening is the amount of pressure relief needed.

VERIFICATION: **Enrollment Review:** Provide commissioning requirements as part of construction documents. The commissioning authority must be identified on the project's submitted CGH checklist.

Certification Review: Provide HVAC system commissioning report by qualified third-party commissioning agent to confirm that the system(s) were tested as outlined in construction documents and that any necessary corrective action has been taken.

ADDITIONAL INFO: Built Green® Colorado: www.builtgreen.org

220.2

FEATURE: Active solar heating system (space heating)

POINT VALUE: 20 points possible

5 ≥ 5% of space heating requirement
10 ≥ 10% of space heating requirement
15 ≥ 15% of space heating requirement
20 ≥ 20% of space heating requirement

DESCRIPTION: To receive these points, the project must include an active solar heating system designed to provide 5% or greater of the building's space heating requirement.

An active solar heating system uses pumps and/or fans to move heat energy from collectors to storage when the collector temperature is warmer than the storage temperature and from storage to the home in response to a call for heat by a thermostat. In contrast, a passive system relies on natural movement of heat (convection, conduction, radiation) to heat the space. When considering an active solar space heating system, the home should be designed to minimize the heating load as much as possible as this reduces the size of the solar heating system. Satisfying 20% of the annual heating load with a solar system may only require 10 to 15 ft² of collector per 100 square feet of house.

This credit feature applies only to space heating from an active solar system. For domestic hot water provided by solar systems, see feature 230.1

VERIFICATION: **Enrollment Review:** Provide active solar heating calculations that demonstrate that at least 5% of the home's space heating requirement will be met through active solar heating strategies.

Certification Review: None.

ADDITIONAL INFO: Solar Rating and Certification Corporation (SRCC): www.solar-rating.org

National Renewable Energy Laboratory: www.nrel.gov

220.3

FEATURE: Ground-source heat pump system

POINT VALUE: 20 points possible

15 Space heating only

OR

20 Space heating, domestic hot water and air conditioning

DESCRIPTION: To receive these points, the project must include a ground-source heat pump (GSHP) system that meets or exceeds the space heating system efficiency listed in Table 220.3 below.

Ground-source heat pump (GSHP) heater systems typically return 3 to 4 units of energy for every one unit put in. Heat pumps can extract heat from the ground for space heating in the heating season, and move heat from the building to the ground in the cooling season. A desuperheater is an energy saving device in a heat pump that, during the cooling cycle, recycles some of the waste heat from the house to heat domestic water. Electricity is used to move fluids to and from the ground, as well as to run the internal refrigerant compressor. Total energy usage is generally one half to one third the amount used to accomplish the same heating and cooling performance as conventional systems.

Table 220.3 Required minimum space heating system efficiency

| System Type | Open Loop GSHP | Closed Loop GSHP | Direct Expansion GSHP |
|-------------------|----------------|------------------|-----------------------|
| Efficiency Rating | 3.6 COP | 3.3 COP | 3.5 COP |

Office of Underground coordination approval is not required unless the project is located in the Central Business District. Contact the Department of Buildings (DOB) if you are uncertain if your project is within the Central Business District.

VERIFICATION: **Enrollment Review:** Provide mechanical plan note(s), mechanical equipment schedule, and/or specifications identifying the type and system efficiency of ground source heat pump (GSHP) system. The system efficiency indicated must meet or exceed the system efficiency identified in Table 220.3.

Certification Review: None.

ADDITIONAL INFO: Geothermal Heat Pump Consortium: www.geoexchange.org

220.4

FEATURE: Air-source heat pump system (8.2 HSPF or greater)

POINT VALUE: 10

DESCRIPTION: To receive these points, the project must include an air-source heat pump (ASHP) system that meets or exceeds a heating seasonal performance factor (HSPF) of 8.2.

VERIFICATION: **Enrollment Review:** Provide mechanical plan note(s), mechanical equipment schedule, and/or specifications identifying the type and system efficiency of air-source heat pump (ASHP) system. The system efficiency must meet or exceed the required heating seasonal performance factor (HSPF) of 8.2.

Certification Review: None.

ADDITIONAL INFO: Air-source heat pump (ASHP) heater systems can return from 1.5 to 3 units of energy for every one unit put in. Heat pumps can extract heat from the outdoor air for space heating in the heating season, and move heat from the building to the outdoor air in the cooling season. Air-source heat pumps have not typically been used in the Chicago area due to the challenges of operating efficiently during extended periods of below freezing weather during the heating season. New air-source heat pump technologies including "All-Climate", "Cold Climate", and hybrid systems – such as air-source heat pump/furnace (combustion) hybrid systems – are proving to effectively address the challenges of the heating season in colder climates such as Chicago. As with other heat pump systems, air-source heat pumps use electricity to move fluids to and from the outside air, as well as to run the internal refrigerant compressor. Total energy usage is generally less than the amount used to accomplish the same heating and cooling performance as conventional systems.

Energy Star – Air-Source Heat Pumps:

http://www.energystar.gov/index.cfm?c=airsrc_heat.pr_as_heat_pumps

US Department of Energy, Energy Efficiency and Renewable Energy – Air-Source Heat Pumps:
apps1.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12620

Architectural Record, March 2006, p 123, by Charles Linn. "Can a New Kind of Heat Pump Change the World?": archrecord.construction.com/resources/conteduc/archives/0603edit-1.asp

Chelan County Washington Public Utility District – Super Efficient Heat Pumps:
www.chelanpud.org/all-climate-heat-pump.html

221 Furnace

221.1 See features 221.1.1 through 221.1.2 below. Only one of the following features may be submitted for points under item 221.1

221.1.1

FEATURE: 92% or greater AFUE furnace (≥ 50% total space heating load)

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must provide a 92% or greater Annual Flue Utilization Efficiency (AFUE) furnace for 50% or greater of the total space heating load.

In some building rehabilitation or building addition cases, an existing furnace not meeting the above requirements will be maintained while the new furnace meeting the above criteria will be used for the addition. Points may be taken here if the new furnace meeting the above criteria provides greater than or equal to 50% of the heating load for the entire structure.

VERIFICATION: **Enrollment Review:** Provide mechanical plan note(s), mechanical equipment schedule, and/or specifications identifying the type and annual flue utilization efficiency (AFUE) of furnace and verifying the provided percentage of the total space heating load ($\geq 50\%$).

Certification Review: None.

ADDITIONAL INFO: Exhaust air from a furnace that is rated at 92% or greater efficiency is typically quite cool, only slightly above 100 °F. At such low temperatures, the gaseous products of combustion condense, and the resulting liquid must be put down a drain. Conventional metal flue pipe is corroded by condensing flue gases, so PVC pipe is usually employed to direct flue gas out of the side of the house. Care should be taken to direct the exhaust stream well away from the side of the home (where it may have corrosive effects). Care should also be taken to avoid placing the exhaust pipe over walks or stairs, as the condensate will freeze during the winter creating a safety hazard.

ENERGY STAR® Program – Heating and Cooling Efficiency:
www.energystar.gov/index.cfm?c=heat_cool.pr_hvac

Gas Appliance Manufacturers Association: www.gamanet.org

Built Green® Colorado: www.builtgreen.org

-OR-

221.1.2

FEATURE: **Direct vent 92% or greater AFUE furnace ($\geq 50\%$ total space heating load)**

POINT VALUE: 10

DESCRIPTION: To receive these points, the project must provide a direct vent 92% or greater Annual Flue Utilization Efficiency (AFUE) furnace for 50% or greater of the total space heating load.

In some building rehabilitation or building addition cases, an existing furnace not meeting the above requirements will be maintained while the new furnace meeting the above criteria will be used for the addition. Points may be taken here if the new furnace meeting the above criteria provides greater than or equal to 50% of the heating load for the entire structure.



VERIFICATION: **Enrollment Review:** Provide mechanical plan note(s), mechanical equipment schedule, and/or specifications identifying the type (direct vent) and annual flue utilization efficiency (AFUE) of furnace and verifying the provided percentage of the total space heating load ($\geq 50\%$).

Certification Review: None.

ADDITIONAL INFO: Direct vent means that outside air is used for combustion, normally through a dedicated plastic pipe several inches in diameter. Exhaust air from a furnace that is rated at 92% or greater efficiency is typically quite cool, only slightly above 100 °F. At such low temperatures, the gaseous products of combustion condense, and the resulting liquid must be put down a drain. Conventional metal flue pipe is corroded by condensing flue gases, so PVC pipe is usually

employed to direct flue gas out of the side of the house. Sometimes the exhaust pipe is co-located with the air intake pipe, thereby slightly improving overall system efficiency by preheating combustion air with free energy from the exhaust stream. Care should be taken to direct the exhaust stream well away from the side of the home (where it may have corrosive effects) and from the intake (which should direct only clean outside air to the furnace). Care should also be taken to avoid placing the exhaust pipe over walks or stairs, as the condensate will freeze during the winter creating a safety hazard.

ENERGY STAR® Program – Heating and Cooling Efficiency:
www.energystar.gov/index.cfm?c=heat_cool.pr_hvac

Gas Appliance Manufacturers Association: www.gamanet.org

Built Green® Colorado: www.builtgreen.org

221.2

FEATURE: Meet’s GAMA rating for electrical efficiency for air handler motors (90% or greater AFUE furnaces only)

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must include a furnace (90% or greater AFUE furnaces only) air handler motor rated as electrically efficient (“e”) by the Gas Appliance Manufacturers Association (GAMA).

A furnace's air handler motor is the largest user of electricity in a gas-fired furnace. Expected gas energy savings resulting from the installation of a 90% furnace may be significantly reduced if the air handler motor is inefficient. Electrically efficient furnaces are those furnaces whose electric consumption is no more than 2% of the total energy used by a furnace during a typical heating season. The designation of "e" is given to electrically efficient furnaces in the Gas Appliance Manufacturers Directory from the Gas Appliance Manufacturers Association (GAMA).

An efficient furnace air handler is often driven by an electronically commutated permanent magnet motor. Electronically commutated motors are one type of variable speed motors that offer better air mixing, lower noise, and tighter temperature and humidity control as well as higher efficiency and lower peak demand than the constant-speed blower motors installed in most standard furnaces. When coupled with modulating gas valves (see feature 221.9), variable speed blowers offer even greater energy savings.

VERIFICATION: **Enrollment Review:** Provide mechanical plan note(s), mechanical equipment schedule, and/or specifications identifying the GAMA-rated electrically efficient furnace air handler motor (90% AFUE or greater furnaces only).

Certification Review: None.

ADDITIONAL INFO: Gas Appliance Manufacturers Association: www.gamanet.org

Built Green® Colorado: www.builtgreen.org

221.3

FEATURE: Include direct vent combination heater – domestic hot water/space heat (CAE ≥ 0.8)

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must include a direct vent combination heater providing both domestic hot water and space heating that meets or exceeds a Combined Annual Efficiency (CAE) of 0.8.



Combination systems merge domestic hot water and space heating into a single appliance. Water is heated within the unit and piped through an air handler to supply space heating through a standard duct system. Commonly available systems are high-efficiency, sealed combustion units. An air conditioning coil can also be included.

VERIFICATION: **Enrollment Review:** Provide mechanical plan note(s), mechanical equipment schedule, and/or specifications identifying the type and system efficiency of the direct-vent combination heater system. The system efficiency must meet or exceed the required combined annual efficiency (CAE) of 0.8.

Certification Review: None.

221.4

FEATURE: Duct system designed and sized using load calculation

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must design and size all ductwork to achieve the required airflow rates using the Air Conditioning Contractors of America (ACCA) Manual D or equivalent procedure.

Both summer and winter loads should be calculated with a procedure such as ACCA Manual J. The Manual J procedure results in an estimate of a room-by-room Btu load at the design hour. This information is used in the Manual D procedures for specifying residential duct runs and flow rates. Designing, sizing and installing ductwork correctly is important for achieving desired airflow rates, particularly if residential commissioning (see feature 220.1) will be used.

VERIFICATION: **Enrollment Review:** Provide mechanical plan note(s) on construction documents indicating duct sizing and/or identify the party responsible for performing these calculations on the project's submitted CGH checklist.

Certification Review: Responsible party to sign-off on the Project Verification Form declaring that the project has designed and sized all ductwork to achieve the required airflow rates using ACCA Manual D or equivalent procedure.

ADDITIONAL INFO: The Air Conditioning Contractors of America (ACCA), which publishes Manual D on residential duct system design, also sells a software package to aid in residential duct design called Right-D™ For Windows. www.ACCA.org

US Department of Energy Air Distribution System Design Fact Sheet:
http://www.toolbase.org/PDF/DesignGuides/doe_airdistributionsystemdesign.pdf

A Builder's Guide to Placement of Ducts and HVAC Equipment in Conditioned Spaces, 2000, NAHB Research Center. Available for \$5 from NAHB Research Center bookstore at nahbrc.org/bookstore/bd0903w.aspx

Design and Construction of Interior Duct System, Florida Solar Energy Center, (2002):
www.fsec.ucf.edu/en/publications/pdf/FSEC-PF-365-01.pdf

221.5

See features 221.5.1 through 221.5.2 below. Only one of the following features may be submitted for points under item 221.5

221.5.1

FEATURE: Transfer grilles or insulated jump ducts

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must include transfer grilles or jump ducts to provide return airflow from all bedrooms.

Closing off bedrooms without clear return flow can create positive pressure in the rooms and starve the system for return air, forcing the system to take air from unintended sources such as attics, crawlspaces, or flues.

Transfer grilles or insulated jump-ducts may be used as an alternative to hard-ducted return air systems. Privacy can be maintained by offsetting low and high grills in the bedroom wall, allowing return air to flow to ducted returns in the hall. Transfer air grilles or insulated jump-ducts must be installed to serve every bedroom that can be closed off from the rest of the house and all bedrooms must have both a supply and return register to comply with this credit feature.

VERIFICATION: **Enrollment Review:** Provide mechanical plans and/or specifications identifying the type and location of air returns in all enclosed bedrooms.

Certification Review: None.

ADDITIONAL INFO: "Builder's Guide", Energy and Environmental Building Association's (EEBA): www.eeba.org

-OR-

221.5.2

FEATURE: Hard-ducted return air system for all bedrooms

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must include transfer grilles or jump ducts to provide return airflow from all bedrooms.

Closing off bedrooms without clear return flow can create positive pressure in the rooms and starve the system for return air, forcing the system to take air from unintended sources such as attics, crawlspaces, or flues.

Hard-ducted air returns must be installed to serve every bedroom that can be closed off from the rest of the house and all bedrooms must have both a supply and return register to comply with this credit feature. Furthermore, the return system must be hard-ducted to the furnace. No panned joist spaces or wall cavities are permitted to be part of the return system.

VERIFICATION: **Enrollment Review:** Provide mechanical plans and/or specifications identifying the type and location of air returns in all enclosed bedrooms.

Certification Review: None.

ADDITIONAL INFO: "Builder's Guide", Energy and Environmental Building Association's (EEBA): www.eeba.org

221.6

FEATURE: Duct leakage test (10% maximum of total system airflow)

POINT VALUE: 6

DESCRIPTION: To receive these points, the project must perform a duct leakage test to confirm that duct leakage is less than 10% of the maximum total system airflow. Duct leakage testing is performed using a Duct Blaster™ or equivalent type fan. The fan is connected to the duct system at the air handler cabinet. With all the registers and grills temporarily sealed, duct leakage is measured by either pressurizing or depressurizing the duct system and measuring the fan flow. Duct leakage can be no more than 10% of system airflow when pressurized to 25 Pascals with the fan.

The duct leakage test is one of the tests required for feature 220.1, "HVAC system commissioning for single family homes".

VERIFICATION: **Enrollment Review:** Identify party responsible for performing the duct leakage testing on the project's submitted CGH checklist.

Certification Review: Provide third-party duct leakage test results to verify that the duct leakage did not exceed 10% of the maximum total system airflow as measured at a pressure of 25 Pascals.

ADDITIONAL INFO: For Duct Blaster™ information, see The Energy Conservatory: www.energyconservatory.com

221.7

FEATURE: All duct work located in conditioned space

POINT VALUE: 3

DESCRIPTION: To receive these points, the project must include all supply and return ducts within the conditioned space. Ductwork is not permitted in unheated attics or vented crawl spaces, even if the ducts are insulated. Ducts may be enclosed in soffits, including reverse soffits located in attics. Reverse soffits must be air sealed to comply.

VERIFICATION: **Enrollment Review:** Provide plans, plan notes, or specifications identifying that all supply and return ducts are located within the conditioned space.

Certification Review: None.

ADDITIONAL INFO: "Builder's Guide", Energy and Environmental Building Association's (EEBA): www.eeba.org

221.8

FEATURE: Modulating gas valve (90% or greater AFUE furnaces only)

POINT VALUE: 1

DESCRIPTION: To receive these points, the project must include a modulating gas valve on all provided furnaces (90% or greater AFUE furnaces only).

Conventional furnaces are either off or burning fuel at a constant rate. Since they are sized to meet the heating demands of a home on the coldest day of the winter, during milder days, they tend to have short run times and spend less time burning at optimal efficiency. Furnaces that modulate their firing rates and distribution fan speed to reflect the actual energy needs of a home as a function of current weather conditions can enhance both overall energy efficiency and comfort. Since the distribution fan runs for a greater part of the heating season, it should have an efficient motor (see feature 221.2).

VERIFICATION: **Enrollment Review:** Provide mechanical plan note(s), mechanical equipment schedule, and/or specifications identifying the modulating gas valve for all provided furnaces (90% or greater AFUE furnaces only).

Certification Review: None.

ADDITIONAL INFO: Built Green® Colorado: www.builtgreen.org

222 Boilers

222.1

FEATURE: Direct vent 90% or greater AFUE boiler

POINT VALUE: 11

DESCRIPTION: To receive these points, the project must provide a 90% or greater Annual Flue Utilization Efficiency (AFUE) direct vent boiler.

VERIFICATION: **Enrollment Review:** Provide mechanical plan note(s), mechanical equipment schedule, and/or specifications identifying the type (direct vent) and annual flue utilization efficiency (90% AFUE) for all boilers provided.

Certification Review: None.

ADDITIONAL INFO: ENERGY STAR® Program – Heating and Cooling Efficiency:
www.energystar.gov/index.cfm?c=heat_cool.pr_hvac

Gas Appliance Manufacturers Association: www.gamanet.org

222.2

FEATURE: Hydronic radiant floor heating system (with R-15 slab insulation)

POINT VALUE: 12 points possible

6 for basement only (or for $\geq 25\%$ of gross square footage of home/unit)
OR
12 for entire building/unit

DESCRIPTION: To receive these points, the project must Hydronic Radiant Floor Heating. Hydronic Radiant Floor Heating is a radiant heat system that distributes hot water through pipes in a thermal mass floor or panel, which slowly radiates the heat into the living space.

Slab-on-grade: Slab edge perimeter and below slab insulation must be installed to a minimum of R-15 per feature 214.6. Points for 214.6 may also be taken.

Suspended floor construction and between floors: Insulation between a heated floor and a heated space should be a minimum of R-5 for hard surface floors and R-11 for carpeted floors, unless the downward heat contribution is desired and supported by the manufacturer’s design criteria.



VERIFICATION: **Enrollment Review:** Provide mechanical plan note(s), mechanical equipment schedule, and/or specifications identifying the use and extent of hydronic radiant floor heating.

Certification Review: None.

ADDITIONAL INFO: Radiant Panel Association: www.radiantpanelassociation.org

222.3

| | |
|-------------------------|---|
| FEATURE: | Modulating gas valve (88% or greater AFUE boilers only) This feature is only applicable to multi-family new and renovation projects. |
| POINT VALUE: | 1 |
| DESCRIPTION: | To receive these points, the project must include a modulating gas valve on all provided boilers (88% or greater AFUE boilers only). Conventional boilers are either off or burning fuel at a constant rate. Since they are sized to meet the heating demands of a home on the coldest day of the winter, during milder days, they tend to have short run times and spend less time burning at optimal efficiency. Boilers that modulate their firing rates to reflect the actual energy needs of a home as a function of current weather conditions can enhance both overall energy efficiency and comfort. |
| VERIFICATION: | Enrollment Review: Provide mechanical plan note(s), mechanical equipment schedule, and/or specifications identifying the modulating gas valve for all provided boilers (88% or greater AFUE boilers only). Certification Review: None. |
| ADDITIONAL INFO: | ENERGY STAR® Program – Heating and Cooling Efficiency: www.energystar.gov/index.cfm?c=heat_cool.pr_hvac Gas Appliance Manufacturers Association: www.gamanet.org |

222.4

| | |
|----------------------|--|
| FEATURE: | Outdoor boiler reset control with automatic cut-off This feature is only applicable to multi-family new and renovation projects. |
| POINT VALUE: | 10 |
| DESCRIPTION: | To receive these points, the project must include an outdoor boiler reset control with automatic cut-off for all provided boilers. An outdoor reset control monitors the outdoor air temperature and adjusts the boiler water temperature accordingly. The colder the outdoor air temperature is, the higher the boiler water temperature. Conversely, the warmer the outdoor air temperature is, the lower the boiler water temperatures. The control automatically shuts-off the boiler at the given outdoor air temperature. |
| VERIFICATION: | Enrollment Review: Provide mechanical plan note(s), mechanical equipment schedule, and/or specifications identifying the outdoor boiler reset control with automatic cut-off for all provided boilers (90% or greater AFUE boilers only). Certification Review: None. |

223 Air Conditioning

223.1

FEATURE: SEER 14 or greater air conditioner (with R410A or other non-HCFC refrigerant)

POINT VALUE: 7

DESCRIPTION: To receive these points, the project must provide an air conditioning system with a seasonal energy efficiency ratio (SEER) of 14 or greater which utilizes a non-HCFC refrigerant (such R410A). Required system cooling efficiencies for several additional air conditioning system types are listed in Table 223.1. All systems must use non-HCFC refrigerants to comply.

Typical central air conditioning units are assigned an efficiency rating known as its “seasonal energy efficiency ratio” (SEER). The SEER is defined as the total cooling output (in British thermal units or Btu) provided by the unit during its normal annual usage period divided by its total energy input (in watt-hours) during the same period. Currently, all air conditioning units are required to have a minimum SEER of 13. Central air conditioning units with SEER ratings of 18 or greater are currently available.

Table 223.1 Required system cooling efficiencies

| Central AC, Air Source Heat Pumps | Open Loop GSHP | Closed Loop GSHP | Direct Expansion GSHP |
|-----------------------------------|----------------|------------------|-----------------------|
| 14 SEER | 17.8 EER | 15.5 EER | 16.5 EER |

A group of chemicals called hydrogenated CFCs (HCFCs) have ozone-depleting potentials ranging from about half to less than 1% of that of chlorofluorocarbons (CFCs). CFCs have been banned due their destructive impact on the earth’s ozone layer. Newer alternatives such as R410A (also know as Puron) are free of chlorine and thus have no negative effect on the ozone layer.

VERIFICATION: **Enrollment Review:** Provide mechanical plan note(s), mechanical equipment schedule, and/or specifications identifying the type and efficiency for all provided air conditioning systems. System cooling efficiencies must be equal to or greater than those listed in Table 223.1.

Certification Review: None.

ADDITIONAL INFO: ENERGY STAR® Program – Heating and Cooling Efficiency:
www.energystar.gov/index.cfm?c=heat_cool.pr_hvac

Consortium for Energy Efficiency and the American Refrigeration Institute:
www.ceehvacdirectory.org

223.2

| | |
|-------------------------|--|
| FEATURE: | Multi-stage condensing unit for air conditioning |
| POINT VALUE: | 4 |
| DESCRIPTION: | <p>To receive these points, the project must include multi-stage condensing units on all provided air conditioning systems.</p> <p>Multi-stage condensing units allow an air conditioner to operate at more than one output level, which prevents short cycling and therefore maximizes the unit's durability while increasing comfort levels in the home.</p> |
| VERIFICATION: | <p>Enrollment Review: Provide mechanical plan note(s), mechanical equipment schedule, and/or specifications identifying the multi-stage condensing units for all provided air conditioning systems.</p> <p>Certification Review: None.</p> |
| ADDITIONAL INFO: | <p>ENERGY STAR® Program – Heating and Cooling Efficiency: www.energystar.gov/index.cfm?c=heat_cool.pr_hvac</p> <p>Consortium for Energy Efficiency and the American Refrigeration Institute: www.ceehvacdirectory.org</p> |

224 Other

224.1

| | |
|----------------------|---|
| FEATURE: | Locate individual or central furnace/boiler to middle 1/3 of building or unit |
| POINT VALUE: | 6 |
| DESCRIPTION: | <p>To receive these points, the project must locate the furnace and boiler within the middle 1/3 of the unit or building. Locating the furnace and/or boiler in middle 1/3 of a building or unit can maximize the efficiency of the distribution system. Although somewhat subjective, a furnace or boiler located in a corner of the building would not qualify.</p> <p>Straight, short distribution runs, especially for ducts, maximize the efficiency of the system. Some builders have found material savings in placing heating registers on interior walls instead of the traditional placement on exterior walls (i.e. below windows). With a thermally efficient building shell (i.e., good insulation, well air-sealed home and high-performance windows), the comfort issues that informed this feature are not as critical.</p> |
| VERIFICATION: | <p>Enrollment Review: Provide mechanical plans, plan note(s), and/or specifications identifying the location of all provided furnaces and/or boilers with the building or unit(s).</p> <p>Certification Review: None.</p> |

224.2

FEATURE: Use passive or energy-efficient assisted stack ventilation within the building or unit

POINT VALUE: 7

DESCRIPTION: To receive these points, the project must provide at least one of the following stack ventilation strategies for the building or at least 50% of individual units within a multi-unit building.

- Operable clerestory windows or skylights (passive stack ventilation)
- Solar-powered “whole house” ventilating fan
- Energy Star qualified “whole house” ventilating fan



A clerestory is a high wall with a band of glazing along the very top. The clerestory wall usually rises above adjoining roofs allowing both daylight and sunlight into the space. Operable clerestory windows and/or operable skylights are commonly used to provide natural or passive stack ventilation.

A ventilating fan is installed at the highest point possible in the home or unit, with a properly sized exhaust area. Ventilating fans can quickly purge warm indoor air during the cooling season by drawing in cooler air after outdoor temperatures drop below indoor air temperatures in the early evening, and are dramatically less expensive to operate than an air conditioner. An insulated and air sealed enclosure must be provided for the heating season.

VERIFICATION: **Enrollment Review:** Provide mechanical plans, plan note(s), building sections, and/or specifications identifying the location of all provided operable clerestory windows or skylights, or solar powered or energy star qualified ventilation fans. Accepted stack ventilation strategies must be provided for at least 50% of individual units within a multi-unit building to comply.

Certification Review: None.

ADDITIONAL INFO: Built Green® Colorado: www.builtgreen.org

“The Passive Solar Energy Book” by Edward Mazria

ENERGY STAR® Program – Qualified Ventilating Fans:
http://www.energystar.gov/index.cfm?c=vent_fans.pr_vent_fans

224.3

FEATURE: ENERGY STAR® qualified programmable thermostat

POINT VALUE: 3

DESCRIPTION: To receive these points, the project must provide a 7-day programmable setback thermostat for all heating and air cooling systems and zones.

A programmable setback thermostat can save a significant amount of energy when properly used (1% percent savings for each degree setback). Providing clear instructions to – or demonstrating its operation for – the building owners/occupants will help ensure proper operation (see feature 610.R1).



ENERGY STAR® qualified thermostats meet strict energy efficiency guidelines. These units save energy by offering four convenient, pre-programmed temperature settings – settings that try to anticipate when it's convenient to scale back on heating or cooling.

VERIFICATION: **Enrollment Review:** Provide mechanical plan note(s) and/or specifications identifying the Energy Star qualified 7-day programmable setback thermostats for all provided heating and cooling systems and zones.

Certification Review: None.

ADDITIONAL INFO: Built Green® Colorado: www.builtgreen.org

ENERGY STAR® Program – Qualified Thermostats:
www.energystar.gov/index.cfm?c=thermostats.pr_thermostats

224.4

FEATURE: Zoned heating and/or cooling within unit (Zones < 1000sf)

POINT VALUE: 5 points possible

- 5 Zoned heating and/or cooling with separate systems,
OR
- 5 Single heating and/or cooling system with multiple thermostats

DESCRIPTION: To receive these points, the project must provide zoned heating and/or cooling. Zoning may be achieved in one of two fashions. Separate heating/cooling systems condition separate areas of the home. For example, a heating system installed on the second floor may condition that part of the home and the heating system located in the basement conditions the basement and first floor. Zoned heating systems send heat to only the rooms or zones calling for heat. Zoned systems can provide energy savings when zones are properly adjusted for the conditions of the room (occupancy, appropriate comfort levels, etc.).

Alternately, one heating system may condition the entire home with multiple thermostats controlling individual spaces or zones. Hydronic systems are particularly well suited for this type

of zoned heating. Points may also be taken for slab sensors attached to thermostats for hydronic slab heating systems.

Zones must be less than 1000 square feet to comply with this feature.

VERIFICATION: **Enrollment Review:** Provide mechanical plans, plan note(s), and/or specifications identifying the location and size (sf) of all zoned heating and/or cooling provided.

Certification Review: None.

ADDITIONAL INFO: Built Green® Colorado: www.builtgreen.org

224.5

FEATURE: ENERGY STAR® qualified ceiling fans

POINT VALUE: 6 points possible

- 3 One ENERGY STAR® qualified ceiling fan installed
- OR
- 6 Two ENERGY STAR® qualified ceiling fans installed

DESCRIPTION: To receive these points, the project must provide either one or two installed Energy Star ceiling fans. Ceiling fans can keep occupants cool during warmer days without requiring air conditioning, or can allow air conditioning set points to be raised without sacrificing comfort. Ceiling fans mix the air that tends to stratify with warmer air near the ceiling, and are particularly effective in vaulted areas.

Points can be taken for ENERGY STAR® ceiling fans installed in one or both of the required two rooms for all units (typically the master bedroom and living room).

ENERGY STAR® rated fans move air up to 20% more efficiently than standard ceiling fans. Savings between \$15-25 per year on utility bills may be achieved, plus any additional air conditioning or heating savings gained by using the fan.



VERIFICATION: **Enrollment Review:** Provide plan note, fixture schedule, or specification identifying the Energy Star qualified ceiling fans to be installed. Ceiling fan locations should be noted on plans.

Certification Review: None.

ADDITIONAL INFO: Built Green® Colorado: www.builtgreen.org

ENERGY STAR® Program – Qualified Ceiling Fans:
www.energystar.gov/index.cfm?c=ceiling_fans.pr_ceiling_fans

224.6

FEATURE: Building automation system (BAS)

POINT VALUE: 15

DESCRIPTION: To receive these points, the project must include a building automation system (BAS). A building automation system provides for the ongoing accountability and performance optimization of building energy and water consumption systems over time. A building automation system should include monitoring of the following building systems:

- Lighting systems and controls
- Constant and variable motor loads
- Variable frequency drive (VFD) operation
- Chiller efficiency at variable loads (kW/ton)
- Cooling load
- Air and water economizer and heat recovery cycles
- Air distribution static pressures and ventilation air volumes
- Boiler efficiencies
- Building-related process energy systems and equipment
- Indoor water risers and outdoor irrigation systems

VERIFICATION: **Enrollment Review:** Provide mechanical plans, plan note(s), and/or specifications identifying the building automation system and the building systems controlled and/or monitored.

Certification Review: None.

ADDITIONAL INFO: US Green Building Council - LEED-NC version 2.2: www.usgbc.org

224.7

FEATURE: ENERGY STAR® qualified rooftop HVAC units

POINT VALUE: 10

DESCRIPTION: To receive these points, the project must provide Energy Star qualified rooftop units. A rooftop unit (RTU) is a factory-fabricated HVAC assembly consisting of fan, coils, filters, and other necessary equipment used to circulate, clean, heat, cool, humidify, dehumidify, and mix air.

ENERGY STAR® qualified rooftop units (RTU) will use 7% to 10% less energy than standard RTUs. According to the Consortium of Energy Efficiency, at least 25% of all rooftop HVAC units are oversized, resulting in increased energy costs and equipment wear. Properly sized equipment dramatically cuts energy costs, increases the life of the equipment and reduces pollution.

VERIFICATION: **Enrollment Review:** Provide mechanical plans, mechanical equipment schedule, and/or specifications identifying the Energy Star qualified rooftop HVAC units.

Certification Review: None.

ADDITIONAL INFO: ENERGY STAR®: www.energystar.gov

230 Water Heating

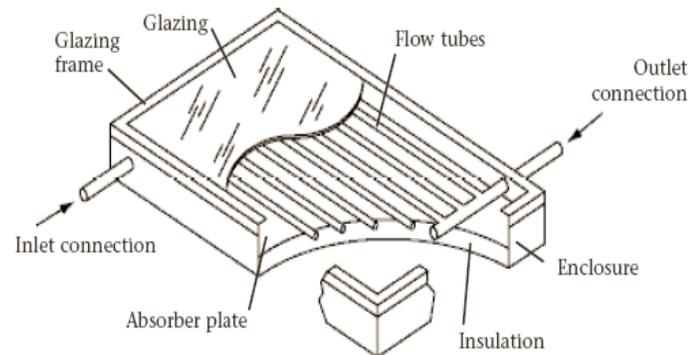
230.1

FEATURE: Solar domestic hot water system ($\geq 50\%$ of annual hot water needs)

POINT VALUE: 20

DESCRIPTION: To receive these points, the project must include a solar domestic hot water system designed to provide at least 50% of the annual hot water needs.

A well-designed solar water heating system of about 80 ft² (about two panels) can provide about 50% of the annual hot water needs of a typical family in Chicago. During the summer, the solar contribution to hot water is much higher whereas it is much lower during the winter. There are several generic types of solar water heaters, including pumped flat-plate collector systems, thermo-siphoning flat-plate collector systems, and integral-collector-storage or "batch" systems. The flat-plate collector system is most appropriate for Chicago.



To optimize annual performance for a domestic hot water system, solar collectors should be tilted at an angle equal to the local latitude. For Chicago the optimum mounting angle is around 42 degrees from horizontal.

In a pumped flat-plate collector solar water heater, either water and/or a non-freezing solution is pumped through a collector, usually in copper tubing on a black absorber surface in an insulated box glazed with high-solar-transmission glass. These solar-heated fluids in turn heat potable water in a storage tank via another pump and heat exchanger. Generally, the solar domestic hot water system serves as a pre-heater for a conventional storage-type water heater.

This credit applies only to solar domestic hot water systems. For active solar space heating, see feature 220.2

VERIFICATION: **Enrollment Review:** Provide mechanical plans, mechanical equipment schedule, and/or specifications identifying the solar domestic hot water system designed to provide at least 50% of the annual hot water needs.

Certification Review: None.

ADDITIONAL INFO: Built Green® Colorado: www.builtgreen.org

Solar Rating and Certification Corporation (SRCC): www.solar-rating.org

National Renewable Energy Laboratory: www.nrel.gov

230.2

FEATURE: Provide rough-in for solar domestic hot water system

POINT VALUE: 7

DESCRIPTION: To receive these points, the project must provide a rough-in for future solar domestic hot water system application capable of providing at least 50% of the annual hot water needs. This feature reduces the cost of adding solar to the structure at a later time. The required components of the rough-in are as follows.

- A chase running from the attic (located under or near a south-facing roof with good solar exposure) to the location of the furnace/water heater (chase must penetrate the building envelope and be air-sealed and insulated in the attic until needed)
- Floor space adjacent to the furnace/water heater for the installation of a storage tank
- Supply and return pipes of sufficient diameter for collectors that will provide at least 50% of the annual hot water needs – the pipes are to be insulated and located in a chase for later plumbing connections

VERIFICATION: **Enrollment Review:** Provide mechanical plans, plan note(s), and/or specifications identifying the rough-in requirements for a future solar domestic hot water system designed to provide at least 50% of the annual hot water needs.

Certification Review: None.

ADDITIONAL INFO: Solar Rating and Certification Corporation (SRCC): www.solar-rating.org

National Renewable Energy Laboratory: www.nrel.gov

230.3

FEATURE: Water heater (0.62 or greater EF)

POINT VALUE: 5 points possible

- 3 Standard storage type gas water heater
- OR
- 5 Direct-vent sealed-combustion standard storage type gas water heater

DESCRIPTION: To receive these points, the project must include either a standard storage type gas water heater with an Energy Factor (EF) of 0.62 or greater or a direct-vent sealed-combustion standard storage type gas water heater with an Energy Factor (EF) of 0.62 as listed by the Gas Appliance Manufacturers Association (GAMA).

A direct-vent sealed-combustion water heater brings air directly into a combustion chamber without mixing with house air. A sealed-combustion heater does not need a chimney, since its exhaust gases are blown from the side of the house with a fan. This eliminates the potential danger of the unit back-drafting into the house. This type of water heater is often referred simply as "direct vent". Care should be taken to avoid placing the exhaust pipe over walks or stairs, as the condensate will freeze during the winter creating a safety hazard. Note that this is not a power vented water heater. A power vented water heater may be vented out the side of a house, but still use indoor air for combustion.

VERIFICATION: **Enrollment Review:** Provide mechanical plans, mechanical equipment schedule, and/or specifications identifying the standard storage type (direct-vent sealed-combustion or not) hot water heater and its Energy Factor rating.

Certification Review: None.

ADDITIONAL INFO: Gas Appliance Manufacturers Association: www.gamanet.org

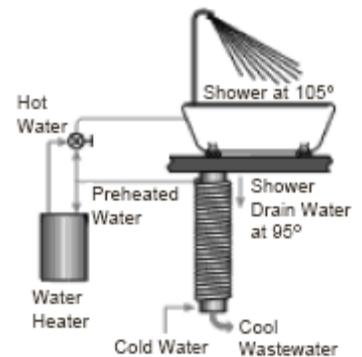
230.4

FEATURE: Drain waste heat recovery system

POINT VALUE: 3

DESCRIPTION: To receive these points, the project must include a drain waste heat recovery system.

Drain waste heat recovery devices pre-heat cold water supply to the water heater with heat from the water draining out of the shower. They result in increased capacities for hot water while simultaneously increasing the efficiency of the water heater and saving energy.



VERIFICATION: **Enrollment Review:** Provide mechanical plans, mechanical equipment schedule, and/or specifications identifying the drain waste heat recovery system.

Certification Review: None.

ADDITIONAL INFO: WaterFilm Energy, Inc - Drain Heat Recovery Systems: www.gfxtechnology.com/contents.html

230.5

FEATURE: Tankless water heaters

POINT VALUE: 10 points possible

- 10 Direct vent or power vented gas-fired tankless water heater (≥ 0.8 EF)
- OR
- 10 Electric tankless water heater ($\geq .99$ EF)

DESCRIPTION: To receive these points, the project must include either a direct vent or power vented gas-fired tankless water heater with a rated Energy Factor of 0.8 or an electric tankless water heater with a rated Energy Factor of 0.99.

Water in a standard storage tank water heater is maintained at a high temperature 24 hours a day, even though hot water may be required for a fraction of that time. Heat is lost through the tank shell while being stored for use. Consequently, water is heated periodically throughout the day to make-up for this standby loss. As a result of standby losses, standard storage tank water heaters are generally inefficient.



“Tankless” water heaters eliminate the tank and associated standby losses. Water is heated as it is needed. Consequently, tankless heaters can offer significant improvements in efficiency and performance.

Points for tankless water heaters may be taken in combination with a solar domestic hot water system (feature 230.1) if water from the solar collectors’ storage tank feeds into the tankless heaters thereby reducing the temperature rise needed in the tankless heaters.

VERIFICATION:

Enrollment Review: Provide mechanical plans, mechanical equipment schedule, and/or specifications identifying the tankless (gas or electric) hot water heater and its Energy Factor rating.

Certification Review: None.

ADDITIONAL INFO:

There are several considerations to address in selecting a tankless water heater. Tankless water heaters use larger amounts of energy as the water flow rate increases through them. These large draws often require a larger-than-normal service entrance for electric units or larger pipe diameter for gas units. However, by having no reservoir of hot water, tankless water heaters eliminate standby losses making them more efficient than typical tank-type water heaters.

Gas Appliance Manufacturers Association: www.gamanet.org

230.6

FEATURE:

Point-of-use hot water system at farthest location from water heater

POINT VALUE:

2

DESCRIPTION:

To receive these points, the project must include a point-of-use hot water system to reduce water and energy use when a point of water use is far from the primary water heating source. A point-of-use hot water system is a small water heater, tank or tankless water heater that is designed to be installed at the point of use. A long pipe run may be eliminated if a small tankless heater is installed. They are mostly sized to supply hot water to one specific application, usually a sink, to provide instant hot water. A mini storage tank may also be used. When the faucet is opened, hot water from the mini-tank is drawn. Hot water from the water heater will have arrived by the time hot water from the tank has been used. This eliminates the wait for the hot water and saves water from being wasted down the drain waiting for the hot water to arrive. A common application is a remote bathroom in a home that typically takes too long to receive hot water.



VERIFICATION:

Enrollment Review: Provide mechanical plans, mechanical equipment schedule, and/or specifications identifying the point-of-use hot water system.

Certification Review: None.

230.7

| | |
|-------------------------|---|
| FEATURE: | Side-arm water heater off of boiler (88% or greater AFUE boilers only) |
| POINT VALUE: | 5 |
| DESCRIPTION: | To receive these points, the project must include a side-arm water heater connected to the boiler (88% or greater AFUE boilers only). Indirect (side-arm) water heaters use the home heating system's boiler to heat domestic hot water, which is stored in a separate insulated tank. Heat is transferred from the boiler using a small circulation pump and a heat exchanger to the separate insulated storage tank. The boiler used must have an annual flue utilization efficiency (AFUE) of 88%. The storage tank should be well insulated to minimize boiler cycling during the summer. |
| VERIFICATION: | Enrollment Review: Provide mechanical plans, mechanical equipment schedule, and/or specifications identifying the side-arm water heater on the boiler. Certification Review: None. |
| ADDITIONAL INFO: | Gas Appliance Manufacturers Association: www.gamanet.org |

230.8

| | |
|----------------------|--|
| FEATURE: | Water heater located near dishwasher and clothes washers (within 20 feet of each) |
| POINT VALUE: | 3 |
| DESCRIPTION: | To receive these points, the project must locate the water heater to facilitate short, insulated piping runs to bathrooms and kitchens. Locating the water heater within 20 feet of both the dishwasher and clothes washer reduces the waiting time for hot water, saving both water and energy. |
| VERIFICATION: | Enrollment Review: Provide mechanical plans, plan note(s), and/or specifications identifying the location of the water heater, dishwasher, and clothes washer to verify that they are each within 20 feet of one another. Certification Review: None. |

230.9

| | |
|---------------------|--|
| FEATURE: | Water pipe insulation |
| POINT VALUE: | 6 points possible |
| | 4 Insulate all hot water lines with standard flexible pipe insulation or better (R-3 in conditioned space, R-6 in unconditioned space) |
| | AND/OR |
| | 2 Insulate all cold water lines with standard flexible pipe insulation or better (R-3 in conditioned space, R-6 in unconditioned space) |

DESCRIPTION:

To receive these points, the project must insulate either all hot water pipes within the project (4 points) and/or all cold water pipes within the project (2 points). 6 points may be taken if all water pipes are insulated. Water pipes in outside areas (crawl spaces, garages, etc.) should be insulated with commercial-grade rigid insulation to reach at least R-6. Pipes in basements and other indoor areas should be wrapped with foam pipe insulation (approximately R-3).



Hot water pipe insulation saves energy in two ways. First, energy loss is reduced from the pipes when hot water flows through them. Secondly, energy is saved as the hot water sits in the pipes between draws. As a result, hot water gets to the tap more quickly resulting in less water going down the drain while one is waiting for the water to get hot.

Cold water pipe insulation reduces the potential for condensation-related problems.

VERIFICATION:

Enrollment Review: Provide plumbing plans, plan note(s), and/or specifications identifying the location and R-value of the water pipe insulation.

Certification Review: None.

240 Appliances

240.R1

FEATURE:

ENERGY STAR® qualified major appliances

POINT VALUE:

Required (when major appliances are provided)

DESCRIPTION:

In order to satisfy this requirement, the project must provide ENERGY STAR qualified major appliances when these appliances are included in the scope of work. Current ENERGY STAR qualified major appliances include:

- Refrigerators
- Dishwashers
- Clothes Washers
- Freezers
- Room Air Conditioners
- Dehumidifiers
- Room Air Cleaners



See feature 224.3 for ENERGY STAR® qualified programmable thermostats and feature 224.5 for ENERGY STAR® qualified ceiling fans.

VERIFICATION:

Enrollment Review: Provide plan note(s), appliance schedule(s), and/or specifications identifying the type and location of the provided Energy Star major appliances.

Certification Review: None.

ADDITIONAL INFO: ENERGY STAR® qualified refrigerator models use high efficiency compressors, improved insulation, and more precise temperature and defrost mechanisms to improve energy efficiency. ENERGY STAR® refrigerators use at least 15 percent less energy than required by current federal standards and 40 percent less energy than the conventional models sold in 2001. Many ENERGY STAR® refrigerators include automatic icemaker and through-the-door ice dispensers.

ENERGY STAR® qualified dishwashers use 25% less energy than the federal minimum standard for energy consumption. An ENERGY STAR® dishwasher saves about \$100 over its lifetime as they use less hot water compared to conventional models. A list of ENERGY STAR® dishwashers is available at the EPA ENERGY STAR® website.

ENERGY STAR® Program – Qualified Appliances:
www.energystar.gov/index.cfm?c=appliances.pr_appliances

240.1

FEATURE: Solar electric system (photovoltaic)

POINT VALUE: 50 points possible

- 10 ≥ 1200 watts DC installed (per unit)
- 20 ≥ 2400 watts DC installed (per unit)
- 30 ≥ 3600 watts DC installed (per unit)
- 40 ≥ 4800 watts DC installed (per unit)
- 50 ≥ 6000 watts DC installed (per unit)

DESCRIPTION: To receive these points, the project must include photovoltaic solar electric panels. Photovoltaic (PV) panels are used to help meet the electric load of the home or dwelling unit. 10 points may be taken for every 1200 watts DC installed (1200 watts DC converts to about 1000 watts AC).

If energy efficient appliances are installed, the solar electric system can be smaller and less expensive and will meet a greater part of the electric load. For example, in an average-sized home with energy efficient appliances and lighting, a 1000 watt photovoltaic system may provide about 20% of the home’s annual electricity needs.



The PV system may be connected to the utility grid. This means that batteries are not required. Whatever extra solar electricity is generated is fed back to the utility, and any extra needed by the occupants is drawn from the utility as in a typical house. This credit applies only to solar electric systems. For active solar space heating see feature 220.2, and for solar domestic water heating see feature 230.1.

VERIFICATION: **Enrollment Review:** Provide plan note(s), electrical equipment schedule, and/or specifications identifying the components and total wattage of the photovoltaic system design.

Certification Review: None.

ADDITIONAL INFO: ComEd: www.exeloncorp.com

US Department of Energy, Energy Efficiency and Renewable Energy – Connecting Your System to the Electricity Grid:

apps1.eere.energy.gov/consumer/your_home/electricity/index.cfm/mytopic=10520

“A Consumer's Guide: Get Your Power from the Sun”: www.nrel.gov/docs/fy04osti/35297.pdf

Spire Solar: www.spirecorp.com/spire-solar

240.2

FEATURE: Provide rough-in for future photovoltaic or wind turbine system

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must include a rough-in for future building-mounted on-site renewable energy. This feature reduces the cost of adding a solar photovoltaic (PV) or wind energy system to the building at a later time. Rough-in for future on-site renewable energy (electricity) system must include the following.

- Building envelope penetration (air-sealed and insulated in the attic until needed)
- Installed conduit (3/4" diameter) between the attic and the electric panel box location
- Space provided near the panel box for an inverter

The conduit will provide a convenient pathway for wires connecting the PV panels or wind turbine to the inverter and panel box.

VERIFICATION: **Enrollment Review:** Provide plan note(s), electrical equipment schedule, and/or specifications identifying the rough-in components for on-site renewable energy.

Certification Review: None.

240.3

FEATURE: Wind turbine

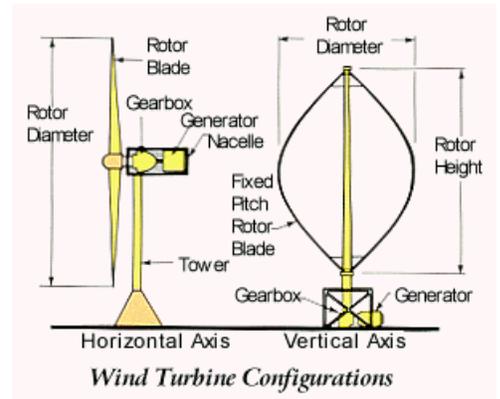
POINT VALUE: 50 points possible

| | |
|----|--------------------------------------|
| 5 | ≥ 0.5 kW system installed (per unit) |
| 10 | ≥ 1 kW system installed (per unit) |
| 20 | ≥ 2 kW system installed (per unit) |
| 30 | ≥ 3 kW system installed (per unit) |
| 40 | ≥ 4 kW system installed (per unit) |
| 50 | ≥ 5 kW system installed (per unit) |

DESCRIPTION:

To receive these points, the project must include an on-site wind turbine. Note that except for very small wind turbines, a residential wind turbine can be a relatively large device and may not be suitable for urban or small-lot suburban homes.

A wind turbine collects kinetic energy from the wind and converts it to electricity that is compatible with a building's electrical system. In a normal residential application, a building is served simultaneously by the wind turbine and a local utility. If the wind speeds are below cut-in speed (7-10 mph) there is no output from the turbine and all of the needed power is purchased from the utility. As wind speeds increase, turbine output increases and the amount of power purchased from the utility is proportionately decreased. When the turbine produces more power than the building needs, the extra electricity is sold to the utility. All of this is done automatically. There are no batteries in a modern residential wind system.



American Wind Energy Association (AWEA)

A small wind system can provide a practical source of electricity if:

- there is adequate space for a wind turbine,
- the property has a good access to wind,
- zoning codes or covenants allow wind turbines, and
- the owner is willing to accept a long-term investment.

VERIFICATION:

Enrollment Review: Provide plan note(s), electrical equipment schedule, and/or specifications identifying the wind turbine system design.

Certification Review: None.

ADDITIONAL INFO:

American Wind Energy Association: www.awea.org

"Small Wind Electric Systems – An Illinois Consumer’s Guide”:

www.eere.energy.gov/windandhydro/windpoweringamerica/pdfs/small_wind/small_wind_il.pdf

240.4

FEATURE:

Gas range with electronic ignition

POINT VALUE:

3

DESCRIPTION:

To receive these points, the project must include a gas range with electronic ignition (no standing pilot light). Applicant must provide appliance in order to receive these points.

VERIFICATION:

Enrollment Review: Provide plan note(s), appliance schedule, and/or specifications identifying the gas range with electronic ignition.

Certification Review: None.

240.5

| | |
|----------------------|--|
| FEATURE: | Provide gas rough-in for clothes dryer and/or range |
| POINT VALUE: | 3 |
| DESCRIPTION: | To receive these points, the project must include a gas rough-in for both the dryer area and kitchen range area in each unit to encourage the installation of gas appliances. Points may only be taken if a gas clothes dryer and/or range are not being provided. If neither appliance is provided, a rough-in for both locations is required to comply with this credit feature. |
| VERIFICATION: | Enrollment Review: Provide plan note(s) and/or specifications identifying the rough-in for gas clothes dryer and/or range in each unit. Certification Review: None. |

240.6

| | |
|-------------------------|---|
| FEATURE: | Provide energy efficient appliance list to owner/occupant |
| POINT VALUE: | 2 |
| DESCRIPTION: | <p>To receive these points, the project must include a list of energy efficient appliances (major and minor) for the building or unit owner/occupant when major appliances have not been provided. If major appliances are being provided, projects may <u>not</u> take points for this credit feature and <u>must</u> comply with required feature 240.R1.</p> <p>Each year, American home appliance use accounts for about 2 quadrillion Btu's of energy and costs consumers nearly \$44 billion, approximately 50% of total residential energy use in the United States.</p> <p>According to the EPA, if all households and businesses in the United States bought ENERGY STAR® labeled equipment instead of standard new equipment over the next 15 years, the nation's cumulative energy bill over that time would be reduced by nearly \$100 billion.</p> |
| VERIFICATION: | Enrollment Review: Identify this credit feature on the project's submitted CGH checklist. Certification Review: Provide a list of energy efficient appliances (major and minor) within or along with the required home manual (see feature 610.R1). |
| ADDITIONAL INFO: | ENERGY STAR®: www.energystar.gov |

250 Lighting

250.1

FEATURE: Solar-powered walkway or outdoor area lighting

POINT VALUE: 3

DESCRIPTION: To receive these points, the project must include outdoor walkway or path lighting with integral photovoltaic (PV) panels. The PV outdoor lighting can provide 50% or more of the outdoor lighting (wattage) requirement for a residential project. Using PV lighting can eliminate the need for exterior wiring to remote areas of the property that can result in cost-savings.



VERIFICATION: **Enrollment Review:** Provide plan note(s), electrical equipment schedule, and/or specifications identifying the outdoor walkway or path lighting with integral PV.

Certification Review: None.

ADDITIONAL INFO: PV lights are available through several home improvement centers, many photovoltaic vendors, and some national catalog companies.

250.2

FEATURE: Energy efficient lighting

POINT VALUE: 9 points possible

9 Install ENERGY STAR® Advanced Lighting Package (ALP)
OR

9 Install ENERGY STAR® qualified lamps (light bulbs) in 80% of fixtures

DESCRIPTION: To receive these points, the project must install lighting in compliance with one of the two energy efficient lighting options listed below (also see Table 250.2).

Install ENERGY STAR® Advanced Lighting Package (ALP) using only ENERGY STAR® qualified fixtures. The ALP consists of a minimum of 60% ENERGY STAR® qualified hard-wired fixtures (interior and exterior) and 100% ENERGY STAR® qualified ceiling fans (if any) in the home or unit.

OR

Install ENERGY STAR® qualified lamps (light bulbs) in at least 80% of the interior and exterior light fixtures included in the home or unit. ENERGY STAR® qualified CFLs are acceptable. All installed ceiling fans must be ENERGY STAR® qualified.

For either option, points may also be taken for feature 224.5.

VERIFICATION:

Enrollment Review: Provide plan note(s), lighting fixture schedule, and/or specifications identifying the components of the energy efficient lighting option selected.

Certification Review: None.

ADDITIONAL INFO: Table 250.2 Energy efficient lighting options

| Energy Efficient Lighting Option | Energy Star Qualified Interior & Exterior Fixtures/Lamps | Energy Star Qualified Ceiling Fans |
|-----------------------------------|--|------------------------------------|
| Advanced Lighting Package (9 pts) | 60% qualified hard-wired fixtures | 100% of installed ceiling fans |
| Energy Star Lamps (9 pts) | 80% of fixtures using qualified lamps | 100% of installed ceiling fans |

Homebuyers can expect to save energy and money through reduced lighting operating costs without any sacrifice on aesthetics by using ENERGY STAR® qualified fixtures and lamps.

ENERGY STAR® qualified lighting uses compact fluorescent lamps which use at least a third of the energy that standard lighting requires. ENERGY STAR® qualified lighting fixtures meet strict EPA guidelines for energy efficiency and produce warm, long-lasting light without slow starts or annoying flicker or hum. On average, qualified fixtures last 10 times longer than standard incandescent fixtures, needing replacement every seven years, compared with once every year for standard fixtures. In addition, ENERGY STAR® qualified lighting utilizing compact fluorescents generates about 70 percent less heat than standard incandescent lighting, which translates into reduced home cooling costs and added comfort during the summer months. Power plants generate the energy that powers most homes. Lowering energy use at home helps prevent greenhouse gas emissions and air pollutants at the source.

Additional energy savings can be achieved through the use of dimmer and occupant sensor controls (see feature 250.3).

ENERGY STAR® Program – Advanced Lighting Package (ALP):
www.energystar.gov/index.cfm?c=fixtures.alp_consumers

ENERGY STAR® Program – Qualified Lamps (Light Bulbs):
www.energystar.gov/index.cfm?c=cfls.pr_cfls

250.3

FEATURE: Automatic lighting control system

POINT VALUE: 6

DESCRIPTION: To receive these points, the project must provide an automated lighting control system. Automatic lighting control systems include occupancy sensors, timers or automatic dimming functions to save electricity. Photoelectric controls can adjust light output based on available daylight.

Automatic lighting control systems must be installed within common spaces and within each unit of a multi-family building in order to receive these points. With advanced controls, common areas must maintain a minimum level of 1 footcandle for all paths of egress at all times by emergency panel or emergency battery unit. In addition to using automatic lighting control



systems within common interior spaces, other types of controls such as motion detectors should be considered for use with exterior lighting to increase energy savings.

VERIFICATION: **Enrollment Review:** Provide plan note(s), lighting fixture schedule, and/or specifications identifying the automatic lighting control system components.

Certification Review: None.

ADDITIONAL INFO: Illuminating Engineering Society of North America: www.iesna.org

Lighting Research Center: www.lrc.rpi.edu

250.4

FEATURE: Recessed can lighting

POINT VALUE: 3 points possible

- 2 Use airtight, insulation contact (IC) rated recessed can lighting
- OR
- 3 No recessed can lighting

DESCRIPTION: To receive these points, the project must provide either insulation contact (IC) rated recessed can lighting (2 points) or use no recessed can lighting (3 points).

Recessed fixtures can be some of the worst locations for heat loss, and can also be sources of moisture problems, cold drafts and high energy bills. Standard recessed can lighting provides not only illumination, but unwanted air infiltration to and from the living space. Three points are provided if recessed can lights are not used.



If recessed lighting is used, the lighting must meet the Chicago Energy Conservation Code. The following is taken from Article 4 of the Code with respect to recessed lighting.

18-13-402.43 Recessed Lighting. Recessed luminaires installed in the building thermal envelope shall be sealed to limit air leakage between conditioned and unconditioned spaces by being:

1. IC-rated and labeled with enclosures that are sealed or gasketed to prevent air leakage to the ceiling cavity or unconditioned space; or
2. IC-rated and labeled as meeting ASTM E283 when tested at 1.57 psi (75 Pa) pressure differential with no more than 2.0 cfm (0.944 Us) of air movement from the conditioned space to the ceiling cavity; or
3. Located inside an airtight sealed box with clearances of at least 0.5 inch (12.7 mm) from combustible material and 3 inches (76 mm) from insulation.

Two points are given for compliance with Chicago Energy Conservation Code requirement option 2 above. Points are not given for compliance with requirement options 1 and 3.

VERIFICATION: **Enrollment Review:** Provide plan note(s), lighting fixture schedule, and/or specifications identifying that either all recessed can lighting will be IC rated in accordance with ASTM 283 or that no recessed can lighting will be used.

Certification Review: None.

250.5

FEATURE: **Purchase Renewable Energy Certificates (one year)**

POINT VALUE: **8**

DESCRIPTION: To receive these points, the project must purchase green-E certified Renewable Energy Certificates to cover one year of the project's electrical usage.

Renewable energy, such as wind power, is a pollution-free alternative to conventional fossil-fuel power plants.

Renewable Energy Certificates (RECs) are available through green-E (www.green-E.org) from a variety of organizations.

VERIFICATION: **Enrollment Review:** Identify the name of the organization from which the green-E certified REC has been (or will be) obtained.

Certification Review: Provide a letter or contract verifying that a one-year Renewable Energy Certificate (REC) has been (or will be) purchased within or along with the required home manual (see feature 610.R1).

ADDITIONAL INFO: Green-E certified renewable energy: www.green-E.org

Renewable Choice Energy: www.renewablechoice.com/residential.html

Green Power Network: apps3.eere.energy.gov/greenpower/about/index.shtml

250.6

FEATURE: **Light colored interior walls, ceiling and soffits**

POINT VALUE: **1**

DESCRIPTION: To receive this point, the project must provide light colored interior walls, ceilings, and soffits in all significant living areas and common spaces to enhance natural daylighting.

Significant living areas are areas which would be occupied frequently during the day such as family rooms, offices, and kitchens. Areas excluded from this calculation would be service areas, toilet rooms, and individual bedrooms.

VERIFICATION: **Enrollment Review:** Provide plan note(s), lighting fixture schedule, and/or specifications identifying that either all recessed can lighting will be IC rated in accordance with ASTM 283 or that no recessed can lighting will be used.

Certification Review: None.

250.7

FEATURE: Light shelves (50% minimum of significant living areas)

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must provide light shelves for at least 50% of significant living areas.

Light shelves are ledges that extend out between upper (typically daylight glazing) and lower (typically vision glazing) portions of windows, either on the interior or exterior of the building. Light shelves reflect sunlight through the upper windows onto the ceiling inside, where the light is diffused and reflected back down over the space providing a soft, natural light. The top of the light shelf must be white and should be designed to promote periodic cleaning. On summer days, exterior light shelves help shade the lower windows. Light shelves are commonly most effective on north and south facing windows.



Significant living areas are areas which would be occupied frequently during the day such as family rooms, offices, and kitchens. Areas excluded from this calculation would be service areas, toilet rooms, and individual bedrooms.

Points may also be taken for feature 210.6, "Provide overhangs and/or shading devices to reduce summer solar heat gain through south-facing windows". Light shelves also work well with item 250.3, "Automatic lighting control system".

VERIFICATION: **Enrollment Review:** Provide plans, plan note(s), wall sections, and/or specifications identifying that light shelves will be provided for at least 50% of significant living areas.

Certification Review: None.

ADDITIONAL INFO: US Department of Energy, Energy Efficiency and Renewable Energy: www.eere.energy.gov/

250.8

FEATURE: Skylights/light tubes (U-value $\leq .65$; provided for $\geq 25\%$ of significant living areas)

POINT VALUE: 5

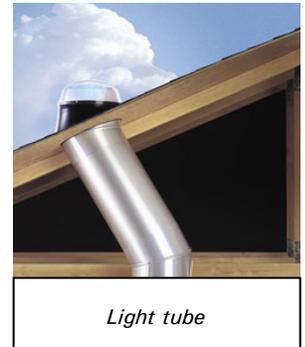
DESCRIPTION: To receive these points, the project must provide skylights or light tubes with a unit/assembly U-value of .65 or less for at least 25% of significant living areas.

The use of natural day lighting reduces eyestrain, increases productivity, and lessens electrical demand. Skylights and light tubes are two potential technologies which capitalize on natural light for interior day lighting.

Skylights are essentially windows in the roof with frames designed and flashed to withstand the rigors of rainfall that a roof typically receives.

Light tubes consist of a round tube lined with a highly reflective material which leads the light rays through a building, starting from an entrance-point located on its roof or one of its outer walls. The entrance point is usually comprised of a dome or diamond-shaped light collector, which functions to collect and reflect as much sunlight into the tube as possible. At the end point (the point of use), a diffuser spreads the light into the room.

Significant living areas are areas which would be occupied frequently during the day such as family rooms, offices, and kitchens. Areas excluded from this calculation would be service areas, toilet rooms, and individual bedrooms.



VERIFICATION: **Enrollment Review:** Provide plans (roof and floor), wall sections, and/or specifications identifying that skylights and/or light tubes will be provided for at least 25% of significant living areas.

Certification Review: None.

ADDITIONAL INFO: Energy Star – Windows, Doors, and Skylights:
www.energystar.gov/index.cfm?c=windows_doors.pr_windows

Solatube: www.solatube.com/

260 Elevators

260.1

FEATURE:

Elevators

This feature is only applicable to multi-family new and renovation projects.

POINT VALUE:

15 points possible

- 2 per hydraulic elevator using biodegradable fluids (maximum 3 elevators)**
OR
5 per gearless elevator (maximum 3 elevators)

DESCRIPTION:

To receive these points, the project must provide either hydraulic elevators using biodegradable fluids (up to 6 points) or gearless elevators – also known as machine-room-less elevators (up to 15 points).

Points are provided for elevators using gearless, permanent-magnet motors using variable-speed, variable-frequency drives in place of hydraulic and geared traction type elevators. Elevators with gearless motors with variable-frequency drives are significantly more energy efficient than hydraulic and standard geared elevators. Gearless elevators require no machine room and are often referred to as machine-room-less elevators. Points are provided for a maximum of three elevators.

Points are also provided if standard hydraulic elevators are used, but a vegetable-based biodegradable hydraulic oil is used in place of standard petroleum-based hydraulic oil. Points are provided for a maximum of three elevators.

VERIFICATION:

Enrollment Review: Provide plans, plan note(s), equipment schedules, and/or specifications identifying that either hydraulic elevators using biodegradable fluids or gearless elevators are provided.

Certification Review: None.

ADDITIONAL INFO:

“The Elevator Revolution”, Environmental Building News August 2004: www.buildinggreen.com

300 Materials

310 Foundation

310.1

FEATURE: Coal fly ash (class 'C') concrete

POINT VALUE: 2

DESCRIPTION: To receive these points, the project must include concrete that contains a minimum of 15% fly ash for use in all foundation walls, flat work and site improvements. The use of fly ash to replace a portion of cement in the concrete mix provides both environmental and performance benefits. Using fly ash in concrete substantially reduces the embodied energy and CO₂ emissions and results in stronger and more durable concrete.

VERIFICATION: **Enrollment Review:** Provide plan note(s) and/or specifications identifying a minimum of 15% fly ash (in place of portland cement) concrete for use in all foundation walls, flat work and site improvements.

Certification Review: None

ADDITIONAL INFO: Environmental Building News, vol. 8 no. 6: www.buildinggreen.com

Green Building Source, *Green Product Information*: oikos.com/green_products

U.S. Environmental Protection Agency (EPA), *Comprehensive Procurement Guidelines*: www.epa.gov/cpg/

310.2

FEATURE: Recycled concrete or glass cullet for concrete aggregate

POINT VALUE: 2

DESCRIPTION: To receive these points, the project must use recycled concrete or glass cullet for concrete aggregate.

VERIFICATION: **Enrollment Review:** Provide plan note(s) and/or specifications identifying recycled concrete or glass cullet used for concrete aggregate.



www.tennwaste.com

www.glasscullet.com

Certification Review: None.

ADDITIONAL INFO: Availability varies, but use of these materials diverts solid waste from landfills.

310.3

FEATURE: Solvent-free damp proofing

POINT VALUE: 1

DESCRIPTION: To receive these points, the project must use solvent-free damp proofing on all sub-grade foundation surfaces. Some materials may have seasonal considerations. Most asphalt-based damp proofing contains solvents, but solvent-free asphalt products are available.

VERIFICATION: **Enrollment Review:** Provide plan note(s) and/or specifications identifying solvent-free damp proofing.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News; www.buildinggreen.com

310.4

FEATURE: Aluminum foundation forms

POINT VALUE: 2

DESCRIPTION: To receive these points, the project must use reusable aluminum foundation forms for new foundation formwork framing to minimize the amount of construction waste.

VERIFICATION: **Enrollment Review:** Provide plan note(s) and/or specifications identifying aluminum foundation form for all new foundation formwork framing.

Certification Review: None.

ADDITIONAL INFO: Portland Cement Association: www.cement.org



Portland Cement Association

310.5

FEATURE: Recycled-content expansion joint filler ($\geq 50\%$ recycled content)

POINT VALUE: 1

DESCRIPTION: To receive these points, the project must use joint filler containing at least 50% recycled content. Traditionally, the resilient materials used for expansion joint filler are made from fiber board, rubber, vinyl, cork or soft woods. Specifying products containing recycled content conserves virgin resources.



VERIFICATION: **Enrollment Review:** Provide plan note(s) and/or specifications identifying recycled-content joint filler.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News; www.buildinggreen.com

310.6

| | |
|-------------------------|--|
| FEATURE: | Use vegetable oil release agents on all forms used for concrete |
| POINT VALUE: | 2 |
| DESCRIPTION: | To receive these points, the project must use vegetable oil release agents on all concrete forms for new concrete work. Traditional coatings used for concrete form release are petroleum based products which can contain high levels of volatile organic compounds (VOCs), and can cause health and environmental problems. Vegetable oil based alternatives are now available that are biodegradable and low-VOC. |
| VERIFICATION: | Enrollment Review: Provide plan note(s) and/or specifications identifying vegetable oil release agents for all concrete formwork. Certification Review: None. |
| ADDITIONAL INFO: | GreenSpec®, Environmental Building News: www.buildinggreen.com |

320 Structural Frame

321 Above-grade wall systems

321.1 See features 321.1.1 through 321.1.5 below. Only one of the following features may be submitted for points under item 321.1

321.1.1

| | |
|-------------------------|---|
| FEATURE: | Engineered wood for exterior wall framing (≥90% of exterior stud-framed wall area) |
| POINT VALUE: | 7 |
| DESCRIPTION: | To receive these points, the project must use engineered stud material (in place of dimensional lumber) for at least 90% of the exterior stud-framed wall area. Engineered studs have excellent stability and consistency in straightness. They can be used in areas where straight studs are critical, like kitchens (for cabinet base) and two-story walls. Engineered lumber and components meet or exceed the performance of solid lumber products, and are resource conserving. Smaller trees are used, and there is little or no waste involved in the production and end use of the products. |
| VERIFICATION: | Enrollment Review: Provide plan note(s) and/or specifications identifying engineered wood for use for at least 90% of the exterior stud-framed wall area. Certification Review: None. |
| ADDITIONAL INFO: | GreenSpec®, Environmental Building News: www.buildinggreen.com |

-OR-

321.1.2

FEATURE: Insulated concrete forms (ICFs) ($\geq 80\%$ of conditioned wall area above grade)

POINT VALUE: 11

DESCRIPTION: To receive these points, the project must use insulated concrete forms (or similar reinforced cementitious foam-filled walls) for at least 80% of the conditioned wall area above grade.

Insulating concrete forms (ICFs) provide a labor-efficient means of building insulated poured concrete walls, floors and roof decks. ICFs are permanent forms with integral insulation—they aren't disassembled after the concrete has cured. Most of these products are made from expanded polystyrene (EPS) foam produced with a non-ozone-depleting blowing agent. Other permanent forms are made from a composite of wood waste and cement or of EPS beads and cement. The environmental advantages of ICF walls include higher R-values and reduced concrete content compared with conventionally formed concrete walls.



AMVIC Building System website

VERIFICATION: **Enrollment Review:** Provide plan note(s) and/or specifications identifying insulated concrete forms (or similar reinforced cementitious foam-filled walls) for use in at least 80% of the conditioned wall area above grade.

Certification Review: None.

ADDITIONAL INFO: Be aware that the R-values claimed by ICF manufacturers are not arrived at in a consistent manner and may be misleading. For comparison purposes, "steady-state" R-values should be used when that information is available. Mass-enhanced or "effective" R-values are only relevant in certain climates or under certain conditions, but they're often listed in product literature. Some EPS foams used in ICFs contain borates to protect against possible damage from wood-boring insects.

ICF Web: www.icfweb.com

Portland Cement Association: www.cement.org

GreenSpec®, Environmental Building News: www.buildinggreen.com

-OR-

321.1.3

FEATURE: Precast insulated concrete panels ($\geq 80\%$ of conditioned wall area above grade)

POINT VALUE: 11

DESCRIPTION: To receive these points, the project must use precast insulated concrete panels for at least 80% of the conditioned wall area above grade.

Precast insulated panels consist of a layer of insulation between two layers of concrete. The typical panel is 8" thick with the insulation layer being 3¼" thick and each layer of concrete being 2" thick. Panels can also be built being 10" or 12" thick.

Window and door openings are cast into the walls at the manufacturing plant as well as electrical boxes and conduit. The exterior can be painted or stained to achieve a desired texture or color. The interior is drywall smooth and requiring only priming and painting.



Portland Cement Association

Another type of panel is site-finished insulating concrete panels. These panels consist of an insulated core with a pre-engineered reinforcing cage surrounding the insulation. The panels are fastened together in the field and a minimum 1 ½" thick cement finish is machine or hand-applied on both sides of the panel. Panels are available up to 12' by 48' in 3" to 20" thicknesses.

VERIFICATION:

Enrollment Review: Provide plan note(s) and/or specifications identifying precast insulated concrete panels (or site-finished insulated concrete panels) for use in at least 80% of the conditioned wall area above grade.

Certification Review: None.

ADDITIONAL INFO:

Be aware that the R-values claimed by manufacturers are not arrived at in a consistent manner and may be misleading. For comparison purposes, "steady-state" R-values should be used when that information is available. Mass-enhanced or "effective" R-values are only relevant in certain climates or under certain conditions, but they're often listed in product literature.

Portland Cement Association: www.cement.org

Dukane Precast: www.dukaneprecast.com

GreenSpec®, Environmental Building News: www.buildinggreen.com

-OR-

321.1.4

FEATURE:

Advanced framing techniques (e.g. 2 x 6 at 24" o.c.) (≥90% of exterior stud-framed wall area)

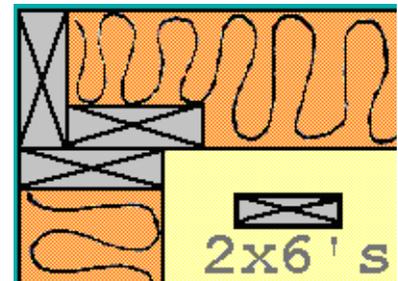
POINT VALUE:

20

DESCRIPTION:

To receive these points, the project must use advanced framing techniques – such as 2 x 6 wood studs at 24" o.c. – to reduce framing materials and provide for better insulation in all new exterior walls.

If 2 x 6 framing is used to comply with this feature both 2 x 6 wood studs at 24 inches on center in all walls and 2- or 3-stud corners are required. Engineered wood may also be used to comply with the advanced framing if the spacing and use contribute to reduction of required framing material and increased insulation potential (e.g. Vertical Engineered Wood I-Joists at 24" o.c.).



VERIFICATION: **Enrollment Review:** Provide plan note(s), framing plans, and/or specifications identifying the advanced framing techniques (e.g. 2 x 6 at 24" o.c.) for use in 90% of exterior stud-framed wall area.

Certification Review: None.

ADDITIONAL INFO: Optimum Value Engineering (OVE) techniques applied according to the technical specifications of the National Association of Home Builders and the Building Science Corporation are not required, but will exceed the intent of this feature. Material savings from this feature can be significant, particularly if the builder uses the NAHB or BSC techniques. In addition, there are energy improvements to be gained from fewer studs on exterior walls and from better insulation at 2-and 3-stud corners.

National Association of Home Builders: www.nahbrc.org

Building Science Corporation, RR-0201 - Using Wood Efficiently: From Optimizing Design to Minimizing the Dumpster: www.buildingscience.com/

-OR-

321.1.5

FEATURE: **Structural insulated panels (SIPs) ($\geq 75\%$ of conditioned wall area above grade)**

POINT VALUE: 25

DESCRIPTION: To receive these points, the project must use Structural Insulated Panels (SIPs) for at least 75% of the conditioned wall area above grade.

Structural Insulated Panels (SIPs) are typically made of foam insulation sandwiched between two panels made of OSB. They use less wood, reduce thermal bridging – creating a higher insulating value for the wall, and generate less waste than standard wood frame structures. Labor savings can also be realized in the construction of SIPs walls, offsetting the higher first cost of the material.

VERIFICATION: **Enrollment Review:** Provide plan note(s), framing plans, and/or specifications identifying the use of structural insulated panel (SIPs) construction for at least 75% of the conditioned wall area above grade.

Certification Review: None.

ADDITIONAL INFO: Structural Insulated Panel Association: www.sips.org



South Chicago Workforce

-OR-

321.1.6

| | |
|-------------------------|--|
| FEATURE: | Light-gauge steel studs for exterior wall framing ($\geq 90\%$ of exterior stud-framed wall area) |
| POINT VALUE: | 3 |
| DESCRIPTION: | To receive these points, the project must use light-gauge (a.k.a. cold-formed) steel studs for at least 90% of the exterior stud-framed wall area. |
| VERIFICATION: | Enrollment Review: Provide plan note(s), framing plans, and/or specifications identifying the use of light-gauge steel studs for at least 90% of the exterior stud-framed wall area Certification Review: None. |
| ADDITIONAL INFO: | GreenSpec®, Environmental Building News: www.buildinggreen.com |

321.2

| | |
|-------------------------|--|
| FEATURE: | FSC certified sustainably harvested lumber ($\geq 90\%$ of total stud wall area) |
| POINT VALUE: | 5 |
| DESCRIPTION: | To receive these points, the project must use dimensional or engineered lumber certified by the Forest Stewardship Council (FSC)-for at least 90% of total stud wall area (interior and exterior). |
| VERIFICATION: | Enrollment Review: Provide plan note(s), framing plans, and/or specifications identifying the use of FSC certified sustainably harvested lumber for at least 90% of the total stud wall area. Certification Review: None. |
| ADDITIONAL INFO: | <p>Most U.S. homes are constructed with wood framing. Although wood is a renewable resource, the amount of wood required for construction purposes is taxing the regenerative capabilities of this resource. The principles of sustainability favor forest management practices that retain natural forest ecosystems. Wood from old growth forests is not identified in final products, making the option of avoiding it very difficult. Most of the old growth trees are in Redwood and Douglas Fir regions; however, wood of these species exists that is not from old growth areas.</p> <p>Engineered wood products are cost competitive and may be less expensive than and structurally superior to dimensional lumber. Note that the cost of FSC certified sustainably harvested lumber may be higher than standard lumber and require additional lead time.</p> <p>The Forest Stewardship Council has introduced an international labeling scheme for forest products, which provides a credible guarantee that the product comes from a well-managed forest. All forest products with the FSC logo have been independently certified as coming from forests that meet the internationally recognized FSC Principles and Criteria of Forest Stewardship. The forest inspections are carried out by a number of FSC accredited certification bodies, which are evaluated and monitored to ensure their competence and credibility.</p> <p>Forest Stewardship Council: www.fscus.org</p> |

322 Roof Systems

322.1

See features 322.1.1 through 322.1.2 below. Only one of the following features may be submitted for points under item 322.1

322.1.1

FEATURE: Engineered wood for roof framing ($\geq 90\%$ of roof area)

POINT VALUE: 7

DESCRIPTION: To receive these points, the project must specify engineered wood (i.e. trusses, rafters, joists) to replace large dimension solid lumber (2x10 or greater) structure in 90% or more of roof area.

Engineered lumber and components meet or exceed the performance of solid lumber products, and are resource conserving. Smaller trees are used, and there is little or no waste involved in the production and end use of the products.

VERIFICATION: **Enrollment Review:** Provide plan note(s), framing plans, and/or specifications identifying engineered wood for use in the roof structure for at least 90% of the roof area.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News: www.buildinggreen.com

APA The Engineered Wood Association: www.apawood.org



Engineered Wood Association

-OR-

322.1.2

FEATURE: Structural insulated panels (SIPs) ($\geq 75\%$ of total roof area)

POINT VALUE: 10

DESCRIPTION: To receive these points, the project must use Structural Insulated Panels (SIPs) for at least 75% of the total roof area.

Structural Insulated Panels (SIPs) are typically made of foam insulation sandwiched between two panels made of OSB. They use less wood, reduce thermal bridging – creating a higher insulating value for the roof, and generate less waste than standard wood frame structures. Labor savings can also be realized in the construction of SIPs roofs, offsetting the higher first cost of the material.

VERIFICATION: **Enrollment Review:** Provide plan note(s), framing plans, and/or specifications identifying the use of structural insulated panel (SIPs) construction for at least 75% of the total roof area.

Certification Review: None.

ADDITIONAL INFO: Structural Insulated Panel Association: www.sips.org

322.2

| | |
|-------------------------|--|
| FEATURE: | FSC certified sustainably harvested lumber for roof framing (≥90% of roof area) |
| POINT VALUE: | 5 |
| DESCRIPTION: | To receive these points, the project must use dimensional or engineered lumber for the roof structure from Forest Stewardship Council (FSC) certified sustainably harvested sources for at least 90% of total roof area. |
| VERIFICATION: | <p>Enrollment Review: Provide plan note(s), framing plans, and/or specifications identifying the use of FSC certified sustainably harvested lumber for the roof structure of at least 90% of the total roof area.</p> <p>Certification Review: None.</p> |
| ADDITIONAL INFO: | <p>Forest Stewardship Council: www.fscus.org</p> <p>See “Additional Info” section of feature 321.2 for more information on FSC certified sustainably harvested lumber.</p> |

323 Floor Systems

323.1

| | |
|-------------------------|---|
| FEATURE: | Engineered wood for floor framing (≥90% of floor area) |
| POINT VALUE: | 7 |
| DESCRIPTION: | <p>To receive these points, the project must use engineered wood (i.e. trusses, joists) to replace large dimension solid lumber (2x10 or greater) structure in 90% or more of the floor area.</p> <p>Engineered lumber and components meet or exceed the performance of solid lumber products, and are resource conserving. Smaller trees are used, and there is little or no waste involved in the production and end use of the products.</p> |
| VERIFICATION: | <p>Enrollment Review: Provide plan note(s), framing plans, and/or specifications identifying engineered wood for use in the floor framing structure for at least 90% of the floor area.</p> <p>Certification Review: None.</p> |
| ADDITIONAL INFO: | <p>GreenSpec®, Environmental Building News: www.buildinggreen.com</p> <p>APA The Engineered Wood Association: www.apawood.org</p> |

323.2

| | |
|---------------------|--|
| FEATURE: | FSC certified sustainably harvested lumber for floor framing (≥90% of floor area) |
| POINT VALUE: | 5 |
| DESCRIPTION: | To receive these points, the project must use dimensional or engineered lumber for the floor structure from Forest Stewardship Council (FSC) certified sustainably harvested sources for at least 90% of floor area. |

VERIFICATION: **Enrollment Review:** Provide plan note(s), framing plans, and/or specifications identifying the use of FSC certified sustainably harvested lumber for the floor structure of at least 90% of the total floor area.

Certification Review: None.

ADDITIONAL INFO: Forest Stewardship Council: www.fscus.org

See "Additional Info" section of feature 321.2 for more information on FSC certified sustainably harvested lumber.

324 Sub-Floor

324.1

FEATURE: **Oriented Strand Board (OSB) with no added urea-formaldehyde**

POINT VALUE: 7

DESCRIPTION: To receive these points, the project must specify Oriented Strand Board (OSB), with no urea-formaldehyde resins. Points are given when this type of OSB is substituted for standard OSB.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying the use of OSB made with resins containing no urea-formaldehyde.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News: www.buildinggreen.com

APA The Engineered Wood Association: www.apawood.org

324.2

FEATURE: **Recycled-content underlayment ($\geq 20\%$ recycled content)**

POINT VALUE: 3

DESCRIPTION: To receive these points, the project must use recycled-content underlayment containing at least 20% pre- and/or post-consumer recycled material. Products that may be considered to receive these points include numerous cellulose-based sound deadening materials which contain recycled/recovered content. Recycled content materials include a % (which varies greatly) of materials such as wood waste, newspaper, or agricultural waste fiber.



OSB does not qualify for this point as a recycled-content material.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying the use of recycled/recovered content underlayment containing at least 20% pre- and/or post-consumer recycled material.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News: www.buildinggreen.com

324.3

FEATURE: **No Lauan underlayment**

POINT VALUE: **3**

DESCRIPTION: To receive these points, the project must completely substitute another type of underlayment for Lauan. The conservation of Lauan is a key factor in the restoration of tropical forests in Southeast Asia. The various species known in the building industry as Lauan have been disappearing at an alarming rate in recent years. Reducing the use of building materials made from these species is crucial to sustaining the industry globally until improved re-forestation practices can be instituted in Indonesia and elsewhere.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying that no Lauan underlayment will be used.

Certification Review: None.

324.4

FEATURE: **Oriented Strand Board (OSB) made from rapidly renewable material**

POINT VALUE: **2**

DESCRIPTION: To receive these points, the project must use Oriented Strand Board (OSB) made from rapidly renewable material in all subfloors. Rapidly renewable materials are those made from plants and trees that are typically harvested within a ten-year cycle or shorter such as aspen poplar or southern yellow pine. Fast growth materials require less land, natural resources, capital and time than conventional building materials and therefore are more environmentally friendly.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying the use of OSB made from rapidly renewable material will be used for all subfloors.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News: www.buildinggreen.com

APA The Engineered Wood Association: www.apawood.org

325 Engineered Alternatives for Lumber

325.1

FEATURE: Engineered wood for beams ($\geq 90\%$ of structural applications)

POINT VALUE: 7

DESCRIPTION: To receive these points, the project must use engineered lumber products for 90% of the structural applications for beams.

Engineered lumber and components meet or exceed the performance of solid lumber products, and are resource conserving. Smaller trees are used, and there is little or no waste involved in the production and end use of the products.

VERIFICATION: **Enrollment Review:** Provide plan note(s), framing plans, and/or specifications identifying engineered wood for use in at least 90% of the structural beam applications.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News: www.buildinggreen.com

APA The Engineered Wood Association: www.apawood.org



Engineered Wood Association

325.2

FEATURE: Engineered wood for window and door headers ($\geq 90\%$ of structural applications)

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must use engineered lumber products for 90% of the structural applications for window and door headers.

VERIFICATION: **Enrollment Review:** Provide plan note(s), framing plans, and/or specifications identifying engineered wood for use in at least 90% of the structural window and door header applications.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News: www.buildinggreen.com

APA The Engineered Wood Association: www.apawood.org

325.3

FEATURE: Engineered wood plate material (100% of application)

POINT VALUE: 2

DESCRIPTION: To receive these points, the project must use engineered wood plate material for 100% of the application of framing plate material.

VERIFICATION: **Enrollment Review:** Provide plan note(s), framing plans, and/or specifications identifying engineered wood for use in 100% of the plate material applications.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News: www.buildinggreen.com

APA The Engineered Wood Association: www.apawood.org

325.4

FEATURE: **Engineered studs (≥90% of total interior stud wall area)**

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must use finger-jointed studs for at least 90% of the total interior stud wall area.

VERIFICATION: **Enrollment Review:** Provide plan note(s), framing plans, and/or specifications identifying finger-jointed studs for at least 90% of the total interior stud wall area.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News: www.buildinggreen.com



325.5

FEATURE: **Recycled-content gypsum wallboard (100% of wallboard)**

POINT VALUE: 3

DESCRIPTION: To receive these points, the project must use recycled/recovered content gypsum for all interior gypsum wallboard. Interior gypsum wallboard must be made with recycled gypsum to comply. Recycled gypsum wallboard is widely available, with recycled content up to 100%.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying recycled/recovered content (made with recycled gypsum) gypsum wallboard for 100% of interior gypsum wallboard.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News: www.buildinggreen.com

Green Building Source, *Green Product Information:* oikos.com/green_products



325.6

FEATURE: Recycled-content exterior sheathing ($\geq 50\%$ recycled content, $\geq 50\%$ of wall sheathing)

POINT VALUE: 3

DESCRIPTION: To receive these points, the project must use recycled-content sheathing (at least 50% pre- and/or post-consumer recycled content) for at least 50% of the exterior wall sheathing provided.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying 50% or greater recycled-content exterior sheathing for at least 50% of wall sheathing area.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News: www.buildinggreen.com



330 Windows / Doors

330.1

FEATURE: Window frames made from FSC certified sustainably harvested wood ($\geq 75\%$ of total window area)

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must use windows with frames made from Forest Stewardship Council (FSC) certified sustainably harvested sources. Windows meeting this criterion must comprise 75% or more of total window area.

VERIFICATION: **Enrollment Review:** Provide plan note(s), window schedule(s), and/or specifications identifying windows with window frames made from FSC certified sustainably harvested wood for at least 75% of the total window area.

Certification Review: None.

ADDITIONAL INFO: Forest Stewardship Council: www.fscus.org

See "Additional Info" section of feature 321.2 for more information on FSC certified sustainably harvested lumber.

330.2

FEATURE: Insulated exterior doors (R-5 or more)

POINT VALUE: 6

DESCRIPTION: To receive these points, the project must use exterior doors, including front door and doors to an attached garage, but not including sliding glass doors or doors to sealed vestibules, insulated to R-5 or better. Most insulated (foam core) fiberglass and metal exterior doors qualify for these points.

VERIFICATION: **Enrollment Review:** Provide plan note(s), door schedule(s), and/or specifications identifying exterior doors with an R-value of 5 or greater for all applicable exterior doors.

Certification Review: None.

ADDITIONAL INFO: Green Building Source, *Green Product Information* oikos.com/green_products

GreenSpec®, Environmental Building News; www.buildinggreen.com

330.3

FEATURE: **No Lauan doors**

POINT VALUE: **3**

DESCRIPTION: To receive these points, the project must not use any Lauan doors (no tropical hardwood doors). The conservation of Lauan is a key factor in the restoration of tropical forests in Southeast Asia. The various species known in the building industry as Lauan have been disappearing at an alarming rate in recent years. Reducing the use of building materials made from these species is crucial to sustaining the industry globally until improved re-forestation practices can be instituted in Indonesia and elsewhere.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying that no Lauan doors will be used.

Certification Review: None.

330.4

See features 330.4.1 through 330.4.2 below. Only one of the following features may be submitted for points under item 330.4

330.4.1

FEATURE: **Regionally salvaged or recycled-content interior doors**

POINT VALUE: **3**

DESCRIPTION: To receive these points, the project must use regionally salvaged (from within 500 miles of the project site) or recycled-content doors (hardboard) for all new doors throughout the interior of the house.

The use of salvaged materials keeps valuable materials out of the waste stream and does not impact the sources of virgin material.

Reconstituted materials use chipped or stranded small-diameter trees, bound by various resins and formed into building products. Recycled-content materials include a percentage (which varies greatly) of materials such as wood waste, newspaper, or agricultural waste fiber.



VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying regionally salvaged (from within 500 miles of the project site) and/or recycled-content interior doors for all new interior doors.

Certification Review: None.

ADDITIONAL INFO: Green Building Source, *Green Product Information:* oikos.com/green_products
GreenSpec®, Environmental Building News: www.buildinggreen.com
ReBuilding Exchange: www.rebuildingexchange.org

-OR-

330.4.2

FEATURE: Interior doors made from FSC certified sustainably harvested wood

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must use doors made from Forest Stewardship Council (FSC) certified sustainably harvested wood for all new interior doors.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying FSC certified sustainably harvested wood doors for all new interior doors.

Certification Review: None.

ADDITIONAL INFO: Forest Stewardship Council: www.fscus.org

See "Additional Info" section of feature 321.2 for more information on FSC certified sustainably harvested lumber.

340 Insulation

340.1 See features 340.1.1 through 340.1.3 below. Only one of the following features may be submitted for points under item 340.1

340.1.1

FEATURE: Recycled-content insulation ($\geq 25\%$ recycled content, $\geq 90\%$ of exterior envelope area)

POINT VALUE: 3

DESCRIPTION: To receive these points, the project must use a 25% or greater recycled-content insulation, such as glass fiber, for at least 90% of the exterior envelope (wall and ceiling or roof) area.

According to the North American Insulation Manufacturer's Association, over 8.4 billion pounds of pre- and post-consumer glass has been recycled into fiberglass insulation since 1992. Today's fiberglass insulation contains upwards of 40% recycled glass, depending upon the manufacturing facility. It is important to check with the supplier or manufacturer for the recycled content of any insulation product. Information on supplier or manufacturer of chosen insulation product is required to claim these points.



Glass fiber batt insulation

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying recycled-content insulation with at least 25% recycled content for 90% of all exterior envelope (wall and ceiling or roof) area.

Certification Review: None.

ADDITIONAL INFO: Green Building Source, *Green Product Information:* oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com

-OR-

340.1.2

FEATURE: **Spray foam insulation (≥90% of exterior envelope area)**

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must use a spray-in polyurethane or soy-based foam system for at least 90% of the exterior envelope (wall and ceiling or roof) area. The entire cavity must be foamed solid to comply.

Depending upon the type and how the spray foam insulation is used on the project, points for feature 340.2 may also be taken.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying spray foam insulation for 90% of all exterior envelope (wall and ceiling or roof) area.

Certification Review: None.

ADDITIONAL INFO: Green Building Source, *Green Product Information:* oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com



Spray foam insulation

-OR-

340.1.3

FEATURE: **Recycled-content insulation (≥75% recycled content, ≥90% of exterior envelope area)**

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must use a 75% or greater recycled-content insulation, such as cellulose, rock wool, or recycled cotton, for at least 90% of the exterior envelope (wall and ceiling or roof) area.

Cellulose is a good example of recycled material use in insulation. Most cellulose insulation is approximately 75% post-consumer recycled newspaper by weight; the rest is comprised of fire



Blown cellulose insulation

and mildew retardant chemicals and - in some products - acrylic binders.

Rock, slag or mineral wool are the common names for insulation produced from both steel slag metallurgical processing and spent aluminum pot liner, a by-product of ore processing. Recycled content varies from 40% to 90%. Rock wool is available in a rigid board style, a blanket style with facing and as a granular to be blown-in during application. With a melt point in excess of 2000 degrees Fahrenheit, rock wool is highly fire resistant. It is important to check with the supplier or manufacturer for the recycled content of any insulation product.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying recycled-content insulation with at least 75% recycled content for 90% of all exterior envelope (wall and ceiling or roof) area.

Certification Review: None.

ADDITIONAL INFO: Green Building Source, *Green Product Information:* oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com

340.2

FEATURE: HCFC-free foam insulation ($\geq 90\%$ of foam insulation sheathing application area)

POINT VALUE: 1

DESCRIPTION: To receive these points, the project must use HCFC-free rigid (or spray-in) foam insulation for at least 90% of foam insulation sheathing application area.

Chlorofluorocarbons and hydro chlorofluorocarbons (CFCs and HCFCs), have been widely used as blowing agents for insulation foams, and are known to contribute to depletion of stratospheric ozone. CFCs were banned by the Montreal Protocol and have been largely replaced by HCFCs, which themselves will be phased out by 2020, or sooner, in some cases.

Expanded polystyrene products (EPS, or beadboard) no longer rely on HCFC's and are eligible for these points. As of 2003, polyisocyanurate spray foams no longer use HCFC's as blowing agents. Polyisocyanurate and "bio-based" spray foams, when used outside the primary exterior wall cavity as a continuous insulation sheathing layer are also eligible for these points. Extruded polystyrene (XPS) products often contain HCFCs, however, HCFC-free products are now available.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying HCFC-free rigid (or spray-in) foam insulation for at least 90% of foam insulation sheathing application area.

Certification Review: None.

ADDITIONAL INFO: Green Building Source, *Green Product Information:* oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com

350 Exterior Wall Finishes

350.1

See features 350.1.1 through 350.1.3 below. Only one of the following features may be submitted for points under item 350.1.

350.1.1

FEATURE: Regionally salvaged or recycled-content siding (salvaged from within 500 miles *or* $\geq 50\%$ recycled content, $\geq 50\%$ of exterior finish area)

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must use regionally salvaged (from within 500 miles of the project site) or recycled-content siding (containing a minimum 50% pre- or post-consumer content) for at least 50% of the exterior finish area.



The use of salvaged materials keeps valuable materials out of the waste stream and does not impact the sources of virgin material.

Reconstituted materials often use chipped or stranded small-diameter trees, bound by various resins and formed into building products. Recycled-content materials include a percentage (which varies greatly) of materials such as wood waste, newspaper, or agricultural waste fiber.

Hardboard siding materials, wood-resin composites and OSB siding qualify for this point. Both are made from low-value trees. Some manufacturers produce a line of siding and exterior products that reportedly have overcome performance problems of earlier OSB siding products. Regular painting and care in installation will help ensure good performance.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying regionally salvaged (from within 500 miles of the site) or recycled-content siding (containing a minimum 50% pre- or post-consumer content) for at least 50% of the exterior finish area.

Certification Review: None.

ADDITIONAL INFO: "Material Selection Checklist Applied to Siding and Siding Comparison Table", Environmental Building News, July/Aug 1997

Green Building Source, *Green Product Information*: oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com

ReBuilding Exchange: www.rebuildingexchange.org

-OR-

350.1.2

FEATURE: FSC certified sustainably harvested wood siding ($\geq 50\%$ of exterior finish area)

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must use Forest Stewardship Council (FSC) certified sustainably harvested wood siding (100% FSC certified content) for at least 50% of the exterior finish area.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying FSC certified sustainably harvested wood siding (100% FSC certified content) for at least 50% of the exterior finish area.

Certification Review: None.

ADDITIONAL INFO: Forest Stewardship Council: www.fscus.org

See "Additional Info" section of feature 321.2 for more information on FSC certified sustainably harvested lumber.

-OR-

350.1.3

FEATURE: Fiber cement siding ($\geq 50\%$ of exterior finish area)

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must use fiber cement siding for at least 50% of the exterior finish area.

Cementitious siding, or fiber-cement siding, is a composite of cement and wood fiber. These products can carry up to a 50-year warranty.

This type of siding is much more durable, and requires less maintenance than standard hardboard siding; however, it generally has higher embodied energy due to the use of Portland cement and imported wood fibers. The painting requirement, while not eliminated, is also reduced with this material.



VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying fiber cement siding for at least 50% of the exterior finish area.

Certification Review: None.

ADDITIONAL INFO: Green Building Source, *Green Product Information:* oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com

350.2

FEATURE: Regionally salvaged or recycled-content exterior trim (salvaged from within 500 miles *or* $\geq 50\%$ recycled content, $\geq 50\%$ of exterior trim area)

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must use regionally salvaged (from within 500 miles of the project site) or recycled-content exterior fascia, soffit and trim (containing a 50% pre- or post-consumer content) for at least 50% of the exterior trim area.



The use of salvaged materials keeps valuable materials out of the waste stream and does not impact the sources of virgin material.

Reconstituted materials often use chipped or stranded small-diameter trees, bound by various resins and formed into building products. Recycled-content materials include a percentage (which varies greatly) of materials such as wood waste, newspaper, or agricultural waste fiber.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying reconstituted, recovered, or recycled-content exterior trim (containing a minimum 50% pre- or post-consumer content) for at least 50% of the exterior trim area.

Certification Review: None.

ADDITIONAL INFO: Green Building Source, *Green Product Information:* oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com

ReBuilding Exchange: www.rebuildingexchange.org

350.3

FEATURE: Fiber cement exterior trim (100% of exterior trim area)

POINT VALUE: 2

DESCRIPTION: To receive these points, the project must use fiber cement exterior fascia, soffit, and trim for 100% of exterior trim area.

Cementitious trim, or fiber-cement trim, is a composite of cement and wood fiber. These products can carry up to a 50-year warranty.

This type of trim is much more durable, and requires less maintenance than standard hardboard trim, however, it generally has higher embodied energy due to the use of Portland cement and imported wood fibers. The painting requirement, while not eliminated, is also reduced with this material.

VERIFICATION: **Enrollment Review:** Provide plan note(s), and/or specifications identifying fiber cement trim for 100% of the exterior trim area.

Certification Review: None.

ADDITIONAL INFO: Green Building Source, *Green Product Information*: oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com

Environmental Building News, Vol. 6, No. 7 features a comparison of various siding options

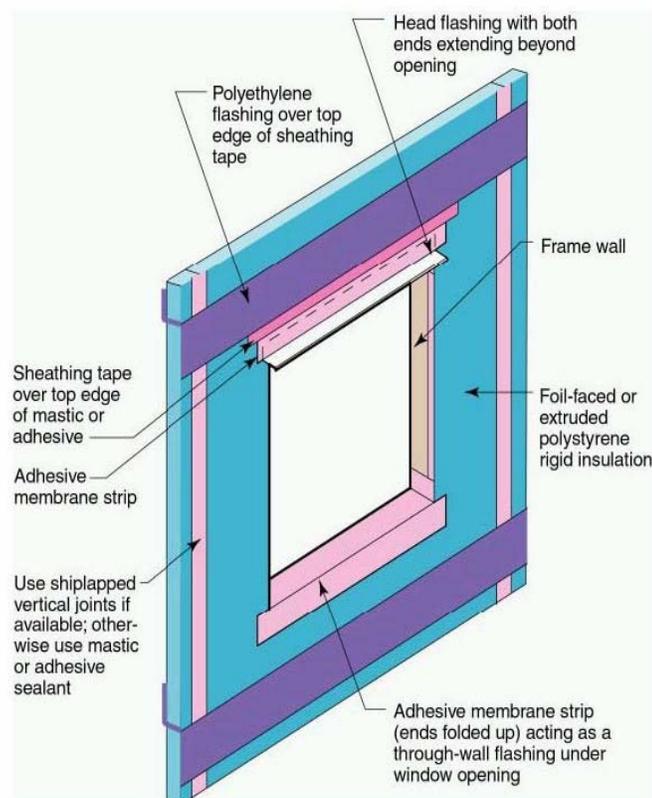
350.4

FEATURE: Install window/door flashing per best construction practices diagram

POINT VALUE: 2

DESCRIPTION: To receive these points, the project must install all new window and door flashing per the best construction practices diagram shown below.

Diagram 350.4 Window/Door Flashing Best Construction Practices



VERIFICATION: **Enrollment Review:** Provide plan note(s), flashing details, and/or specifications identifying window and door flashing per the best construction practices diagram shown below.

Certification Review: None.

ADDITIONAL INFO: *Builders Field Guide*, Energy and Environmental Building Association: www.eeba.org

350.5

| | |
|-------------------------|---|
| FEATURE: | Regionally produced or salvaged masonry or stone ($\geq 50\%$ of exterior wall area) |
| POINT VALUE: | 8 |
| DESCRIPTION: | <p>To receive these points, the project must use regionally produced or regionally salvaged masonry and/or regionally extracted or regionally salvaged stone on at least 50% or more of the exterior wall area. Exterior wall area includes veneers and single/double wythe construction. Product data or supplier information should indicate that material was extracted, recovered, salvaged, or manufactured within 500 miles of the project site.</p> <p>The primary resource impact of masonry is the energy consumed in its manufacture. The primary resource impact of stone is the energy consumed in its extraction and the associated impact of the local ecology. Durability should be considered in the overall lifecycle analysis, and local sources should be used to avoid additional energy consumption from transportation.</p> |
| VERIFICATION: | <p>Enrollment Review: Provide plan note(s), exterior finish schedules, and/or specifications identifying regionally produced (including extracted, recovered, salvaged, or manufactured) masonry or stone for at least 50% of the exterior wall area.</p> <p>Certification Review: None.</p> |
| ADDITIONAL INFO: | <p>The Brick Industry Association: www.gobrick.com/</p> <p>Rebuilding Exchange: www.rebuildingexchange.org</p> |

360 Roofs

361 30-year minimum roofing material

| | |
|-------------------------|---|
| 361.1 | See features 361.1.1 through 361.1.2 below. Only <u>one</u> of the following features may be submitted for points under item 361.1 |
| 361.1.1 | |
| FEATURE: | Composition, fiberglass or asphalt roofing (30 year minimum, $\geq 90\%$ of total roofing material area) |
| POINT VALUE: | 3 |
| DESCRIPTION: | To receive these points, the project must use thirty-year or better roofing material, including composition, fiberglass, or asphalt for at least 90% of the roofing material area. All roofing materials must meet the City of Chicago Municipal Code reflectivity standards. |
| VERIFICATION: | <p>Enrollment Review: Provide plan note(s) and/or specifications identifying a 30 year minimum composition, fiberglass, or asphalt roof for at least 90% of the total roofing material area.</p> <p>Certification Review: None.</p> |
| ADDITIONAL INFO: | <p>Green Building Source, <i>Green Product Information</i>: oikos.com/green_products</p> <p>GreenSpec®, Environmental Building News: www.buildinggreen.com</p> |

-OR-

361.1.2

FEATURE: Metal, slate, clay or concrete roofing (40 year minimum, ≥90% of total roofing material area)

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must use forty-year or better roofing material such as concrete, slate, clay, or metal for at least 90% of the roofing material area.

Products with inherently longer service lives have better environmental impact profiles due to the fact that they will not be filling landfills on the relatively quick cycle that other products suffer from.

All roofing materials must meet the City of Chicago Municipal Code reflectivity standards of.

VERIFICATION: **Enrollment Review:** Provide plan note(s) and/or specifications identifying a 40 year minimum clay, concrete, metal, or slate roof for at least 90% of the total roofing material area.

Certification Review: None.

ADDITIONAL INFO: Green Building Source, *Green Product Information:* oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com

362 Other roofing materials

362.1 See features 362.1.1 through 362.1.2 below. Only one of the following features may be submitted for points under item 362.1

362.1.1

FEATURE: Self-adhering roof underlayment for eaves, valleys, and penetrations (pitched roofs only)

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must use smooth, non-granular self-adhering roof underlayment on all eaves, valleys, and roof penetrations on pitched roofs.

Membranes in this category offer the environmental advantage of significantly contributing to the durability of the roof system by protecting the sheathing during ice-damming events.

VERIFICATION: **Enrollment Review:** Provide plan note(s) and/or specifications identifying self-adhering roof underlayment on all eaves, valleys, and roof penetrations on pitched roofs.

Certification Review: None.

ADDITIONAL INFO: "Underlayment Considerations": www.professionalroofing.net/article.aspx?id=640

Green Building Source, *Green Product Information:* oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com

-OR-

362.1.2

| | |
|-------------------------|--|
| FEATURE: | Self-adhering roof underlayment for entire roof (pitched roofs only) |
| POINT VALUE: | 6 |
| DESCRIPTION: | <p>To receive these points, the project must use smooth, non-granular self-adhering roof underlayment on entire pitched roof areas.</p> <p>Membranes in this category offer the environmental advantage of significantly contributing to the durability of the roof system by protecting the sheathing during ice-damming events.</p> |
| VERIFICATION: | <p>Enrollment Review: Provide plan note(s) and/or specifications identifying self-adhering roof underlayment for entire pitched roof areas.</p> <p>Certification Review: None.</p> |
| ADDITIONAL INFO: | <p>“Underlayment Considerations”: www.professionalroofing.net/article.aspx?A_ID=640</p> <p>Green Building Source, <i>Green Product Information</i>: oikos.com/green_products</p> <p>GreenSpec®, Environmental Building News: www.buildinggreen.com</p> |

362.2

| | |
|-------------------------|--|
| FEATURE: | Recycled-content roofing material (≥ 90% of total roofing material area) |
| POINT VALUE: | 3 |
| DESCRIPTION: | <p>To receive these points, the project must use roofing with any percentage of recycled-content and with a Class-A fire rating for at least 90% of the roofing.</p> |
| VERIFICATION: | <p>Enrollment Review: Provide plan note(s) and/or specifications identifying recycled-content roofing for at least 90% of the total roofing material area.</p> <p>Certification Review: None.</p> |
| ADDITIONAL INFO: | <p>U.S. Environmental Protection Agency (EPA), <i>Comprehensive Procurement Guidelines</i>: www.epa.gov/cpg/</p> <p>Green Building Source, <i>Green Product Information</i>: oikos.com/green_products</p> <p>GreenSpec®, Environmental Building News: www.buildinggreen.com</p> |



370 Finished Floor

371 Non-Carpet

371.1

FEATURE: Hard surfaces ($\geq 80\%$ of the total finished floor area)

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must use hard floor surfaces for at least 80% of the total finished floor area.

VERIFICATION: **Enrollment Review:** Provide floor plans, plan note(s), floor finish schedules and/or specifications identifying that hard floor surfaces for at least 80% of the total finished floor area.

Certification Review: None.



371.2

FEATURE: Regionally salvaged wood flooring ($\geq 10\%$ of total finished floor area)

POINT VALUE: 6

DESCRIPTION: To receive these points, the project must use wood flooring from regionally salvaged sources (from within 500 miles of the project site) for 10% of total finished floor area.

Most salvaged or reclaimed wood is Long-leaf Heart Pine, American Chestnut, or Red or White Oak purchased from the demolition sites of old homes, mills, ships, warehouses and barns. From an environmental standpoint, the use of salvaged wood products keeps these valuable materials out of the waste stream and does not impact living trees. Very often the reused wood flooring comes from varieties of trees that are no longer present to harvest, or in grain patterns only found in rare old large trees. This adds to the value and aesthetic quality of this type of flooring.

VERIFICATION: **Enrollment Review:** Provide floor plans, plan note(s), floor finish schedules and/or specifications identifying the use of regionally salvaged wood flooring (from within 500 miles of the site) for at least 10% of the total finished floor area.

Certification Review: None.

ADDITIONAL INFO: The Hardwood Floors Magazine web site provides a searchable database listing vendors of reclaimed wood flooring products at www.nwfa.org/member/mag.aspx - Click on "Resource Book" and then select "Wood Flooring Species – Reclaimed Woods" in the "Search by Product" box.

ReBuilding Exchange: www.rebuildingexchange.org

371.3

FEATURE: Natural linoleum flooring with low VOC adhesives or backing ($\geq 10\%$ of total finished floor area)

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must use natural linoleum in place of any vinyl sheet flooring or vinyl composition tile, installed with low VOC adhesives or backing for 10% of total finished floor area. Adhesives or backing must have a VOC (volatile organic compound) content less than that listed in feature 440.5.



www.forbo-linoleum.com

Linoleum has been used as a generic term for all sheet-flooring products, but is in fact a natural product made from linseed oil and cork. Linoleum is a very durable flooring material. Installed with non-toxic, low VOC adhesives, it will also not contribute to poor indoor air quality.

VERIFICATION: **Enrollment Review:** Provide floor plans, plan note(s), floor finish schedules and/or specifications identifying the use of natural linoleum flooring for at least 10% of the total finished floor area AND adhesives or backing with a VOC content less than 150 grams per liter.

Certification Review: None.

ADDITIONAL INFO: Green Building Source, *Green Product Information:* oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com

371.4

FEATURE: FSC certified sustainably harvested wood flooring ($\geq 10\%$ of total finished floor area)

POINT VALUE: 7

DESCRIPTION: To receive these points, the project must use wood flooring made from Forest Stewardship Council (FSC) certified sustainably harvested sources for 10% of total finished floor area.

VERIFICATION: **Enrollment Review:** Provide floor plans, plan note(s), floor finish schedules and/or specifications identifying the use of FSC certified sustainably harvested wood flooring for at least 10% of the total finished floor area.

Certification Review: None.

ADDITIONAL INFO: Forest Stewardship Council: www.fscus.org

See "Additional Info" section of feature 321.2 for more information on FSC certified sustainably harvested lumber.

371.5

FEATURE: FSC certified sustainably harvested bamboo flooring ($\geq 10\%$ of total finished floor area)

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must use FSC certified sustainably harvested bamboo flooring in place of hardwood flooring for 10% of total finished floor area.

Bamboo is a rapidly renewable material and is an increasingly popular alternative to traditional hardwood flooring. Bamboo is a fast-growing grass that has durability similar to that of oak. It is available in conventional hardwood flooring dimensions, in several styles and stain colors, and third-party certified as sustainably harvested by the Forest Stewardship Council (FSC).



Bamboo flooring

VERIFICATION: **Enrollment Review:** Provide floor plans, plan note(s), floor finish schedules and/or specifications identifying the use of FSC certified bamboo flooring for at least 10% of the total finished floor area.

Certification Review: None.

ADDITIONAL INFO: Green Building Source, *Green Product Information:* oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com

Forest Stewardship Council: www.fscus.org

See "Additional Info" section of feature 321.2 for more information on FSC certified sustainably harvested products.

371.6

FEATURE: Cork flooring ($\geq 10\%$ of total finished floor area)

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must use cork flooring in place of hardwood flooring for 10% of total finished floor area.

Cork is harvested sustainably and is an increasingly popular alternative to traditional hardwood or vinyl (resilient) flooring. Cork flooring is manufactured from the bark of cork trees. The bark is harvested approximately every nine years and causes no harm to the tree itself. Cork's unique cell structure makes it shock-absorbing and highly durable. Cork flooring products are available many sizes and are often manufactured as interlocking tiles or planks (nominal 12" x 12" tiles and 12" by 36" are common).



Cork flooring

VERIFICATION: **Enrollment Review:** Provide floor plans, plan note(s), floor finish schedules and/or specifications identifying the use of cork flooring for at least 10% of the total finished floor area.

Certification Review: None.

ADDITIONAL INFO: Green Building Source, *Green Product Information:* oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com

371.7

FEATURE: **Recycled-content flooring (≥ 50% recycled content, ≥ 10% of total finished floor area)**

POINT VALUE: 2

DESCRIPTION: To receive these points, the project must use recycled-content flooring – with at least 50% recycled content – in place of hardwood flooring for 10% of total finished floor area.

Common examples of recycled-content flooring include ceramic tile, terrazzo, and rubber flooring. Using recycled-content flooring materials helps to expand the market for the reuse of recyclable materials and helps close the loop for recycling efforts.

VERIFICATION: **Enrollment Review:** Provide floor plans, plan note(s), floor finish schedules and/or specifications identifying the use of recycled-content flooring – containing at least 50% pre- and/or post-consumer recycled content – for at least 10% of the total finished floor area.

Certification Review: None.

ADDITIONAL INFO: Green Building Source, *Green Product Information:* oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com

371.8

FEATURE: **Ceramic tile flooring with low VOC adhesives and plasticizer-free grout**

POINT VALUE: 3

DESCRIPTION: To receive these points, the project must use ceramic tile flooring with low VOC adhesives and plasticizer-free grout for all ceramic tile installations. The adhesives must have a VOC (volatile organic compound) content less than that listed in feature 440.5.

VERIFICATION: **Enrollment Review:** Provide floor plans, plan note(s), floor finish schedules and/or specifications identifying the use of ceramic tile flooring with low VOC adhesives and plasticizer-free grout with a compliant VOC concrete for all ceramic tile installations.

Certification Review: None.

ADDITIONAL INFO: Check the MSDS (Material Safety Data Sheet) for toxicity and VOC content of mastic and grout. Website reference to toxic substances: www.atsdr.cdc.gov/toxfaq-f.html#bookmark05

Green Building Source, *Green Product Information*: oikos.com/green_products

GreenSpec®, Environmental Building News: www.buildinggreen.com

372 Carpet

372.1

FEATURE: Natural fiber carpet, tacked not glued ($\geq 10\%$ of total finished floor area)

POINT VALUE: 6

DESCRIPTION: To receive these points, the project must use natural fiber carpet for at least 10% of total finished floor area. Carpet must be tacked down and not glued down to comply.

Natural fiber carpet can be made with wool, natural latex, or other natural and non-toxic materials – instead of SB (styrene butadiene) latex backed carpet – and can be installed without glues. Natural fiber carpet is not likely to produce harmful VOCs (volatile organic compounds) unless treated with chemicals.

VERIFICATION: **Enrollment Review:** Provide floor plans, plan note(s), floor finish schedules and/or specifications identifying the use of natural fiber carpet (tacked down) for at least 10% of the total finished floor area.

Certification Review: None.

ADDITIONAL INFO: King County (WA), *Environmentally Responsible Carpet Choices*: www.metrokc.gov/procure/green/carpet.htm

Green Building Source, *Green Product Information*: oikos.com/green_products

U.S. Environmental Protection Agency (EPA), *Comprehensive Procurement Guidelines*: www.epa.gov/cpg/

372.2

FEATURE: Recycled-content carpet, tacked not glued ($\geq 25\%$ recycled content, $\geq 10\%$ of total finished floor area)

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must use 25% or greater recycled-content carpet for at least 10% of total finished floor area. Carpet must be tacked down and not glued down to comply.

What happens to the milk cartons and plastic pop bottles that are left on the curb on recycling day? This plastic, rather than ending up in landfills, is being turned into useful products, many of them building products that will last for years. One of these products is carpet. The plastic is re-spun into fibers that are made into plush carpet that performs as well or better than other types of carpet made from virgin materials, and at a cost comparable to or less than other carpets. Forty 2-liter soft drink bottles are diverted from the landfill for every square yard of recycled PET carpet.

Carpet glues can contribute to poor indoor air quality. Tacking carpet down instead of using glue eliminates this potential source of poor indoor air quality.



Recycled-content carpet

VERIFICATION:

Enrollment Review: Provide floor plans, plan note(s), floor finish schedules and/or specifications identifying the use of 25% or greater recycled-content carpet (tacked down) for at least 10% of the total finished floor area.

Certification Review: None.

ADDITIONAL INFO:

King County (WA), *Environmentally Responsible Carpet Choices:* www.metrokc.gov/procure/green/carpet.htm

Green Building Source, *Green Product Information:* oikos.com/green_products

U.S. Environmental Protection Agency (EPA), *Comprehensive Procurement Guidelines:* www.epa.gov/cpg/

372.3

FEATURE:

Natural or recycled-content carpet pad ($\geq 10\%$ of total finished floor area)

POINT VALUE:

3

DESCRIPTION:

To receive these points, the project must use natural or recycled-content ($\geq 25\%$) carpet pad for at least 10% of the total finished floor area.



Carpet pad composed of a variety of pre- and post-consumer and post-industrial recycled content is widely available. Recycled-content carpet pad is typically made from recycled textiles, carpet, carpet cushion, or tires (including rebond). Not only does recycled-content carpet pad keep these materials out of landfills and reduce the demand for and environmental impact of virgin pad materials, it will often yield better indoor air quality, as older materials typically have lower emission rates of volatile organic compounds (VOCs).

VERIFICATION:

Enrollment Review: Provide floor plans, plan note(s), floor finish schedules and/or specifications identifying the use of natural carpet pad OR 25% or greater recycled-content carpet pad for at least 10% of the total finished floor area.

Certification Review: None.

ADDITIONAL INFO:

King County (WA), *Environmentally Responsible Carpet Choices:* www.metrokc.gov/procure/green/carpet.htm

Green Building Source, *Green Product Information:* oikos.com/green_products

U.S. Environmental Protection Agency (EPA), *Comprehensive Procurement Guidelines:* www.epa.gov/cpg/

380 Cabinetry and Trim

380.1

FEATURE: Regionally salvaged wood cabinet fronts (100% of cabinet fronts)

POINT VALUE: 6

DESCRIPTION: To receive these points, the project must use regionally salvaged wood (from within 500 miles of the project site) for 100% of built-in cabinet fronts.

Most salvaged or reclaimed wood is Long-leaf Heart Pine, American Chestnut, or Red or White Oak purchased from the demolition sites of old homes, mills, ships, warehouses and barns. From an environmental standpoint, the use of salvaged wood products keeps these valuable materials out of the waste stream and does not impact living trees. Very often this reused wood comes from varieties of trees that are no longer present to harvest, or in grain patterns only found in rare old large trees. This adds to the value and aesthetic quality of this type of material.



VERIFICATION: **Enrollment Review:** Provide floor plans, plan note(s), kitchen finish schedules and/or specifications identifying the use of regionally salvaged wood (from within 500 miles of the site) for all built-in cabinet fronts.

Certification Review: None.

ADDITIONAL INFO: ReBuilding Exchange: www.rebuildingexchange.org

380.2

FEATURE: Composite wood or agrifiber cabinets (100% of cabinet boxes)

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must use CPA EPP-certified composite wood or agrifiber meeting equivalent standards for 100% of the built-in cabinet boxes.

Composite wood such as particleboard or MDF used for cabinets must be certified by the Composite Panel Association (CPA) as an Environmentally Preferable Product (EPP).



The Composite Panel Association is the North American trade association for producers of particleboard, medium density fiberboard (MDF), hardboard and other compatible products. The Association operates an independent Environmentally Preferable Product (EPP) Grademark Certification Program and testing laboratory developed to provide independent certification of wood composite products that are demonstrably environmentally preferable through their use of 100% recycled and/or recovered wood fiber and adherence to voluntarily lower formaldehyde emission standards than government regulations.

Agrifiber products may also be used to comply with this feature as long as they use 100% recycled and/or recovered fiber AND meet the California Air Resources Board's (CARB)

Airborne Toxic Control Measure to reduce Formaldehyde Emissions from Composite Wood Products (effective January 1, 2009).

Also see feature 450.1.

VERIFICATION: **Enrollment Review:** Provide floor plans, plan note(s), kitchen finish schedules and/or specifications identifying the use of Composite Panel Association (CPA) Environmentally Preferable Product (EPP) certified composite wood or agrifiber materials meeting equivalent standards as identified in the CGH Guide feature description for all built-in cabinet boxes.

Certification Review: None.

ADDITIONAL INFO: Composite Panel Association's EPP program: www.pbmdf.com/index.asp?bid=1087

California Air Resources Board – Composite Wood Products page:
www.arb.ca.gov/toxics/compwood/compwood.htm

California Air Resources Board, Airborne Toxic Control Measure (effective January 1, 2009):
www.arb.ca.gov/regact/2007/compwood07/fro-final.pdf

380.3

FEATURE: Composite wood or agrifiber shelving & countertops (100% of built-in shelving & countertop area)

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must use CPA EPP-certified composite wood or agrifiber meeting equivalent standards for 100% of the built-in shelving and countertop area.

Composite wood such as particleboard or MDF used for cabinets must be certified by the Composite Panel Association (CPA) as an Environmentally Preferable Product (EPP).



The Composite Panel Association is the North American trade association for producers of particleboard, medium density fiberboard (MDF), hardboard and other compatible products. The Association operates an independent Environmentally Preferable Product (EPP) Grademark Certification Program and testing laboratory developed to provide independent certification of wood composite products that are demonstrably environmentally preferable through their use of 100% recycled and/or recovered wood fiber and adherence to voluntarily lower formaldehyde emission standards than government regulations.

Agrifiber products may also be used to comply with this feature as long as they use 100% recycled and/or recovered fiber AND meet the California Air Resources Board's (CARB) Airborne Toxic Control Measure to reduce Formaldehyde Emissions from Composite Wood Products (effective January 1, 2009).

Also see feature 450.2.

VERIFICATION: **Enrollment Review:** Provide floor plans, plan note(s), kitchen finish schedules and/or specifications identifying the use of Composite Panel Association (CPA) Environmentally Preferable Product (EPP) certified composite wood or agrifiber materials meeting equivalent standards as identified in the CGH Guide feature description for all built-in shelving and countertops.

Certification Review: None.

ADDITIONAL INFO: Composite Panel Association’s EPP program: www.pbmdf.com/index.asp?bid=1087

California Air Resources Board – Composite Wood Products page:
www.arb.ca.gov/toxics/compwood/compwood.htm

California Air Resources Board, Airborne Toxic Control Measure (effective January 1, 2009):
www.arb.ca.gov/regact/2007/compwood07/fro-final.pdf

380.4

FEATURE: FSC certified sustainably harvested hardwood trim ($\geq 75\%$ of interior trim area)

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must use solid hardwood interior trim from Forest Stewardship Council (FSC) certified sustainably harvested sources for at least 75% of the interior trim area.

VERIFICATION: **Enrollment Review:** Provide floor plans, plan note(s), finish schedules and/or specifications identifying the use of FSC certified sustainably harvested solid hardwood trim for at least 75% of the total interior trim area.

Certification Review: None.

ADDITIONAL INFO: Forest Stewardship Council: www.fscus.org

See “Additional Info” section of feature 321.2 for more information on FSC certified sustainably harvested products.

380.5

FEATURE: Engineered composite wood or agrifiber trim ($\geq 75\%$ of interior trim area)

POINT VALUE: 1

DESCRIPTION: To receive these points, the project must use finger-jointed, composite wood and/or agrifiber trim for at least 75% of the total interior trim area.

Finger-jointed wood uses scrap wood and shorter lengths to produce useful wood components from wood. Composite wood and agrifiber products use recycled and/or recovered content. Using these materials diverts materials from the landfill and preserves virgin material sources.

VERIFICATION: **Enrollment Review:** Provide floor plans, plan note(s), finish schedules and/or specifications identifying the use of finger-jointed, composite wood and/or agrifiber trim for at least 75% of the total interior trim area.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News: www.buildinggreen.com

Green Building Source, *Green Product Information*: oikos.com/green_products

390 Outdoor Materials

390.1

FEATURE: Recycled-content outdoor materials ($\geq 50\%$ recycled content)

POINT VALUE: 9 points possible

- 7 for 25% of all outdoor materials (by surface area)
- 8 for 50% of all outdoor materials (by surface area)
- 9 for 75% of all outdoor materials (by surface area)

DESCRIPTION: To receive these points, the project must use recycled-content materials for outdoor structures (excluding detached garages), decking, patios, and fencing containing at least 50% pre- and/or post-consumer recycled content.

7 points are awarded if 25% of all outdoor materials by surface area contain at least 50% recycled content. 8 points are awarded if 50% of all outdoor materials by surface area contain at least 50% recycled content. 9 points are awarded if 75% of all outdoor materials by surface area contain at least 50% recycled content.

Recycled content decking materials may have up to 100% recycled plastic or plastic/wood fiber mix. These materials may also resist moisture, rot, and termites, and require little maintenance over an extended lifespan. Many of these recycled content decking materials can be worked with regular woodworking tools and fastening systems, although some require special equipment (e.g. carbide saw blades and router bits) for best results. Manufacturers should supply information on pre- and post-consumer recycled content.



www.trex.com

VERIFICATION: **Enrollment Review:** Provide site plan, plan note(s), finish schedules and/or specifications identifying the use of recycled-content materials for outdoor structures, decking, and landscape features containing at least 50% pre- and/or post-consumer recycled content.

Certification Review: None.

ADDITIONAL INFO: U.S. Environmental Protection Agency (EPA), *Comprehensive Procurement Guidelines*: www.epa.gov/cpg/

GreenSpec®, Environmental Building News: www.buildinggreen.com

Green Building Source, *Green Product Information*: oikos.com/green_products

390.2

FEATURE: FSC certified sustainably harvested outdoor lumber (75% of lumber surface area)

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must use Forest Stewardship Council (FSC) certified sustainably harvested lumber for at least 75% (by surface area) of lumber used in outdoor structures (excluding detached garages), decking, patios, and fencing.

Outdoor structures, decking and landscaping materials made from third-party certified sustainably harvested lumber. Eight points are provided if the lumber has been Forest Stewardship Council (FSC) certified to be sustainably harvested.

VERIFICATION: **Enrollment Review:** Provide site plan, plan note(s), finish schedules and/or specifications identifying the use of FSC certified sustainably harvested lumber for outdoor structures, decking, and landscape features.

Certification Review: None.

ADDITIONAL INFO: Forest Stewardship Council: www.fscus.org

See "Additional Info" section of feature 321.2 for more information on FSC certified sustainably harvested products.

390.3

FEATURE: Regionally salvaged outdoor materials

POINT VALUE: 9 points possible

7 for 25% of all outdoor materials (by surface area)
8 for 50% of all outdoor materials (by surface area)
9 for 75% of all outdoor materials (by surface area)

DESCRIPTION: To receive these points, the project must use regionally salvaged materials (from within 500 miles of the project site) for outdoor structures (excluding detached garages), decking, patios, and fencing.

7 points are awarded if 25% of all outdoor materials by surface area are salvaged. 8 points are awarded if 50% of all outdoor materials by surface area are salvaged. 9 points are awarded if 75% of all outdoor materials by surface area are salvaged.

The use of salvaged materials keeps valuable materials out of the waste stream and does not impact the sources of virgin material.

VERIFICATION: **Enrollment Review:** Provide site plan, plan note(s), finish schedules and/or specifications identifying the use of regionally salvaged materials (from within 500 miles of the site) for outdoor structures (excluding detached garages), decking, and landscape features.

Certification Review: None.

ADDITIONAL INFO: ReBuilding Exchange: www.rebuildingexchange.org

400 Health & Safety

400 Minimum Indoor Environmental Quality

400.R1

FEATURE: No unvented combustion appliances

POINT VALUE: Required

DESCRIPTION: In order to satisfy this requirement, the project must not include unvented combustion appliances (e.g. fireplaces). An unvented fireplace, or “ventless” fireplace, is an unvented combustion appliance. Products of combustion include moisture, carbon dioxide and nitrogen oxides. Excess moisture in the home can cause damage and contribute to mold growth. According to the US Department of Energy,

“Most energy and health experts advise against unvented space heaters or fireplaces. Even when operating properly, these units produce unhealthy exhaust gases such as nitrogen oxides and excess water vapor”.

Vented fireplaces are permitted. Points may be taken in feature 420.6 for the use of vented fireplaces that utilize outdoor air for combustion.

VERIFICATION: **Enrollment Review:** Provide plan notes or specifications to verify that all combustion appliances included are vented to the outside. If no combustion appliances are included in the project, document this on the project’s submitted checklist.

Certification Review: None.

ADDITIONAL INFO: “Unsafe Gas Heaters Proliferate”, Environmental Building News, May/June 1996

“Combustion Equipment Safety”, Technology Fact Sheet, Office of Building Technology, State and Community Programs, Energy Efficiency and Renewable Energy, U.S. Department of Energy

400.R2

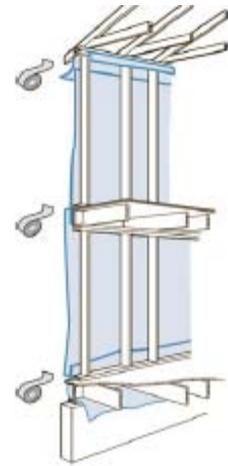
FEATURE: Full exterior drainage plane

POINT VALUE: Required (for all new exterior envelope area)

DESCRIPTION: In order to satisfy this requirement, the project must include a full exterior drainage plane for all new exterior envelope area.

Moisture is involved in most building problems. The most serious tend to be structural damage due to wood decay, unhealthy fungal growth, corrosion, freeze-thaw, and damage to moisture sensitive interior finishes.

A properly installed drainage plane effectively addresses the intrusion of bulk water from the exterior that has penetrated the exterior cladding. The drainage plane must be integrated with window and door flashings. All seams in the drainage plane should be overlapped and taped.



From the NAHB Green Home Building Guidelines

VERIFICATION:

Enrollment Review: Provide wall sections, plan notes, and/or specifications identifying the full exterior drainage plane provided for all new exterior building envelope area.

Certification Review: None.

ADDITIONAL INFO:

“Builder’s Guide”, Energy and Environmental Building Association’s (EEBA): www.eeba.org

Building Science Corporation: www.buildingscience.com

“Weather-Resistive Barriers”, Technology Fact Sheet, Office of Building Technology, State and Community Programs, Energy Efficiency and Renewable Energy, U.S. Department of Energy

400.R3

FEATURE:

Install MERV 8 air filter (ensure that air handlers can maintain adequate pressure and airflow)

POINT VALUE:

Required

DESCRIPTION:

To receive these points, the project must use at least a MERV 8 filter for mechanical ventilation. The MERV (Minimum Efficiency Reporting Value) system was incorporated into ASHRAE Standard 52.2, and provides a measurement of a filter’s ability to remove particles of different sizes. MERV 8 filters remove particles between 3-10 microns and are more effective than standard spun fiber filters. MERV 8 filters can capture items such as cement dust, mold spores, dusting aids, and hair spray, but do not capture contaminants such as humidifier dust, auto emissions, lead dust or bacteria, which are in the 1 micron range. MERV 8 filters also have a resource efficiency benefit from the standpoint that more dust is captured by the filter and is not deposited on the air handler.

Note that compliance with credit feature **430.1.2 (Install a whole-house HEPA filter)** fulfils the requirements of this required feature. True HEPA filters are considered equivalent to a MERV 16 rating. The use of “HEPA-type” filters as opposed to true HEPA filters does **not** meet the requirements of this required feature.

Homes that use **only** passive or exhaust-only ventilation are exempt from this requirement.

VERIFICATION:

Enrollment Review: Provide plan notes, equipment schedule notes, and/or specifications identifying MERV 8 or higher mechanical filtration.

Certification Review: None.

ADDITIONAL INFO:

“Your Furnace Filter”, Canada Mortgage and Housing Corporation: www.cmhc-schl.gc.ca/en/co/maho/gemare/gemare_008.cfm

"UNDERSTANDING MERV Ratings", Aero-Chem®: www.furnacefiltercare.com/merv-ratings.php

"Air Filtration in Buildings", Environmental Building News, October 2003

"Sidebar: Measuring Filtration Efficiency", Environmental Building News, October 2003

LEED for Homes Reference Guide, First Edition 2008 – US Green Building Council, www.usgbc.org

410 Indoor Air Quality

410.1

FEATURE: **Meet American Lung Association Health House® Standards**
This feature is only applicable to single-family new and renovation projects.

POINT VALUE: 40

DESCRIPTION: To receive these points, the project must be designed to meet the American Lung Association (ALA) Health House® building standards. The American Lung Association (ALA) Health House® is a national education program created to raise the standards for healthier indoor environments. The goals of the Health House® Program are:

- Minimize particulate matter and biological contaminants,
- Control indoor humidity and air filtration,
- Reduce Volatile Organic Compound Emissions (VOCs), and
- Increase energy efficiency and resource efficiency.

Builders must receive training and be certified to participate in this Program. Additional information on the Program and the building guidelines can be found the ALA's website. Note that many of the Health House® guidelines are already included on this checklist and points for those individual items may still be taken.

VERIFICATION: **Enrollment Review:** Provide plan notes and/or specifications identifying the American Lung Association (ALA) Health House® Program requirements AND identify the ALA Health House certified builder on the project's submitted checklist.

Certification Review: Provide American Lung Association (ALA) Health House® Program Certificate stating that the building has satisfied these standards.

ADDITIONAL INFO: American Lung Association Health House® Program: www.healthhouse.org

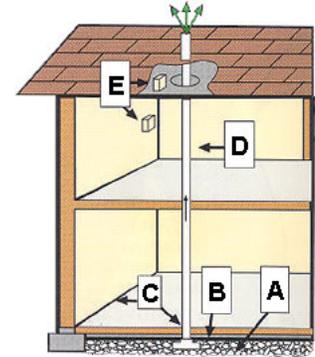
410.2

FEATURE: Radon mitigation system (passive or active) installed to EPA guidelines

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must include a passive or active radon mitigation system including the US Environmental Protection Agency radon-resistant construction techniques (A through E) indicated in the adjacent diagram.

Radon is a naturally occurring radioactive gas found in the soil and is the second largest cause of lung cancer after smoking. The US Environmental Protection Agency estimates that one in fifteen homes nationally have elevated radon levels. Chicago is located in a "moderate radon potential" zone. As a gas, radon can move into a home through cracks and joints in the foundation, basement floors, slabs-on-grade and unsealed crawl space floors. A passive or active sub-slab ventilation system provides a simple means for venting radon to the exterior of the home. New floors are required for existing buildings to receive these points.



A. Gas permeable layer (4" of gravel)
B. Plastic sheeting
C. Seal joints in slab
D. 3" or 4" plastic vent pipe
E. Junction box for future fan (active system includes fan)

VERIFICATION: **Enrollment Review:** Provide plan notes and/or specifications identifying the passive or active radon mitigation system that utilizes all of the US Environmental Protection Agency's radon-resistant construction techniques.

Certification Review: None.

ADDITIONAL INFO: US Environmental Protection Agency: www.epa.gov/radon

US Environmental Protection Agency – Radon Resistant New Construction: www.epa.gov/radon/construc.html

For Illinois radon information see www.cityofchicago.org and input 'radon data' into the site's search

410.3

FEATURE: Formaldehyde-free insulation throughout house (90% of insulation area)

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must include formaldehyde-free insulation (free of all added formaldehyde products) for at least 90% of the insulation area in a building meet this feature.

Some fiberglass insulation is made without added formaldehyde, and cellulose insulation contains no formaldehyde. Other non-formaldehyde insulation options include but are not limited to the following:

- Perlite, which comes from volcanic rock,
- Straw, a waste product of various grains,

- *Aircrete*, a cementitious foam,
- *Icynene* foam, and
- many other products.

VERIFICATION: **Enrollment Review:** Provide plan notes and/or specifications identifying formaldehyde-free insulation (free of all added formaldehyde products) for at least 90% of the insulation area.

Certification Review: None.

ADDITIONAL INFO: "Agency for Toxic Substances and Disease Registry: www.atsdr.cdc.gov

420 Ventilation

420.1

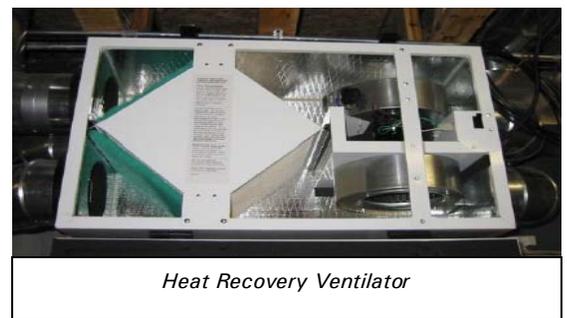
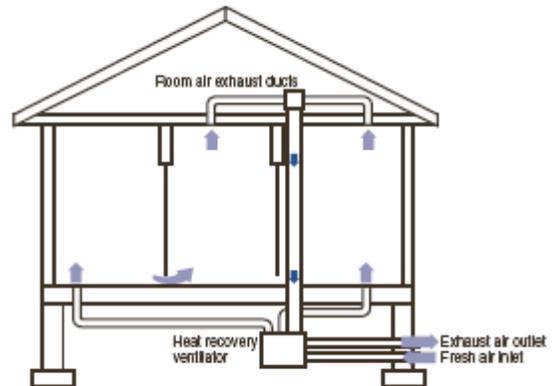
FEATURE: Energy & heat recovery ventilators

POINT VALUE: 12 points possible

- 12 Energy Recovery Ventilator (ERV)
OR
12 Heat Recovery Ventilator (HRV)

DESCRIPTION: To receive these points, the project must include either an energy recovery ventilator or a heat recovery ventilator. Controlled ventilation is increasingly important as houses are built tighter to prevent excessive air infiltration and energy losses. A combination of tighter homes and out gassing from new building materials (glues, paints, carpets, pads, cabinets) can create indoor air quality problems that range from mildly irritating to severe.

A heat-recovery ventilator reduces the heating and cooling costs of ventilation by transferring heat from the warm inside air being exhausted to the fresh but cold outside air in the winter, and vice-versa in the summer. Comfort is also improved because the supply air is tempered before delivery, reducing drafts. Some heat-recovery systems, called Energy Recovery Ventilators also transfer moisture. This is an advantage in the summer when air conditioning is used.



VERIFICATION: **Enrollment Review:** Provide plan notes and/or specifications identifying the specified Energy of Heat Recovery Ventilator.

Certification Review: None.

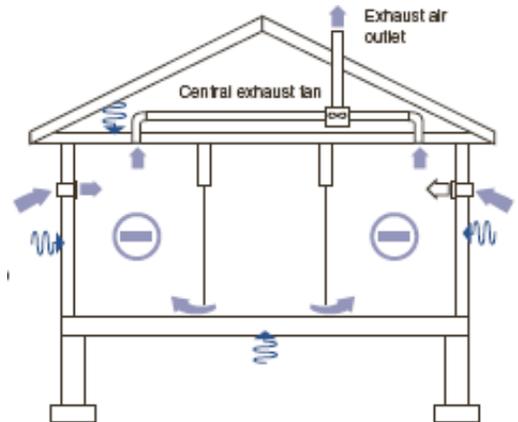
ADDITIONAL INFO: "Builder's Guide", Energy and Environmental Building Association's (EEBA): www.eeba.org

420.2

FEATURE: Continuous exhaust only mechanical ventilation system

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must include a continuous exhaust mechanical ventilation system. Exhaust ventilation systems are relatively simple. Typically, an exhaust ventilation system is composed of a single fan connected to a centrally located, single exhaust point in the dwelling unit. A preferable design option is to connect the fan to ducts from several rooms (preferably rooms where pollutants tend to be generated, such as bathrooms). The fan is typically installed in the attic above the insulation. Alternately, bathroom exhaust fans designed for continuous operation may also be used and installed in the bathrooms. This feature addresses dwelling units only and does not address common space in multifamily or mixed-use buildings.



VERIFICATION: **Enrollment Review:** Provide plan notes and/or specifications identifying a continuous exhaust mechanical ventilation system.

Certification Review: None.

ADDITIONAL INFO: “Builder’s Guide”, Energy and Environmental Building Association’s (EEBA): www.eeba.org

“Whole House Ventilation Systems”, Technology Fact Sheet, Office of Building Technology, State and Community Programs, Energy Efficiency and Renewable Energy, U.S. Department of Energy

420.3

FEATURE: Bathroom exhaust fans per guide requirements

POINT VALUE: 6

DESCRIPTION: To receive these points, the project must include bathroom exhaust fans in all full bathrooms that meet the following criteria:

- Provide 75 CFM exhaust at 0.25” water column pressure (note: typical contractor-grade fans only provide at 0.1”)
- Sone rating less than 1.5
- Wattage less than 0.5 watts/CFM
- Vented to the outside of the building, and
- Fans must be controlled by a mechanical timer or fan-delay switch

These bathroom exhaust guidelines do not apply to half-baths. All fans in full-baths must comply with these criteria to claim points.

VERIFICATION: **Enrollment Review:** Provide plan notes and/or specifications identifying bathroom exhaust fans for all full-baths that meet the guidelines above.

Certification Review: None.

ADDITIONAL INFO: "Whole House Ventilation Systems", Technology Fact Sheet, Office of Building Technology, State and Community Programs, Energy Efficiency and Renewable Energy, U.S. Department of Energy

420.4

FEATURE: **Meets ASHRAE Standard 62.2-2007**

POINT VALUE: **6**

DESCRIPTION: To receive these points, the project must be designed to meet ASHRAE Standard 62.2-2007 (or ASHRAE Standard 62.1-2007 for mid-rise buildings).

To address indoor air-quality issues, the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) has approved and published a residential indoor air-quality standard. Because most people spend 90 percent of their time indoors and a substantial portion of this time in their homes, ASHRAE Standard 62.2, *Ventilation and Acceptable Indoor Air Quality in Low-rise Residential Buildings* was developed to ensure healthy indoor air in residences. ASHRAE 62.1-2007 may be substituted for mid-rise buildings.

The most effective strategy for minimizing indoor exposure to pollutants is to prevent them from being released into the air in the first place. To this end, the standard requires source-control measures that exhaust pollutants (e.g. combustion appliances and cooking fumes) from specific rooms before the pollutants enter the rest of the household. In addition, whole-house ventilation brings fresh air into the house, diluting pollutants that are difficult to control at the source.

Standard 62.2 addresses three primary areas:

- Whole-house ventilation
- Local exhaust
- Source control

Whole-house ventilation - The whole-house continuous ventilation requirements in the standard are intended to dilute contaminant emissions from people, materials, and background processes.

Local exhaust - The intent of the standard's local exhaust requirements is to remove contaminants from rooms such as kitchens and bathrooms that have specific pollutant sources (e.g., cooking, electrical equipment, moisture).

Source control - This area of the standard addresses sources of contamination not covered in the first two areas.

The standard also provides information on proper venting of exhaust fans. The strategies identified in features 420.1, 420.2 and 420.3 may both be used to meet the ASHRAE standard and credit for those features may also be taken separately.

VERIFICATION: **Enrollment Review:** Provide plan notes and/or specifications identifying that the building will be designed to meet ASHRAE Standard 62.2-2007 (or ASHRAE Standard 62.1-2007 for mid-rise buildings).

Certification Review: None.

ADDITIONAL INFO: ASHRAE Standard 62.2, *Ventilation and Acceptable Indoor Air Quality in Low-rise Residential Buildings*: www.ashrae.org

ASHRAE Standard 62.1, *Ventilation for Acceptable Indoor Air Quality*: www.ashrae.org

420.5

FEATURE: Range hood vented outside

POINT VALUE: 6

DESCRIPTION: To receive these points, the project must vent all range hoods to the outside. Recirculating range hoods that merely “filter” air back into the living space do not effectively remove pollutants from the indoor environment. Direct ventilation to the exterior is a more effective option for true ventilation purposes, and is a key component of an effective overall ventilation strategy. Range hood exhaust must be ducted to the outside, not to the attic. A minimum 150 CFM exhaust range hood is recommended.



VERIFICATION: **Enrollment Review:** Provide plan notes and/or specifications identifying all range hoods vented to the outside.

Certification Review: None.

420.6

FEATURE: Sealed-combustion fireplace (gas or wood) with outside combustion air

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must use only sealed-combustion, direct-vent fireplaces that use outside air for combustion. A gas fireplace can create the aesthetic benefit of a fireplace without the energy waste and associated pollution of a typical wood-burning fireplace. A sealed-combustion or direct-vent fireplace avoids using conditioned inside air for combustion and venting. The fireplace should be able to be isolated from the living space with sealed glass doors. All fireplaces within the home or unit must meet these criteria to comply with this feature.

VERIFICATION: **Enrollment Review:** Provide plan notes and/or specifications identifying sealed-combustion fireplaces only with dedicated outside combustion air.

Certification Review: None.

430 Air Filtering

430.1

FEATURE: See features 430.1.1 through 430.1.2 below. Only one of the following features may be submitted for points under item 430.1

430.1.1

FEATURE: Install high-performance air filter (MERV 10 or greater; ensure that air handlers can maintain adequate pressure and airflow)

POINT VALUE: 10 points possible

5 ≥ MERV 10 filter
OR
10 ≥ MERV 13 filter

DESCRIPTION: To receive these points, the project must use MERV 10 or greater rated filters for mechanical ventilation. The MERV (Minimum Efficiency Reporting Value) system was incorporated into ASHRAE Standard 52.2, and provides a measurement of a filter's ability to remove particles of different sizes. MERV 10 filters remove particles between 1-3 microns, are more effective than standard spun fiber filters, and capture contaminants such as lead dust, humidifier dust, auto emissions and legionella. MERV 13 filters can capture smaller particles, between .3 -1.0 microns in size, such as bacterial, tobacco smoke, printer toner, face powder and insecticide dust. MERV filters with higher efficiency numbers also have a resource efficiency benefit from the standpoint that more dust is captured by the filter and is not deposited on the air handler.

Note that MERV 10 or greater rated filters are not industry standard filters, so it must be verified that furnaces can operate properly with increased filtration (and associated pressure drop).

VERIFICATION: **Enrollment Review:** Provide plan notes, equipment schedule notes, and/or specifications identifying ≥ MERV 10 or ≥ MERV 13 mechanical filtration.

Certification Review: None.

ADDITIONAL INFO: "Your Furnace Filter", Canada Mortgage and Housing Corporation: www.cmhc-schl.gc.ca/en/co/maho/gemare/gemare_008.cfm

"UNDERSTANDING MERV Ratings", Aero-Chem®: www.furnacefiltercare.com/merv-ratings.php

"Air Filtration in Buildings", Environmental Building News, October 2003

-OR-

430.1.2

FEATURE: Install whole house HEPA filter (ensure that air handlers can maintain adequate pressure and airflow)

POINT VALUE: 10

DESCRIPTION: To receive these points, the project must use a whole house HEPA filter. Typical filters trap only the larger dust particles in the air to keep the fan and coil clean, and are from 3-5% efficient. To trap a reasonable range of household pollutants, filters should block particles as small as 0.3 microns. High Efficiency Particle Arresting (HEPA) filters, by definition, will trap 99.97% of all particles down to 0.3 microns in size.

HEPA filters often employ some form of upstream pre-filtration to remove larger pollutants, thus the larger, easy-to-capture particles won't waste the high efficiency media.

Note that the higher filtration of HEPA filters restricts air flow, so the HVAC blower must be designed accordingly.

Note that compliance with this credit feature fulfills the requirements of required feature 400.R3 (Install MERV 8 air filter). True HEPA filters are considered equivalent to a MERV 16 rating. The use of "HEPA-type" filters as opposed to true HEPA filters does not meet the requirements of this required feature.

VERIFICATION: **Enrollment Review:** Provide plan notes, equipment schedule notes, and/or specifications identifying whole house HEPA filter system.

Certification Review: None.

ADDITIONAL INFO: "Air Filtration in Buildings", Environmental Building News, October 2003

"Better Indoor Air Through Filtration", Southface Energy Institute:
southface.org/web/resources&services/publications/factsheets/3airfiltr.pdf

430.2

FEATURE: Install central vacuum

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must use a central vacuum system. Unlike conventional vacuums that tend to recirculate dust, this type of system can remove a larger percentage of contacted dirt, dust mites, pollen, dander and other allergens and carries them away from living areas, which helps improve indoor air quality. Research has proven that this type of system can provide measurable relief for allergy sufferers. It's recommended that central vacuums installed be rated at 500 air watts or greater and include an electric motor driven floor brush. The central vacuum must vent to the outdoors.

VERIFICATION: **Enrollment Review:** Provide plan notes, equipment schedule notes, and/or specifications identifying central vacuum system.

Certification Review: None.

440 Interior Finishes

440.1

FEATURE: Low VOC wood finishes (100% of applications)

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must use low-VOC (volatile organic compound) wood finishes for all clear wood finish applications on the interior of the building (defined as inside the weatherproofing system and applied on-site).

Wood finishes having VOC content less than or equal to the limits listed in Table 440.1 below are considered low VOC.

Table 440.1 VOC limits for wood finishes

| Application | VOC content limit (grams/liter) |
|---|---------------------------------|
| Varnishes (including urethane finishes) | 350 |
| Laquers | 550 |
| Shellacs, clear | 730 |
| Shellacs, pigmented | 550 |
| Stains | 250 |

VERIFICATION: **Enrollment Review:** Provide plan notes, specifications, or product data sheets or MSDS (material safety data sheets) indicating compliant VOC content for all interior wood finishes.

Certification Review: None.

ADDITIONAL INFO: South Coast Air Quality Management District Rule 1113, Architectural Coatings: www.aqmd.gov/rules/reg/reg11/r1113.pdf

Green Seal Standards: www.greenseal.org

GreenSpec®, Environmental Building News: www.buildinggreen.com

US Green Building Council – LEED for Homes (1st Edition): www.usgbc.org

440.2

FEATURE: Minimal VOC content paints, coatings & primers (100% of applications)

POINT VALUE: 6 points possible

4 for low VOC content paints, coatings & primers
OR

6 for no VOC content paints, coatings & primers

DESCRIPTION:

To receive these points, the project must use paints, coatings, and primers that do not exceed the VOC limits listed below (low VOC) or contain zero VOCs (no VOC) for all applications on the interior of the building (defined as inside the weatherproofing system and applied on-site). 4 points are given for using all low VOC content products and 6 points are given for using all zero VOC content products.



VOCs (volatile organic compounds) are released when paint is drying and gives a room that “fresh paint smell”. VOCs can cause a number of respiratory and nervous system problems from occasional headaches to more serious reactions.

Paints, coatings, and primers having VOC content less than or equal to the limits listed in Table 440.2 below are considered low VOC.

Table 440.2 VOC limits for paint, coatings and primers

| Application | VOC content limit (grams/liter) |
|--|---------------------------------|
| Paints, interior latex flat | 100 |
| Paints, interior latex non-flat | 150 |
| Paints, anti-corrosive and anti-rust paints applied to interior ferrous metal surfaces | 250 |
| Floor coatings | 100 |
| Primers or undercoatings (with or without colorant added) | 150 |

VERIFICATION:

Enrollment Review: Provide plan notes, specifications, or product data sheets or MSDS (material safety data sheets) indicating compliant VOC content for all interior paints, coatings, and primers.

Certification Review: None.

ADDITIONAL INFO:

Paint's luster depends upon its mixture of pigment, resin and inert ingredients. Paint with less pigment and more resin is glossier than the reverse. Enamel is a term that usually denotes an extra-smooth, hard surface coating which is the result of a high-resin formula. Flat paints are those that register a gloss of less than 5 on a 60-degree meter or less than 15 on an 85-degree meter. Non-flat coatings are those that register a gloss of 5 or greater on a 60-degree meter and a gloss of 15 or greater on an 85-degree meter.

The glossier a finish, the more durable and washable it tends to be. Flat paint generally hides irregularities and surface imperfections, important for both exterior and interior walls. Pearl and eggshell paints hide imperfections but are more washable than flat paints. For painting interiors, flat paints are often used for ceilings, eggshell for walls and semi-gloss or gloss on doors and trim.

South Coast Air Quality Management District Rule 1113, Architectural Coatings: www.aqmd.gov/rules/reg/reg11/r1113.pdf

Green Seal Standards: www.greenseal.org

GreenSpec®, Environmental Building News: www.buildinggreen.com

US Green Building Council – LEED for Homes (1st Edition): www.usgbc.org

440.3

FEATURE: Low VOC sealers (100% of applications)

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must use low-VOC (volatile organic compound) sealers for all applications on the interior of the building (defined as inside the weatherproofing system and applied on-site).

Sealers having VOC content less than or equal to the limits listed in Table 440.3 below are considered low VOC.

Table 440.3 VOC limits for sealers

| Application | VOC content limit (grams/liter) |
|-----------------------|---------------------------------|
| Waterproofing sealers | 250 |
| Sanding sealers | 275 |
| All other sealers | 200 |

VERIFICATION: **Enrollment Review:** Provide plan notes, specifications, or product data sheets or MSDS (material safety data sheets) indicating compliant VOC content for all interior sealers.

Certification Review: None.

ADDITIONAL INFO: South Coast Air Quality Management District Rule 1113, Architectural Coatings: www.aqmd.gov/rules/reg/reg11/r1113.pdf

Green Seal Standards: www.greenseal.org

GreenSpec®, Environmental Building News: www.buildinggreen.com

US Green Building Council – LEED for Homes (1st Edition): www.usgbc.org

440.4

FEATURE: Low-emitting carpet and carpet pad (100% of applications)

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must use low-emitting carpet and carpet pad that complies with the Carpet and Rug Institute (CRI) Green Label Plus program for all applications on the interior of the building (defined as inside the weatherproofing system).

VERIFICATION: **Enrollment Review:** Provide plan notes, specifications, or product data sheets indicating CRI Green Label Plus compliant carpet and carpet pad for all interior applications.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News: www.buildinggreen.com

440.5

FEATURE: Low VOC adhesives (100% of applications)

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must use low-VOC adhesives for all adhesive applications on the interior of the building (defined as inside the weatherproofing system and applied on-site). Adhesives used for the typical interior architectural applications listed below must not exceed the stated VOC limits.

Table 440.5 VOC limits for adhesives

| Application | VOC content limit (grams/liter, less water) |
|---|---|
| Indoor carpet adhesives | 50 |
| Carpet pad adhesives | 50 |
| Wood flooring adhesives | 100 |
| Rubber floor adhesives | 60 |
| Subfloor adhesives | 50 |
| VCT & asphalt tile adhesives | 50 |
| Ceramic tile adhesives | 65 |
| Linoleum adhesives | 50 |
| Drywall and panel adhesives | 50 |
| Cove base adhesives | 50 |
| Multipurpose construction adhesives | 70 |
| Structural glazing adhesives | 100 |
| PVC welding | 510 |
| CPVC welding | 490 |
| ABS welding | 325 |
| Plastic cement welding | 250 |
| Adhesive primer for plastic | 550 |
| Contact adhesives | 80 |
| Special-purpose contact adhesives | 250 |
| Structural wood member adhesives | 140 |
| Sheet-applied rubber lining operations | 850 |
| Top and trim adhesives | 250 |
| Metal to metal adhesives | 30 |
| Plastic foam adhesives | 50 |
| Porous material (except wood) adhesives | 50 |
| Wood adhesives | 30 |
| Fiberglass adhesives | 80 |

VERIFICATION: **Enrollment Review:** Provide plan notes, specifications, or product data sheets or MSDS (material safety data sheets) indicating compliant VOC content for all adhesives used inside the building's weatherproofing system.

Certification Review: None.

ADDITIONAL INFO: South Coast Air Quality Management District Rule 1168, Adhesive & Sealant Applications: www.aqmd.gov/rules/reg/reg11/r1168.pdf

Green Seal Standards: www.greenseal.org

GreenSpec®, Environmental Building News: www.buildinggreen.com

US Green Building Council – LEED for Homes (1st Edition): www.usgbc.org

440.6

FEATURE: Low VOC sealants (100% of applications)

POINT VALUE: 4

DESCRIPTION: To receive these points, the project must use low VOC sealants for all sealant applications on the interior of the building (defined as inside the weatherproofing system and applied on-site). Sealants used for the typical interior architectural applications listed below must not exceed the stated VOC limits.

Table 440.6 VOC limits for sealants and sealant primers

| Application | VOC content limit (grams/liter) |
|------------------------|---------------------------------|
| Architectural sealants | 250 |

VERIFICATION: **Enrollment Review:** Provide plan notes, specifications, or product data sheets or MSDS (material safety data sheets) indicating compliant VOC content for all sealants used inside the building's weatherproofing system.

Certification Review: None.

ADDITIONAL INFO: South Coast Air Quality Management District Rule 1168, Adhesive & Sealant Applications: www.aqmd.gov/rules/reg/reg11/r1168.pdf

Green Seal Standards: www.greenseal.org

GreenSpec®, Environmental Building News: www.buildinggreen.com

US Green Building Council – LEED for Homes (1st Edition): www.usgbc.org

450 Cabinetry

450.1

FEATURE: All cabinets made from urea-formaldehyde-free composite wood or agrifiber

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must use urea-formaldehyde-free composite wood or agrifiber cabinet components for all new built-in cabinetry. Conventional cabinets made of plywood, particleboard, or medium density fiberboard (MDF) typically contain urea-formaldehyde resins that off-gas and may create indoor air quality problems.

VERIFICATION: **Enrollment Review:** Provide plan notes, specifications, or product data sheets or MSDS (material safety data sheets) indicating urea-formaldehyde-free composite wood or agrifiber for all new built-in cabinetry.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News: www.buildinggreen.com

450.2

FEATURE: All shelving & countertops made from urea-formaldehyde-free composite wood or agrifiber

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must use urea-formaldehyde-free composite wood or agrifiber for all new built-in shelving & countertops. Conventional shelving and composite countertop material made of plywood, particleboard, or medium density fiberboard (MDF) typically contain urea-formaldehyde resins that off-gas and may create indoor air quality problems.

VERIFICATION: **Enrollment Review:** Provide plan notes, specifications, or product data sheets or MSDS (material safety data sheets) indicating urea-formaldehyde-free composite wood or agrifiber for all new built-in shelving and countertops.

Certification Review: None.

ADDITIONAL INFO: GreenSpec®, Environmental Building News: www.buildinggreen.com

460 Garages

460.1

| | |
|-------------------------|---|
| FEATURE: | Garage isolated from living space This does not apply to structured parking (e.g. parking decks) in multi-family projects |
| POINT VALUE: | 10 points possible 10 Detached garage OR 10 Attached garage, with compliant air-sealing and testing |
| DESCRIPTION: | <p>To receive these points, the project must either have a detached garage or an attached garage with tested air sealing to keep garage contaminants from negatively impacting the indoor air quality of living space. A detached garage is defined as a garage not connected to any living areas. An attached garage is directly connected to the house. An attached garage must be isolated from the house by extensive air sealing, with a pressure difference of 45 Pa or greater with reference to the house, verified by testing (see feature 212.2) in order to comply.</p> <p>This feature does not apply to structured parking (e.g. parking decks) in multi-family projects</p> <p>Points may also be given if there is an existing detached garage that will be used and if it remains detached from all living areas.</p> |
| VERIFICATION: | <p>Enrollment Review: Provide plan notes (site plan) and/or specifications identifying that either the garage will be detached from all living space or that the attached garage will be air sealed and tested. If testing is being pursued, the project must also identify the blower door/ air seal testing contractor.</p> <p>Certification Review: If option 2 – Attached garage, with compliant air sealing and testing – is the compliance path being pursued, provide blower door test results indicating 45 Pa pressure difference was achieved with reference to the house.</p> |
| ADDITIONAL INFO: | <p>A continuous and sealed air barrier between an attached garage and the living areas is critical to prevent the introduction of exhaust gases from internal combustion engines into the dwelling. This includes access doors as well as any penetrations in the common walls and ceiling/floor sections. Supplying heat and cooling to a garage is sometimes desired by homeowners, but using the air handler that supplies the space conditioning to the remainder of the home is never appropriate. Even though no return air duct is provided in the garage, positive pressure in the garage will tend to cause exfiltration into the dwelling.</p> <p>“Builder’s Guide”, Energy and Environmental Building Association’s (EEBA): www.eeba.org</p> <p>Building Science Corporation: www.buildingscience.com</p> |

460.2

| | |
|---------------------|---|
| FEATURE: | Exhaust fan in attached garage (wired to delay timer/door opener) This does not apply to structured parking in multi-family projects when ventilation is already required |
| POINT VALUE: | 8 points possible |

- 6 Exhaust fan in attached garage
- OR
- 8 Solar-powered exhaust fan in attached garage

DESCRIPTION:

To receive these points, the project must provide an exhaust fan in the attached garage that is wired to a delay timer in order to remove auto exhaust from the garage for ten minutes after the vehicle enters or leaves the garage. An additional two points may be received for the use a solar-powered exhaust fan for this application.

Garages are sources of indoor air pollutants from vehicle exhaust, particularly when home heating and cooling systems are operating. When the inside of the house is under a negative pressure, air can be drawn from numerous areas, including the garage. Because an exhaust fan creates negative pressure in the garage, pollutants are less likely to be drawn into the home. An exhaust fan is not a substitute for air sealing (see feature 460.1) since wind speed and direction affect the performance of a mechanical exhaust system. In addition, pressure differences between the dwelling and garage may be present when the exhaust fan is not operating causing air to move from the garage into the home.

VERIFICATION:

Enrollment Review: Provide plan note and/or specification identifying the garage exhaust fan (wired to a delay timer or constantly exhausting) provided for the attached garage.

Certification Review: None.

ADDITIONAL INFO:

“Builder’s Guide”, Energy and Environmental Building Association’s (EEBA): www.eeba.org

Building Science Corporation: www.buildingscience.com

470 Moisture Management

470.1

FEATURE:

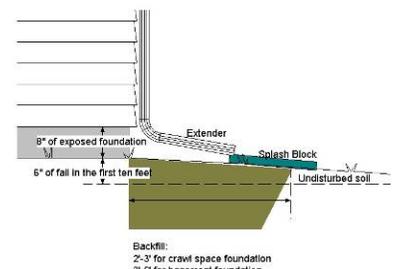
Extend downspouts (5 ft, perpendicular to foundation face)

POINT VALUE:

2

DESCRIPTION:

Downspout extensions assure that rainwater is able to drain clear of the backfill area around the building’s perimeter, and thereby reduce the moisture to which foundation walls are exposed. Downspouts should discharge water at least 5 feet away from foundation, measured perpendicular to the foundation wall. Landscaping edging should not interfere with discharge water.



The Chicago Building Code may require a site drainage connection to the storm sewer. Applicant will be informed during permitting if a connection is required, and will confirm points during building certification as necessary.

*Building Research Council,
University of Illinois at Urbana-
Champaign*

VERIFICATION:

Enrollment Review: Provide plan notes and/or specifications identifying the downspout extensions provided to discharge water at least 5 feet away from the building foundation.

Certification Review: None.

470.2

FEATURE: Sealed ground cover in crawl space and under-floor below grade spaces

POINT VALUE: 6

DESCRIPTION: A sealed ground cover should be installed to prevent moisture migration from the ground through capillary action (through a slab) or by vapor movement (in crawl space). Ground cover/vapor barrier should be sealed to the walls and should overlap at least 12 inches at all joints. All holes and joints in the ground cover should be sealed with tape or caulk. Ground cover under slab should be 6-mil. An 8-mil ground cover should be used on crawl space floors.



Sealed ground cover

VERIFICATION: **Enrollment Review:** Provide plan note and/or specification identifying the ground cover/moisture barrier for all crawl space areas or other under-floor below grade spaces.

Certification Review: None.

ADDITIONAL INFO: "Builder's Guide", Energy and Environmental Building Association's (EEBA): www.eeba.org

Building Science Corporation: www.buildingscience.com

500 Resource Conservation

500 Minimum Resource Conservation

500.R1

FEATURE: Protect trees and natural features during construction

POINT VALUE: Required

DESCRIPTION: In order to satisfy this requirement, the project must protect any trees (or significant natural features) on site or within the parkway that have been identified to remain. Trees maintained on the site and within parkway should be protected by fencing (typical tree protection fencing) around the tree at least as far as the drip line (the tips of branches farthest from the trunk) when possible. Compacted soil will damage root systems and can ultimately destroy the tree, even though its demise may occur as much as a year or two after construction. Other best management practices include maintaining positive drainage to trees and natural features and/or ensuring adequate irrigation to these trees during and following construction. Grading and trenching in the root zone should be avoided.

VERIFICATION: **Enrollment Review:** Provide plan notes (site plan) and/or specifications identifying the protection of existing trees “to remain” within the site and the public parkway and/or significant on-site natural features (e.g. a creek or remnant landscape feature).

Certification Review: None.

ADDITIONAL INFO: “Landscape Installation/Erosion and Sediment Control”, Green Industries of Colorado, Best Management Practices: www.greenco.org

500.R2

FEATURE: Limit single-family house size per number of bedrooms

This feature is only applicable to single-family new and renovation projects.

POINT VALUE: See Tables 500.R2a and 500.R2b below

DESCRIPTION: In order to satisfy this requirement, the project must calculate the points received or lost based on the total square footage (gross) of conditioned space and the number of bedrooms in the single-family home.

The design and construction of smaller homes has many environmental benefits and need not be at the cost of comfort and convenience. Multi-function spaces that can accommodate different uses for different household configurations and for different needs over time may be designed (e.g., a room adjoining the master bedroom that can serve as a nursery, a home office, or a hobby space) to provide flexibility and adaptability without an increase in home size. Outdoor “rooms” to expand living space in mild weather may also enhance the design of such a home.

Projects must include all conditioned space, whether finished or not, that meets building code requirements for living space. A bedroom is defined as an enclosed room that is used principally for sleeping or contains a closet and has ready access to a bathroom – i.e., a room other than a kitchen, bathroom, living room, dining room, family / media room, laundry room, garage, hallway, or unfinished basement area. Houses with square footage less than the national average according to Table 500.R2a will receive positive points for this requirement (see left hand

column). Houses with square footage equal to the national will be receive no points. Houses with square footage greater than the national average will deduct points. To determine the score for a home between two sizes shown, interpolate and then round to the closest point.

House Size in Square Feet by Number of Bedrooms
Table 500.R2a

| Points | 0 Bedrooms | 1 Bedrooms | 2 Bedrooms | 3 Bedrooms | 4 + Bedrooms |
|-----------------------------|---------------|---------------|----------------|----------------|-----------------|
| 20 | 275 | 350 | 750 | 900 | 1150 |
| 16 | 350 | 400 | 875 | 1100 | 1450 |
| 12 | 425 | 500 | 1000 | 1300 | 1750 |
| 8 | 500 | 600 | 1125 | 1500 | 2050 |
| 4 | 575 | 700 | 1250 | 1700 | 2350 |
| National Average | 650 SF | 800 SF | 1375 SF | 1900 SF | 2650 SF |
| -4 | 725 | 900 | 1500 | 2100 | 2950 |
| -8 | 800 | 1000 | 1625 | 2300 | 3250 |
| -12 | 875 | 1100 | 1750 | 2500 | 3550 |
| -16 | 950 | 1200 | 1875 | 2700 | 3850 |
| -20 | 1025 | 1300 | 2000 | 2900 | 4150 |

Determine size score for homes larger than those shown in the applicable column by subtracting additional points for each added size increment, as shown in Table 500.R2b

Size Increments for Larger Homes
Table 500.R2b

| 0 Bedrooms | 1 Bedroom | 2 Bedrooms | 3 Bedrooms | 4 Or More Bedrooms | Deduction Per Increment |
|---------------|--------------|---------------|---------------|-----------------------|-------------------------------|
| 37.5 | 50 | 62.5 | 100 | 150 | -2 |

VERIFICATION:

Enrollment Review: Provide the calculation used to determine the points received or lost based on the total square footage (gross) of conditioned space and the number of bedrooms in the single-family home.

Certification Review: None.

510 Land Use

510.1

FEATURE:

Save and reuse topsoil on site (determine value by soil analysis)

POINT VALUE:

4

DESCRIPTION:

To receive these points, the project must save and reuse valuable topsoil (as determined by soil analysis) removed as part of the construction activities. Topsoil must be removed and stored and protected on-site from erosion and construction activities (see feature 100.R1) for re-use after construction. Topsoil is a valuable resource and should be retained whenever possible. Simply pushing topsoil to the side of the site will not ensure its proper storage.

VERIFICATION:

Enrollment Review: Provide plan notes (site plan) and/or specifications identifying the storage and protection of valuable topsoil on-site for re-use.

Certification Review: None.

ADDITIONAL INFO: "Landscape Installation/Erosion and Sediment Control", Green Industries of Colorado, Best Management Practices: www.greenco.org

"Storm Water Management for Construction Activities", Chapter 3 (USEPA Document No. EPA 832R92005), U.S. Environmental Protection Agency Office of Water: www.epa.gov/OW

Internet download link for Chapter 3 (72 pages): www.epa.gov/npdes/pubs/chap03_conguide.pdf

Download site for all sections of referenced EPA document:
nepis.epa.gov/EPA/html/Pubs/pubtitleOW.htm

520 Materials Re-Use

520.1

FEATURE: Regionally salvaged structural material

POINT VALUE: 3 5% minimum of structural applications
OR
5 10% minimum of structural applications

DESCRIPTION: To receive these points, the project must use regionally salvaged, reclaimed, or refurbished structural materials (from within 500 miles of the project site). Reuse of existing structural material also qualifies.

The reuse of existing or salvaged structural materials simultaneously helps to relieve two environmental problems: the consumption of natural resources, and the landfill volume occupied by materials from demolished homes and buildings. Waste from demolished buildings is currently estimated to occupy between 15 and 25 percent of the volume in landfills. Much of this material can be salvaged for reuse with equivalent (and in some cases superior) performance compared to its original application.

VERIFICATION: **Enrollment Review:** Provide plan notes and/or specifications identifying the use of regionally salvaged (from within 500 miles of the site) structural material for at $\geq 5\%$ or $\geq 10\%$ of the project's structural applications.

Certification Review: None.

ADDITIONAL INFO: ReBuilding Exchange: www.rebuildingexchange.org

520.2

FEATURE: Regionally salvaged finish material

POINT VALUE: 3 5% minimum of finish applications
OR
5 10% minimum of finish applications

DESCRIPTION: To receive these points, the project must use regionally salvaged, reclaimed, or refurbished interior and exterior finish materials (from within 500 miles of the project site). Reuse of existing finish material also qualifies.

The reuse of existing or salvaged finish materials simultaneously helps to relieve two environmental problems: the consumption of natural resources, and the landfill volume occupied by materials from demolished homes and buildings. Waste from demolished buildings is currently estimated to occupy between 15 and 25 percent of the volume in landfills. Much of this material can be salvaged for reuse with equivalent (and in some cases superior) performance compared to its original application.

VERIFICATION: **Enrollment Review:** Provide plan notes and/or specifications identifying the use of regionally salvaged (from within 500 miles of the site) finish material for at $\geq 5\%$ or $\geq 10\%$ of the project's interior and exterior applications.

Certification Review: None.

ADDITIONAL INFO: ReBuilding Exchange: www.rebuildingexchange.org

520.3

FEATURE: Recycled-content paints

POINT VALUE: 1

DESCRIPTION: To receive these points, the project must use recycled-content paints. Leftover paint is used to make recycled paint. The recycled paints are often collected from municipal waste programs. As the colors may be unpredictable, recycled paints are often used as primers. Better quality recycled paints are available, although color selection may be limited.

VERIFICATION: **Enrollment Review:** Provide plan notes and/or specifications identifying the use of recycled-content paints.

Certification Review: None.

ADDITIONAL INFO: Environmental Building New; www.buildinggreen.com

"Household Hazardous Waste: Steps to Safe Management," US Environmental Protection Agency www.epa.gov/owow/nps/toolbox/other/epa_house_haz_waste.pdf

City of Chicago's Household Chemical and Computer Recycling Facility – 1150 North Branch Street, Chicago, IL

For hours, visit www.cityofchicago.org/streetsandsan – click on Chicago Recycling Initiative, Dispose Household Chemicals & Computer Recycling, and Overview

530 Waste Reduction & Recycling

530.1

FEATURE: Implement construction waste recycling plan diverting 75% of material from landfill (exceed City ordinance by 25%)

POINT VALUE: 15

DESCRIPTION: To receive these points, the project must establish and implement a construction waste recycling plan to divert at least 75% of the demolition and construction waste from the landfill.

An ordinance requiring the diversion of at least 50% of construction waste from the landfill took effect in January 2007. The requirements of the ordinance apply to all residential projects with four or more units that involve the construction of a new structure or that involve buildings or structures that have been substantially rehabilitated, as determined by the Chicago Department of Buildings.

In 2003, more than 1.4 million tons of construction steel, 615 thousand tons of concrete and brick and 122 thousand tons of wood were recycled in Chicago.

VERIFICATION:

Enrollment Review: Provide plan notes and/or specifications identifying the requirements (a plan) for construction waste diversion and identify the party responsible for implementation of the plan.

Certification Review: At the completion of a job, the General Contractor or Demolition Contractor must submit documentation to the Department of Environment through Department of Buildings (DOB). A certificate of occupancy will not be issued until documentation has been submitted and certified.

ADDITIONAL INFO:

“Construction Best Management Practices”, City of Chicago; egov.cityofchicago.org/webportal/COCWebPortal/COC_EDITORIAL/constructionBestManagementPractices11-2.pdf

NAHB Research Center’s Residential Construction Waste Management – A Builder’s Field Guide: www.nahbrc.org/bookstore/cw0503w.aspx

530.2

FEATURE:

Built-in recycling center with two or more bins in each unit

POINT VALUE:

6

DESCRIPTION:

To receive these points, the project must provide a built-in system for recycling which allows separation and storage of at least two materials. This built-in system may be located either in the kitchen or in a utility area (not garage) adjacent to or convenient to the kitchen.

Recycling is one of the easiest ways to contribute to a greener community and this very visible feature fits well with local recycling programs. This item is a visible demonstration of the builder’s commitment to green building, making recycling more convenient for the homeowner.

VERIFICATION:

Enrollment Review: Provide plan note and/or specification identifying the built-in recycling center including the location and number of bins.

Certification Review: None.

ADDITIONAL INFO:

Blue Cart Recycling: www.bluecartschicago.org - Chicago is shifting to the Blue Cart Recycling program citywide, as of June 2008 through the end of 2011. Homes in a Blue Cart area that are serviced by City of Chicago garbage pick-up are given a blue recycling cart to deposit recyclable materials, including paper, cardboard, plastics, glass, tin and aluminum (see Table 530.2 below). These materials can be co-mingled, but consider separately bagging paper to prevent cross contamination.

Table 530.2

| Items to INCLUDE in your Blue Cart |
|------------------------------------|
| Glass jars and bottles |
| Aluminum cans, foil and pie tins |
| Tin or Steel cans |

| |
|--|
| Cereal boxes, paper towel rolls |
| Cardboard (flatten all boxes) |
| Plastic bottles and containers (numbers 1-5, 7 accepted) |
| Junk mail |
| Magazines and catalogs |
| Telephone books |
| Paper bags |
| Office paper and file folders |
| Newspaper and inserts |
| Beverage cartons (milk, juice, soy cartons) |
| Items NOT to Include in your Blue Cart |
| YARD WASTE - Yard waste is recycled separately. It should be bagged and placed beside the blue cart. |
| NON-RECYCLEABLE TRASH - Non-recyclables should continue to go into your black garbage cart for regular city trash pickup. These items belong in your garbage cart: food scraps, styrofoam or #6 plastic, plastic bags. |
| HOUSEHOLD HAZARDOUS WASTE & ELECTRONICS - Take all household hazardous waste (paint, cell phones, batteries, and electronics) and old computers to the city's new permanent facility. The new facility Household Chemicals and Computer Recycling Facility is located at 1150 N. North Branch Street. |

Blue Drop-Off Centers were created to give residents in transitional recycling areas a temporary recycling replacement for the Blue Bag, which is no longer in use. With the exception of yard waste, these regional recycling stations will accept all of the same commodities that go into the Blue Cart.

| Drop Off Center | Address |
|---|--------------------------|
| Caldwell Woods Forest Preserve | 6358 W. Devon Ave |
| Far North Side | 6441 N. Ravenswood |
| Chevailier Woods Forest Preserve | 5530 N. East River Road |
| Schiller Woods East Forest Preserve | 8700 W. Irving Park Road |
| Portage Park Neighborhood | 4243 N. Neenah |
| 17 th District Police Station | 4649 N. Pulaski |
| Horner Park | 4201 N. California |
| Riis Park | 6241 W. Wrightwood |
| Hermosa Community | 4619 W. Homer |
| Kosciuszko Park | 2732 N. Avers |
| Notebaert Nature Museum | 2430 N. Cannon Drive |
| Household Chemicals Computer Recycling Facility | 1150 N. North Branch |
| Old 10 th District Police Station | 1952 W. 23rd St. |
| Chgo Center for Green Technology | 445 N. Sacramento |
| Columbus Park | 400 S. Golf |
| North Lawndale | 1817 S. Pulaski |
| Douglas Park | 1359 S. Thompson Dr. |
| Near South | 1758 S. Clark |
| City Facility Campus | 1424 W. Pershing |

| | |
|--------------------------------|-----------------------|
| Gage Park | 2411 W. 55th |
| Sherman Park | 1300 W. Garfield Blvd |
| Washington Park | 5560 Russell Dr |
| Marquette Park | 6734 S. Kedzie |
| Ogden Park | 6500 S. Racine |
| Auburn Gresham | 7811 S. Racine |
| Rainbow Park | 3111 E. 77th Street |
| Dan Ryan Woods Forest Preserve | 2300 W. 83rd Street |
| Calumet Park Beach | 9807 S. Avenue G |
| West Pullman | 11615 S. Indiana |
| William Powers Recreation Area | 12949 S. Avenue O |

1995 City of Chicago Recycling Ordinance; For information on Chicago’s Workplace and Residential Recycling Ordinance, go to www.cityofchicago.org/streetsandsan, click on Chicago Recycling Initiative, and click on Private Sector Recycling

530.3

FEATURE: **Waste sorter with recycling functions (multi-family projects only)**
This feature is only applicable to multi-family new and renovation projects

POINT VALUE: 5

DESCRIPTION: To receive these points, the project must provide a waste sorter designed to address recycling programs in multi-family buildings. Generally, a chute is provided that directs waste to a space where waste products are automatically separated from materials that can be recycled.

VERIFICATION: **Enrollment Review:** Provide plan notes and/or specifications identifying the waste sorter with recycling functions included in the project.

Certification Review: None.

ADDITIONAL INFO: Wilkinson Hi-Rise Waste Chutes: www.wilkinsonhirise.com

1995 City of Chicago Recycling Ordinance; For information on Chicago’s Workplace and Residential Recycling Ordinance, go to www.cityofchicago.org/streetsandsan, click on Chicago Recycling Initiative, and click on Private Sector Recycling

530.4

FEATURE: **Multi-unit recycling plan (multi-family projects only)**
This feature is only applicable to multi-family new and renovation projects

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must utilize the City of Chicago’s Multi-Unit Residential Recycling Toolkit (Recycling Toolkit) to provide a recycling program for building residents. In the Recycling Toolkit (see Additional Info below), you will find information on how to estimate your building's current recycling rate, a list of which waste haulers offer source-separated recycling

services, how to educate residents (including sample posters, flyers and newsletters), and information on how to track your progress.

VERIFICATION: **Enrollment Review:** Provide plan notes and/or specifications identifying the requirements (a plan) for the multi-unit recycling plan and identify the party responsible for the development and implementation of the plan.

Certification Review: Provide a copy of the project's Recycling Toolkit checklist (see Additional Info) in the required Home Manual for feature 610.R1.

ADDITIONAL INFO: 1995 City of Chicago Recycling Ordinance: For information on Chicago's Workplace and Residential Recycling Ordinance, go to www.cityofchicago.org/streetsandsan, click on Chicago Recycling Initiative, and click on Private Sector Recycling

Recycling Toolkit – 5 Steps to Recycling in Multi-Unit Buildings: To download the Recycling Toolkit, go to www.cityofchicago.org/streetsandsan, click on Recycling Chicago, then Residential Recycling, and then click on How does Multi-unit Recycling Work in the City of Chicago

530.5

FEATURE: Provide home-scale composting

POINT VALUE: 6

DESCRIPTION: To receive these points, the project must provide an indoor hot-composter or outdoor composter for the home or available for all units. In the United States, 40% of the solid waste stream sent to landfill is comprised of organic materials and, food scraps comprise 25% of solid material waste. Composting allows this material to break down naturally without taking up landfill space, and the resulting mulch can provide an affordable, valuable soil amendment for the site's landscaping and gardening needs.

VERIFICATION: **Enrollment Review:** Provide plan notes and/or product cut sheet identifying the home-scale composting system.

Certification Review: Include information on the composter provided, and provide any warranty and/or maintenance information in the Home Manual (feature 610.R1). Provide instructions on the types of materials that can be composted, and how often they can be harvested.

ADDITIONAL INFO: Information on the City of Chicago Composting Ordinance: www.cityofchicago.org/environment - Click on Initiatives & Programs, then Composting Ordinance

Chicago Home Composting: www.chicagohomecomposting.org

Nature Mill: www.naturemill.com

The Earth Machine: www.earthmachine.com or www.composters.com

540 Water Conservation

541 Interior

541.1

See features 541.1.1 through 541.1.2 below. Only one of the following features may be submitted for points under item 541.1

541.1.1

FEATURE: Toilets for single family homes

POINT VALUE: 6 points possible

- 1 per 1.1 gpf toilet (max of 3 toilets)
- OR
- 2 per dual-flush toilet averaging 1.1 gpf (max of 3 toilets)

DESCRIPTION: To receive these points, the project must use a standard-flush toilet rated at 1.1 gallons per flush or a dual-flush toilet averaging 1.1 gallons per flush.

Dual-flush toilets deliver 1.6 gallons with the high-volume flush, which is used for solid wastes, and 0.8 to 1.1 gallons with the low-volume flush, which is used for liquid wastes (and paper). Average gpf for dual flush toilets is determined by using a 1:3 ratio (e.g. (1x1.6gpf + 3x.8gpf)/4 = average gpf). Most dual-flush toilets operate with a fairly conventional gravity-flush technology. How users select the flush-volume with dual-flush toilets varies widely by manufacturer.

For single family homes, points will be awarded for a maximum of 3 toilets, on a per fixture basis. 3 is the maximum number of points awarded if 3 or more 1.1 gallon per flush toilets. 6 is the maximum number of points awarded if 3 or more toilets are dual-flush toilets, averaging 1.1 gallons per flush.

VERIFICATION: **Enrollment Review:** Provide plan notes, plumbing fixture schedules, and/or specifications identifying the water conserving toilets included in the project.

Certification Review: None.

ADDITIONAL INFO: Environmental Building New: www.buildinggreen.com

"Water Saving Gadgets Make a Splash", Home Energy Magazine; July/Aug 1998:
www.homeenergy.org

"Dual-flush Toilet Testing", Canada Mortgage and Housing Corporation; September 2002:
www.cmhc.ca/

USGBC Resources: www.usgbc.org/resources

Maximum Performance (MaP™) TESTING California Urban Water Conservation Council:
www.cuwcc.org/MaPTesting.aspx

California Urban Water Conservation Council Product News: www.cuwcc.org/resource-center/product-information.aspx

Water Closet Performance Testing:
www.ebmud.com/conserving_&_recycling/toilet_test_report/default.htm

U.S. EPA's WaterSense Program: www.epa.gov/owm/water-efficiency

Water Wiser – The Water Efficiency Clearinghouse:
www.awwa.org/Resources/Waterwiser.cfm?navItemNumber=1516

-OR-

541.1.2

FEATURE: Toilets for multi-family projects

POINT VALUE: 12 points possible

6 1.1 gpf toilets (100% of toilets)
OR

12 Dual-flush toilets averaging 1.1 gpf (100% of toilets)

DESCRIPTION: See feature 541.2.1 for description.

For multi-family projects, points will be only awarded if all toilets are either dual-flush or average 1.1 gpf.

VERIFICATION: **Enrollment Review:** Provide plan notes, plumbing fixture schedules, and/or specifications identifying the water conserving toilets included in the project.

Certification Review: None.

ADDITIONAL INFO: Environmental Building New: www.buildinggreen.com

“Water Saving Gadgets Make a Splash”, Home Energy Magazine; July/Aug 1998:
www.homeenergy.org

“Dual-flush Toilet Testing”, Canada Mortgage and Housing Corporation; September 2002:
www.cmhc.ca/

USGBC Resources: www.usgbc.org/resources

Maximum Performance (MaP™) TESTING California Urban Water Conservation Council:
www.cuwcc.org/MaPTesting.aspx

California Urban Water Conservation Council Product News: www.cuwcc.org/resource-center/product-information.aspx

Water Closet Performance Testing:
www.ebmud.com/conserving_&_recycling/toilet_test_report/default.htm

U.S. EPA’s WaterSense Program: www.epa.gov/owm/water-efficiency

Water Wiser – The Water Efficiency Clearinghouse:
www.awwa.org/Resources/Waterwiser.cfm?navItemNumber=1516

541.2

| | |
|-------------------------|--|
| FEATURE: | Bathroom faucets fitted with aerator restricting flow to 1.8 gallons per minute (gpm) |
| POINT VALUE: | 2 |
| DESCRIPTION: | To receive these points, the project must either use bathroom faucets rated at 1.8 gallons per minute or less or use flow restricting aerators rated at 1.8 gallons per minute or less to retrofit existing bathroom faucets. Faucets meeting this standard are readily available and offer levels of performance that are equal to their higher-flow counterparts. All bathroom faucets must meet this standard to comply. |
| VERIFICATION: | Enrollment Review: Provide plan notes, plumbing fixture schedules, and/or specifications identifying the water conserving faucets (or flow-restricting aerators for fixture retrofits) included in the project. Certification Review: None. |
| ADDITIONAL INFO: | California Urban Water Conservation Council Product News: www.cuwcc.org/resource-center/product-information.aspx U.S. EPA's WaterSense Program: www.epa.gov/owm/water-efficiency Water Wiser – The Water Efficiency Clearinghouse: www.awwa.org/Resources/Waterwiser.cfm?navItemNumber=1516 |

541.3

| | |
|-------------------------|--|
| FEATURE: | Kitchen faucet fitted with aerator restricting flow to 2.0 gpm |
| POINT VALUE: | 2 |
| DESCRIPTION: | To receive these points, the project must either use kitchen faucets rated at 2.0 gallons per minute or less or use flow restricting aerators rated at 2.0 gallons per minute or less to retrofit existing kitchen faucets. Faucets meeting this standard are readily available and offer levels of performance that are equal to their higher-flow counterparts. All kitchen faucets must meet this standard to comply. |
| VERIFICATION: | Enrollment Review: Provide plan notes, plumbing fixture schedules, and/or specifications identifying the water conserving faucets (or flow-restricting aerators for fixture retrofits) included in the project. Certification Review: None. |
| ADDITIONAL INFO: | California Urban Water Conservation Council Product News: www.cuwcc.org/resource-center/product-information.aspx U.S. EPA's WaterSense Program: www.epa.gov/owm/water-efficiency Water Wiser – The Water Efficiency Clearinghouse: www.awwa.org/Resources/Waterwiser.cfm?navItemNumber=1516 |

541.4 See features 541.4.1 through 541.4.2 below. Only one of the following features may be submitted for points under item 541.4

541.4.1

FEATURE: Showerheads for single family homes

POINT VALUE: 2 per showerhead with flow rate of 2.0 gpm or less (maximum of 3 showerheads)

DESCRIPTION: To receive these points, the project must use water conserving showerheads rated at 2.0 gallons per minute or less. Showers account for roughly 20% of residential indoor water use, according to the EPA. Standards in the Energy Policy Act of 1992 mandated that, beginning in 1994, showerheads could use no more than 2.5 gallons per minute at 80 psi of water pressure. While actual water use in showers is much more variable than water use for toilet flushing (because people take showers of different lengths and rarely use a shower at full flow), substantial savings are being measured in homes that have installed low-flow showerheads.

For single family homes, points will be awarded for a maximum of 3 showerheads, on a per fixture basis. 3 is the maximum number of points awarded if 3 or more showerheads have a flow rate of 2.0 gpm or less in a single family home.

VERIFICATION: **Enrollment Review:** Provide plan notes, plumbing fixture schedules, and/or specifications identifying the water conserving showerheads included in the project.

Certification Review: None.

ADDITIONAL INFO: Environmental Building News: www.buildinggreen.com

California Urban Water Conservation Council Product News: www.cuwcc.org/resource-center/product-information.aspx

U.S. EPA's WaterSense Program: www.epa.gov/owm/water-efficiency

"Low-Flow Showerheads, Family Strife, and Cold Feet", Home Energy Magazine; July/Aug 1994: www.homeenergy.org

Water Wiser – The Water Efficiency Clearinghouse: www.awwa.org/Resources/Waterwiser.cfm?navItemNumber=1516

-OR-

541.4.2

FEATURE: Showerheads for multi-family projects

POINT VALUE: 10 showerheads with flow rate of 2.0 gpm or less (100% of showerheads)

DESCRIPTION: See feature 541.4.1 for description

For multi -family projects, points will be only awarded if all showerheads have a flow rate of 2.0 gpm or less.

VERIFICATION: **Enrollment Review:** Provide plan notes, plumbing fixture schedules, and/or specifications identifying the water conserving showerheads included in the project.

Certification Review: None.

ADDITIONAL INFO: Environmental Building News: www.buildinggreen.com

California Urban Water Conservation Council Product News: www.cuwcc.org/resource-center/product-information.aspx

U.S. EPA's WaterSense Program: www.epa.gov/owm/water-efficiency

"Low-Flow Showerheads, Family Strife, and Cold Feet", Home Energy Magazine; July/Aug 1994: www.homeenergy.org

Water Wiser – The Water Efficiency Clearinghouse: www.awwa.org/Resources/Waterwiser.cfm?navItemNumber=1516

541.5

FEATURE: **Capture and reuse graywater on site**

POINT VALUE: 8

DESCRIPTION: To receive these points, the project must capture and reuse graywater on site.

There are two types of wastewater created in a home, blackwater and graywater. Blackwater is water that has been mixed with waste from the toilet. Graywater is wastewater from non-toilet plumbing fixtures such as showers, basins and taps. Graywater can be used for irrigation or toilet flushing.

Toilet flushing represents one of the largest uses of water in residences and therefore represents a large opportunity for water conservation. In order to reuse graywater indoors for toilet flushing, the blackwater and graywater waste streams must be separated. The blackwater waste stream is directed to the sewer system. The graywater stream is directed to a treatment and disinfection system that must be installed. The treatment system, which must meet local code requirements, provides a suitable level of treatment before reuse. Graywater cannot be stored for longer than a few hours untreated as it begins to turn septic and smell and can be a source of pathogens.

Special approval from the *Committee on Building Standards and Test* may be required.

VERIFICATION: **Enrollment Review:** Provide plan notes, fixture schedules, and/or specifications identifying the system designed for the capture and reuse of graywater on site.

Certification Review: None.

ADDITIONAL INFO: "Waste Water Reuse", WHO Regional Centre for Environmental Health Activities: www.emro.who.int/ceha/clearingh_waterdemand/portals/wutiliz/municipal/greywater.asp

"Grey Water ... the Easy Way" by Reiner Hildebrand: www.reinerhildebrand.de/grau/grey.html

Gray Water Policy Design": www.oasisdesign.net/greywater/law/#upc

542 Exterior

542.1

| | |
|-------------------------|--|
| FEATURE: | Amended topsoil (3 cubic yards of soil amendment per 1,000 ft² of landscape area; based on soil analysis) |
| POINT VALUE: | 4 |
| DESCRIPTION: | To receive these points, the project must provide soil amendments to promote healthy drought-tolerant landscaping. Proper soil preparation is critical to the success of a lawn or garden. Obtain at least one soil nutrient analysis to determine type of soil amendment needed. In order to properly incorporate the soil amendment, the organic matter should be worked into the soil to a depth of 4 to 6 inches at a minimum. Additional long-term benefits to root systems are provided by working amendments into the soil to a depth of 12-18 inches. Soil amendments that are high in salts have high pHs or that contain seeds for weeds or other undesirable grasses should be avoided. |
| VERIFICATION: | Enrollment Review: Provide plan notes (site or landscape plan) and/or specifications identifying the topsoil amendment strategy being pursued. Certification Review: None. |
| ADDITIONAL INFO: | "Soil Amendment/Ground Preparation", Green Industries of Colorado, Best Management Practices: www.greenco.org |

542.2

| | |
|-------------------------|--|
| FEATURE: | Irrigation system with efficiency device such as a soil moisture or rain sensor |
| POINT VALUE: | 2 |
| DESCRIPTION: | To receive these points, the project must use an irrigation system equipped with soil moisture or rain sensors to allow for flexible programming to adjust watering schedules to the needs of plant types. Irrigation is not done on a fixed schedule. |
| VERIFICATION: | Enrollment Review: Provide plan notes (site or landscape plan) and/or specifications identifying the irrigation system equipped with an accepted efficiency device. Certification Review: None. |
| ADDITIONAL INFO: | "Irrigation Efficiency (General Principles)", Green Industries of Colorado, Best Management Practices: www.greenco.org Water Wiser – The Water Efficiency Clearinghouse: www.awwa.org/Resources/Waterwiser.cfm?navItemNumber=1516 |

542.3

| | |
|-------------------------|--|
| FEATURE: | Irrigation system designed for efficient distribution of water |
| POINT VALUE: | 2 |
| DESCRIPTION: | To receive these points, the project must use an irrigation system designed for efficient distribution of water. Turf and bedding areas should be zoned separately. Shrubs and trees should be irrigated with non-spray irrigation systems such as drip irrigation and subsurface irrigation. Proper installation of irrigation systems following manufacturer's instructions is critical, as is ensuring that "head-to-head" spacing is provided. |
| VERIFICATION: | Enrollment Review: Provide plan notes (site or landscape plan) and/or specifications identifying the irrigation system designed for efficient distribution of water. Certification Review: None. |
| ADDITIONAL INFO: | "Irrigation Efficiency (General Principles)", Green Industries of Colorado, Best Management Practices: www.greenco.org Water Wiser – The Water Efficiency Clearinghouse: www.awwa.org/Resources/Waterwiser.cfm?navItemNumber=1516 |

542.4

| | |
|-------------------------|--|
| FEATURE: | 50% maximum cool season turf grass (fescue or bluegrass); remainder of non-paved site area as non-turf bedding |
| POINT VALUE: | 6 |
| DESCRIPTION: | To receive these points, the project must install less than 50% of planted (non-paved) site area with cool season turf grass (fescue or bluegrass). The remaining planted site area must be dedicated to planting beds of native or adapted plants, shrubs, or trees. Fescue grows in a variety of soils and is the most heat- and drought-resistant of the cool-season grasses. Bluegrass forms a high-quality turf because of its fine, soft, glossy green leaves that cut cleanly when mowed. It is not well adapted to shallow, clay, compacted, or extremely acid or alkaline soils. |
| VERIFICATION: | Enrollment Review: Provide plan notes (site or landscape plan) and/or specifications identifying the planted (non-paved) area of the site indicating that 50% or less of this area will be planted with cool season turf grass. Certification Review: None. |
| ADDITIONAL INFO: | Illinois Turf grass Foundation: www.illinoisturfgrassfoundation.org "Landscaping with Native Plants Fact sheet", US Environmental Protection Agency: www.epa.gov/greenacres/nativeplants/factsht.html#Native%20Plant "A Guide to Stormwater Best Management Practices", City of Chicago: http://www.cityofchicago.org/content/dam/city/depts/doe/general/NaturalResourcesAndWaterConservation_PDFs/Water/guideToStormwaterBMP.pdf |

542.5

FEATURE: Install drought-tolerant native or adapted landscape; at least 50% of non-paved site area

POINT VALUE: 6

DESCRIPTION: To receive these points, the project must install drought-tolerant native and/or adapted plants for 50% of the non-paved site area (excluding the building footprint). A drought-tolerant plant is one that will survive in the typical or less than typical amount of rainfall for a region. They are well adapted to the climate, and their low water requirements reduce the need to be watered. Landscaping which includes drought-tolerant plants can either be native or adapted to a region, but CANNOT include any invasive species.

Native plants are plants that have evolved over thousands of years in a particular region and occur in communities, that is - they have evolved together with other plants. Native plants provide a beautiful, hardy, drought resistant, low maintenance landscape while benefiting the environment. Once established, they save time and money by eliminating or significantly reducing the need for fertilizers, pesticides, water and lawn maintenance equipment. The deep root systems of many native Midwestern plants increase the soil's capacity to infiltrate stormwater runoff. Native plants can significantly reduce a site's stormwater runoff and, consequently, its potential contribution to flooding.

Invasive plants are non-native plants that have been introduced into an environment in which they did not evolve. In general, aggressive, non-native plants have no enemies or controls to limit their spread. As they move in, complex native plant communities, with hundreds of different plant species supporting wildlife, will be converted to a monoculture.

VERIFICATION: **Enrollment Review:** Provide plan notes (site or landscape plan) and/or specifications identifying the drought-tolerant native and/or adapted plantings for at least 50% of the non-paved site area.

Certification Review: None.

ADDITIONAL INFO: "Landscaping with Native Plants Fact sheet", US Environmental Protection Agency:
www.epa.gov/greenacres/nativeplants/factsht.html#Native%20Plant

"Invasive Plant Species in Illinois", Illinois Native Plant Society:
www.ill-inps.org/index_files/Page815.htm

"A Guide to Stormwater Best Management Practices", City of Chicago:
egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/GuideToStormwaterBMPs.pdf

"Raingarden Brochure", City of Chicago:
egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/Rain_Garden_Brochure_012505.pdf

542.6

FEATURE: Install bedding with mulch to depth of 3 inches

POINT VALUE: 3

DESCRIPTION: To receive these points, the project must use at least 3 inches of mulch in planting beds to help to reduce weeds, keep roots cool, keep soil moist and reduce the frequency of required watering. All planting beds requiring mulch must meet the above criterion.

VERIFICATION: **Enrollment Review:** Provide plan notes, details (site or landscape plan), and/or specifications identifying that at least 3 inches of mulch will be provided for all mulch-requiring planting beds.

Certification Review: None.

ADDITIONAL INFO: "Mulching" and "Landscape Installation", Green Industries of Colorado, Best Management Practices: www.greenco.org

542.7

FEATURE: Organic mulch or compost

POINT VALUE: 1

DESCRIPTION: To receive these points, the project must use organic mulch to help reduce water loss through evaporation, reduce soil loss due to exposure to wind and runoff, suppress weed growth, and provide a more uniform soil temperature. Organic mulch material includes bark, wood chips, chopped leaves and pine needles.

VERIFICATION: **Enrollment Review:** Provide plan notes (site or landscape plan), and/or specifications identifying the use of organic mulch or compost for plant bed mulching.

Certification Review: None.

ADDITIONAL INFO: "Mulch", Green Industries of Colorado, Best Management Practices: www.greenco.org

600 Homeowner Education

610 Home Manual

610.R1

FEATURE: Provide manual to owners/occupants/maintenance staff on basic issues related to use and care of their home.

POINT VALUE: Required

DESCRIPTION: In order to satisfy this requirement, the project must provide a Home Manual including the items listed below. The Home Manual must be provided to the owner, occupant, or maintenance staff. Homeowners, occupants, and maintenance staff must understand the green features of their homes, how those features are intended to operate and, if necessary, how those features are to be maintained. It is only with this understanding that the full benefits of living in a green home can be realized throughout the years of occupancy.

- Summary that explains the importance of the homeowner/occupant of keeping a green built home green.
- Copy of Chicago Green Homes checklist and point total for home.
- Equipment and appliances operation, maintenance and warranty information. (*including stormwater capture system for required feature 140.R1*)
- Appropriate manuals from manufacturers for reference.
- Clearly label safety valves and controls for major house systems.
- Residential recycling opportunities in Chicago
- Information on how to keep a home's relative humidity in the range of 30-40%.
- Benefits of using fluorescent lighting (if included in home).
- Lifestyle practices to minimize water and energy use.
- Local bicycle, bus, subway and train options.
- Information on how to enroll in a program for purchasing energy from a renewable energy provider.
- Provide tools and resources to encourage on-site, urban produce gardening and maintenance (*if feature 130.3 is being pursued*).
- Provide composting information and instructions to the homeowner – including the type of composter provided information on materials that can be composted, and any necessary warranty or maintenance information (*if feature 530.5 is being pursued*).
- *For Multi-unit projects pursuing feature 530.4 only* - A copy of the project's Recycling Toolkit

VERIFICATION: **Enrollment Review:** Provide plan notes and verification information on project's CGH checklist identifying the party responsible for providing the manual.

Certification Review: Provide a copy of the Home Manual including all applicable items from the list above.

ADDITIONAL INFO: Fannie Mae's, *Home Performance Power: Fannie Mae's Guide to Buying and Maintaining a Green Home*. For a copy, call Fannie Mae's Consumer Resource Center at 1-800-7FANNIE (1-800-732-6643).

Lighting energy savings calculator at:
www.goodmart.com/light_bulb_energy_saving_calculator.aspx

Water saving tips at: www.h2ouse.org

Energy Saving tips: www1.eere.energy.gov/consumer/tips/pdfs/energy_savers.pdf and
www.aceee.org/consumerguide/checklist.htm

Chicago Transit Authority (CTA): www.transitchicago.com

Metra: www.metrarail.com

Square Foot Gardening Foundation: www.squarefootgardening.org

For Recycling opportunities in Chicago: www.bluecartschicago.org

1995 City of Chicago Recycling Ordinance; For information on Chicago’s Workplace and Residential Recycling Ordinance, go to www.cityofchicago.org/streetsandsan, click on Chicago Recycling Initiative, and click on Private Sector Recycling

Recycling Toolkit – 5 Steps to Recycling in Multi-Unit Buildings; To download the Recycling Toolkit, go to www.cityofchicago.org/streetsandsan, click on Recycling Chicago, then Residential Recycling, and then click on How does Multi-unit Recycling Work in the City of Chicago

610.1

| | |
|-------------------------|---|
| FEATURE: | Include additional information in the manual |
| POINT VALUE: | 8 |
| DESCRIPTION: | <p>To receive these points, the project must provide additional information about maintenance and operation of a green home in the Home Manual. Include all of the following items in the Home Manual:</p> <ul style="list-style-type: none">A. Maintenance checklist schedule.B. List of local service providers that focus on routine maintenance and proper operation of equipment and the home (furnace, water heater and air conditioner servicing, gutter system cleaning, irrigation system maintenance etc.).C. Photo record of framing showing utilities installed. Photos should be taken prior to covering utilities and should be clearly marked.D. Information on the importance of site drainage away from the home. Information can include ideas for plantings around the perimeter of the home, tips for cleaning gutters and the importance of diverting water at least five feet away from foundation with downspouts, leaders and splash blocks.E. Information on organic pest control, fertilizers and environmental cleaning products and where these products/services can be obtained.F. Proper disposal of hazardous materials in Chicago. Examples of hazardous wastes include paint, batteries and old electronic devices.G. Landscape maintenance plan or, if landscaping is not provided, a list of drought-resistant plants |
| VERIFICATION: | <p>Enrollment Review: Provide plan notes and verification information on project’s CGH checklist identifying the party responsible for providing the manual including the additional information.</p> <p>Certification Review: Provide a copy of the Home Manual including all applicable items from the list above.</p> |
| ADDITIONAL INFO: | <p>EPA Hazardous Household Waste Info: www.epa.gov/osw/conserves/materials/pubs/hhw-safe.htm</p> <p>Cooperative Extension publications for information about termite tubes, where to look for them, and what they look like. See, for example, www.uky.edu/Agriculture/Entomology/entfacts/struct/ef604.htm</p> |

See the EPA's Landscaping with Native Plants Factsheet for the Midwest,
www.epa.gov/greenacres/nativeplants/factsht.html

City of Chicago's 'A Guide to Stormwater Best Management Practices',
egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/GuideToStormwaterBMPs.pdf

City of Chicago – Raingarden Brochure',
egov.cityofchicago.org/webportal/COCWebPortal/COC_ATTACH/Rain_Garden_Brochure_012505.pdf

620 Education & Training

620.1

| | |
|-------------------------|--|
| FEATURE: | Provide walk-through to owners/occupants/maintenance staff in the use and care of their home. |
| POINT VALUE: | 7 |
| DESCRIPTION: | <p>To receive these points, the project must provide a walk-through to owners, occupants, and maintenance staff. For single-family homes, provide a walk-through to the owner/occupant. For multi-unit buildings provide a walk-through to all occupants and maintenance staff. The goals and strategies of the green home should be explained. The importance of owner/occupant interaction with the home should be emphasized, especially as related to minimizing the operating costs of the home.</p> <p>Training should be provided to the owner/occupant/maintenance person during the walk-through. Control of all of the mechanical systems should be demonstrated. Controls include thermostats, lighting, ventilation systems and exhaust fans. Maintenance schedule of these and other systems should be explained.</p> |
| VERIFICATION: | <p>Enrollment Review: Provide plan notes and verification information on project's CGH checklist identifying the party responsible for providing the walk-through.</p> <p>Certification Review: Provide a letter signed by the owner, occupant, or maintenance staff to confirm completion of the walkthrough.</p> |
| ADDITIONAL INFO: | <p>National Association of Home Builders, <i>Your New Home and How to Take Care of It</i>. Washington, DC: BuilderBooks, 2001, 60 pages. Provide homeowners these pages and pages of tips on maintenance to help keep their new home performing at its peak. In the back there are pages on which to note maintenance dates and remarks. www.builderbooks.com 800-223-2665</p> |

620.2

| | |
|----------------------|---|
| FEATURE: | Provide video documentation of walk-through to owners/occupants/maintenance staff. |
| POINT VALUE: | 10 |
| DESCRIPTION: | <p>To receive these points, the project must provide owners, occupants, or maintenance staff with video documentation of information presented at walk-through.</p> |
| VERIFICATION: | <p>Enrollment Review: Provide plan notes and verification information on project's CGH checklist identifying the party responsible for providing the video of the walk-through.</p> <p>Certification Review: Provide a copy of video (typically a DVD) to the owner, occupants, or maintenance staff and the Chicago Green Homes Program.</p> |

700 Innovation

710 Innovation

710.1

FEATURE: Innovation in residential design and construction (providing a measureable and quantifiable environmental benefit)

POINT VALUE: 15

DESCRIPTION: To receive these points, the project must submit a letter narrative or other report to demonstrate the measureable and quantifiable benefit of the system or strategy proposed. This feature is intended to encourage the use of new and innovative materials and technologies.

Approval from *The Committee on Building Standards and Tests* may be required to use materials or systems not currently permitted in Chicago.

VERIFICATION: **Enrollment Review:** Provide narrative including demonstrable environmental benefit of measures or systems submitted for innovation.

Certification Review: None.

ADDITIONAL INFO: City of Chicago's Department of Construction and Permits website:
egov.cityofchicago.org/city/webportal/portalEntityHomeAction.do?entityName = Construction + and + Permits&entityNameEnumValue = 124

GLOSSARY OF TERMS

Accommodation

An adjustment including reasonable modification to rules, policies, practices, and physical environment that promotes the use of a particular strategy or technology.

Active Solar

An active solar system uses pumps and/or fans to move heat energy from solar radiation between system components in response to a call by a thermostat.

Adapted (Introduced, Non-native) Plants

Plants that reliably grow well in a given habitat with minimal attention from humans in the form of winter protection, pest protection, water irrigation, or fertilization once root systems are established in the soil. Adapted plants are considered to be low maintenance but not invasive.

Adaptive Reuse

The renovation of a building or site to include elements that allow a particular use or uses to occupy a space that originally was intended for a different use.

Adhesive

Any substance that is used to bond one surface to another surface by attachment. Adhesives include adhesive bonding primers, adhesive primers, adhesive primers for plastics, and any other primer.

Aerator

An apparatus that mixes air into flowing water

Annual Flue Utilization Efficiency (AFUE)

An annual measure of a boiler or furnace's heating efficiency based on the amount of heat actually delivered to your house compared to the amount of fuel that is supplied. It takes into account the cyclic on/off operation and associated energy losses of the heating unit as it responds to changes in the load, which in turn is affected by changes in weather and occupant controls.

Aggregate

Inert components such as crushed stone, gravel, or sand commonly used in concrete and plaster mixtures.

Air Changes Per Hour (ACH)

The number of times per hour a volume of air, equivalent to the volume of space, enters that space.

Air Conditioning

The process of treating air to meet the requirements of a conditioned space by controlling its temperature, humidity, cleanliness and distribution. (ASHRAE 62.1-2004)

Air Tightness

Synonymous with Envelope Tightness (see below).

Albedo

Synonymous with Solar Reflectance (see below).

Alternative Fuel Vehicles

Alternative fuel vehicle is defined by the Energy Policy Act (EPAAct) as any dedicated, flexible fuel, or dual-fuel vehicle designed to operate on at least one alternative fuel. Alternative fuels include compressed natural gas (CNG), biodiesel (b20 blend or higher), propane, hydrogen, and electricity (including solar energy).

Aquifer

An underground water-bearing rock formation or group of formations, which supplies groundwater, wells or springs.

American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)

ASHRAE is the trade association that provides information and sets standards for the heating, ventilation, air conditioning and refrigeration industry.

Assembly Recycled Content

Includes the percentages of post-consumer and pre-consumer content. The determination is made by dividing the weight of the recycled content by the overall weight of the assembly.

Basis of Design (BOD)

Includes design information necessary to accomplish the owner's project requirements, including system descriptions, indoor environmental quality criteria, other pertinent design assumptions (such as weather data), and references to applicable codes, standards, regulations and guidelines.

Biodiversity

The variety of life in all forms, levels and combinations, including ecosystem diversity, species diversity, and genetic diversity.

Blackwater

Does not have a single definition that is accepted nationwide. Wastewater from toilets and urinals is, however, always considered blackwater.

Wastewater from kitchen sinks (perhaps differentiated by the use of a garbage disposal), showers, or bathtubs may be considered blackwater by state or local codes. Project teams should comply with the blackwater definition as established by the authority having jurisdiction in their areas.

Blower Door Test

A Blower Door Test utilizes a testing device that fits into an exterior doorway and contains a fan that creates a controlled pressure difference between the inside and outside of a home by varying the speed of the fan. Leaky homes require higher fan speeds to produce a given pressure difference than do tighter homes. The Blower Door Test is useful in quantifying the degree of leakiness of a home (i.e., how "tight" the home is) and helps in identifying where leakage occurs, thereby directing additional air sealing work if needed.

Brownfield

An abandoned, vacant, derelict or underutilized property where past actions have resulted in actual or perceived contamination and where there is an active potential for redevelopment. (See requirements for Brownfield Site below)

Brownfield Site

A site classified as a brownfield by a local, state or federal government agency or by means of an ASTM E1903-97 Phase II Environmental Site Assessment.

Building Automation System

A system that utilizes computer-based monitoring to coordinate, organize and optimize building control systems.

Building Density

The floor area of the building divided by the total area of the site (square feet per acre).

Building Envelope (Building Shell)

The exterior surface of a building's construction - the walls, windows, roof and floor – that encloses conditioned space. Also referred to as the "building shell."

Building Footprint

The area on a project site that is used by the building structure and is defined by the perimeter of the building plan. Parking lots, landscapes and other non-building facilities are not included in the building footprint.

Candela

The base unit of luminous intensity

Carpool

An arrangement in which two or more people share a vehicle for transportation

Car Sharing

A system under which multiple households share a pool of automobiles, either through cooperative ownership or through some other mechanism.

CFM50

A standard unit of building envelope tightness (air tightness) measuring the Cubic Feet per Minute at a 50 pascal (Pa) pressure difference between interior and exterior conditions. CFM50 is divided by the square footage of the building envelope area. Envelope area includes the gross square footage of the building shell that encloses the conditioned area. Below grade walls and floors are included if part of the conditioned space of the home.

Chicago Green Homes Program (CGH)

CGH was designed to encourage the residential industry in Chicago to use technologies, products, and practices that provide greater energy efficiency, reduce pollution, provide healthier indoor air, reduce water usage, preserve natural resources, and improve the durability and reduce the maintenance of residential projects.

Chicago Building Code (CBC)

The CBC is the building code for the city of Chicago. The general purpose of the code is to ensure the health, safety, and welfare of building occupants.

Chicago Energy Conservation Code

The Chicago Energy Conservation Code is an amendment to the Chicago Building Code that was created to consolidate disparate code requirements and allow the formulation of a modern energy-efficiency standard.

Chlorofluorocarbons (CFCs)

Hydrocarbons that deplete the stratospheric ozone layer.

CO

Carbon Monoxide

CO₂

Carbon dioxide

Commissioning

The process of ensuring that systems are designed, installed, functionally tested, and capable of being operated and maintained to perform in conformity with the owner's project requirements.

Commissioning Plan

A document defining the commissioning process, which is developed in increasing detail as the project progresses through its various phases.

Commissioning Report

The document that records the results of the commissioning process, including the as-built performance of the HVAC system and unresolved issues.

Commissioning Specification

The contract document that details the objective, scope and implementation of the construction and acceptance phases of the commissioning process as developed in the design-phase commissioning plan.

Commissioning Team

Includes those people responsible for working together to carry out the commissioning process.

Community

An interacting population of individuals living in a specific area.

Composite Panel Association (CPA)

The Composite Panel Association is the North American trade association for producers of particleboard, medium density fiberboard (MDF), hardboard and other compatible products. The Association also operates an independent Grademark Certification Program and testing laboratory.

Composite Wood

A product consisting of wood or plant particles or fibers bonded together by a synthetic resin or binder (i.e., plywood, particle-board, OSB, MDF, composite door cores).

Composition Roofing

Composition roofing shingles are composed of a fiberglass reinforcing mat coated with asphalt and mineral fillers with a top surface embedded with a layer of ceramic or mineral granules.

Conditioned Space

The part of a building that is heated or cooled, or both, for the comfort of occupants. (ASHRAE 62.1-2004)

Contaminant

An unwanted airborne constituent that may reduce acceptability of the air. (ASHRAE 62.1-2004)

Conventional Irrigation

Refers to the most common irrigation system used in the region where the building is located. A common conventional irrigation system uses pressure to deliver water and distributes it through sprinkler heads above the ground.

Cubic Feet per Minute (CFM)

CFM is a standard of airflow measurement.

Damp-Proofing

Measures taken to halt the passage of moisture through a wall or floor.

Daylight Glazing

Daylight Glazing is generally defined as the portion of exterior windows above 7'-6" that permits daylight into building spaces.

Daylighting

The controlled admission of natural light into a space through glazing with the intent of reducing or eliminating electric lighting. By utilizing solar light, daylighting creates a stimulating and productive environment for building occupants.

Development Footprint

The area on the project site including building footprint, access roads, rear yards, and curb/side setbacks.

Desuperheater

A desuperheater is an energy saving device in a heat pump or air conditioner that, during the cooling cycle, recycles some of the waste heat from the house to heat domestic water.

Direct Current (DC)

An electrical current that flows only in one direction in a circuit

Direct Vent

A direct vent appliance draws combustion intake air from outside and combustion exhaust air to the outside eliminating the need for a standard chimney system.

Downspout

A conduit or pipe for conveying water from a gutter, scupper, drop outlet or other drainage mechanism from roof to a lower level or grade. Downspouts are also known as Leader Pipes.

Drainage Plane

Drainage planes are water repellent materials (building paper, housewrap, foam insulation, etc.) which are typically located behind the cladding and are designed and constructed to drain water that passes through the cladding. They are interconnected with flashings, window and door openings, and other penetrations of the building enclosure to provide drainage of water to the exterior of the building.

(www.buildingscience.com/resources/glossary.htm)

Drip Irrigation

A high-efficiency irrigation method in which water is delivered at low pressure through buried mains and sub-mains. From the sub-mains, water is distributed to the soil from a network of perforated tubes or emitters. Drip irrigation is a type of micro-irrigation.

Ecosystem

A basic unit of nature that includes a community of organisms and their non-living environment linked by biological, chemical and physical process.

Embodied Energy

Energy that is used during the entire life cycle of the commodity for manufacturing, transporting and disposing of the commodity as well as the inherent energy captured within the product itself.

Emissivity

The ratio of the radiation emitted by a surface to the radiation emitted by a blackbody at the same temperature.

Empowerment Zone

Empowerment Zones are areas within the City of Chicago designated by the Department of Housing and Urban Development (HUD) targeted for community revitalization by attracting the public and private investment necessary for economic development.

Endangered Species

An animal or plant species that is in danger of becoming extinct throughout all or a significant portion of its range due to harmful human activities or environmental factors.

Engineered Wood

Engineered Wood is composed of recycled or reconstituted wood products that are laminated, finger-jointed, or otherwise recombined to form composite materials. They are commonly manufactured by binding together wood strands, fibers, or veneers with adhesives. The products are typically more uniform and superior in strength as compared to dimensional lumber. These products are engineered to precise design specifications which are tested to meet national or international standards.

Energy Factor (EF)

The measure of the overall efficiency of a water heater based on recovery efficiency, standby losses, and energy input based on US Department of Energy test procedures.

Energy Policy Act of 1992 (EPACT)

Emphasizes energy efficiency, research and development on conventional fuels, alternative fuels, and uranium enrichment. Also establishes several guidelines for radioactive waste disposal. (legacystory.apps.em.doe.gov/text/link/link12.htm)

ENERGY STAR® Rating

The rating a building earns using the ENERGY STAR Portfolio Manager to compare building energy performance to similar buildings in similar climates. A score of 50 represents average building performance. A program of the United States Environmental Protection

Envelope Tightness (Air Tightness)

The general measure of the extent to which a building envelope allows air or gas to pass in or out.

Environmental Protection Agency (EPA)

The EPA is a federal agency established in 1970 to enforce environmental laws that protect human health and the environment.

Environmentally Preferable Products

Products identified as having a lesser or reduced effect on health and the environment when compared with competing products that serve the same purpose.

EPS

Expanded polystyrene foam

Erosion

A combination of processes in which materials of the earth's surface are loosened, dissolved or worn away, and transported from one place to another by natural agents (such as water, wind or gravity).

Ethylene Propylene Diene Monomer (EPDM)

EPDM is a popular type of weather-resistant and chemically compatible synthetic rubber. EPDM is commonly used for roofing membranes, seals, pond liners, and other uses.

Exfiltration

Uncontrolled outward air leakage from conditioned spaces through unintentional openings in ceilings, floors and walls to unconditioned spaces or the outdoors caused by pressure differences across these openings due to wind, inside-outside temperature differences (stack effect), and imbalances between supply and exhaust airflow rates. (ASHRAE 62.1-2004)

Exhaust Air

The air removed from a space and discharged to outside the building by means of mechanical or natural ventilation systems.

Ex-situ Remediation

Involves the removal of contaminated soil and groundwater. Treatment of the contaminated media occurs in another location, typically a treatment facility. A traditional method of ex-situ remediation is pump-and-treat technology that uses carbon filters and incineration. More advanced methods of ex-situ remediation include chemical treatment or biological reactors.

Fascia

The fascia is the horizontal board that is attached to the face of an eave to conceal the ends of the roof rafters. Rain gutters are typically attached to the fascia board.

Fiber Cement

Fiber cement building components are typically composed of portland cement, sand, and cellulose fiber that have been cured with pressurized steam to increase strength and dimensional stability.

Finger Joint

A series of fingers machined into the ends of two pieces of lumber to be joined together with adhesive.

Flashing

Sheet metal or other material used to close and finish roof transitions, roof openings and wall openings to protect a building from water leakage.

Flat Coatings

Coatings that register a gloss of less than 15 on an 85-degree meter or less than 5 on a 60-degree meter.

Fly Ash

The solid residue derived from incineration processes. Fly ash can be used as a substitute for portland cement in concrete.

Formaldehyde

A naturally occurring VOC found in small amounts in animals and plants, but is carcinogenic and an irritant to most people when present in high concentrations—causing headaches, dizziness, mental impairment, and other symptoms. When present in the air at levels above 0.1 ppm (parts per million), it can cause watery eyes, burning sensations in the eyes, nose, and throat; nausea; coughing; chest tightness; wheezing; skin rashes; and asthmatic and allergic reactions.

Forest Stewardship Council - United States (FSC-US)

An organization whose sole purpose is to coordinate the development of forest management standards throughout the different biogeographic regions of the U.S., to provide public information about certification and FSC, and to work with certification organizations to promote FSC certification in the U.S. FSC-US has a national presence through the work of its Board of Directors, members, staff, and regional standards coordinators. There are 10 Principles and 57 Criteria that address legal issues, indigenous rights, labor rights, multiple benefits, and environmental impacts surrounding forest management. (www.fscus.org) The Forest Stewardship Council (FSC) is an international organization that brings people together to find solutions which promote responsible stewardship of the world's forests. (www.fsc.org)

FPSF

Frost-protected Shallow Foundation

Full Cutoff

A luminaire light distribution where the candela per 1000 lamp lumens does not numerically exceed 25 (2.5 percent) at an angle of 90 degrees perpendicular to the ground plane, and 100 (10 percent) at a vertical angle of 80 degrees perpendicular to the ground plane.

Full Cutoff Fixture

A light fixture (luminaire) that allows no emission of light above a horizontal plane through the fixture. See Full Cutoff definition above for technical description of full cutoff. Shielding is often applied to a fixture to achieve full cutoff criteria.

GAMA

Gas Appliance Manufacturers Association

Gearless Elevator

An elevator system, initially designed for buildings between 2 and 20 stories, that employs a smaller sheave and redesigned motor configuration. The reduced sheave size and allow the machine to be mounted within the hoistway itself and thus eliminating the need for a machine room.

Glass Cullet

Broken or waste glass returned for recycling

Graywater (also spelled greywater and gray water)

Defined by the Uniform Plumbing Code (UPC) in its Appendix G, titled "Gray water Systems for Single-Family Dwellings," as "untreated household wastewater which has not come into contact with toilet waste. Grey water includes used water from bathtubs, showers, bathroom wash basins, and water from clothes-washer and laundry tubs. It shall not include wastewater from kitchen sinks or dishwashers."

The International Plumbing Code (IPC) defines graywater in its Appendix C, titled "Graywater Recycling Systems," as "wastewater discharged from lavatories, bathtubs, showers, clothes washers, and laundry sinks."

Some states and local authorities allow kitchen sink wastewater to be included in graywater. Other differences with the UPC and IPC definitions can probably be found in state and local codes. Project teams should comply with the graywater definitions as established by the authority having jurisdiction in their areas.

Greenfield Site

Sites that have not been previously developed or graded and remain in a natural state.

Greenhouse Gases

Gases such as carbon dioxide, methane and CFCs that are relatively transparent to the higher-energy sunlight, but trap lower-energy infrared radiation.

Green Permit Program

The Chicago Department of Construction and Permits (DCAP) expedited permit process for projects that incorporate innovative green building strategies. The DCAP Green Permit Program provides developers and owners with an incentive to build green by streamlining the permit process timeline for their projects.

Ground-source Heat Pump

Heat pumps are mechanical systems that extract heat from the ground for space heating in the heating season, and move heat from the building to the ground in the cooling season

Header

A horizontal framing member in buildings that is located at the top of a framed opening

Heat Island Effect

Occurs when warmer temperatures are experienced in urban landscapes compared to adjacent rural areas as a result of solar energy retention on constructed surfaces. Principal surfaces that contribute to the heat island effect include streets, sidewalks, parking lots and buildings.

Heat Recovery System

A mechanical system that transfers heat energy via a heat exchanger between exhausted indoor air and incoming outdoor air to save energy in heating or cooling a building or space.

High Efficiency Particulate Air filter (HEPA)

A HEPA Filter is a type of air filter that is rated to remove 99.97% of particles 0.3 microns (um) or larger at a specified flow rate of air.

HVAC Systems

Include heating, ventilating, and air-conditioning systems used to provide thermal comfort and ventilation for building interiors.

Hybrid Vehicles

Vehicles that use a gasoline engine to drive an electric generator and use the electric generator and/or storage batteries to power electric motors that drive the vehicle's wheels.

Hydrochlorofluorocarbons (HCFCs)

Refrigerants used in building equipment that deplete the stratospheric ozone layer, but to a lesser extent than CFCs.

Hydrofluorocarbons (HFCs)

Refrigerants that do not deplete the stratospheric ozone layer. However, some HFCs have high global warming potential and, thus, are not environmentally benign.

Hydronic Radiant Floor Heating

Hydronic Radiant Floor Heating is a radiant heat system that distributes hot water through pipes in a thermal mass floor, which slowly radiates the heat into the living space.

Impervious Surfaces

Surfaces that promote runoff of precipitation volumes instead of infiltration into the subsurface. The imperviousness or degree of runoff potential can be estimated for different surface materials.

Indoor Air Quality

The nature of air inside the space that affects the health and well-being of building occupants.

Infill Site

A site located on an empty or vacant lot of land within an urban area as opposed to a site located on new undeveloped land outside the city or town.

Infiltration

(1)

Uncontrolled inward air leakage to conditioned spaces through unintentional openings in ceilings, floors and walls from unconditioned spaces or the outdoors caused by the same pressure differences that induce exfiltration. (ASHRAE 62.1-2004)

(2)

The hydrologic penetration or percolation of water into the surface and sub-surface layers of soil typically contributing water to the groundwater table and recharging groundwater aquifers.

Infrared or Thermal Emittance

A parameter between 0 and 1 (or 0% and 100%) that indicates the ability of a material to shed infrared radiation (heat). The wavelength range for this radiant energy is roughly 3 to 40 micrometers. Most building materials (including glass) are opaque in this part of the spectrum, and have an emittance of roughly 0.9.

Materials such as clean, bare metals are the most important exceptions to the 0.9 rule. Thus clean, untarnished galvanized steel has low emittance, and aluminum roof coatings have intermediate emittance levels.

In-situ Remediation

Involves treatment of contaminants in place using technologies such as injection wells or reactive trenches. These methods utilize the natural hydraulic gradient of groundwater and usually require only minimal disturbance of the site.

Insulated Concrete Forms (ICFs)

Insulated Concrete Forms are insulated reinforced forms for cast-in-place concrete walls that are left in place permanently as insulation.

Invasive Plants

Both indigenous and non-indigenous species or strains that are characteristically adaptable, aggressive, have a high reproductive capacity and tend to overrun the ecosystems in which they inhabit. Collectively they are one of the great threats to biodiversity and ecosystem stability.

Jump Ducts

Jump ducts are a method of improving the energy efficiency of homes with forced-air heating and cooling systems. They address the critical issues of equalizing air pressure in various parts of the home and of effectively handling return air. Jump ducts handle return air from rooms that can be isolated by closing doors. Jump ducts move air from closed rooms to the hallway or open interior space and ultimately to the central return air duct typically via ceiling cavities or attic space.

Landfill

A waste disposal site for the deposit of solid waste from human activities.

Landscape Area

Area of the site equal to the total site area less the building footprint, paved surfaces, water bodies, patios, etc.

Lauan

Lauan is a tropical hardwood commonly used as plywood or sheathing consisting of sheets of wood glued and pressed one on the other and generally disposed so that the grains of successive layers are at an angle. Lauan plywood can consist of lower grade plywood layers with one outer ply of Lauan. Lauan is an endangered species tropical hardwood.

LEED

Leadership in Energy and Environmental Design (LEED) is a voluntary, consensus-based standard for developing high-performance, sustainable buildings developed by the US Green Building Council.

Light Shelves

Light shelves are ledges that extend out between the upper (typically daylight glazing) and lower (typically vision glazing) portions of windows, either on the interior or exterior of the building. Light shelves reflect sunlight through the upper windows onto the ceiling inside, where the light is diffused and reflected back down over the space providing a soft, natural light. The top of the light shelf must be white and should be designed to promote periodic cleaning. On summer days, exterior light shelves help shade the lower windows. Light shelves are commonly most effective on north/south facing windows.

Light Pollution

Waste light from building sites that produces glare, is directed upward to the sky or is directed off the site.

Light Trespass

Light Trespass is defined as light from a building or site directed into an adjacent building or site producing glare or becoming a nuisance due to quantitative, directional, or spectral attributes. Light trespass can cause discomfort, distraction or a loss of visibility.

Low-Emissivity Glass (Low-e)

Low-e or low-emissivity glass has a special thin-film metallic or oxide coating which exhibits a high transmittance of solar energy in the visible range and a high reflectance and low-emissivity of solar energy in the thermal infrared range.

Luminous Intensity

The measure of the energy emitted by a light source in a particular direction (measured in candela or candlepower)

Masonry

Construction of materials such as bricks, concrete blocks, ceramic blocks, and stone typically constructed with mortared joints.

MDF

Medium Density Fiberboard

Mechanical Ventilation

Ventilation provided by mechanical powered equipment, such as motor-driven fans and blowers, but not by devices such as wind-driven turbine ventilators and mechanically operated windows. (ASHRAE 62.1-2004)

Minimum Efficiency Reporting Value (MERV)

MERV is a rating of the effectiveness of air filters in removing particle contaminants from the air and is dependent upon the particle size. A higher MERV number equates to a higher level of air filtration.

Mixed-mode Ventilation

A ventilation strategy that combines natural ventilation with mechanical ventilation, allowing the building to be ventilated either mechanically or naturally; and at times both mechanically and naturally simultaneously.

Modulating Gas Valve

A valve that modulates fuel flow levels to heating equipment improving energy efficiency, equipment life, and occupant thermal comfort

MSDS

Material Safety Data Sheet

Multi-stage Condensing Unit

A condensing unit that allows an air conditioner to operate at more than one output level, which prevents short cycling and therefore maximizes the unit's durability while increasing thermal comfort levels in the home

Multi-Unit/Multi-Family

See City of Chicago Zoning Ordinance

National Fenestration Rating Council (NFRC)

The National Fenestration Rating Council (NFRC) is a non-profit, public/private organization created by the window, door and skylight industry. It is comprised of manufacturers, suppliers, builders, architects and designers, specifiers, code officials, utilities and government agencies. NFRC's primary goal is to provide accurate information to measure and compare the energy performance of window, door or skylight products.

Native (Indigenous) Plants

Plants that have adapted to a given area during a defined time period and are not invasive. In America, the term often refers to plants growing in a region prior to the time of settlement by people of European descent.

Natural Ventilation

Ventilation provided by thermal, wind or diffusion effects through doors, windows or other intentional openings in the building. (ASHRAE 62.1-2004)

Non-flat Coatings

Coatings that register a gloss of 5 or greater on a 60-degree meter and a gloss of 15 or greater on an 85-degree meter.

Non-potable Water

Water that is not suitable for human consumption without treatment that meets or exceeds EPA drinking water standards.

Non-roof Impervious Surfaces

Includes all surfaces on the site with a perviousness of less than 50%, not including the roof of the building. Examples of typically impervious surfaces include parking lots, roads, sidewalks and plazas.

North American Insulation Manufacturer's Association (NAIMA)

NAIMA is a trade association of North American manufacturers of fiber glass, rock wool, and slag wool insulation products.

Off-gassing

The emission of volatile organic compounds from synthetic and natural products.

Open Space Area

The property area minus the development footprint.

Oriented Strand Board (OSB)

A manufactured wood panel made out of wood chips and glue. Often used as a substitute for plywood in the exterior wall and roof sheathing. Panels are typically 4 by 8 feet and made of layers held together with a resin-based glue.

Outdoor Air

The ambient air that enters a building through a ventilation system, through intentional openings for natural ventilation, or by infiltration. (ASHRAE 62.1-2004)

Overhang

A roof extension or horizontal building projection extending beyond a building exterior wall for the purpose of shading and/or protecting exterior walls and windows.

Paints

Liquid, liquifiable or mastic compositions that are converted to a solid protective, decorative, or functional adherent film after application as a thin layer. These coatings are intended for on-site application to interior or exterior surfaces of residential, commercial, institutional or industrial buildings.

Passive Solar

A passive solar system relies on natural movement of heat energy (convection, conduction, radiation) from solar radiation to move heat to or from the space.

Pedestrian Access

Implies that pedestrians can walk to the services without being blocked by walls, freeways or other barriers.

Permeable or Porous Materials

Materials capable of being penetrated by fluids or gasses via interconnected open spaces or voids.

Perviousness

The percent of the surface area of a paving material that is open and allows moisture to pass through the material and soak into the earth below the paving system.

pH

The pH is a measure of the acidity or basicity (alkalinity) of a material when dissolved in water. It is expressed on a scale from 0 to 14. A pH of 7 is neutral. Values less than 7 are acidic, and values greater than 7 are basic.

Photovoltaics

A system of non-mechanical semiconductors that converts solar energy into direct current electricity.

Post-consumer

Waste material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of materials from the distribution chain (source: ISO 14021). Examples of this category include construction and demolition debris, materials collected through curbside and drop-off recycling programs, broken pallets (if from a pallet refurbishing company, not a pallet making company), discarded products (e.g., furniture, cabinetry and decking) and urban maintenance waste (e.g., leaves, grass clippings, tree trimmings, etc.).

Potable Water

Water suitable for drinking and supplied from wells or municipal water systems.

Precast Insulated Concrete Panels

Factory prefabricated concrete wall panels with integrated insulation. Precast Insulated Concrete Panels allow for the optimization of concrete volume and strength and allow for quick on-site assembly.

Pre-consumer Content

Defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it (source ISO 14021). Examples in this category include planer shavings, plytrim, sawdust, chips, bagasse, sunflower seed hulls, walnut shells, culls, trimmed materials, print overruns, over-issue publications, and obsolete inventories. (Previously referred to as Post-industrial Content.)

Preferred Parking

Refers to parking spots that are closest to the main entrance of the project, exclusive of spaces designated for handicapped.

Previously Developed Sites

Sites that previously contained buildings, roadways, parking lots, or were graded or altered by direct human activities.

Primer

A material applied to a substrate to improve adhesion of a subsequently applied adhesive.

Property Area

The total area within the legal property boundaries of a site and encompassing all areas of the site, including constructed areas and non-constructed areas.

Public Transportation

Bus, rail or other transportation service for the general public, operating on a regular, continual basis that is publicly or privately owned.

PVC

Polyvinyl Chloride

Rain Barrel

A barrel or rigid container used as a cistern to capture and store rainwater

Rain Garden

Rain gardens are a simple form of bioinfiltration. Bioinfiltration systems are shallow, landscaped depressions used to promote absorption and infiltration of stormwater runoff. This management practice is very effective at removing pollutants and reducing the volume of runoff, especially when used for parking lot islands.

Rapidly Renewable Materials

Material considered to be an agricultural product, both fiber and animal, that takes 10 years or less to grow or raise, and to harvest in an ongoing and sustainable fashion.

Recessed Lighting

Fixtures mounted between joists or rafters above the ceiling surface so as to appear flush with the ceiling. Recessed light fixtures are commonly referred to as can lights.

Recirculated Air

The air removed from a space and reused as supply air. (ASHRAE 62.1-2004)

Recycled / Recovered Content

The portion or amount of pre-consumer and post-consumer recovered material diverted from the waste stream usually expressed as a percentage by weight.

Recycling

The collection, reprocessing, marketing and use of materials that were diverted or recovered from the solid waste stream.

Refrigerants

The working fluids of refrigeration cycles. Refrigerants absorb heat from a reservoir at low temperatures and reject heat at higher temperatures.

Regionally Extracted Materials

For the purposes of this guide, must have their source as a raw material from within a 500-mile radius of the project site.

Regionally Manufactured Materials

For the purposes of this guide, must be assembled as a finished product within a 500-mile radius of the project site. Assembly does not include on-site assembly, erection or installation of finished components, as in structural steel, miscellaneous iron or systems furniture.

Regularly Occupied Spaces

Areas where workers are seated or standing as they work inside a building; in residential applications it refers to living and family rooms.

Renewable Energy

Energy derived from resources that are renewable and regenerative which are naturally and continually replenished.

Renewable Energy Certificates (RECs)

RECs are a representation of the environmental attributes of green power, and are sold separately from the electrons that make up the electricity. RECs allow the purchase of green power even when the electrons are not purchased.

Return Air

The air removed from a space to then be recirculated or exhausted. (ASHRAE 62.1-2004)

Reuse

A strategy to return materials to active use in the same or a related capacity.

Rooftop Unit (RTU)

A roof top unit (RTU) is a factory-fabricated HVAC assembly consisting of fan, coils, filters, and other equipment used to circulate, clean, heat, cool, humidify, dehumidify, or mix air that is designed for rooftop installation.

R-Value

A unit of thermal resistance used for comparing insulating values of different materials. The higher the R-Value of a material, the greater its insulating properties and the slower the heat flows through it.

(www.eere.energy.gov/financing/glossary.html)

Salvaged Materials

Construction materials recovered from existing buildings or construction sites and reused in other buildings. Common salvaged materials include structural beams and posts, flooring, doors, cabinetry, brick and decorative items.

Sealed Combustion Appliances

A sealed combustion or direct-vent appliance avoids using conditioned inside air by taking air for combustion directly from the outside atmosphere and releasing combustion exhaust directly to the outside atmosphere.

Sealant

Any material with adhesive properties that is formulated primarily to fill, seal, or waterproof gaps or joints between two surfaces. Sealants include sealant primers and caulks.

Seasonal Energy Efficiency Rating (SEER)

SEER is the most commonly used measure of the energy efficiency of consumer central air conditioning systems. A higher SEER number equates to a more energy efficient system.

Sedimentation

The addition of soils to water bodies by natural and human-related activities. Sedimentation decreases water quality and accelerates the aging process of lakes, rivers and streams.

Sheathing

Plywood or other materials used to enclose the outside of exterior walls and roof structures of a building and typically fastened directly to rafters or studs.

Short-cycling

Short-cycling is used to define a heating, ventilation, or air conditioning unit that restarts immediately after shutting off.

Sill Plate

The horizontal building member that rests on top of the foundation to which the building structure above is attached.

Single-Family

See City of Chicago Zoning Ordinance

Site Area

Synonymous with property area.

Site Assessment

An evaluation of above-ground (including facilities) and subsurface characteristics, including the geology and hydrology of the site, to determine if a release has occurred, as well as the extent and concentration of the release. Information generated during a site assessment is used to support remedial action decisions.

Soffit

A finish material used to cover the underside of an overhang.

Solar Domestic Hot Water System

A domestic water heating or preheating system typically utilizing solar collectors and insulated storage tanks. SDHW systems can be active (with pumps) or passive (without pumps) and utilize various solar collection strategies.

Solar Electric System

See Photovoltaics

Solar Heat Gain Coefficient (SHGC)

The Solar Heat Gain Coefficient (SHGC) measures how well a window blocks heat from sunlight. The SHGC is the fraction of the heat from the sun that enters through a window. SHGC is expressed as a number between 0 and 1. The lower a window's SHGC, the less solar heat it transmits. (http://www.energycodes.gov/support/shgc_faq.stm)

Solar Reflectance (albedo)

The ratio of the reflected solar energy to the incoming solar energy over wavelengths of approximately 0.3 to 2.5 micrometers. A reflectance of 100% (1.0) means that all of the energy striking a reflecting surface is reflected back into the atmosphere and none of the energy is absorbed by the surface. The best standard technique for its determination uses spectrophotometric measurements with an integrating sphere to determine the reflectance at each different wavelength. An averaging process using a standard solar spectrum then determines the average reflectance (see ASTM Standard E903).

Solvent

A substance typically liquid capable of dissolving one or more other substances

Square Footage

The total area in square feet of all rooms of a building, including corridors, elevators, stairwells and shaft spaces.

Stormwater Runoff

Water volumes that are created during precipitation events and that flow over surfaces into sewer systems or receiving waters. All precipitation waters that leave project site boundaries on the surface are considered to be stormwater runoff volumes.

Studs

Regularly spaced vertical framing members in a wall to which sheathing, drywall or other coverings are attached.

Structural Insulated Panels (SIPs)

Building component panels consisting of two pieces of oriented strand board (OSB) with a rigid expanded polystyrene insulation material permanently bonded between them. SIPs can be used for roof, wall, and floor structures.

Supply Air

The air delivered by mechanical or natural ventilation to a space, composed of any combination of outdoor air, recirculated air, or transfer air. (ASHRAE 62.1-2004)

Sustainable Forestry

The practice of managing forest resources to meet the long-term forest product needs of humans while maintaining the biodiversity of forested landscapes. The primary goal is to restore, enhance and sustain a full range of forest values—economic, social and ecological.

Tankless Water Heater

Tankless water heaters are gas, propane, or electric water heating devices that are activated by the flow of water and provide instant hot water. Tankless Water Heaters save energy by eliminating the 24-hour standby hot water storage tanks of traditional water heaters.

Tax-increment financing (TIF)

TIF is a real estate redevelopment technique that allows a company to finance land acquisitions or improvements by borrowing money tax free (thus reducing interest rates) and lets companies purchase renovated sites or buildings at below-market costs.

(minneapolisfed.org/econed/essay/topics/gloss97.cfm)

Thermal Comfort

A condition of mind experienced by building occupants expressing satisfaction with the thermal environment.

Threatened Species

An animal or plant species that is likely to become endangered within the foreseeable future.

Topsoil

The upper layer of soil, containing organic matter and nutrients that supports plant life.

Total Suspended Solids (TSS)

Particles or flocs that are too small or light to be removed from stormwater via gravity settling. Suspended solid concentrations are typically removed via filtration.

Transfer Grilles

Transfer grilles are a method of improving the energy efficiency of homes with forced-air heating and cooling systems. They address the critical issues of equalizing air pressure in various parts of the home and of effectively handling return air. Transfer grilles handle return air from rooms that can be isolated by closing doors. Transfer grilles move air from closed rooms to the adjacent space or hallway and ultimately to the central return air duct typically via wall cavities.

Underground Parking

A "tuck-under" or stacked parking structure that reduces the exposed parking surface area.

Underlayment

A material placed under flooring, shingles, or other finish materials to provide a smooth, even base.

United States Green Building Council (USGBC)

The United States Green Building Council (USGBC) is the nation's foremost coalition of leaders from every sector of the building industry working to promote buildings that are environmentally responsible, profitable and healthy places to live and work. Our more than 7,500 member organizations and our network of 75 regional chapters are united to advance our mission of transforming the building industry to sustainability. (www.usgbc.org)

U-Value

The rate of heat loss, in British thermal units per hour, through a square foot of a surface (wall, roof, door, windows, or other building surface) when the difference between the air temperature on either side is 1° Fahrenheit. The U-value is the reciprocal of the R-Value. (www.eere.energy.gov/financing/glossary.html)

Ventilation

The process of supplying air to or removing air from a space for the purpose of controlling air contaminant levels, humidity, or temperature within the space. (ASHRAE 62.1-2004)

Verification

The full range of checks and tests carried out to determine if all components, subsystems, systems, and interfaces between systems operate in accordance with the contract documents. In this context, "operate" includes all modes and sequences of control operation, interlocks and conditional control responses, and specified responses to abnormal or emergency conditions.

Vision Glazing

Vision Glazing is generally defined as the portion of exterior windows above 2'-6" and below 7'-6" that permits a view to the outside of the project space.

VOCs (Volatile Organic Compounds)

Carbon compounds that participate in atmospheric photochemical reactions (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates, and ammonium carbonate). The compounds vaporize (become a gas) at normal room temperatures.

Waste-Heat Recovery

The recovery of heat energy discharged as a waste product of one process to provide heat energy to another process.

Weathered Reflectivity

A measure of solar reflectance after a standard period of exposure to the elements.

Wind Turbine

A wind turbine collects kinetic energy from the wind and converts it to electricity

Zoned Heating/Cooling

Building spaces separated into distinct zones with independent temperature controls.

Appendix A

Climate Data

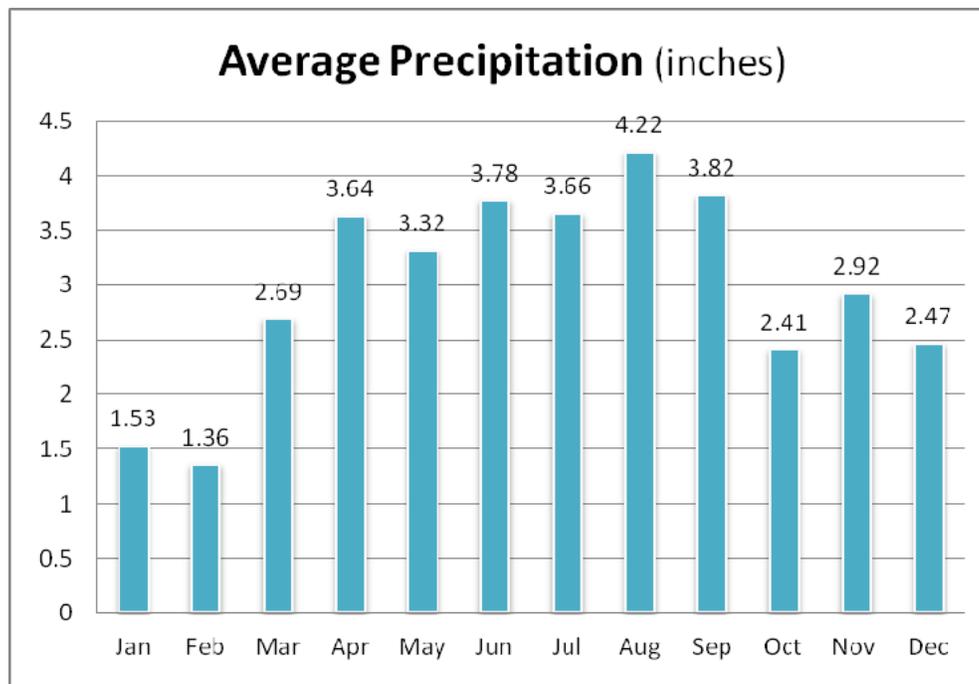
CHICAGO CLIMATE DATA

Climate data files are found at: http://www.eere.energy.gov/buildings.energyplus/cfm/weather_data.cfm

| | Value (units) |
|--|---------------|
| Latitude/Longitude | 42/87.45 |
| Elevation (1 st floor finished floor elevation) | Varies |
| Clearness number | Varies |
| Summer outdoor air design dry bulb/wet bulb | 92 |
| Ground reflectance | Varies |

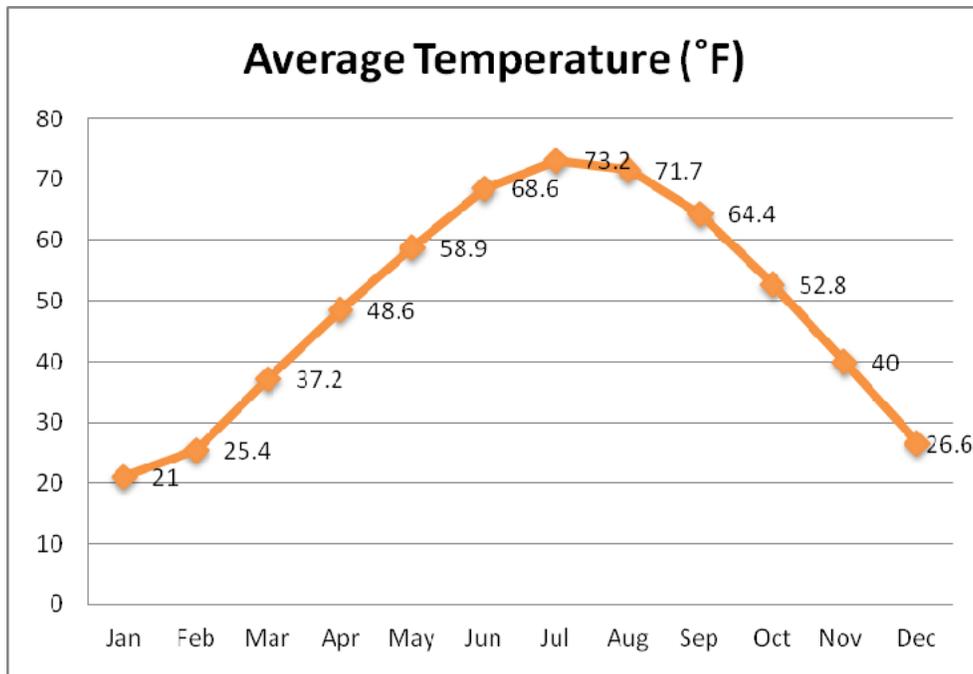
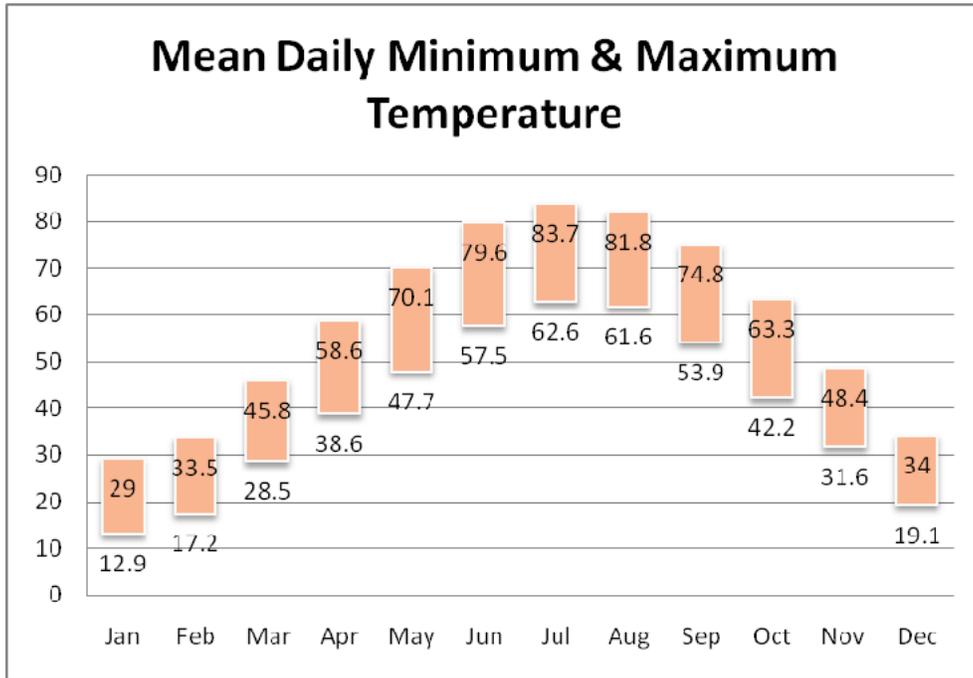
Average Precipitation

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|--------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| inches | 1.53 | 1.36 | 2.69 | 3.64 | 3.32 | 3.78 | 3.66 | 4.22 | 3.82 | 2.41 | 2.92 | 2.47 | 35.8 |



Annual Temperature Profile

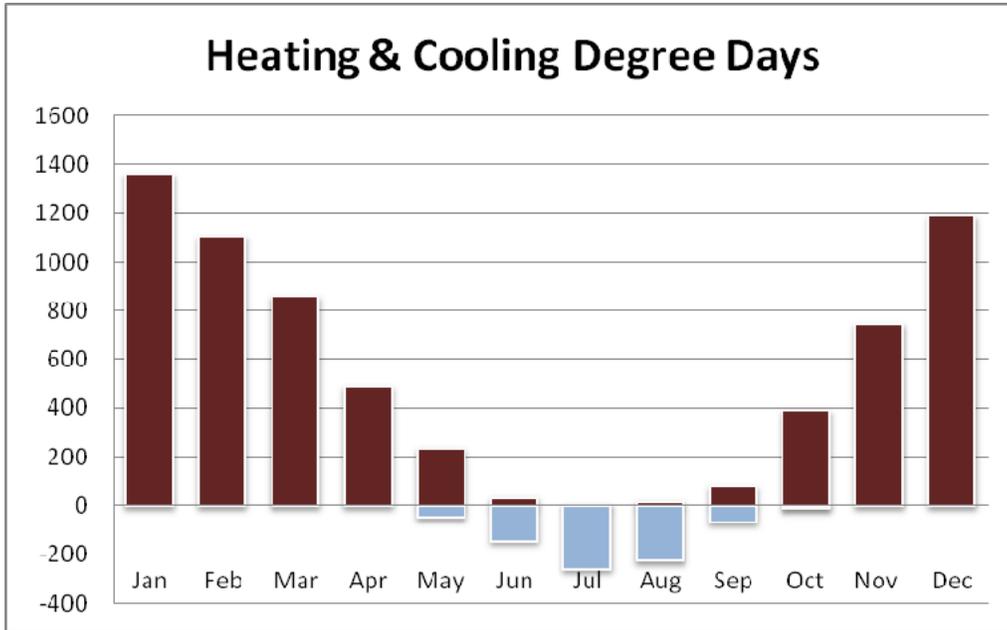
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|-------------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Average(°F) | 21.0 | 25.4 | 37.2 | 48.6 | 58.9 | 68.6 | 73.2 | 71.7 | 64.4 | 52.8 | 40.0 | 26.6 | 49.0 |
| Max (°F) | 29.0 | 33.5 | 45.8 | 58.6 | 70.1 | 79.6 | 83.7 | 81.8 | 74.8 | 63.3 | 48.4 | 34.0 | 58.6 |
| Min (°F) | 12.9 | 17.2 | 28.5 | 38.6 | 47.7 | 57.5 | 62.6 | 61.6 | 53.9 | 42.2 | 31.6 | 19.1 | 39.5 |



Heating and Cooling Degree Days

| | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Year |
|---------------------|-----|-----|-----|-----|-----|------|------|------|-----|-----|-----|-----|------|
| Heating Degree Days | 5 | 19 | 84 | 391 | 750 | 1190 | 1364 | 1109 | 862 | 492 | 235 | 35 | 6536 |

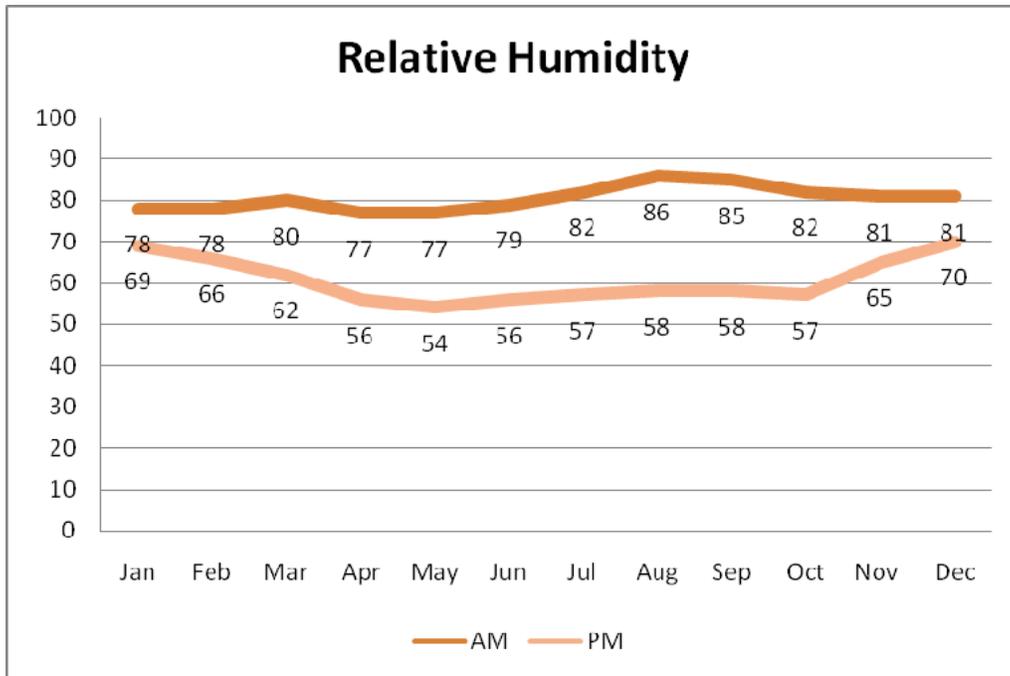
| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Year |
|---------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| Cooling Degree Days | 0 | 0 | 0 | 0 | 46 | 143 | 259 | 226 | 66 | 12 | 0 | 0 | 752 |



Relative Humidity

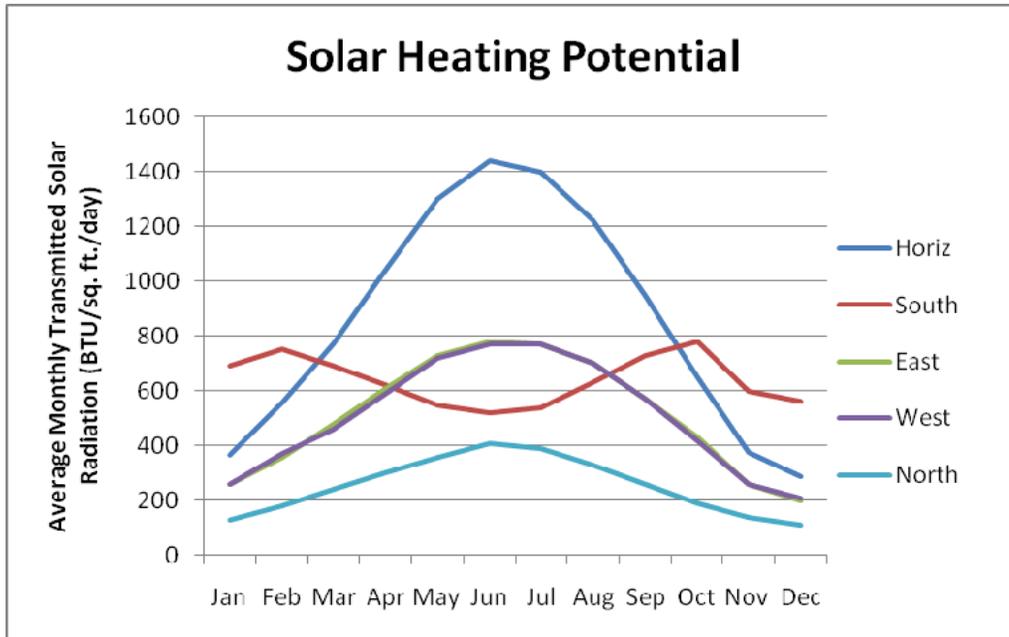
| Jan | | Feb | | Mar | | Apr | | May | | Jun | | Jul | |
|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|
| AM | PM |
| 78 | 69 | 78 | 66 | 80 | 62 | 77 | 56 | 77 | 54 | 79 | 56 | 82 | 57 |

| Aug | | Sep | | Oct | | Nov | | Dec | | Annual | |
|-----|----|-----|----|-----|----|-----|----|-----|----|--------|----|
| AM | PM | AM | PM |
| 86 | 58 | 85 | 58 | 82 | 57 | 81 | 65 | 81 | 70 | 80 | 61 |

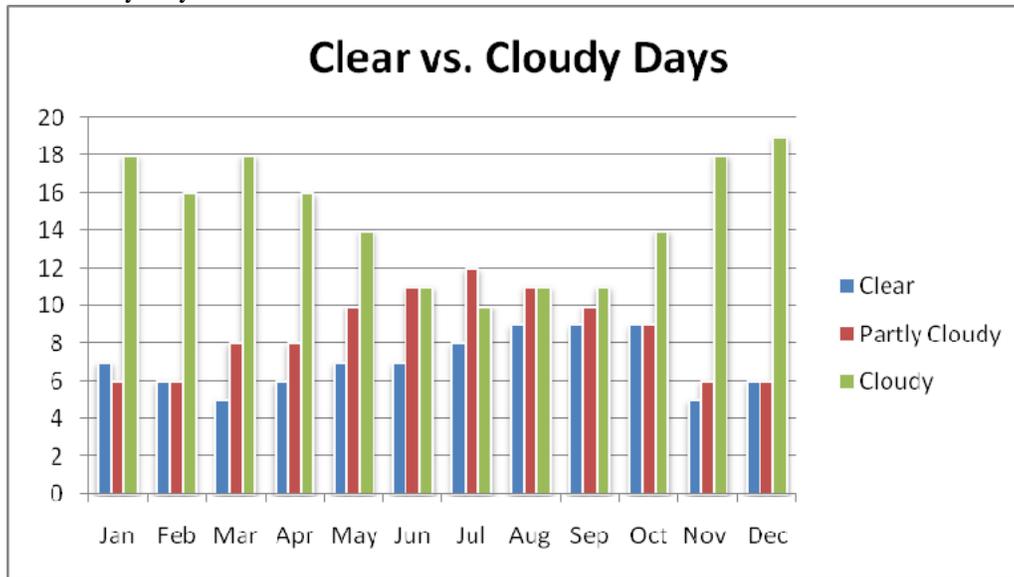


Solar Heating Potential

| | | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-----------------------------------|-------|-----|-----|-----|------|------|------|------|------|-----|-----|-----|-----|
| Cumulative Solar Insolation | Horiz | 370 | 560 | 770 | 1040 | 1300 | 1440 | 1400 | 1220 | 950 | 650 | 380 | 290 |
| | South | 690 | 750 | 690 | 620 | 550 | 520 | 540 | 630 | 730 | 780 | 600 | 560 |
| | East | 260 | 360 | 480 | 610 | 730 | 780 | 770 | 700 | 570 | 430 | 260 | 200 |
| (Btu/sq.ft./day) unshaded | West | 260 | 370 | 460 | 590 | 720 | 770 | 770 | 700 | 570 | 420 | 260 | 210 |
| | North | 130 | 180 | 240 | 300 | 360 | 410 | 390 | 330 | 260 | 190 | 140 | 110 |

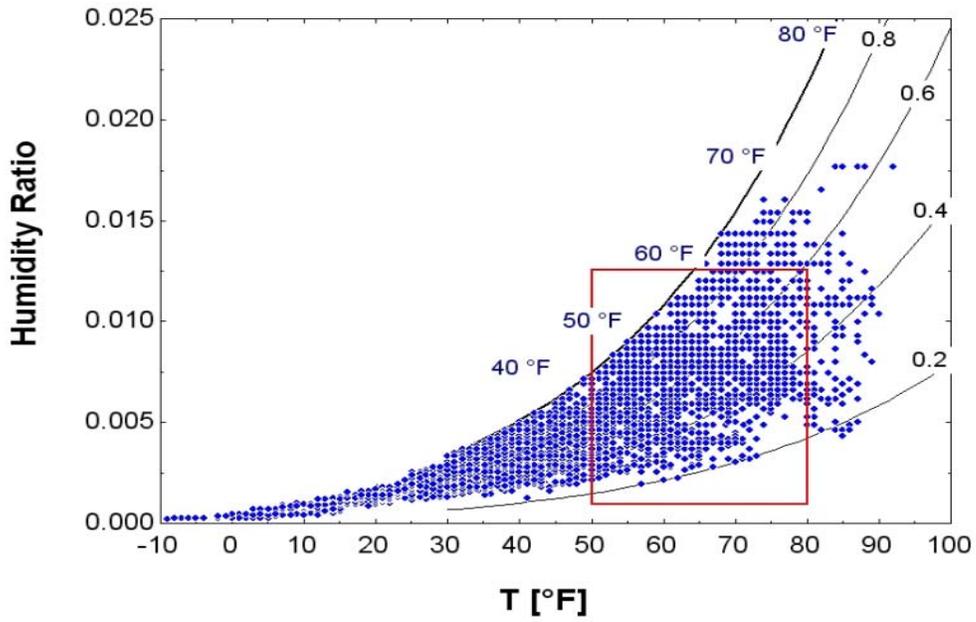


Clear Versus Cloudy Days



Psychrometric Chart

Temperature and Humidity (Chicago TMY2)



Wind Rose

