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For Projects Awarded in 2010

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Overview

The Iowa Green Streets Criteria promote public health, energy efficiency, water conservation, smart locations, operational savings and sustainable building practices. The Iowa Green Streets Criteria apply to Iowa Department of Economic Development Housing Fund, Community Development Block Grant Program Community Facilities and Services Fund, and Main Street Iowa Challenge Grant projects. As a result, the strategies in the following pages enhance affordable housing, community facilities, town centers and communities as a whole.

In addition to increasing resource efficiency and reducing environmental impacts, green building strategies can yield cost savings through long-term reduction in operating expenses. The benefits include improved energy performance and comfort, a healthier indoor environment, increased durability of building components, and simplified maintenance requirements that can lead to financial efficiencies for property managers and owners. Green building practices improve the economics of managing affordable housing, community facilities, and Main Street businesses while enhancing quality of life for residents, visitors and employees. When green building practices inform the location of our buildings – placing homes, community facilities and businesses near community amenities such as public transportation to create walkable, livable neighborhoods – the benefits for citizens and communities expand to include fewer sprawl-related transportation impacts.

Guiding principles behind the Iowa Green Streets Criteria ensure that buildings must be cost effective to build, and durable and practical to maintain. In addition, the principles work together to help produce green buildings that:

- Result in a high-quality, healthy living and working environment
- Lower utility costs
- Enhance connections to nature
- Protect the environment by conserving energy, water, materials and other resources
- Advance the health of local and regional ecosystems

How to Use This Document

The Iowa Green Streets Criteria is based on the national Green Communities Criteria available online at www.greencommunitiesonline.org/tools/criteria/index.asp. The Iowa Department of Economic Development thanks Enterprise and its partners for development of the national Green Communities Criteria and the use of those criteria in development of the Iowa Green Streets Criteria.

The 2008 version of Enterprise's Green Communities Criteria is purposefully aligned with the United States Green Building Council's Leadership in Energy and Environmental Design (LEED™) Rating System for Homes to assist criteria users that are considering achievement of a LEED rating for their project. Achievement of a LEED rating is not a requirement of the Iowa Department of Economic Development's Housing Fund, Community Development Block Grant Program Community Facilities and Services Fund, and Main Street Challenge Grant projects. Cross references to LEED for Homes measures are provided to assist housing project developers interested in seeking a LEED rating.

All of the mandatory Iowa Green Streets Criteria are required for both residential and non-residential applications. However, there are certain criteria that are not applicable to or are different for non-residential applications. Therefore, certain criterion include different requirements for residential versus non-residential projects.

Mixed-use projects, those that include both a residential and non-residential component, may use either the residential or non-residential green criteria as long as the approach taken meets all code requirements applicable to the project. An example of a mixed-use project type is one with floors of residential units stacked above first-floor retail.

Please be aware that this Iowa Green Streets Criteria document is subject to periodic revision and update. Refer to the Iowa Department of Economic Development's Community Development Division Web site, <http://www.iowalifechanging.com/community/> for the most current version.

(Note: The mandatory criteria referenced in this document are based on the national Green Communities Criteria as of February 2008. Any revisions to the national Green Communities Criteria will not apply to Iowa Department of Economic Development projects unless adopted by the Iowa Department of Economic Development and specifically addressed in the Iowa Green Streets Criteria.)

Activities and Projects Covered by the Iowa Green Streets Criteria

The Iowa Green Streets Criteria include mandatory and optional components in the criteria for the following types of activities or projects.

- Multi-family new construction
- Multi-family “gut” rehabilitation (see definition below)
- Multi-family rehabilitation (see definition below)
- Single-family new construction
- Main Street Iowa Challenge Grant projects
- Community facility buildings funded by the Community Development Block Grant Program Community Facilities and Services Fund

Gut Rehabilitation – Gut rehabilitation is defined as an activity or project that involves extensive (substantial) rehabilitation in terms of total removal and replacement of all interior (non-structural) systems, equipment, components or features of the existing structure to be rehabilitated or converted, whereby the existing structure will be reduced (as part of the rehabilitation or conversion of the structure) down to the basic structure or exterior building shell (e.g., the foundation system; exterior walls; roofs; and interior structural components such as columns, beams, floors and structural bearing walls). Gut rehabilitation may also include structural and non-structural modifications to the exterior of the structure.

Rehabilitation – Rehabilitation is defined as rehabilitation projects with rehabilitation activities that are less extensive than the gut rehabilitation definition above. **For multi-family, community facility, and Main Street Challenge Grant projects involving rehabilitation, the project shall implement all of the mandatory Iowa Green Streets Criteria that are applicable to that specific project.** For example, projects replacing interior light fixtures shall adhere to criterion 5-3a, Efficient Lighting Interior, and projects replacing bathroom exhaust fans shall adhere to criterion 7-5a, Exhaust Fans – Bathroom. Project applicants shall document for IDED any mandatory criteria that will not be met and explain the reason for not meeting that criteria. Criterion 5-1b, Efficient Energy Use: Rehabilitation, shall be applicable to all rehabilitation projects.

Additional Requirements

In addition to the Iowa Green Streets Criteria, the following requirements, as applicable, apply to all activities and projects covered by the Iowa Green Streets Criteria.

- All new construction including single-family and multi-family housing activities and projects; community facilities; and Main Street Challenge Grant projects less than four stories in height, are subject to the requirements of Energy Star.
- All newly constructed projects or activities including new single-family and multi-family housing; multi-family rehabilitation; community facilities; and Main Street Challenge Grant projects or activities shall be professionally designed, complete with a detailed set of construction plans and specifications that incorporate all applicable requirements of the Iowa Green Streets Criteria and Energy Star.
- All new construction including single-family and multi-family housing activities and projects; community facilities; and Main Street Challenge Grant projects funded with IDED’s Housing fund, Community Development Block Grant funds or Main Street Challenge Grant funds are subject to the requirements of the International Energy Conservation Code (the most current version as adopted by the State Building Code).
- All new construction and rehabilitation activities or projects must meet the requirements of any and all locally adopted and enforced building codes, standards and ordinances. In the absence of locally adopted and enforced building codes, the building code requirements of the State Building Code shall apply.
- Applicants must provide evidence of site control with their application (proposed lease, warranty deed, purchase agreement option)

Optional Points

A significant number of optional criteria are also included in the green criteria for increasing the overall sustainability and energy performance of homes and buildings. The following review statement was added to each program to review and reward projects incorporating optional green criteria.

“Degree to which the proposed project or activity is consistent with sustainability and smart growth principals and the degree to which the project or activity exceed the Iowa Green Streets Criteria (optional components).”

Depending on the program, the optional criteria account for up to approximately ten percent of the total project “score” during the application review and selection processes of the Iowa Department of Economic Development Housing Fund, Community Development Block Grant Program Community Facilities and Services Fund, and Main Street Challenge Grant programs.

Applications achieving the following ranges of optional criteria points will be considered to achieve a low, moderate or high level of additional green performance during application review and selection.

Optional Green Criteria Point Range	Level of Additional Green Performance
2 – 15 points	Low
16 - 70 points	Moderate
71 - or more points	High

Other Resources

Here are some additional resources to assist you with your green project:

- AARP – www.aarp.org
- American Institute of Architects, Iowa Chapter – www.aiaiowa.org
- Building Green, LLC/Environmental Building News – www.buildinggreen.com/
- Center on Sustainable Communities – www.icosc.com/
- Certified 3rd-Party Energy Raters – www.natresnet.org/directory/raters.aspx
- Energy Star - www.energystar.gov
- Green Communities – www.greencommunitiesonline.org/resources.asp
- Green Home Guide – www.greenhomeguide.org/
- Green Home New Construction Specifications – www.gmhf.com/homeplans/green.htm
- Iowa Department of Cultural Affairs – www.culturalaffairs.org
- Iowa Department of Public Health – www.idph.state.ia.us
- Iowa Energy Center – www.energy.iastate.edu/
- Iowa Go Green – www.iowagogreen.com
- Iowa State University Extension – www.extension.iastate.edu/
- National Association of Homebuilders Model Green Home Building Guidelines – www.nahb.org/fileUpload_details.aspx?contentTypeID=7&contentID=1994
- Partnership for Advanced Technologies in Housing – www.pathnet.org/
- U.S. Green Building Council – www.usgbc.org/
- University of Minnesota Center for Sustainable Building Research – www.csbr.umn.edu/index.html

For even more resources, visit the Iowa Department of Economic Development’s Community Development Division Web site www.iowalifechanging.com/community.

For additional information about the Iowa Green Streets Criteria, please call:

**515.725.3069 or e-mail:
greenstreets@iowalifechanging.com**

**Visit the Web site:
www.iowalifechanging.com/community**

Section 1: Integrated Design

An integrated design process incorporates sustainability up-front, uses a holistic and total-systems approach to the development process, and promotes good health and livability through the building's life cycle. The goal is to establish a written commitment that informs the project's objectives through the building's life cycle.

Sustainable building strategies should be considered from the moment the developer initiates the project. The professional development team should include a developer, architect, engineer, landscape architect, LEED™ Accredited Professional or experienced green building design specialist, contractor, and asset and property management staff. Whenever possible, the team also should include maintenance staff and occupant representatives. The team must be committed to environmentally responsive, resource conserving and healthy building principles and practices.

Section 2: Site, Location and Neighborhood Fabric

Location within existing communities – or contiguous to existing development – helps conserve land and the spread of stormwater runoff to new watersheds. It also reduces travel distances. Proper site selection avoids development of inappropriate sites and damage to or loss of fragile, scarce environmental resources. The greatest savings come from developing in areas that already have infrastructure and civic amenities. Site selection is also an opportunity to clean up and redevelop brownfields, and restore the land and infill segmented communities.

Compact development encourages more resource-efficient development of land, reduces development costs and conserves energy. It also can contribute to creating more walkable, livable communities, while helping restore, invigorate and sustain livable development patterns. Making the streetscape safer and more inviting for walkers and bicyclists encourages alternative transportation choices to the automobile. Safer streets and streetscapes also promote physical activity and public health, while creating opportunities for social interaction and increased safety by bringing more eyes on public spaces.

Section 3: Site Improvements

Sustainable design and site planning integrate design and construction strategies to: minimize environmental site impacts; enhance human health; reduce construction costs; maximize energy, water, and natural resource conservation; improve operational efficiencies; and promote alternative transportation.

Section 4: Water Conservation

Water efficiency conserves finite fresh water resources and reduces utility bills. Significant water savings can be realized by specifying and installing water-efficient appliances and plumbing fixtures, implementing low-water landscape and irrigation strategies, and taking advantage of rainwater catchment and graywater sources.

Section 5: Energy Efficiency

Energy efficiency helps to maximize occupant comfort and health, and reduces utility bills. Conservation measures mitigate the accumulative burdens of energy production and delivery, extraction of nonrenewable natural resources, degradation of air quality, global warming and the increasing concentration of pollutants.

Section 6: Materials Beneficial to the Environment

Reducing, reusing and recycling building materials conserves natural resources and reduces emissions associated with manufacturing and transporting raw materials. Many techniques and building products on the market contribute to more durable, healthy and resource-efficient buildings.

Section 7: Healthy Living Environment

The importance of a healthy living environment is a significant green building issue directly affecting occupants. Creating a healthy living environment involves the use of materials that do not cause negative health impacts for residents or workers, especially for more sensitive groups such as children, seniors and individuals with existing respiratory problems and compromised immune systems.

Section 8: Operations and Maintenance

Operations and maintenance (O&M) practices impact the building owner's costs and residents' health, comfort and safety. Sustainable building O&M practices enhance resident health and operational savings. The key to successful building performance is the integration of O&M plans, education and cost-effective, low-maintenance design.

Green Communities Development Team Worksheet

Developer Name: _____

Project Name: _____

Address (Street/City/State): _____



Please note that partial points are not awarded, unless specifically noted for a criterion.

This worksheet provides a quick overview of the criteria and is a convenient resource for the project development team to track progress towards meeting the green criteria during the planning stage. Please refer to the individual criterion for detailed information on how to comply with that particular criterion.

Distinguishing Between Types of Rehab

For the purposes of this criteria, gut rehabilitation is defined as an activity or project that involves extensive (substantial) rehabilitation. Refer to the full definition of gut rehabilitation on page 2 of the criteria. Rehabilitation is defined as projects with activities that are less extensive than gut rehabilitation.

LH= Aligned with LEED for Homes credit. For more information on the LEED for Homes rating system, please go to www.usgbc.org.

YES	NO	?		Integrated Design	Maximum Points
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1.1	Green Development Plan Submit Green Development Plan outlining the integrated design approach used for this development that demonstrates involvement of the entire development team.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	LH		
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1.2	Applicant/Recipient, Architect/Project Designer, and/or Contractor Certification Certify in writing at various stages of the development process intent to comply, and actual compliance with all of the MANDATORY Iowa Green Streets Criteria.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1.3	Universal Design and Visitability Create spaces that meet the needs of all people: young, old, abled, and disabled.	5
				Site, Location and Neighborhood Fabric	Maximum Points
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.1a	Smart Site Location - Proximity to Existing Development: New Construction Provide site map demonstrating that the development is located on a site with access to existing roads, water, sewers and other infrastructure within or contiguous (having at least 25 percent of the perimeter bordering) to existing development.	Mandatory <i>(except infill site or rehabs)</i>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	LH		
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.1b	Smart Site Location - Protecting Environmental Resources: New Construction Do not locate new development within 100 feet of wetlands, critical slope areas, land identified as habitat for a threatened or endangered species; or on land previously used as public park land, land identified as prime farmland, or with elevation at or below the 100-year floodplain.	Mandatory <i>(except infill site or rehabs)</i>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	LH		
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.1c	Smart Site Location - Proximity to Services: New Construction Locate projects within one-quarter mile of at least two, or one-half mile of at least four community and retail facilities.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	LH		
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.2a	Compact Development: New Construction Achieve densities for new construction of at least six units per acre for detached/semi-detached houses; 10 for town homes; 15 for apartments.	25
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.2b	Compact Development: Residential Increase average minimum densities to meet or exceed: seven units per acre for detached/semi-detached; 12 units for town homes; and 20 units for apartments.	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.3	Walkable Neighborhoods: Sidewalks and Pathways Connect project to the pedestrian grid. Include sidewalks or other all-weather pathways within the project linking the development to public spaces, open spaces and adjacent development.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.4	Walkable Neighborhoods: Connections to Surrounding Neighborhoods Provide a site plan demonstrating at least three separate connections from the development to sidewalks or all-weather pathways in surrounding neighborhoods.	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	LH		
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.5a	Smart Site Location: Passive Solar Heating/Cooling Orient building to make the greatest use of passive solar heating and cooling.	5
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	LH		
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.5b	Smart Site Location: Grayfield, Brownfield or Adaptive Reuse Site Locate the project on a grayfield, brownfield or adaptive reuse site.	15
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	LH		
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2.6	Transportation Choices Locate project within one-quarter mile radius of adequate public transit service.	12
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	LH		

YES	NO	?		Maximum Points
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Site Improvements	
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3.1 Environmental Remediation Upon award of an IDEED contract for funding, conduct a Phase I Environmental Site Assessment and provide a plan for abatement if necessary.	Mandatory <i>(except scattered-site single family)</i>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3.2 Erosion and Sedimentation Control LH For projects disturbing one (1) acre or more, obtain a DNR stormwater permit. For projects disturbing less than one (1) acre, implement EPA's Best Management Practices for erosion and sedimentation control during construction referring to the EPA document, <i>Storm Water Management for Construction Activities</i> .	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3.3 Landscaping LH Provide a tree or plant list certified by the architect or landscape architect that the selection of new trees and plants are appropriate to the site's soils and microclimate and do not include invasive species. Locate plants to provide shading in the summer and allow for heat gain in the winter.	Mandatory <i>(if providing landscaping)</i>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3.4 Surface Water Management LH Capture, retain, infiltrate and/or harvest the first 1.25 inches of rain that falls in a 24-hour period. Note: Mandatory for <u>new construction</u> project applications submitted after January 1 st , 2010.	Mandatory <i>(new Construction)</i> 25 <i>(Gut Rehab and Rehab)</i>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3.5 Storm Drain Labels Label all storm drains or storm inlets to clearly indicate where the drain or inlet leads.	2
			Water Conservation	Maximum Points
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4.1 Water-Conserving Appliances and Fixtures – Residential LH Install water-conserving fixtures with the following minimum specifications: toilets – 1.3 GPF; showerheads – 1.75 GPM; kitchen faucets – 2.0 GPM; bathroom faucets – 1.75 GPM. Water-Conserving Appliances and Fixtures – Non-Residential Install water-conserving fixtures with the following minimum specifications: toilets – 1.6 GPF; urinals – 1.0 GPF, public lavatories - .5 GPM or better at 60 psi, showerheads – 1.75 GPM; kitchen faucets – 2.0 GPM or better.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4.2 No Irrigation Do not install irrigation.	Mandatory
			Energy Efficiency	Maximum Points
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5.1a Efficient Energy Use – Residential LH Meet IECC 2009 and Energy Star standards (single family and low rise residential) and achieve a HERS Index of 70 using a third-party HERS Rater. Efficient Energy Use – Non-Residential and Residential Structures with Four or More Stories Above Grade Exceed ASHRAE 90.1-2007 by 10 percent.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5.1b Efficient Energy Use: Less than Gut Rehabilitation Perform an energy analysis of existing building condition, estimate costs of improvements, implement measures that will improve building energy performance by 15 percent from pre-renovation figures.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5.2 Energy Star and Energy Efficient Appliances LH If providing appliances, install Energy Star clothes washers, dishwashers and refrigerators, and dryers with built-in moisture sensors.	Mandatory <i>(if providing appliances)</i>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5.3a Efficient Lighting: Interior – Residential Install the Energy Star Advanced Lighting Package in all interior units and use Energy Star or high-efficiency commercial grade fixtures in all common areas and outdoors. Efficient Lighting: Interior – Non-Residential Meet or exceed current ASHRAE standard 90.1-2007 for interior lighting or follow applicable interior lighting guidelines from the ASHRAE Advanced Energy Design Guides.	Mandatory
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5.3b Efficient Lighting: Exterior LH Install daylight sensors or timers on all outdoor lighting, including front and rear porch lights.	Mandatory

YES NO ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

5.4	HVAC Sizing, Installation and Duct Systems Size heating and cooling equipment in accordance with the Air Conditioning Contractors of America (ACCA) Manual, parts D, J and S.	Mandatory
5.5	Electricity and Gas Meters Install individual or sub-metered electric and gas meters.	2
5.6 LH	Additional Reductions in Energy Use Exceed the relevant Energy Star HERS score for low-rise residential buildings or exceed other standards by increased percentages.	Optional <i>(see full criteria)</i>
5.7a LH	Renewable Energy Install PV panels, wind turbines or other renewable energy source to provide at least 10 percent of the project's estimated electricity demand.	15
5.7b	Photovoltaic (PV) Ready Site, design, engineer and wire the development to accommodate installation of PV in the future.	2
Materials Beneficial to the Environment		Maximum Points
6.1a LH	Construction Waste Management Develop and implement a construction waste management plan to reduce the amount of material sent to the landfill by at least 25 percent.	Mandatory
6.1b	Construction Waste Management: Additional Diversion Reduce the amount of construction waste sent to the landfill by and additional 25 percent or more.	Optional <i>(see full criteria)</i>
6.2	Durable and Low-Maintenance Exteriors Specify durable siding materials such as masonry or fiber cement to reduce or eliminate rot and reduce need for painting.	Mandatory
6.3 LH	Recycled Content Material Use materials with recycled content; provide calculation for recycled content percentage based on cost or value of recycled content in relation to total materials for project. Minimum recycled material must be 5 percent.	14
6.4 LH	Certified, Salvaged and Engineered Wood Commit to using at least 25 percent (by cost) wood products and materials that are salvaged wood, engineered framing materials or certified in accordance with the Forest Stewardship Council.	5
6.5a LH	Reduce Heat-Island Effect: Roofing Use Energy Star-compliant and high-emissive roofing or install a "green" (vegetated) roof for at least 50 percent of the roof area; or a combination of high-albedo and vegetated roof covering 75 percent of the roof area.	5
6.5b LH	Reduce Heat-Island Effect: Paving Use light-colored, high-albedo materials and/or an open-grid pavement with a minimum Solar Reflective Index of 0.6 over at least 30 percent of the site's hardscaped area.	5
6.5c LH	Reduce Heat-Island Effect: Plantings Locate trees or other plantings to provide shading for at least 50 percent of sidewalks, patios and driveways within 50 feet of a building.	5
Healthy Living Environment		Maximum Points
7.1 LH	Low / No Volatile Organic Compounds (VOC) Paints and Primers Specify that all interior paints and primers must comply with current Green Seal standards for low-VOC limits.	Mandatory
7.2 LH	Low / No VOC Adhesives and Sealants Specify that all adhesives must comply with Rule 1168 of the South Coast Air Quality Management District. Caulks and sealants must comply with Regulation 8, Rule 51 of the Bay Area Air Quality Management District.	Mandatory
7.3	Urea Formaldehyde-free Composite Wood Use particleboard and MDF that is certified compliant with the ANSI A208.1 and A208.2. If using nonrated composite wood, all exposed edges and sides must be sealed with low-VOC sealants.	Mandatory

YES NO ?

Y N ?

Y N ?	<p>7.4 LH Green Label Certified Floor Coverings Do not install carpets in below grade living spaces, entryways, laundry rooms, bathrooms, kitchens or utility rooms. If using carpet, use the Carpet and Rug Institute’s Green Label certified carpet, pad and carpet adhesives.</p>	Mandatory <i>(if providing floor coverings)</i>
Y N ?	<p>7.5a LH Exhaust Fans: Bathroom – Residential Install Energy Star-labeled bathroom fans that exhaust to the outdoors and are connected to a light switch and are equipped with a humidistat sensor or timer, or operate continuously.</p> <p>Exhaust Fans: Bathroom – Non-Residential Meet or exceed the current ASHRAE ventilation standard 62.1-2007 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.</p>	Mandatory
Y N ?	<p>7.5b LH Exhaust Fans – Kitchen: New Construction – Residential Install power vented fans or range hoods that exhaust to the exterior.</p> <p>Exhaust Fans – Kitchen: New Construction – Non-Residential Meet or exceed the current ASHRAE ventilation standard 62.1-2007 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.</p>	Mandatory
Y N ?	<p>7.5c Exhaust Fans – Kitchen: Rehabilitation – Residential Install power vented fans or range hoods that exhaust to the exterior.</p> <p>Exhaust Fans – Kitchen: Rehabilitation – Non-Residential Meet or exceed the current ASHRAE ventilation standard 62.1-2007 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.</p>	5
Y N ?	<p>7.6a LH Ventilation – Residential Install a ventilation system for the dwelling unit, providing adequate fresh air per ASHRAE 62.1-2007 for residential buildings above three stories or ASHRAE 62.2 for single family and low-rise multifamily dwellings.</p> <p>Ventilation – Non-Residential Meet or exceed the current ASHRAE ventilation standard 62.1-2007 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.</p>	Mandatory
Y N ?	<p>7.6b Ventilation: Rehabilitation – Residential Install a ventilation system for the dwelling unit, providing adequate fresh air per ASHRAE 62.1-2007 for residential buildings above three stories or ASHRAE 62.2 for single family and low-rise multifamily dwellings.</p> <p>Ventilation: Rehabilitation – Non-Residential Meet or exceed the current ASHRAE ventilation standard 62.1-2007 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.</p>	10
Y N ?	<p>7.7 Water Heaters: Mold Prevention Use tankless hot water heaters or install conventional hot water heaters in rooms with drains or catch pans with drains piped to the exterior of the dwelling and with non-water sensitive floor coverings.</p>	Mandatory
Y N ?	<p>7.8 Cold and Hot Water Pipe Insulation Insulate exposed cold and hot water pipes in climates and building conditions susceptible to moisture condensation.</p>	Mandatory

YES NO ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

Y N ?

7.9a	Materials in Wet Areas: Surfaces In wet areas, use materials that have smooth, durable, cleanable surfaces. Do not use mold-propagating materials such as vinyl wallpaper and unsealed grout.	Mandatory
7.9b	Materials in Wet Areas: Tub and Shower Enclosures Use fiberglass or similar enclosure or, if using any form of grouted material, use backing materials such as cement board, fiber cement board or equivalent (i.e., not paper-faced).	Mandatory
7.10a	Basements and Concrete Slabs: Vapor Barrier Provide vapor barrier under all slabs. For concrete floors either in basements or on-grade slab install a capillary break of 4 four inches of gravel over soil. Cover all gravel with 6-millimeter polyethylene sheeting moisture barrier with joints lapped 1 foot or more. Install at least 1" extruded polystyrene below slab in addition to the vapor barrier to control mold growth. On interior below grade walls, avoid using separate vapor barrier or below grade vertical insulation.	Mandatory
7.10b LH	Basements and Concrete Slabs: Radon – Residential In EPA Zone 1 and 2 areas, install passive radon-resistant features below the slab along with a vertical vent pipe with junction box available, if an active system should prove necessary. For substantial rehab, introduce radon-reduction measures if elevated levels of radon are detected. Basements and Concrete Slabs: Radon – Non-Residential For new construction projects, follow the guidance contained in the EPA document, Radon Prevention in the Design and Construction of Schools and other Large Buildings. For gut rehabilitation projects, test the building for presence of radon. If elevated levels of radon exist, introduce radon-reduction measurements.	Mandatory
7.11	Water Drainage Provide drainage of water to the lowest level of concrete away from windows, walls and foundations.	Mandatory
7.12 LH	Garage Isolation – Residential Provide a continuous air barrier between the conditioned (living) space and any unconditioned garage space. In single-family houses with attached garages, install a CO alarm inside the house on the wall that is attached to the garage and outside the sleeping area, and do not install air handling equipment in the garage. Garage Isolation – Non-Residential Non-Residential — Meet or exceed the current ASHRAE ventilation standard 62.1-2007 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.	Mandatory
7.13 LH	Clothes Dryer Exhaust Clothes dryers must be exhausted directly to the outdoors with a rigid-type vent.	Mandatory
7.14 LH	Integrated Pest Management Seal all wall, floor and joint penetrations with low-VOC caulking. Provide rodent-proof and corrosion-proof screens (e.g., copper or stainless steel mesh) for large openings.	Mandatory
7.15	Healthy Flooring Materials: Alternative Sources Use non-vinyl, non-carpet floor coverings in all rooms.	15
7.16	Smoke-free Building Enforce a "no smoking" policy in all common and individual living areas in all buildings. See full criteria for "common area" definition.	2
7.17 LH	Combustion Equipment: Includes Space and Water-Heating Equipment Specify power vented or combustion sealed equipment. Install one hard-wired CO detector for each sleeping area, minimum one per floor.	Mandatory

YES NO ?

Y N ?

Y N ?

Y N ?

Operations and Maintenance		
8.1 LH	<p>Building Maintenance Manual</p> <p>Provide a manual that includes the following: a routine maintenance plan; instructions for all appliances, HVAC operation, water-system turnoffs, lighting equipment, paving materials and landscaping, pest control and other systems that are part of each occupancy unit; an occupancy turnover plan that describes the process of educating the tenant about proper use and maintenance of all building systems.</p>	Mandatory
8.2 LH	<p>Occupant's Manual</p> <p>Provide a guide for homeowners/building owners and renters that explains the intent, benefits, use and maintenance of green building features, along with the location of transit stops and other neighborhood conveniences, and encourages additional green activities such as recycling, gardening and use of healthy cleaning materials, alternate measures for pest control and purchase of green power.</p>	Mandatory
8.3 LH	<p>Homeowner/Building owner and New Occupant Orientation</p> <p>Provide a walk-through and orientation to the homeowner/building owner or new occupant using the Occupant Manual from 8-2 above that reviews the building's green features, operations and maintenance along with neighborhood conveniences.</p>	Mandatory

Section 1: Integrated Design

1.1
LH

Green Development Plan

Mandatory

How

Using Appendix A, Green Development Plan and Checklist, submit a Green Development Plan and Checklist that outlines the integrated design approach used for this development that demonstrates involvement of the entire development team. The use of a green design charrette or workshop is strongly encouraged for developing an effective an integrated green development plan. For assistance in completing the green development plan, see the template and additional resources online at www.greencommunitiesonline.org/tools/resources.

The plan must provide the following:

- The name and role of members of the professional design and development team known at the time of application.
- A statement of the overall green development goals of the project and the expected/intended outcomes from addressing those goals.
- A description of the process that was used to select the green building strategies, systems and materials that will be incorporated into the project.
- A description of how each of the mandatory (and optional items) will be included in the project.
- Identification of which members of the design and development team are or will be responsible for implementing the green features.
- A description of follow-up measures to be taken through the completion of design, permitting, construction, occupancy and operation to ensure that the green features are included and correctly installed, and that the owners or tenants receive information about the function and operation of the features.

The plan must include meeting minutes or another type of documentation that captures and summarizes components of the integrated design process that have been completed at the time of application.

Indicate whether this is the first time the applicant has completed a project with green features. If so, explain why the applicant wants to incorporate them in this project. If this is not the first green project, the plan must include a written statement on how the integrated design approach taken for this project compares to approaches taken for previous affordable housing, community facility or Main Street Iowa Challenge Grant activities or projects designed and developed by members of the project team.

Intent

An integrated design process incorporates sustainability from the outset and connects the design to the regional climatic conditions. It takes into consideration the existing community context, and uses a holistic and total-systems approach to the development process, promoting good health and livability through the building's (or development's) life cycle. The benefits of an integrated design process can include substantially lower development costs and greater health, economic and environmental benefits for residents, property owners and communities. It is important that the development and property management teams are committed to a written plan that they can refer to throughout the development process. This plan will continue to inform the green objectives for the project throughout its life cycle.

Things to Consider

- Projects that achieve this measure also meet the requirements for LEED for Homes credit ID 1.4 - "Design Charrette," worth 1 point toward LEED certification. Projects also may fulfill credit ID 1.2 "Integrated Project Team," worth 1 point toward LEED certification. If pursuing ID 1.2 toward LEED certification, the project team must be assembled and involved to meet three basic requirements:
 - Team members must include at least three major skill sets (as listed in the LEED for Homes Rating System);
 - All team members must be included in at least three phases of the design and construction process; and
 - Project team must conduct meetings on at least a monthly basis to review project status, responsibilities, next steps, etc.

- Enterprise offers grants, technical resources and templates to support the integrated design process. Information is available at www.greencommunitiesonline.org/tools/funding/grants/charrette.asp.
- Conduct a green design charrette with the development team, including professionals with expertise in the following:
 - Architecture or residential building design;
 - Mechanical or energy engineering;
 - Building science or performance testing;
 - Green building or sustainable design; and
 - Civil engineering, landscape architecture, habitat restoration, or land-use planning.

➤ Neighborhood Design Guidelines

See Douglas Farr, *Sustainable Urbanism: Urban Design with Nature*, Hoboken: John Wiley & Sons, 2008; Reid Ewing, *Best Development Practices*, Chicago: American Planning Association, 1995; and Peter Calthorpe, *The Next American Metropolis*, New York: Princeton Architectural Press, 1993.

These three books are full of practical guidelines for design and placement of development into a neighborhood fabric that is supportive of environmental sustainability.

- *Whole Building Design Guide*, www.wbdg.org/wbdg_approach.php
This Web site describes the core elements of “whole building design,” which includes the combination of an integrated design approach and an integrated team process. This site helps users identify design objectives and organize their processes to meet those objectives.
- Consider developing a durability plan. Refer to LEED for Homes ID 2: Durability Management Process to think through the development and implementation of a durability plan. This will promote the increased service life of the building envelope and its components and systems through appropriate design, materials and installation.

1.2	Applicant/Recipient, Architect/Project Designer, and/or Contractor Certification	Mandatory
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How

The Architect/Project Designer, General Contractor, HVAC Contractor, and/or Applicant/Recipient are required to certify in writing at various stages of the development process their intention to comply, and actual compliance with all of the MANDATORY Iowa Green Streets Criteria, as follows:

- Certification of Intent to Comply at time of initial application – signed by Applicant and the Architect/Project designer .
- Certification of Construction Contract Document Compliance prior to construction commencement signed by Recipient and Architect/Project Designer.
- Certification of Compliance at end of construction – signed by Recipient, Architect/Project Designer, General Contractor and HVAC Contractor.
- HERS Index Certification (as applicable) – signed by HERS rater, Recipient and Architect/Project Designer.

How

Create spaces that meet the needs of all people: young, old, abled, and disabled. Adhere to the requirements below for minimum accessibility. Use of and adherence to the University of Iowa Clinical Law Programs' Universal Design Survey Checklist is encouraged. See <http://www.uiowa.edu/~clinic/A.%20Washington%20Court%20Housing%20Survey/3.%20Other%20Materials/6.%20Conduct%20Your%20Own%20Survey/UDSurveyChecklist4.20.09.pdf> for more information.

Things to Consider

➤ Wall Reinforcement

At least one bathroom within the same level where occupants enter their place of residence shall be provided with wood blocking installed within wall framing, to support grab bars as needed. The wood blocking, when measured to the center, shall be located between thirty-three inches (33") and thirty-six inches (36") above the finish floor. The wood blocking shall be located in all walls adjacent to a toilet, shower stall or bathtub.

➤ Interior Doors

All doorways within the same level where occupants enter their place of residence shall provide a minimum clear opening of thirty-two inches (32") when the door is open ninety degrees (90°), measured between the face of the door and the opposite stop.

➤ Switch and Outlet Requirements

All wall switches controlling light fixtures and fans, shall be located at a height not to exceed forty-eight inches (48") above the finished floor. Height shall be determined by measuring from the finished floor to the center of the switch.

All receptacles shall be located at a height not less than fifteen inches (15") above the finished floor. Height shall be determined by measuring from the finished floor to the center of the receptacle. When the receptacle placement is prohibited by the height of a window or design feature, an alternate location can be selected that meets the accessibility intent of these requirements.

➤ No-Step Entrance

Must provide at least one building entrance that is an accessible entrance served by a ramp or a no-step entrance. A building entrance door must have a minimum net clear opening of thirty-two inches (32").

Intent

Universal design improves the ability of Iowa's aging population to age in place and improves overall building accessibility for all populations.

Things to Consider

- Design and construct kitchen spaces, sinks, cabinets, and appliances so they support or can be easily adapted to support universal design concepts.
- Universal Design Checklist and Survey by University of Iowa Clinical Law Programs includes a very useful project checklist and links to many additional resources on universal design and green construction. See <http://www.uiowa.edu/~clinic/A.%20Washington%20Court%20Housing%20Survey/3.%20Other%20Materials/6.%20Conduct%20Your%20Own%20Survey/UDSurveyChecklist4.20.09.pdf>
- Conduct Your Own Universal Design and Green Home Survey by University of Iowa Clinical Law Programs, <http://www.livablecommunity.org/Portals/3/Conduct%20Your%20Own%20Universal%20Design&GreenHome%20Survey6.16.09.pdf>
- Universal Design Information from Iowa City, Iowa, www.icgov.org/default/?id=1169
- Law requirements for accessibility of multi-family housing, www.uiowa.edu/infotech/housingaccess.htm
- "Aging-In Place Checklist," www.toolbase.org/Home-Building-Topics/Universal-Design/aging-in-place-checklists
- Principles of Universal Design, www.toolbase.org/Home-Building-Topics/Universal-Design/principals-universal-design

Section 2:

Site, Location and Neighborhood Fabric

2.1a LH	Smart Site Location - Proximity to Existing Development: New Construction	Mandatory <i>(except infill site or rehabs)</i>
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How

Provide preliminary site map with your application demonstrating that the development is located on a site with access to existing roads, water, sewers and other infrastructure within or contiguous (having at least 25 percent of the perimeter bordering) to existing development. Do not build on tracts of land that require installing a septic tank or a sanitary sewer or water line extension of 1,000 feet or greater from the property line of the tract being developed, or within critical potable watershed areas.

Intent

Location within existing communities, within or contiguous to existing development, helps conserve land and the spread of stormwater runoff to new watersheds. It also reduces travel distances. Proper site selection avoids development of inappropriate sites and damage to or loss of fragile, scarce environmental resources. The greatest savings come from developing in areas that already have infrastructure and civic amenities. Site selection is also an opportunity to clean up and redevelop brownfields and to fill in gaps within the built environment.

Things to Consider

- Projects that achieve this measure also meet the requirements for LEED for Homes credit LL 3.1 “Edge Development,” worth 1 point toward LEED certification, and should also be eligible for points under credit LL 4 “Infrastructure.” Also, projects may be eligible for 1 point under credit LL 3.3 “Previously Developed,” if the project is built on a previously developed lot. And infill developments may be able to achieve credit LL 3.2 “Infill,” if at least 75% of the perimeter immediately borders previously developed land. LL 3.2 is worth 2 points toward LEED certification.

2.1b LH	Smart Site Location - Protecting Environmental Resources: New Construction	Mandatory <i>(except infill site or rehabs)</i>
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How

Do not locate new development, including buildings, built structures, roads or other parking areas, on portions of sites that meet any of the following:

- Land in a wetland or within 100 feet of wetlands, including isolated wetlands or streams. Maintain or establish riparian buffer using native vegetation where possible. Bike and foot paths are allowed if at least 25 feet from the wetlands boundary.
- Land within 100 feet of critical slope area
- Prime farmland
- Public parkland
- Land that is specifically identified as habitat for any species on federal or state threatened or endangered lists
- Land with elevation at or below the 100-year floodplain
- Land outside the corporate limits of a municipality

***An infill site, which is exempted from 2-1b, is a site that has 75 percent of its perimeter bordering existing development or roads and has access to existing infrastructure.**

Intent

Proper site selection avoids development of inappropriate sites, and damage to or loss of fragile and scarce environmental resources.

Definitions

- “Wetlands” is defined by the U.S. Code of Federal Regulations, 40 CFR, Parts 230-233 and Part 22. New wetlands constructed as part of stormwater mitigation or other site restoration efforts are exempt from this part of the requirement.
- “Critical slope area” is an area within a tract of land that has a greater than 15 percent change in elevation or an erodability factor of greater than 0.4 as determined by the Natural Resources Conservation Service of the USDA.
- Prime farmland is defined here as land that contains “prime soils”, “unique soils”, or “soils of state significance” as identified in state Natural Resources Conservation Service soil surveys. Sites that are previously developed are exempt from this requirement.
- “Critical habitat” is an area that the U.S. Fish and Wildlife Service or a state or tribal authority designates as occupied by a threatened or endangered species, or essential to the conservation of a threatened or endangered species. See, for example, Endangered Species Act, 16 U.S.C. 1523(5).
- The “100-year flood plain” is defined by FEMA in the Agency’s national flood information map. The 100-year flood plain is shown by the Flood Insurance Rate Map (FIRM) for the community published by FEMA. If no FIRM exists, contact the Iowa Department of Natural Resources (IDNR) Flood Plain Management Program for a determination. The IDNR contact for your area can be determined at www.iowadnr.gov/water/floodplain/contact.html.

Things to Consider

- Projects that achieve this measure also meet the requirements for LEED for Homes credit LL 2, “Site Selection,” worth 2 points toward LEED certification.
- Iowa’s Threatened and Endangered Species Program, www.iowadnr.gov/other/threatened.html.
- Protect existing trees and steer away from project sites that will result in the loss of mature woodlands. The Home Depot Foundation encourages programs that create or expand partnerships between community tree organizations and those focused on other areas of community development, such as affordable housing and programs that provide volunteer opportunities. See www.homedepotfoundation.org/support_trees.html.
- Protect habitat of potential endangered species. Use state and local lists to identify these habitats.
- U.S. Department of Energy, Building Technologies Program www.eere.energy.gov/buildings/highperformance/pdfs/sustainable_guide/sustainable_guide_ch3.pdf. This Web site provides guidance on sustainable site selection.
- U.S. Department of Agriculture, Natural Resources Conservation Service Web Soil Survey available at <http://websoilsurvey.nrcs.usda.gov/app/>.
- Digital Q3 Flood Data Availability, States Map Federal Emergency Management Agency (FEMA), FEMA’s national flood information maps. <http://msc.fema.gov/webapp/wcs/stores/servlet/info?storeId=10001&catalogId=10001&langId=-1&content=productQ3Map&title=Q3%20Availability%20-%20State%20Map&parent=productInfo&parentTitle=Product%20Information>

2.1c LH	Smart Site Location - Proximity to Services: New Construction	Mandatory
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How

Provide a preliminary location map with your application with exact distances indicating that the project is located within ¼ mile of at least two, or ½ mile of at least four, of the following facilities: Adequate (see definition below) public transportation, supermarket, public school, library, licensed child care center, usable park space, bank, medical or dental office, post office, convenience store, laundry/dry cleaner, pharmacy, place of worship, community or civic center that is accessible to residents.

Intent

Locating projects in communities with services strengthens those communities and residents' ties to society. It also prevents leapfrog development, which carries numerous negative consequences, including fragmented ecosystems, the spread of polluted runoff to new watersheds, strain on municipal budgets that must stretch to accommodate longer service routes and infrastructure lines, and damage to landscapes that enhance the quality of life for Iowans.

Pedestrian- and transit-oriented neighborhoods inspire smaller streets and less land relegated to the automobile, and create a more livable, efficient community. These neighborhoods offer residents a range of services, parks and employment opportunities within walking and biking distance. They also offer opportunities for a healthier quality of life while lowering residents' dependence on cars, thereby reducing the costs of owning a car and the need for garages and other parking areas.

Definitions

Adequate transportation means bus stops within ¼ mile of the development. Adequate bus service during peak periods is defined as bus service available every 30 minutes during peak periods.

Things to Consider

- This criterion can help projects meet one of the requirements for LEED for Homes credit LL 5.1 "Basic Community Resources" worth 1 point toward LEED certification, if the project is located within ½ mile of transit services that offer 30 or more transit rides per weekday (combined bus, rail, and ferry). Alternatively, this point can be achieved by projects located within ¼ mile from four community resources or ½ mile from seven community resources. Additional points toward LEED certification are available for locating a project proximate to community resources or public transportation under LL 5.
- Safe Routes to School National Partnership
www.saferoutespartnership.org/home
The Safe Routes to School National Partnership is a network of more than 300 nonprofit organizations, government agencies, schools, and professionals working together to advance the Safe Routes to School (SRTS) movement in the United States. SRTS can provide a variety of important benefits to children and their communities, including increasing physical activity, reducing traffic congestion, improving air quality, and enhancing neighborhood safety.

2.2a	Compact Development: New Construction	25
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How

The Project architect or designer must complete the density calculation as defined below and certify its correctness. The project applicant must provide documentation from the applicable local jurisdiction indicating that the applicable density requirements provided below are permitted on the project site. The minimum net density for new construction must be:

- 6 units per acre for detached or semi-detached houses;
- 10 for townhomes; and
- 15 for apartments.

Net density is measured by taking the total dwelling units after construction, divided by the acreage of the entire tract down to one decimal point, minus dedicated acreage of public street rights of way, riparian and wetland buffers, and open space that has been dedicated through a conservation program.

Intent

Compact development encourages more resource-efficient development of land, reduces development costs and conserves energy. It also can contribute to creating more walkable communities, while helping restore, invigorate and sustain livable development patterns.

Things to Consider

- LEED for Homes SS 6, “Compact Development,” rewards 2 points for projects with an average density of 7 or more dwelling units per acre, 3 points for an average density of 10 or more units per acre and 4 points for an average density of 20 or more units per acre.
- Congress for New Urbanism, www.cnu.org
This nonprofit organization provides tools and resources for promoting walkable, neighborhood-based development as an alternative to sprawl.
- Smart Growth Network, www.smartgrowth.org
This website outlines smart growth principles, provides a guide through smart growth terms and technical concepts, and hosts a searchable catalogue of reports, websites, tools, and case studies dating from 1997 to today.
- Urban Land Institute, www.washington.uli.org
The Urban Land Institute is a nonprofit organization based in Washington, D.C., that promotes the responsible use of land to enhance the total environment. ULI’s online bookstore includes numerous publications regarding compact and higher-density development.

2.2b	Compact Development: Residential
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How

Calculate density as defined under 2-2, Compact Development, and increase average minimum density for new construction to meet or exceed the following guidelines:

- 7 units per acre for detached or semi-detached;
- 12 units per acre for town homes; and
- 20 units per acre for apartments.

Intent

Compact development encourages more resource-efficient development of land, reduces development costs and conserves energy. It also can contribute to creating more walkable communities, while helping restore, invigorate and sustain livable development patterns.

Things to Consider

- Projects that achieve this measure also meet the requirement under LEED for Homes SS 6 “Compact Development.” Points toward LEED certification are awarded depending on the density of the development, with 2 points available for 7 or more units per acre, 3 points available for 10 or more units per acre or 4 points for 20 or more units per acre.
- Congress for New Urbanism, www.cnu.org
This nonprofit organization provides tools and resources for promoting walkable, neighborhood-based development as an alternative to sprawl.
- Smart Growth Network, www.smartgrowth.org
This website outlines smart growth principles, provides a guide through smart growth terms and technical concepts, and hosts a searchable catalogue of reports, websites, tools, and case studies dating from 1997 to today.
- Urban Land Institute, www.washington.uli.org
The Urban Land Institute is a nonprofit organization based in Washington, D.C., that promotes the responsible use of land to enhance the total environment. ULI’s online bookstore includes numerous publications regarding compact and higher-density development.

2.3	Walkable Neighborhoods: Sidewalks and Pathways
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Mandatory

How

Connect the project to the pedestrian grid. Provide a preliminary site map with your application indicating that sidewalks or other all-weather pathways exist or were created to link the development to public spaces, open spaces and adjacent development. Projects whose building entrances open directly on to a public sidewalk meet this requirement.

Intent

Making the streetscape safer and more inviting for walkers and bicyclists encourages alternative transportation choices to the automobile. It also promotes physical activity and public health, while creating opportunities for social interaction and increases safety by bringing more eyes on public spaces.

Things to Consider

- Use porous pavement for sidewalks and other paved surfaces to reduce stormwater runoff and the distribution of pollutants to streams, rivers and water bodies. Design sidewalks to distribute stormwater to open space for recharge and to prevent flooding.
- Unimproved dirt pathways do not qualify as “all-weather” walking facilities.

2.4	Walkable Neighborhoods: Connections to Surrounding Neighborhoods
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How

Provide a preliminary site map with your application demonstrating at least three separate connections (excluding entrances / exits from a single building) to sidewalks or all-weather pathways in surrounding neighborhoods.

Intent

Providing easy access to sidewalks or other all-weather pathways promotes walking, biking and other healthy lifestyles. Walkable neighborhoods reduce dependence on automobile travel and possibly automobile ownership, while reducing auto-related emissions.

Things to Consider

- Integrate pedestrian and bicycle connections from the new development to the surrounding neighborhood through sidewalks, bike lanes or paths.
- Consider using porous pavement for sidewalks and other paved surfaces to reduce stormwater runoff and the distribution of pollutants to streams, rivers and water bodies. Design sidewalks to distribute stormwater to open space for recharge and to eliminate flooding.
- Where possible and if not using federal funds administered by the Iowa Department of Economic Development, wait until development is occupied before laying out paved pathways/sidewalks from the development to the surrounding neighborhood. Build the pathways/sidewalks where there is visible evidence of pedestrian and bicycle use.

How

Orient building to make the greatest use of passive or active solar heating and cooling.

- Elongate building on an east-west axis. The east-west axis of the building should be within 15 degrees of due east-west.
- The glazing area on the north- and south-facing walls of the building should be at least 50% greater than the sum of the glazing area on the east- and west- facing walls.
- The roof should have a minimum of 450 square feet of south-facing area that is oriented appropriately for solar applications.
- At least 90% of the glazing on the south-facing wall should be completely shaded (using shading, overhangs, etc.) at noon on June 21 and unshaded at noon on December 21.

Two points may be awarded if the applicant is able to orient the buildings as required above to the maximum extent that is feasible based on site constraints.

Intent

Solar energy is a radiant heat source that yields natural processes on which all life depends. Some of the natural processes can be managed through building design to help heat and cool the building. The basic natural processes used in passive solar energy are the thermal energy flows associated with radiation, conduction and natural convection. When sunlight strikes a building, the building materials can reflect, transmit or absorb the solar radiation. Additionally, the heat produced by the sun causes air movement that can be predictable in designed spaces. These basic responses to solar heat lead to design elements, material choices and placements that can provide heating and cooling effects in a home. Passive solar energy means that mechanical means are not employed to utilize solar energy.

Things to Consider

- Projects that achieve this measure meet the requirements for LEED for Homes credit ID 1.5, "Building Orientation for Solar Design," worth 1 point toward LEED certification.
- Consider placing different window films on north, east, south and west facades. The south windows should have a high solar heat gain coefficient (SHGC) with a low U-value. The west windows should have the lowest SHGC and a Low U-value and the north and east windows should have the lowest U-value. See www.eere.energy.gov/consumer/your_home/windows_doors_skylights/index.cfm/mytopic=13370.
- Interior spaces requiring the most light, heating and cooling should be along the south face of the building.
- A narrow floor plate (less than 40 feet), properly designed single-loaded corridors, and an open floor plan optimize daylight penetration and passive ventilation.
- Shading through overhangs and canopies on the south and deciduous trees on the south and west prevent the summer sun from entering the interior.
- U.S. Department of Energy, Building Technologies Program, www.eere.energy.gov/buildings/publications/pdfs/building_america/29236.pdf. A part of the department's "Building Toolbox," this site includes tips and techniques for passive solar heating, passive solar cooling, thermal storage, and daylighting.
- Passive Solar Design for the Home, U.S. Department of Energy Office of Energy Efficiency and Renewable Energy. Report # DOE/GO-102001-1105. February, 2001. Available from the U.S. Office of Scientific and Technical Information (www.osti.gov) or on-line at www.nrel.gov/docs/fy01osti/27954.pdf.

2.5b LH	Smart Site Location: Grayfield, Brownfield or Adaptive Reuse Site	15
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How

Locate the project on a grayfield, brownfield or adaptive reuse site.

Intent

Use of previously developed sites, including those where development is complicated by real or perceived environmental contamination or physical constraints, reduces pressure on undeveloped land and the spread of pavement to new watersheds. Many such sites are otherwise prime locations for redevelopment and provide potential economic and location benefits to citizens, neighborhoods and communities. Reuse of existing structures reduces the need for new materials and utilizes embodied energy.

Definitions

- Grayfields are previously developed abandoned sites, such as parking lots, obsolete shopping centers, and dilapidated residential structures scheduled to be deconstructed or demolished.
- Brownfields require a Phase II Environmental Site Assessment and remediation plan.
- An adaptive reuse site is one that was previously developed for non-residential purposes, in which at least 25 percent of the proposed development will reuse existing non-residential structures.

Things to Consider

- Projects that achieve this measure also meet the requirement under LEED for Homes credit LL 3.3, “Previously Developed,” worth 1 point toward LEED certification.
- U.S. Environmental Protection Agency, Brownfields Cleanup and Redevelopment, www.epa.gov/brownfields/index.html
This site includes information about EPA’s Brownfields Program, brownfield law, brownfield grants, technical tools and resources, and information on brownfield projects across the country.
- Municipal Research and Services Center of Washington, Infill Development Strategies for Shaping Livable Neighborhoods, www.mrsc.org/Publications/textfill.aspx
This site, sponsored by the State of Washington, contains an overview of strategies for encouraging and implementing infill development patterns. The principal audience is policymakers and developers in Washington, but the insights are broadly applicable.
- Congress of New Urbanism, “Greyfields into Goldfields: Dead Malls Become Living Neighborhoods,” www.cnu.org/malls
This Web site contains a study on opportunities for converting dead shopping malls into new neighborhoods.
- National Vacant Properties Campaign, www.vacantproperties.org/
This Web site provides information, resources, tools, and assistance to support vacant property revitalization efforts.
- Athena®, Impact Estimator for Buildings and EcoCalculator for Assemblies, www.athenasmi.org/.

2.6 LH	Transportation Choices	12
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How

Provide a context map demonstrating that the site is within a ¼ mile radius of adequate public transit service (see definition below) qualifies for 12 points.

If it can be shown that the site is within ½ mile of adequate public transit service (see definition below), it qualifies for 6 points.

Intent

Encouraging the use of public transportation minimizes dependence on car ownership. Transit-oriented neighborhoods reduce residents’ needs to own a car, eliminating or lowering the costs of auto ownership, and controlling the area needed for car use and storage. Transit use reduces related emissions of air pollutants and climate-change gasses.

Definitions

Adequate public transit service during peak periods is defined as 20 or more transit rides per weekday per qualifying transit service.

Things to Consider

- Projects that achieve these measures meet the requirement for LEED for Homes credit LL 5.1 “Basic Community Resources” worth up to 2 points toward LEED certification. Additional points toward LEED certification are available for projects that have greater frequency of transit rides available (more than 60/weekday); see the LEED for Homes Rating System for additional information.
- Reconnecting America, www.reconnectingamerica.org
Reconnecting America provides both the public and private sectors with an impartial, fact-based perspective on development-oriented transit and transit-oriented development, and seeks to reinvent the planning and delivery system for building regions and communities around transit and walking rather than the automobile.
- Victoria Transportation Policy Institute, www.vtpi.org
This independent research organization provides consulting and publicly available research about solutions to emerging transportation issues, such as transportation demand management.

Section 3: Site Improvements

3.1 Environmental Remediation

Mandatory
*(except
scattered-site
single family)*

How

Upon award of an IDED contract for funding, conduct a Phase I Environmental Site Assessment and any additional assessments required to determine whether any hazardous materials are present on the site.

Environmental assessments for Main Street Challenge Grant projects will be coordinated and funded by the Main Street Iowa program of the Iowa Department of Economic Development.

Intent

To help satisfy any site environmental concerns, and to establish liability protections, the first step is known as a Phase I Environmental Site Assessment (ESA). A Phase I ESA takes place prior to purchase and involves research into the site’s development history, past uses, and environmental records in and around the site area, in order to determine the likelihood that the site could have been adversely impacted by environmental contaminants.

Phase I research usually includes a walk-over of the site to note any obvious sources and impacts from contamination, but does not usually include any direct sampling or analysis of soils or groundwater at the site. A Phase I is a good ‘resume’ to put together on the site’s development and environmental history.

If a Phase I does not indicate a likelihood of environmental issues, often that is all that is needed to satisfy the lenders or your legal counsel. Your possession of a Phase I prior to purchase will assist in establishing liability protection under Federal Law, if that should come in to play. As the costs for a Phase I environmental audit are often not too burdensome, conducting a Phase I prior to your property purchase can be a relatively simple part of successfully implementing your development strategy.

If you conduct such an “all appropriate inquiry” into the property’s past uses and environmental conditions, this can help with establishing liability protections for you under Federal Law as an “innocent landowner” or a “bona fide prospective purchaser”.

To qualify for the Federal liability protections, a Phase I ESA must be conducted using ASTM Standard E1527-05. A Phase I that is conducted without following this Standard will not qualify for Federal liability protections. Phase Is are conducted by environmental consulting or engineering firms for a fee. You should ensure that any firm you hire is familiar with the ASTM Standard, and can confidently complete a Phase I review.

Conducting a Follow-up Phase II Assessment

When a Phase I indicates that past uses or site conditions may have created the likelihood of an environmental release, it may be beneficial to physically investigate soils and groundwater at the site to determine if contamination is actually present, and to what extent and concentration. An assessment to confirm if contamination is present is known as a Phase II Environmental Site Assessment. A Phase II usually involves collection of soil and groundwater samples in and around areas where hazardous materials were manufactured, stored, or transferred on the site, and in areas where there is evidence of contamination, such as stained soil, distressed vegetation, and areas where wastes may have been dumped, buried, or burned on site.

A Phase II is a very critical component of a brownfield redevelopment plan, and should be closely discussed between the buyer and seller. A Phase II can be more expensive.

Things to Consider

- Iowa Department of Economic Development Brownfield Site Redevelopment Program, www.iowalifechanging.com/business/brownfields.html
- Iowa Department of Natural Resources Brownfield Redevelopment Program, www.iowadnr.gov/land/consites/brownfields/index.html
- EPA Brownfields Program, www.epa.gov/brownfields/about.htm

3.2 LH	Erosion and Sedimentation Control	Mandatory
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How

All construction that disturbs one acre or more requires a stormwater general permit #2 from the Iowa Department of Natural Resources. Obtain authorization and follow the requirements of the permit including the development and implementation of a Stormwater Pollution Prevention Plan. Submit a copy of the stormwater general permit #2 and the Stormwater Pollution Prevention Plan before site disturbance begins.

For projects disturbing less than one acre, implement EPA's Best Management Practices for erosion and sedimentation control during construction, referring to the EPA document, Stormwater Management for Construction Activities (EPA 832-R-92-005).

Erosion control measures must include all of the following:

- Stockpile and protect disturbed topsoil from erosion (for reuse);
- Control the path and velocity of runoff with silt fencing or comparable measures;
- Protect on-site storm sewer inlets, streams, and lakes with straw bales, silt fencing, silt sacks, rock filters, or comparable measures;
- Provide swales to divert surface water from hillsides;
- If soils in a sloped area (i.e., 25%, or 4:1 slope) are disturbed during construction, use tiers, erosion blankets, compost blankets, filter socks and berms, or some comparable approach to keep soil stabilized; and
- No compaction inside the drip ring of existing trees and shrubs.

Intent

Erosion and sediment control during site development keeps soils on site, reduces stormwater runoff and prevents sediment from entering local waterways. Erosion and sediment control helps to avoid stormwater related problems that can delay construction, cause environmental degradation to creeks, streams and lakes and damage public and private properties downstream.

Things to Consider

- Specific design and specifications of best management practices to minimize soil erosion and sediment movement from the construction site and satisfy the requirements of General Permit #2 can be found in both the Iowa Construction Site Erosion Control Manual and the Iowa Statewide Urban Design and Specifications Manual.
- Iowa Construction Site Erosion Control Manual, www.ctre.iastate.edu/erosion/
- Iowa Department of Natural Resources General Permit #2 information can be found at www.iowadnr.com/water/stormwater/index.html
- Iowa Statewide Urban Design and Specifications (SUDAS), www.iowasudas.org/design.cfm
- Iowa Stormwater Education Program, www.iowastormwater.org/
- Urban Resources and Borderland Alliance Network (URBAN), www.urbanwaterquality.org/
- Projects that achieve this measure also meet the requirement for LEED for Homes prerequisite SS 1.1, “Erosion Controls During Construction,” which is a mandatory requirement for LEED certification.
- Consider opting for one of the following methods – phasing, seeding, grading, protecting onsite vegetation, directing runoff to on-site depressions or swales – instead of using silt fencing. Additionally, the measures that are employed should result in no visible off-site discharge.
- The EPA’s document, Stormwater Management for Construction Activities, may be purchased as item PB 922 359 51 from the National Technical Information Service at <http://yosemite.epa.gov/water/owrcatalog.nsf/9da204a4b4406ef885256ae0007a79c779841350a94e869585256d83004fd7c7!OpenDocument>.
- CPESC Inc, www.cpesc.net
Search the directory to find certified erosion and sedimentation control professionals in Iowa.
- EPA Erosion and Sediment Control Model Ordinances, www.epa.gov/owow/nps/ordinance/erosion.htm
This resource, developed by the Environmental Protection Agency, is geared toward helping municipalities draft ordinances for erosion and sedimentation control and might serve as a helpful tool in developing company policies for meeting the SS 1.1 prerequisite.
- Vermont Department of Environmental Conservation, Water Quality Division
www.vtwaterquality.org/stormwater/docs/construction/sw_low_risk_site_handbook.pdf.
This web site links to the Low Risk Site Handbook for Erosion Prevention and Sediment Control, an easy-to-follow guide that describes specific strategies, including diagrams and photos.

3.3
LH

Landscaping

Mandatory
(if providing
landscaping)

How

Commit to providing a tree or plant list, to be certified by the Architect or Landscape Architect at Construction Documents stage, that the selection of new trees and plants are at least 50% native species, 100% appropriate to the site’s soils and microclimate, and do not include invasive species (see definition below). Limit application of non-native turf species.

Intent

Native vegetation is well adapted to the climate and provides excellent erosion, sediment, dust and pollution control. Native plants are also more resistant to naturally occurring disease, insects and low levels of nutrients, thereby reducing the need for fertilizers, pesticides or herbicides. (In areas where water shortages are common, xeriscape (a landscaping method that uses drought-resistant plants to conserve resources, especially water) should be considered.

Definition

Invasive species are plants that are introduced to an area outside their original range, threaten Iowa’s biodiversity and cause harm in their new home.”

Things to Consider

- This requirement of this measure that projects "...not include invasive species" also meets the requirement of LEED for Homes prerequisite SS 2.1, "No Invasive Plants," which is a mandatory requirement for LEED certification. Additionally, projects may be eligible for points under SS 2.2 – 2.4, which award projects for employing principles of basic sustainable landscape design, limiting conventional turf and using drought-tolerant plants.
 - See Iowa Stormwater Management Manual Native Landscaping section, www.ctre.iastate.edu/PUBS/stormwater/documents/2E-6NativeLandscaping.pdf.
 - Iowa Native Lands recommended native plant list, www.prrcd.org/inl/recommended_plants.htm.
 - See the Iowa Native Plant Society to exchange ideas and for information on native plantings, www.public.iastate.edu/~herbarium/inps/index.php.
 - Iowa Prairie Network, www.iowaprairienetwork.org/.
 - Iowa Living Roadway Trust Fund, www.iowalivingroadway.com/.
 - Combine landscape plan with stormwater management to provide surface water filtration and aesthetic benefits.
 - Non-native turf needs significant amounts of water every year to thrive, whereas native turf needs much less water every year.
 - While turf is appropriate for some landscaping, such as for play areas, it should be minimized wherever possible, except in
 - climates where it needs no irrigation.
- In areas where water shortages are common, xeriscape (a landscaping method that uses drought-resistant plants to conserve resources, especially water) should be employed.

3.4 LH	Surface Water Management Capture, retain, infiltrate and/or harvest the first 1.25 inches of rain that falls in a 24-hour period. Note: Mandatory for <u>new construction</u> project applications submitted after January 1 st , 2010.	Mandatory <i>(new Construction)</i> 25 <i>(Gut Rehab and Rehab)</i>
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How

Capture, retain, infiltrate and/or harvest rainfall equivalent to up to 1.25" per rainfall event.

Intent

Stormwater quality can be improved with better site planning and development to reduce post-construction runoff volume. This can be accomplished by decreasing impervious area and increasing emphasis on infiltration practices as described by the guidelines found in the Iowa Stormwater Management Manual.

Reducing stormwater runoff through design and management techniques increases on-site filtration, prevents pollutants from entering waterways, and reduces soil erosion. Water storage and nutrient collection processes reduce the need for irrigation and contribute to forming a healthier ecological community within the landscape.

Things to Consider

- Iowa Stormwater Management Manual, www.ctre.iastate.edu/PUBS/stormwater/
- Incorporate the use of water-permeable walkways and parking areas into your project to infiltrate stormwater.
- Projects achieving this measure also may satisfy the requirements of LEED for Homes SS 4.3, "Management of Runoff from Roof" and/or WE 1.1, "Rainwater Harvesting System." See the LEED for Homes Rating System for the specific requirements.
- Projects that achieve this measure through installation of a green roof may be eligible for up to 1 point toward LEED certification under LEED for Homes credit SS 4.3, "Management of Runoff from Roof." To achieve this point, LEED for Homes requires that the green roof covers at least 50% of the roof area for 0.5 point, or 100% of the roof area for 1 point.
- Projects that achieve this measure may be eligible for points under LEED for Homes SS 4.1, "Permeable Lot," worth up to 4 points toward LEED certification. To achieve points under this credit, at least 70% of the built environment, not including area under roof, must be permeable or designed to capture water runoff for infiltration on-site. See SS 4.1 in the LEED for Homes Rating System for more information.
- U.S. Environmental Protection Agency, Heat Island Effect, www.epa.gov/heatisland
This Web site contains basic information about heat island effect, its social and environmental costs, and strategies to minimize its prevalence, including shading and coloration of hardscapes.

- Use water-permeable materials such as pervious interlocking concrete paving blocks, concrete grid pavers, perforated brick pavers and compacted gravel.
- Water-permeable materials include pervious interlocking concrete paving blocks, concrete grid pavers, perforated brick pavers and compacted gravel.
- NAHB Research Center ToolBase Services: Permeable Pavement
<http://toolbase.org/Technology-Inventory/Sitework/permeable-pavement>.
 This is a resource provided through a partnership with the Department of Housing and Urban Development, the Partnership for Advancing Technology in Housing (PATH), and the National Association of Home Builders Research Center. This site provides details, lists of manufacturers, and related information on permeable paving options.
- Check with your local government to ensure the capture of rainwater is legal in that jurisdiction and to determine if any local incentives exist.
- Make use of innovative, low-impact techniques such as rain gardens, green roofs, rain barrels and cisterns to capture and re-use stormwater.
- Minimize impervious areas (surfaces that do not allow stormwater infiltration), including roofs, driveways, sidewalks and streets, or use porous materials for such areas.

3.5	Storm Drain Labels	2
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How

Assure the project plans and specifications call for labeling of all storm drains or storm inlets to clearly indicate where the drain or inlet leads.

Intent

Provide a visual reminder that storm sewer inlets connect to area waterways and groundwater storages, and should not be used to dump garbage of any kind.

Things to Consider

- Use a simple painted stencil that reads: “Caution – leads to [name of body of water]!”
- New Jersey Department of Environmental Protection, “Storm Drain Labeling Guidelines for New Jersey, www.state.nj.us/dep/watershedmgt/DOCS/StormDrainLabeling.pdf

Section 4: Water Conservation

4.1 LH	Water-Conserving Appliances and Fixtures Install water-conserving fixtures following the minimum specifications below for residential and non-residential projects.	Mandatory
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How

For **residential** projects, install water-conserving fixtures with the following specifications:

- Toilets – 1.3 GPF (gallons per flush) or better, dual-flush toilets meeting the 1.3 GPF or better are encouraged
- Showerheads – 1.75 GPM (gallons per minute) or better
- Kitchen faucets – 2.0 GPM or better
- Bathroom faucets – 1.5 GPM or better

For **non-residential** projects install water-conserving fixtures with the following specifications:

- Toilets (water closets) – 1.6 GPF (gallons per flush) or better
- Urinals – 1.0 GPF
- Public Laboratories – .5 GPM or better at 60 psi
- Showerheads – 1.75 GPM (gallons per minute) or better
- Kitchen faucets – 2.0 GPM or better

Intent

Showers and faucets account for approximately 25 percent of indoor water use. Toilets account for approximately 20 percent of indoor water use. Saving water translates into utility savings, both by conserving water and reducing the energy required for water heating. Compared with pre-1992 fixtures, water-conserving fixtures can reduce the amount of water used in showers and sinks by 75 percent and 50 percent, respectively.

Things to consider

- EPA's WaterSense® Web site, www.epa.gov/owm/water-efficiency/index.htm, maintains a list of toilets meeting the 1.28 GPF requirement.
- An economic alternative to high efficiency toilets may be to purchase a 1.6 GPF toilet and retrofit with a dual flush retrofit kit.
- Projects achieving the requirements of this measure may be eligible for points toward LEED certification under LEED for Homes credit WE 3.2 "Very High Efficiency Fixtures and Fittings."
- Not all high-efficiency toilets operate equally well, and poor design can lead to ineffective flushing and the need for multiple flushes. The U.S. Environmental Protection Agency's WaterSense program certifies toilets that achieve both water efficiency and operational effectiveness. The WaterSense label identifies high-efficiency products that have been verified for performance. WaterSense currently has a specification for high-efficiency toilets and bathroom faucets and specification for showerheads is under development. Information available at www.epa.gov/owm/water-efficiency.
- Maximum Performance (MaP™) TESTING California Urban Water Conservation Council, www.cuwcc.org/maptesting.lasso. The Maximum Performance (MaP™) testing project was initiated in 2003 to test toilet models' performance. This testing protocol simulates real-world use to help consumers identify high-efficiency toilets that not only save water but also work well. The current MaP testing report provides performance information on 470 toilet models.
- Composting Toilet Reviews, www.buildinggreen.com/features/mr/waste.html
- Water Use It Wisely, www.wateruseitwisely.com/toolsLinks/index.shtml
This site provides extensive lists of links and related resources concerning water conservation in addition to a series of links to plumbing fixture and faucet resources and sites. Scroll down to the "Fixtures and Appliances" section of links and resources.

4.2 No Irrigation

Mandatory

How

Do not install irrigation. Watering tubes for trees are allowed for a grace period of two years.

Irrigation systems already in existence onsite are grandfathered in. The use of captured rainwater for grandfathered in irrigation systems is encouraged.

Intent

On average, outdoor water use accounts for about 40 percent of residential water use. Native landscapes or carefully selected plantings can tolerate no irrigation once established, even in dry periods.

Things to Consider

- Projects achieving the requirements of this measure for no irrigation system may be eligible for up to 10 points toward LEED certification under LEED for Homes credits SS 2.5 “Reduce Overall irrigation Demand by at Least 20%” and WE 2.3 “Reduce Overall irrigation Demand by at Least 45%.”
- American Society of Landscape Architects, www.asla.org
ASLA is the national professional association representing landscape architects. The Web site provides information about members, products, services, publications, and events.
- International Center for Water Technology, www.icwt.net
The International Center for Water Technology is a consortium of public and private entities, led by the efforts of California State University–Fresno. This website includes research papers and educational materials about cutting-edge progress in water-saving technologies.
- Water-Efficient Landscaping: Preventing Pollution and Using Resources Wisely, www.epa.gov/owm/water-efficiency/docs/water-efficient_landscaping_508.pdf
This manual from EPA provides information about landscaping techniques to reduce water use.
- Water Wiser: The Water Efficiency Clearinghouse, www.awwa.org/waterwiser/
This clearinghouse provides articles and reference materials on all forms of water efficiency.
- Watering tubes for trees are allowed for a grace period of two years.

Section 5: Energy Efficiency

5.1a LH	Efficient Energy Use Design and construct the project to meet the following requirements for residential and non-residential projects.	Mandatory
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How

For **residential** projects:

- Use a professionally certified, third-party Home Energy Rating System (HERS) rater and Mortgage Industry National Home Energy Rating Standards (HERS) to verify energy efficiency achievement by meeting the following performance levels identified below.
 - Follow Energy Star standards, to achieve a HERS Index of 70 or better for all structures under four stories above grade regardless of climate zone, http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.homes_guidelns.
 - Use a certified, third-party HERS Rater independent of the project team and developer to verify that all items of the Energy Star Thermal Bypass Inspection Checklist have met the requirements of the checklist. The builder cannot self-verify achievement of any of the checklist requirements. See checklist at http://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/Thermal_Bypass_Inspection_Checklist.pdf.
 - Meet or exceed the requirements of the 2009 International Energy Conservation Code.
 - For buildings of four stories or more above grade, exceed the performance of ASHRAE 90.1-2007 Appendix G by 10 percent.
 - Pass a pre-drywall inspection by the energy rater verifying proper sealing and insulation practices.
 - An energy rating performed by a certified HERS rater is required on each unit after it is completed to verify that actual construction meets the above listed requirements. In the event that the proposed construction does not meet the overall U-Value standards with a HERS Index of 70 or better, the rater will provide suggestions for corrections to plans and specifications that will ensure that IECC standards, overall U-Value standards and HERS Index of 70 or better will be met. The certified HERS Rater must verify upon completion of actual construction that the home met or exceeded the required HERS Index.
 - Use a professionally certified third-party energy rater to document that the HVAC system was installed correctly for each unit by measuring and documenting that actual btu delivery is 90% or greater of the system’s rated output capacity. Use of the installed efficiency testing standard (System Efficiency Ratio (SER) of the National Comfort Institute (NCI) is recommended.

- Where used, it is recommended that air conditioning equipment should be at least 14 SEER and use R-410a refrigerant that is charged according to manufacturer specifications. Heating equipment is recommended to be at least 92 AFUE for furnaces where used and 85 AFUE for boilers where used. Project developers are advised to contact their local utility provider, as some providers require higher levels of efficiency for equipment to meet the minimum requirements for rebate and other incentive programs.
- Projects with more than 100,000 cubic feet of heated or cooled interior space must complete the Energy Review form requirement of the state of Iowa identified in Code of Iowa chapter 103A.19(6). See www.dps.state.ia.us/fm/building/PDFs/Energy_Review.pdf for more information.

For **non-residential** projects:

- Use a professionally certified third-party energy rater, mechanical engineer, or energy design services provided by your local utility provider to verify energy efficiency achievement meeting or exceeding the performance levels identified below.
 - Exceed the performance of ASHRAE 90.1-2007 Appendix G by 10 percent.
 - Design the project to achieve Design to Earn the Energy Star designation, http://www.energystar.gov/index.cfm?c=new_bldg_design.new_bldg_design_benefits.
 - Use a certified, third-party HERS Rater independent of the project team and developer to conduct and pass a pre-drywall inspection verifying proper sealing and insulation practices.
 - Use a professionally certified third-party energy rater to document that the HVAC system was installed correctly by measuring and documenting that actual btu delivery is 90% or greater of the system's rated output capacity. Use of the installed efficiency testing standard (System Efficiency Ratio (SER) of the National Comfort Institute (NCI) is recommended.
 - Where used, it is recommended that air conditioning equipment should be at least 14 SEER and use R-410a refrigerant that is charged according to manufacturer specifications. Heating equipment is recommended to be at least 92 AFUE for furnaces where used and 85 AFUE for boilers where used. Project developers are advised to contact their local utility provider, as some providers require higher levels of efficiency for equipment to meet the minimum requirements for rebate and other incentive programs.
 - Projects with more than 100,000 cubic feet of heated or cooled interior space must complete the Energy Review form requirement of the state of Iowa identified in Code of Iowa chapter 103A.19(6). See www.dps.state.ia.us/fm/building/PDFs/Energy_Review.pdf for more information.

Intent

In 1992, the EPA introduced Energy Star as a voluntary labeling program designed to identify and promote energy-efficient products to reduce greenhouse gas emissions. Energy Star is an accepted standard for single-family residential new construction projects.

Energy Star-qualified homes are independently verified to be energy efficient. These savings are based on heating, cooling, hot water, normalized lights and appliance energy use and are typically achieved through a combination of building-envelope upgrades, high-performance windows, controlled air infiltration, upgraded heating and air conditioning systems, tight duct systems and upgraded water-heating equipment, appliances and lighting. These features contribute to improved home quality and homeowner comfort, and to lower energy demand and reduced air pollution.

The American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1-2007 establishes minimum requirements for the energy-efficient design of buildings, except low-rise residential buildings. The standard is also the basis of Chapter 7 of the International Code Council's International Energy Conservation Codes. State energy codes that may be more stringent than ASHRAE 90.1 are identified on the U.S. Department of Energy's Building Energy Codes Web site, www.energycodes.gov. The Energy Star pilot program for mid and high-rise buildings requires 20 percent better than ASHRAE 90.1-2004.

A Home Energy Rating System (HERS) evaluates the energy efficiency of a home or apartment, compared with a computer-simulated reference unit of identical size and shape. The HERS rating results in a score between 0 and 100, with the reference unit assigned a score of 100. From this point, each 1 percent reduction in energy usage (compared to the reference unit) results in a one point decrease in the HERS score. Energy Star requires a unit to be significantly more energy efficient than the reference unit. HERS ratings are conducted by third-party HERS raters, www.natresnet.org/directory/raters.aspx.

Things to Consider

- For a list of certified HERS raters, visit <http://www.natresnet.org/directory/raters.aspx>. An additional list of raters is also available on EPA's Energy Star Web site at www.energystar.gov/index.cfm?fuseaction=new_homes_partners.showHomesSearch.
- The ASHRAE Advanced Energy Design guides and the Advanced Building Core Performance Guide provide a simplified step-by-step approach to achieving predictable energy performance that exceeds state and national standards.
- ASHRAE Advanced Energy Design Guide applicable to the project, www.ashrae.org/publications/page/1604.
- Advanced Building Core Performance Guide, www.advancedbuildings.net/corePerf.htm.
- Projects that are three stories or less and meet this measure also fulfill the requirement of LEED for Homes prerequisite EA 1.1 "Energy Performance," a mandatory requirement for LEED certification. Projects that are four stories and above should connect with their local LEED for Homes Provider to determine the energy performance requirements for their project type.
- Contact your local utility provider to determine project design assistance and incentives that may be available.
- For more information regarding Energy Star standards go to the new homes section of the Energy Star homepage, www.energystar.gov.
- Guidelines for Energy Star qualified new homes are online at www.energystar.gov/index.cfm?c=bldrs_lenders_raters.homes_guidelns.
- Use Optimum Value Engineering (Advanced Framing) practices. See Building Science Consulting for more information and framing details and diagrams, www.buildingscienceconsulting.com/designsthatwork/advancedframing/default.htm
See PATH write-up "Advanced Framing Techniques: Optimum Value Engineering (OVE), www.toolbase.org/TechInventory/TechDetails.aspx?ContentDetailID=625&BucketID=6&CategoryID=13
See PATH case study "Save Thousands With Advanced Framing for Walls," <http://www.pathnet.org/si.asp?id=2443>
- See examples of model wall assemblies online at the Energy and Environmental Building Alliance, www.eeba.org, and Building Science Corporation, www.buildingscience.com
- Use 1" x 4" let-in bracing and 1" expanded polystyrene sheathing sealed at all edges and penetrations for exterior wall construction instead of oriented-strand board.
- Use products such as insulated concrete forms, structural insulated panels, and spray foams to achieve a better thermal envelope and better energy performance.
- Any wet blown insulation product installed in wall cavities must be tested and verified to have a moisture content level of less than 15 percent prior to enclosure.
- Use products such as energy recovery and heat recovery ventilators to save energy and improve ventilation.
- To find a Home Energy Rater in your area, call the Energy Star toll-free hotline: 888-STAR-YES or visit www.natresnet.org/directory/raters.aspx.
- For more information on ASHRAE, go to www.ashrae.org or call 888-527-4723.
- Iowa law considers geothermal heat pump applications as an energy efficiency technology.

5.1b

Efficient Energy Use: Less than Gut Rehabilitation

Mandatory

How

Identify an architect or designer with green building experience, an engineer or energy auditor to conduct an energy analysis of the existing building condition and identify cost-effective energy improvements by preparing an energy improvement report. The report must use software recognized by the energy modeling industry to model the current and projected energy performance of the building. Implement energy improvements adequate to improve the building's energy performance by 15% or better from pre-renovation figures.

As an alternative way of achieving energy performance requirements, moderate and substantial rehab projects may opt to fulfill the requirements of 5-1a.

Intent

In moderate rehabs, the financial benefits of making specific building improvements (added insulation, replacement windows, etc.) vary tremendously from one building to the next, in relation to existing building conditions and the local climate. Because of that, the most effective practice is to conduct a building assessment, determine the unique conditions of the building (amount of existing insulation, R-value of windows, etc.), and use software or manual calculations to determine the cost and return on investment of various alternative improvements. A 10-year payback period represents a 10 percent per year simple payback. This 10-year payback benchmark was chosen because today's cost of mortgage financing is significantly below a 10 percent per annum. Therefore, the improvements are expected to save more money than they cost over the long run.

5.2 LH	Energy Star and Energy Efficient Appliances	Mandatory <i>(if providing appliances)</i>
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How

If providing appliances, install Energy Star refrigerators, Energy Star labeled washers and dryers with built in moisture sensors.

When the energy performance of the home is modeled to produce a HERS Index for 5-1a, the model should include the appliances and the HERS Index should reflect this.

If not providing appliances, provide information on purchasing Energy Star appliances in the occupant manual required in section 8.2.

Intent

In 1992, EPA introduced Energy Star, a voluntary labeling program designed to identify and promote energy-efficient products to reduce greenhouse gas emissions. Energy Star products must meet strict energy efficiency criteria set by EPA. These products reduce utility costs and greenhouse gas emissions.

Things to Consider

- Projects that achieve this measure may be eligible for points toward LEED certification under LEED for Homes credit EA 9.1 "High Efficiency Appliances," for up to 2 points. Note that this credit is part of the prescriptive pathway in the energy category in LEED for Homes; thus, projects receiving points in the performance pathway (for energy performance under credit EA 1) are not eligible for this credit, and vice versa.
- For more information on Energy Star labeled appliances go to the appliances section of the Energy Star homepage, www.energystar.gov/index.cfm?c=appliances.pr_appliances.
- This ENERGY STAR site includes links to lists of qualified dishwashers, clothes washers, refrigerators, and freezers, along with product and store locators, purchasing guides, and information about rebates and other incentive programs.
- To find a Home Energy Rater in your area, call the Energy Star toll-free hotline: 888-STAR-YES or visit www.natresnet.org/directory/raters.aspx.

5.3a	Efficient Lighting: Interior Design and construct the project to meet the following interior lighting specifications for residential and non-residential projects.	Mandatory
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How

For **residential** projects:

Integrate proper use of daylighting into building designs. Install the Energy Star Advanced Lighting Package in all interior units, and use Energy Star or high-efficiency commercial grade fixtures in all common areas and outdoors. Use compact fluorescent lamps (CFL) or light-emitting diodes (LED).

If reusing existing fixtures in a rehab, installing compact fluorescent light bulbs (CFLs) or other products that achieve equal to or better energy performance is permitted. If installing new fixture, these must be ENERGY STAR labeled.

The following lighting types are exempt from this requirement: emergency lighting; lighting required by code for health and safety purposes; and lighting used for eye adaptation near covered vehicle entrances and exits.

For **non-residential** projects:

Meet or exceed current ASHRAE standard 90.1-2007 for interior lighting or follow applicable interior lighting guidelines from the ASHRAE Advanced Energy Design Guides, www.ashrae.org/publications/page/1604.

Intent

Energy Star-qualified lighting uses 2/3 less energy and lasts six to 10 times longer than traditional lighting. Reduced energy use lowers utility costs and greenhouse gas emissions.

Things to Consider

- Projects that achieve this measure should meet the requirements of LEED for Homes prerequisite EA 8.1 “ENERGY STAR Lights,” a mandatory requirement for LEED certification. Additionally, projects that achieve this measure also may be eligible for points toward LEED certification under LEED for Homes credit EA 8 for installing the ENERGY STAR Advanced Lighting Package. Note that this credit is part of the prescriptive pathway in the energy category in LEED for Homes; thus, projects receiving points in the performance pathway (for energy performance under credit EA 1) are not eligible for this credit, and vice versa.
- The ENERGY STAR Advanced Lighting Package (ALP) designation identifies homes equipped with a comprehensive set of ENERGY STAR qualified light fixtures. The ALP designation applies to lighting packages for new home construction that consist of a minimum of 60% ENERGY STAR qualified hard-wired fixtures and 100% ENERGY STAR qualified ceiling fans where installed. Information on the ALP can be found at: www.energystar.gov/index.cfm?c=bldrs_lenders_raters.ALP_Builder.

This site includes complete information on EPA’s Advanced Lighting Program specifications and requirements, along with extensive technical resources, qualified product and manufacturer lists and locators, case studies, and marketing support resources.

- For information on lighting, see the Energy Star Products section at www.energystar.gov. Also see the Energy Star Program Requirements for Solid State Lighting Luminaries, www.netl.doe.gov/ssl/PDFs/ENERGY%20STAR%20SSL%20Final%209.12.07.pdf.
- Incorporate the use of motion sensors into lighting applications to turn off lights when rooms are not being used.
- For information on proper disposal of mercury containing compact fluorescent lamps, visit the Iowa DNR Web site, www.iowadnr.com/waste/cfl.html.

5.3b LH	Efficient Lighting: Exterior	Mandatory
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How

Install daylight sensors or timers on all outdoor lighting, including front and rear porch lights.

Design and install outdoor lighting to eliminate light trespass from the building and site and to minimize impact on nocturnal environments. Only light areas needing to be lit.

The following lighting types are exempt from this requirement: emergency lighting; lighting required by code for health and safety purposes; lighting used for eye adaptation near covered vehicle entrances and exits; and historic lighting.

Intent

Daylight sensors automatically turn off the exterior lighting when sufficient day lighting is available or lighting is otherwise not required. Proper aiming of exterior fixtures and the use of shade trees and plants help prevent unwanted glare (light trespass) into neighboring buildings and natural areas, and limit disturbance of the night sky (light pollution).

Things to Consider

- Projects that achieve this measure are eligible for points toward LEED certification under LEED for Homes credit EA 8.2 for improved lighting. Note that this credit is part of the prescriptive pathway in the energy category in LEED for Homes; thus, projects receiving points in the performance pathway (for energy performance under credit EA 1) are not eligible for this credit, and vice versa.
- Design outdoor lighting to eliminate light trespass from the building and site, and to minimize impact on nocturnal environments.
- Use downlighting instead of uplighting.
- Consult the Illuminating Engineering Society of North America's Recommended Practice Manual: Lighting for Exterior Environments.

5.4	HVAC Sizing, Installation and Duct Systems
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Mandatory

How

Size heating and cooling equipment in accordance with the Air Conditioning Contractors of America (ACCA) Manual, Parts D, J and S, ASHRAE handbooks, or equivalent software, to prevent short-cycling of heating or air conditioning and ensure adequate dehumidification. Seal all ductwork with mastic or an appropriate seam sealer. Insulating all supply ducts is recommended.

Intent

Appropriately sized equipment can improve efficiency and ensure adequate dehumidification, preventing short-cycling that can lead to excess moisture in the air, which can cause mold growth and resident discomfort.

Things to Consider

- Projects that achieve this measure also meet the requirements under LEED for Homes prerequisite EA 6.1 "Good HVAC Design and Installation," which is a mandatory requirement for LEED certification.
- The HVAC system contractor or designer generates a Manual J load calculation to ensure proper sizing of the cooling system. This calculation accounts for factors such as the home's orientation with respect to the sun, window design and insulation rating. The contractor can utilize one of the HVAC-industry adopted software programs, based upon Manual J, which assists with these designs. Consult www.acca.org for a list of software programs to perform Manual J calculations.
- Air Conditioning Contractors of America, Manual D: Residential Duct Design Checklist, www.acca.org/Files/?id=66.
- Air Conditioning Contractors of America, information on Manuals D, J and S, www.acca.org/store/category.php?cid=1
- Air Conditioning Contractors of America, HVAC Quality Installation Specification, www.acca.org/quality/. This site provides a link to the ACCA Standard: "HVAC Quality Installation Specification: Residential and Commercial Heating, Ventilating, and Air Conditioning Applications." The site also includes a link to various articles and other ANSI and ACCA standards.
- California Energy Commission, Procedures for HVAC System Design and Installation
See www.energy.ca.gov/efficiency/qualityhomes/procedures.html
This site provides an overview of good practices for designing and installing the HVAC system, as well as detailed strategies and measures for the "house as a system" approach to construction.

5.5	Electricity and Gas Meters
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2

How

Install individual or sub-metered electric and gas (if applicable) meters.

Intent

To raise residents' awareness of the cost associated with electricity consumption, which may reduce energy use.

How

Exceed the relevant Energy Star HERS Index of 70 for low-rise residential buildings or ASHRAE 90.1-2007 by more than 10 percent for buildings of four stories or more above grade or non-residential structures. Receive one additional point for each point of improvement in the HERS Index or for each percent better than the ASHRAE 90.1-2007 beyond 10 percent.

Provide calculations for the following:

- Forecast the annual energy efficiency of the entire project to exceed ASHRAE 90.1-2007 by 16 percent as in 5-1a.
- Analyze and adopt additional energy improvements.
- Reforecast annual energy costs with the additional improvements. Use that figure to determine the percentage of energy savings from the baseline established in the first bullet.
- For rehabilitation projects, perform energy modeling as required in 5-1b and determine percentage that exceeds the required 15% reduction in energy usage from pre-renovation figures.

Intent

The relative energy efficiency of a given dwelling unit is established by comparing it to the HERS Reference Home, an accepted national standard based on the 2006 International Energy Conservation Code that uses a scale of 0-100. The lower the score is, the more efficient the home. The HERS Reference Home scores a HERS Index of 100 points. Essentially, one point is awarded or deducted for each 1 percent change in energy efficiency for the home's thermal envelope, heating, cooling and domestic hot water systems relative to the 2006 IECC. A home that uses approximately 20 percent less energy than the HERS Reference Home scores 20 points and is equivalent to an Energy Star-qualified home in climate zones 6-8. A home with zero purchased energy scores 0.

For new construction, adding incremental improvements will advance energy efficiency while reducing utility and operating costs for residents and building owners. Renewable energy use and energy conservation lessen smog, acid rain and greenhouse gas emissions.

Things to Consider

- Projects that achieve this measure may be eligible for points toward LEED certification under LEED for Homes credit EA 1.2, "Exceptional Energy Performance," for up to 34 points. See EA 1 in the LEED for Homes Rating System for the logarithmic equations that relate the HERS Index to the appropriate number of LEED points.
- For more information regarding Energy Star standards go to the new homes section of the Energy Star homepage, www.energystar.gov.
- For information on Builder Option Packages, go to www.energystar.gov/index.cfm?c=bop.pt_bop_index.
- To find a Home Energy Rater in your area, call the Energy Star toll-free hotline: 888-STAR-YES.
- For a list of certified HERS raters, visit <http://www.natresnet.org/directory/raters.aspx>. An additional list of raters is also available on EPA's Energy Star Web site at www.energystar.gov/index.cfm?fuseaction=new_homes_partners.showHomesSearch.
- For more information on ASHRAE, go to www.ashrae.org or call 888-527-4723.

How

Install photovoltaic (PV) panels, wind turbines, solar assisted hot water heating or domestic hot water or other renewable source to provide at least 10 percent of the project's estimated energy demand. Describe whether the installed renewable energy system will benefit common space, occupant space, or both and how the renewable energy system will benefit the owner and occupants?

Intent

Use of renewable energy reduces environmental impacts associated with utility energy production and use. These impacts include natural resource destruction, air pollution, greenhouse gas emissions and water pollution. Use of onsite renewable energy technologies, such as PV panels and wind turbines, can also result in energy cost savings.

Things to Consider

- Projects that achieve this measure may be eligible for up to 10 points toward LEED for Homes certification under credit EA 10 “Renewable Energy System.” Projects can receive 1 point for every 3% of the annual reference electrical load met by the renewable energy system. Note that the annual reference electric load is defined as the amount of electricity that a typical home (e.g., the HERS Reference Home) would consume in a typical year.
- American Solar Energy Society, www.ases.org
ASES is a nonprofit organization committed to a sustainable energy economy. ASES accelerates the development and use of solar and other renewable energy resources through advocacy, education, research, and collaboration among professionals, policymakers, and the public.
- American Wind Energy Association, www.awea.org
AWEA is a national association representing wind power plant developers, wind turbine manufacturers, utilities, consultants, insurers, financiers, researchers, and others involved in the wind industry.
- Database of State Incentives for Renewable Energy, www.dsireusa.org
The North Carolina Solar Center developed this database to collect information on state financial and regulatory incentives (e.g., tax credits, grants, and special utility rates) designed to promote the application of renewable energy technologies. DSIRE also offers additional features such as preparing and printing reports that detail the incentives on a state-by-state basis.
- Florida Solar Energy Center, www.fsec.ucf.edu/en/consumer/solar_electricity/index.htm
A resource for basic information on types of photovoltaic solar electric systems, sizing, installation, and system ratings. FSEC also has an industry resources page that includes its Photovoltaic System Design Course Manual, available at www.fsec.ucf.edu/en/industry/resources/pv/index.htm.
- National Center for Photovoltaics, www.nrel.gov/ncpv
NCPV provides a clearinghouse on all aspects of photovoltaic (PV) solar cell systems.
- National Renewable Energy Laboratory, www.nrel.gov
The National Renewable Energy Laboratory is a very useful resource.
- U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, www.eere.energy.gov
The EERE Web site contains many renewable energy technology and energy efficiency resources.

5.7b	Photovoltaic (PV) Ready
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5.7b	Photovoltaic (PV) Ready	2
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How

Site, design, engineer and wire the development to accommodate installation of PV in the future. General contractor (GC) and PV contractor must document the following: 1) information on the roof load; 2) location of conduit and 3) the potential location of the dash box. GC and PV contractor must provide documentation to building owner and manager.

Submit documentation and photos that demonstrate the following:

- Orient buildings to permit access to sunlight;
- Design and include south facing architectural elements on the roof for PV;
- Reserve unobstructed roof areas where panels can be placed; and
- Run wiring from the prospective PV location to a central panel as part of the general electrical work

Intent

Photovoltaics are composite materials that convert sunlight directly into electrical power and are the easiest renewable energy source to use in affordable housing.

Generating and using renewable energy in a development is a hedge against rising costs for purchased energy. Further, it avoids the environmental impacts associated with conventional power generation: natural resource destruction, air and water pollution, and greenhouse gas production.

Things to Consider

- The first cost of PV can be high, but grants and subsidies are available in many states. Building “PV Readiness” into a project reserves the opportunity to install a system later when resources are available.
- Database of State Incentives for Renewable Energy, www.dsireusa.org
This North Carolina Solar Center database collects information on state financial and regulatory incentives (e.g., tax credits, grants, and special utility rates) designed to promote the application of renewable energy technologies. DSIRE provides incentive details on a state-by-state basis.
- *Building New Homes that are Renewable Ready*, www.focusonenergy.com/Information-Center/Renewables/Fact-Sheets-Case-Studies/Solar.aspx
- *Constructing Commercial Buildings to be Solar-Energy Ready*, www.focusonenergy.com/Information-Center/Renewables/Fact-Sheets-Case-Studies/Solar.aspx

Section 6: Materials Beneficial to the Environment

6.1a LH	Construction Waste Management	Mandatory
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How

Reduce the amount of construction waste sent to the landfill.

- Investigate and document local options for diversion (recycling, reuse, etc.) of all anticipated major constituents of the project waste stream, including cardboard packaging and “household” recyclables (e.g., beverage containers).
- Commit to following a waste management plan that is appropriate for the site and local conditions, and that prevents, recycles or salvages at least 25 percent of non-hazardous construction and demolition debris. Residential and mixed used projects may base their prevention and recycling amounts on the National Association of Home Builders’ Research Center’s industry average of 4.2 pounds of waste per conditioned square foot. See table below to calculate debris prevention and recycling for home projects.

Amount to Landfills and Incinerators			
Reduced construction waste		Increased waste diversion	
<i>Pounds/ft²</i>	<i>Cubic Yards/1,000 ft²</i>	<i>Percentage waste</i>	<i>Percentage diverted</i>
4.0	25.5	100	0
3.5	22.3	88	12
3.0	19.1	75	25
2.5	15.9	63	37
2.0	12.8	50	50
1.5	9.6	38	62
1.0	6.4	25	75
.5	3.2	13	87

(Source: “Table 27: Waste Diversion,” *LEED for Homes Rating System*, pg. 84)

Intent

The amount of job-site waste resulting from construction of the average (2000 sq. ft.) U.S. home is 4 pounds per square foot of conditioned space, totaling about 8,000 pounds and taking up 50 cubic yards of landfill space. To the extent possible, waste should be avoided because 1) landfill space is rapidly diminishing, 2) incineration produces pollutants, 3) waste of materials is in itself a negative environmental impact. (Source: National Association of Home Builders Research Center, 2001, www.hahbrc.org)

Approximately 20 percent of all waste landfilled in Iowa is construction and demolition debris. An estimated 520,000 tons of construction and demolition debris are landfilled in Iowa annually.

Things to Consider

- See the National Association of Home Builders' Green Building Guidelines, section 2.1 "Reduce Quantity of Materials and Waste," www.nahb.org/fileUpload_details.aspx?contentTypeID=7&contentID=1994
- The Iowa Department of Natural Resources Web site, www.iowadnr.gov/waste/ and the department's Iowa Waste Exchange program, www.iowadnr.com/waste/iwe/index.html may be a resource to assist with construction and demolition debris recycling efforts.
- See www.iowadnr.com/waste/recycling/files/examplebid.pdf for an example of sample bid language for construction and demolition debris management services.
- See www2.ci.seattle.wa.us/Implement/pdfs/SampleCWMP.pdf for an example of a construction debris management plan.
- Best Management Practices Waste Reduction Construction and Demolition Debris: A Guide for Building, Construction, and Environmental Professionals, www.iowalifechanging.com/business/downloads/bestmgmtpractices.pdf.
- Contact your local integrated solid waste management agency for assistance.
- This measure helps a project meet LEED for Homes prerequisite MR 3.1 "Construction Waste Management Planning," a mandatory requirement for LEED certification. The other mandatory requirement that is part of this LEED prerequisite is to document the diversion rate for construction waste. Projects may also be eligible for additional points toward LEED certification for construction waste reduction under MR 3.2.
- Create detailed framing plans or scopes of work and accompanying architectural details for use on the job site. Refer to LEED for Homes MR 1.2: Detailed Framing Documents for additional information.
- Create a detailed cut list and lumber order prior to construction. Refer to LEED for Homes MR 1.3: Detailed Cut List and Lumber Order for additional information.
- NAHB Research Center, Toolbase.org, "Best Practices for Construction Waste Management," www.toolbase.org/Best-Practices/Construction-Waste/waste-mgmt-field-guide. This page includes frequently asked questions, case studies, reports, and various links. It also includes "A Builder's Field Guide," which includes guidance for creating a step-by-step construction waste management and recovery plan.
- U.S. EPA WasteWise Program, www.epa.gov/wastewise/targeted/challenge/cbres.htm. This site has information about the WasteWise Building Challenge program, including articles, publications, and various links and resources for more information.
- EPA Construction & Demolition Debris, www.epa.gov/epaoswer/non-hw/debris-new/index.htm. This site includes basic information on construction and demolition debris disposal practices, regional and state programs, publications, and links.
- Construction Materials Recycling Association, www.cdrecycling.org. This site includes links to Web sites on recycling concrete, asphalt roof shingles, and drywall and a state-by-state listing of construction waste reusers and recyclers.
- Efficient Wood Use in Residential Construction. Natural Resources Defense Council, 1998. This NRDC handbook describes the advantages of several wood-efficient approaches to design, material selection, and construction for residential applications and includes extensive practical and resource information for builders, architects, engineers, and developers. It may be purchased online, at www.nrdc.org/cities/building/rwoodus.asp.

6.1b	Construction Waste Management: Additional Diversion	Optional (see full criteria)
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How

Reduce the amount of construction waste sent to the landfill by an additional 25 percent or more and receive an additional five points for each additional 25 percent of debris prevented, salvaged or recycled up to 15 points..

6.2	Durable and Low-Maintenance Exteriors	Mandatory
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How

Specify durable siding materials such as masonry or fiber-cement to reduce or eliminate rot and reduce need for painting. Specify roofing products with ≥ 30 year life and document how product will save energy. Use at least 25 percent reclaimed materials or recycled content materials such as brick, framing lumber, recycled concrete and aggregates, and fly ash concrete OR select long lived non-toxic materials such as brick or cement fiber siding.

Intent

The use of more durable building materials and building materials that positively impact energy use, result in lower long-term maintenance and operating costs, and improve building value is a best practice.

6.3 LH	Recycled Content Material	14
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How

The percentage of recycled-content building material is based on cost or value (if using salvaged/reused materials) and does not include mechanical and electrical equipment. Provide calculations for recycled content percentage as follows:

- For a given material or furnishing, multiply the recycled-content percentage by weight (post-consumer or post-industrial) by the value of the product to find the value of the recycled content for that item.
- Add up the values of the recycled content of all the materials and furnishings.
- Divide this sum by the total value of the materials for the project.

Intent

Recycled materials have been recovered or otherwise diverted from the solid waste stream either during the manufacturing process or after consumer use. Use of recycled content materials reduces the negative impact resulting from extraction and processing of virgin materials. Many recycled content materials have additional benefits, which yield better results and a stronger final product.

Things to Consider

- Projects that achieve this measure may be eligible for points under LEED for Homes credit MR 2.2 “Environmentally Preferable Products,” worth .5 point per component toward LEED certification. Note that a particular material must make up 90% of the component, by weight or volume. See MR 2.2 in the LEED for Homes Rating System for more information.
- Consider incorporating recycled-content materials from the early stages of project design.
- Many commonly used products, such as metals, concrete, masonry, acoustic tile, drywall, carpet, ceramic tile and insulation, are available with recycled content. For guidance, see the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7(e).
- EPA’s Comprehensive Procurement Guidelines provide information and specifications for purchasing recycled-content materials, www.epa.gov/cpg.
- Oikos Green Building Source, www.oikos.com/green_products/index.php
A Web site dedicated to sustainable and energy-efficient construction: Green Building News, Products Database, Product Gallery, Energy Source Builder Newsletter, and more.
- Green Building Supply, www.greenbuildingsupply.com
An Iowa company dedicated to supplying green building materials and cleaning products.
- Greenmaker Supply, www.greenmakersupply.com
A company dedicated to supplying green building materials and cleaning products.

6.4 LH	Certified, Salvaged and Engineered Wood	5
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How

Commit to using at least 25 percent (by cost) wood products and materials that are certified in accordance with the Forest Stewardship Council (<http://www.fscus.org/>), salvaged wood, or engineered framing materials. The percentage of certified, salvaged and engineered wood products is based on cost or value. The project architect or designer must complete and submit the following calculation: Divide the sum of the value of all certified, salvaged or engineered wood products by the value of all wood products.

Intent

Less than 10 percent of the old growth forest remains in the United States. The use of Forest Stewardship Council-certified wood encourages forestry practices that are environmentally responsible, socially beneficial and economically viable. The use of salvaged wood and engineered wood products precludes the need to use old-growth lumber.

Things to Consider

- Projects that achieve this measure through FSC-certified or salvaged wood may be eligible for points under LEED for Homes credit MR 2.2 “Environmentally Preferable Products,” worth .5 point per component toward LEED certification for environmental preferability (FSC-certification) or local production. To achieve points for local production, products must be extracted, processed, and manufactured within 500 miles of the project. See MR 2.2 in the LEED for Homes Rating System for more information.
- For help in locating FSC-certified products, visit <http://www.fscus.org/>.
- Rainforest Alliance, “SmartGuide to Green Building Wood Sources,” www.rainforestalliance.org/smartguides This site lists U.S. suppliers, manufacturers, and distributors of FSC-certified building products.

6.5a LH	Reduce Heat-Island Effect: Roofing	5
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How

Use Energy Star-compliant (reflectivity of greater than .65) and high-emissive roofing (with an emissivity of at least 0.8 when tested in accordance with ASTM 408). Or, install a “green” (vegetated) roof for at least 50 percent of the roof area. Combinations of high-albedo and vegetated roof can be used, providing they collectively cover 75 percent of the roof area.

Intent

Urban heat islands disturb the atmosphere and cause energy waste by increasing loads on cooling systems. Heat islands create thermal gradient differences between developed and undeveloped areas. Using roof surfaces that do not retain heat reduces the heat island. Resources and information on green roofs can be found at www.earthpledge.org/GreenRoof.html.

Things to Consider

- Lawrence Berkeley National Laboratory, Heat Island Group, <http://eetd.lbl.gov/HeatIsland>
The Lawrence Berkeley National Laboratory conducts research to find, analyze, and implement solutions to minimizing heat island effects; its current efforts focus on the study and development of more reflective surfaces for roadways and buildings.

6.5b LH	Reduce Heat-Island Effect: Paving	5
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How

Use light-colored, high-albedo materials and/or an open-grid pavement, with a minimum Solar Reflective Index of 0.6, over at least 30 percent of the site’s hardscaped area.

Intent

Urban heat islands have increased local air temperatures due to the absorption of solar energy by the built environment. They increase energy consumption by increasing loads on cooling systems. Heat islands create thermal gradient differences between developed and undeveloped areas. Use paving surfaces that do not retain heat and reduce the heat island effect.

Things to Consider

- Projects achieving this measure may be eligible for 1 point toward LEED certification under LEED for Homes credit SS 3.1, “Reduce Local Heat Island Effects.” To achieve this point, LEED for Homes requires that light-colored, high-albedo materials or vegetation are installed for **at least 50% of sidewalks, patios, and driveways within 50 feet of the home.**
- The Solar Reflectance Index (SRI) is a measure of the constructed surface’s ability to reflect solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. To calculate the SRI for a given material, obtain the reflectance value and emittance value for the material. SRI is calculated according to ASTM E 1980-01.
- Trees Forever is an Iowa-based organization providing a variety of resources related to the planting and care of trees, www.treesforever.org/.
- U.S. Environmental Protection Agency, Heat Island Effect, www.epa.gov/heatisland. This Web site contains basic information about heat island effect, its social and environmental costs, and strategies to minimize its prevalence, including shading and coloration of hardscapes.
- Lawrence Berkeley National Laboratory, Heat Island Group, <http://eetd.lbl.gov/HeatIsland>. The Lawrence Berkeley National Laboratory conducts research to find, analyze, and implement solutions to minimizing heat island effects; its current efforts focus on the study and development of more reflective surfaces for roadways and buildings.

6.5c LH	Reduce Heat-Island Effect: Plantings	5
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How

Locate trees or other plantings to provide shading for at least 50% of sidewalks, patios, and driveways within 50 feet of the building. Shading should be calculated for noon on June 21, when the sun is directly overhead, based on five years’ growth.

Intent

Urban heat islands have increased local air temperatures due to the absorption of solar energy by the built environment. They increase energy consumption by increasing loads on cooling systems. Heat islands create thermal gradient differences between developed and undeveloped areas. Use paving surfaces that do not retain heat and reduce the heat island effect.

Things to Consider

- Projects that achieve this measure also meet a requirement of LEED for Homes credit SS 3.1 “Reduce Local Heat Island Effects,” worth 1 point toward LEED certification.
- Trees Forever is an Iowa-based organization providing a variety of resources related to the planting and care of trees, www.treesforever.org/
- Check with local utility providers and the Iowa Department of Natural Resources Bureau of Forestry, www.iowadnr.gov/forestry/index.html for tree planting information and incentives.
- Use natural mulches instead of rock.
- The Home Depot Foundation encourages programs that create or expand partnerships between community tree organizations and those focused on other areas of community development. See www.homedepotfoundation.org/support_trees.html.

Section 7: Healthy Living Environment

7.1 LH	Low / No Volatile Organic Compounds (VOC) Paints and Primers	Mandatory
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How

Specify that all interior paints and primers must comply with current Green Seal standards for low VOC limits. Specify pre-finished products or low VOC stains, varnishes, and lacquers.

Intent

VOCs are chemicals containing carbon molecules that are volatile enough to evaporate from material surfaces into indoor air at normal temperatures. Interior paints and primers that release VOCs may pose health hazards to residents and workers. Outdoors, VOCs react with sunlight and nitrogen in the atmosphere to form ground level ozone, a chemical that has a detrimental effect on human health and ecosystems. Ozone damages lung tissue, reduces lung function and sensitizes the lungs to other irritants. Use of low-VOC paints and primers will reduce the concentration of such airborne chemicals.

Things to Consider

- This measure helps a project meet the requirement of LEED for Homes credit MR 2.2, “Environmentally Preferable Products,” worth .5 point per component toward LEED certification for products that meet low emissions specifications. See MR 2.2 in the LEED for Homes Rating System for more information.
- The Web site www.greenseal.org/resources/reports/CGR_wood_finish.pdf contains information on recommended VOC levels and products for wood finishes and stains.
- The Web site www.greenseal.org/findaproduct/index.cfm#paints lists paints that are Green Seal certified. Also, the Green Seal Standard GS-11 (available for download at www.greenseal.org/certification/environmental.cfm) shows the below VOC limits for paints:

Architectural paints, coatings and primers applied to interior walls and ceilings	Flats: 50 g/L Nonflats: 150 g/L	Green Seal Standard GS-11, Paints, 1st Edition, May 20, 1993
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- The Web site www.toolbase.org has information on low- and no-VOC paints, including a list of paint manufacturers that carry these products.
- The resource www.greenguide.com provides information on low/no VOC paints and primers.

7.2 LH	Low / No VOC Adhesives and Sealants	Mandatory
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How

Specify that all adhesives must comply with Rule 1168 of the South Coast Air Quality Management District. All caulks and sealants must comply with regulation 8, rule 51, of the Bay Area Air Quality Management District.

Intent

Interior caulks, sealants and adhesives that release VOCs may pose health hazards to residents and workers. (See 7-1.) Use of low-VOC adhesives and sealants will reduce the concentration of such airborne chemicals.

Things to Consider

- This measure helps a project meet the requirements of LEED for Homes credit MR 2.2 “Environmentally Preferable Products,” worth .5 point per component toward LEED certification for products that meet low emissions specifications. See MR 2.2 in the LEED for Homes Rating System for more information.
- Regulation 8, rule 51, of the Bay Area Air Quality Management District www.baaqmd.gov/dst/regulations/rg0851.pdf
- Rule 1168, South Coast Air Quality Management District. Ruling can be found at www.aqmd.gov/rules/reg/reg11_tofc.html
- South Coast Air Quality Management District, 1168 VOC limits
VOC Limit*, Less Water and Less Exempt Compounds in Grams per Liter
Architectural Applications Current VOC Limit

Indoor Carpet Adhesives	50
Carpet Pad Adhesives	50
Outdoor Carpet Adhesives	150
Wood Flooring Adhesive	100
Rubber Floor Adhesives	60
Subfloor Adhesives	50
Ceramic Tile Adhesives	65
VCT and Asphalt Tile Adhesives	50
Dry Wall and Panel Adhesives	50
Cove Base Adhesives	50
Multipurpose Construction Adhesives	70
Structural Glazing Adhesives	100
Single Ply Roof Membrane Adhesives	250

- Pontolilo, Brian. “Making Sense of Caulks and Sealants.” *Fine Homebuilding Magazine* 62 (April/May 2004): 97-101, www.taunton.com/fh/.
- NREL. *Weatherize Your Home – Caulk and Weatherstrip*. U.S. Department of Energy, National Renewable Energy Laboratory, p. 4.
- U.S. Department of Energy Building America Program, www.eere.energy.gov/buildings/building_america/

7.3 Urea Formaldehyde-free Composite Wood

Mandatory

How

Use particleboard and MDF that is certified compliant with the ANSI A208.1 and A208.2; see Things to Consider below. If using composite wood that does not comply with ANSI, all exposed edges and sides must be sealed with low-VOC sealants.

Intent

Particleboard and MDF may emit urea formaldehyde. Formaldehyde is a volatile organic compound. Symptoms of exposure vary widely and can include watery eyes, nausea, coughing, chest tightness, wheezing, skin rashes, allergic reactions and burning sensations in the eyes, nose and throat. In a new report, the World Health Organization (WHO) International Agency for Research on Cancer upgraded its evaluation of formaldehyde from a probable carcinogen to a known human carcinogen based on new evidence that formaldehyde causes nasopharyngeal cancer in humans. Avoiding products with added urea formaldehyde will reduce the quantity of harmful indoor air contaminants.

Things to Consider

- Make this requirement part of the specifications for contractor and sub-contractor submittals. Obtain the manufacturer's specifications to determine whether materials meet this requirement. See third-party testing labels documenting compliance with the relevant ANSI standards. Materials certified as compliant with ANSI A208.1 and A208.2 must meet formaldehyde emission limits. The American National Standard for Particleboard, ANSI A208.1, classifies particleboard by density and class, and is the voluntary particleboard standard for the North American industry. This standard covers physical, mechanical and dimensional characteristics as well as formaldehyde levels. ANSI A208.1 for particleboard limits formaldehyde in industrial particleboard to 0.30 parts per million (ppm), and 0.20 ppm in particleboard flooring.
- ANSI Standard A208.2, Medium Density Fiberboard, is the North American industry standard for MDF. This standard classifies MDF by density and use (interior or exterior) and identifies product grades. Specifications identified in the standard include physical and mechanical properties, dimensional tolerances and formaldehyde emission limits. ANSI A208.2 sets the formaldehyde emission limit for MDF at 0.30 parts per million (ppm) at a loading of 0.26m/m (0.08 ft²/ft³). The addition of finishes or overlays may significantly alter product emissions.
- If feasible, specify urea-formaldehyde-free plywood or medium-density fiberboard.

7.4 LH	Green Label Certified Floor Coverings	Mandatory <i>(if providing floor coverings)</i>
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How

Do not install carpets in entryways, laundry rooms, bathrooms, kitchens or utility rooms. If using carpet in other rooms, use products that meet the Carpet and Rug Institute's Green Label certified carpet, pad and carpet adhesives. Green Label Plus certified carpet, pad, and carpet adhesives also meet this criterion and are encouraged.

Intent

New carpets, padding and adhesives release VOCs that may pose health hazards to residents and workers. Carpets also attract allergens such as dirt, pollen, mold spores, dust mites and other microbes that may pose health hazards to individuals allergic to these substances. The Carpet and Rug Institute's program certifies that labeled carpets are low VOC.

Things to Consider

- More information on the Carpet and Rug Institute can be found on their website at www.carpet-rug.org. Details are provided under "Commercial Customers," and within "Green Building and the Environment."
- The EPA Energy Star with Indoor Air Package Specifications require Green Label Plus carpet. The "Plus" label is more stringent. The California Rug Institute maintains a list of manufacturers and products meeting the Green Label Plus standard. To view the list, go to www.carpet-rug.org/drill_down_2.cfm?page=8&sub=17&requesttimeout=350.
- Make this requirement part of the specifications for contractor and sub-contractor submittals. Do not specify the use of wall-to-wall carpets in bathrooms, kitchens, entryways, utility rooms and other wet areas. Instead, use smooth and resilient flooring that can tolerate moisture (e.g., ceramic tile, linoleum). Resilient flooring should be made from products that do not use vinyl chloride in the manufacturing process and do not produce dioxin.

Follow the specifications below for residential and non-residential bathroom ventilation.

How

For residential projects:

Install low-sone Energy Star-labeled bathroom fans that exhaust to the outdoors and are connected to a light switch and are equipped with a humidistat sensor or timer, or operate continuously. If using a heat recovery ventilator or energy recovery ventilator, connect the exhaust fan to the heat recovery or energy recovery ventilator system.

For non-residential projects:

Meet or exceed the current ASHRAE ventilation standard 62.1-2007 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.

Intent

Properly sized and controlled exhaust fans in bathrooms and kitchens reduce moisture condensation, lowering the potential for indoor mold growth that may yield odors and pose health hazards to residents. Besides helping to reduce moisture, kitchen fans also help remove carbon dioxide and carbon monoxide over fuel-burning appliances and other air contaminants that may be byproducts of cooking. Energy Star-qualified fans use 65 percent less energy on average than standard models and move more air per unit energy used with less noise. Timers and humidistat sensors help ensure that fans regularly remove moisture and provide increased ventilation.

Things to Consider

- This criterion helps a project meet one of two requirements under LEED for Homes prerequisite EQ 5.1 “Basic Local Exhaust,” which is a mandatory requirement for LEED certification. The other requirement is that of designing and installing a local exhaust system in the kitchen(s). Projects achieving this criterion also may be eligible for 1 point toward LEED certification under LEED for Homes credit EQ 5.2 “Enhanced Local Exhaust.” See EQ 5 in the LEED for Homes Rating System for more information.
- For more information on bathroom fans, go to the products section of the Energy Star homepage: www.energystar.gov/index.cfm?c=vent_fans.pr_vent_fans. This Web site describes the advantages of ENERGY STAR–labeled bathroom, utility room, and kitchen exhaust fans and provides product and manufacturer lists.
- The cfm for intermittent bath fans should be at least 50 cfm or 20 cfm if operating continuously, per ASHRAE Standard 62.2-2007 section 5.
- Home Ventilating Institute, Ventilation Systems and Controls www.hvi.org/
HVI provides consumers an assurance of product performance. It also works to increase public awareness of the need for good ventilation and provides resources for selecting the proper ventilation products.
- Review of Residential Ventilation Technologies, www.buildingscience.com/documents/reports
This page provides a link to “Review of Residential Ventilation Technologies,” a report that reviews current and potential ventilation technologies for residential buildings with particular emphasis on North American climates and construction.

Additional Things to Consider

(source: ASHRAE Advanced Energy Design Guide for K-12 School Buildings)

Zone exhaust airflows (for restrooms, janitorial closets, science laboratories, kitchens, art and vocational classrooms, locker rooms, etc.) should be determined based on the current version of ASHRAE Standard 62.1, but should not be less than the values required by local code unless approved by the authority having jurisdiction.

Central exhaust systems for restrooms, janitorial closets, and locker rooms should be interlocked to operate with the air-conditioning system, except during unoccupied periods. Such a system should have a motorized damper that opens and closes with the operation of the fan. The damper should be located as close as possible to the duct penetration of the building envelope to minimize conductive heat transfer through the duct wall and avoid having to insulate the entire duct. During unoccupied periods, it should remain closed and the exhaust fan turned off, even if the air-conditioning system is operating to maintain setback or setup temperatures. Consider designing exhaust ductwork to facilitate recovery of energy from Class 1 and Class 2 (e.g., restrooms) exhaust air, per the requirements of ASHRAE Standard 62.1.

Kitchens will generally have separate exhaust and make-up air systems according to the use of the kitchen and to the equipment manufacturers' suggestions. If showers are provided in locker rooms, exhaust must be increased during use and will generally require separate air intake (intake hood or make-up air unit).

- ASHRAE Advanced Energy Design Guides, www.ashrae.org/publications/page/1604
- ASHRAE Standard 62.1-2007, www.ashrae.org/technology/page/548
This site provides a viewable version of ASHRAE Standard 62.1-2007.

7.5b LH	Exhaust Fans – Kitchen Follow the specifications below for residential and non-residential kitchen ventilation.	Mandatory
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How

For residential projects:

Install power vented fans or range hoods that exhaust to the exterior.

For non-residential projects:

Meet or exceed the current ASHRAE ventilation standard 62.1-2007 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.

Intent

Properly sized and controlled exhaust fans in bathrooms and kitchens reduce moisture condensation, lowering the potential for indoor mold growth that may yield odors and pose health hazards to residents. Besides helping to reduce moisture, kitchen fans also help remove carbon dioxide and carbon monoxide over fuel-burning appliances and other air contaminants that may be byproducts of cooking. Energy Star-qualified fans use 65 percent less energy on average than standard models and move more air per unit energy used with less noise. Timers and humidistats help ensure that fans regularly remove moisture and provide increased ventilation.

Things to Consider

- This measure helps a project meet one of two requirements under LEED for Homes prerequisite EQ 5, "Basic Local Exhaust," which is a mandatory requirement for LEED certification. The other requirement is that of designing and installing a local exhaust system in the bathroom(s). See EQ 5 in the LEED for Homes Rating System for more information on how to meet this prerequisite.
- There is currently no ENERGY STAR labeling program for kitchen range fans. Avoid oversized range fans, which can depressurize homes and cause back-drafting of combustion appliances. For most kitchen applications, a range hood fan with a capacity of ~200 cubic feet per minute (cfm) is more than adequate.
- If continuous, the cfm for intermittent kitchen fans should be at least 100 cfm or five air changes per hour (ach), based on kitchen volume, per ASHRAE Standard 62.2-2007 section 5.

Additional Things to Consider

(source: ASHRAE Advanced Energy Design Guide for K-12 School Buildings)

Zone exhaust airflows (for restrooms, janitorial closets, science laboratories, kitchens, art and vocational classrooms, locker rooms, etc.) should be determined based on the current version of ASHRAE Standard 62.1, but should not be less than the values required by local code unless approved by the authority having jurisdiction.

Central exhaust systems for restrooms, janitorial closets, and locker rooms should be interlocked to operate with the air-conditioning system, except during unoccupied periods. Such a system should have a motorized damper that opens and closes with the operation of the fan. The damper should be located as close as possible to the duct penetration of the building envelope to minimize conductive heat transfer through the duct wall and avoid having to insulate the entire duct. During unoccupied periods, it should remain closed and the exhaust fan turned off, even if the air-conditioning system is operating to maintain setback or setup temperatures. Consider designing exhaust ductwork to facilitate recovery of energy from Class 1 and Class 2 (e.g., restrooms) exhaust air, per the requirements of ASHRAE Standard 62.1.

Kitchens will generally have separate exhaust and make-up air systems according to the use of the kitchen and to the equipment manufacturers' suggestions. If showers are provided in locker rooms, exhaust must be increased during use and will generally require separate air intake (intake hood or make-up air unit).

- ASHRAE Advanced Energy Design Guides, www.ashrae.org/publications/page/1604
- ASHRAE Standard 62.1-2007, www.ashrae.org/technology/page/548
This site provides a viewable version of ASHRAE Standard 62.1-2007.

7.5c	Exhaust Fans – Kitchen: Rehabilitation Follow the specification below for residential and non-residential kitchen ventilation.	5
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How

For residential projects:

Install power vented fans or range hoods that exhaust to the exterior.

For non-residential projects:

Meet or exceed the current ASHRAE ventilation standard 62.1-2007 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.

Intent

Properly sized and controlled exhaust fans in bathrooms and kitchens reduce moisture condensation, lowering the potential for indoor mold growth that may yield odors and pose health hazards to residents. Besides helping to reduce moisture, kitchen fans also help remove carbon dioxide and carbon monoxide over fuel-burning appliances and other air contaminants that may be byproducts of cooking. Energy Star-qualified fans use 65 percent less energy on average than standard models and move more air per unit energy used with less noise. Timers and humidistats help ensure that fans regularly remove moisture and provide increased ventilation.

Things to Consider

- This measure helps a project meet one of two requirements under LEED for Homes prerequisite EQ 5, “Basic Local Exhaust,” which is a mandatory requirement for LEED certification. The other requirement is that of designing and installing a local exhaust system in the bathroom(s). See EQ 5 in the LEED for Homes Rating System for more information on how to meet this prerequisite.
- There is currently no ENERGY STAR labeling program for kitchen range fans. Avoid oversized range fans, which can depressurize homes and cause back-drafting of combustion appliances. For most kitchen applications, a range hood fan with a capacity of ~200 cfm is more than adequate.
- For more information on kitchen fans or range hoods, go to the Products section of the Energy Star homepage, www.energystar.gov.
- If continuous, the cfm for intermittent kitchen fans should be at least 100cfm or five air changes per hour (ach), based on kitchen volume, per ASHRAE Standard 62.2-2007 section 5.

Additional Things to Consider

(source: ASHRAE Advanced Energy Design Guide for K-12 School Buildings)

Zone exhaust airflows (for restrooms, janitorial closets, science laboratories, kitchens, art and vocational classrooms, locker rooms, etc.) should be determined based on the current version of ASHRAE Standard 62.1, but should not be less than the values required by local code unless approved by the authority having jurisdiction.

Central exhaust systems for restrooms, janitorial closets, and locker rooms should be interlocked to operate with the air-conditioning system, except during unoccupied periods. Such a system should have a motorized damper that opens and closes with the operation of the fan. The damper should be located as close as possible to the duct penetration of the building envelope to minimize conductive heat transfer through the duct wall and avoid having to insulate the entire duct. During unoccupied periods, it should remain closed and the exhaust fan turned off, even if the air-conditioning system is operating to maintain setback or setup temperatures. Consider designing exhaust ductwork to facilitate recovery of energy from Class 1 and Class 2 (e.g., restrooms) exhaust air, per the requirements of ASHRAE Standard 62.1.

Kitchens will generally have separate exhaust and make-up air systems according to the use of the kitchen and to the equipment manufacturers' suggestions. If showers are provided in locker rooms, exhaust must be increased during use and will generally require separate air intake (intake hood or make-up air unit).

- ASHRAE Advanced Energy Design Guides, www.ashrae.org/publications/page/1604
- ASHRAE Standard 62.1-2007, www.ashrae.org/technology/page/548
This site provides a viewable version of ASHRAE Standard 62.1-2007.

7.6a LH	Ventilation Adhere to the ventilation requirement below for residential and non-residential projects.	Mandatory
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How

For residential projects:

Install a ventilation system for the dwelling unit providing adequate fresh air per ASHRAE 62.1- 2007 for residential buildings above 3 stories or ASHRAE 62.2 for single family and low-rise multifamily dwellings.

For non-residential projects:

Meet or exceed the current ASHRAE ventilation standard 62.1-2007 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.

Intent

Optimal ventilation improves indoor air quality by providing fresh air to the living space on a regular basis.

Things to Consider

- Projects that achieve this measure also meet the requirements of LEED for Homes prerequisite EQ 4.1 "Basic Outdoor Air Ventilation," which is a mandatory requirement for LEED certification. Projects that meet this measure may also be eligible for a point toward LEED certification under EQ 4.2 "Enhanced Outdoor Air Ventilation."
- Specify a mechanical whole-house ventilation system per ASHRAE 62.2-2007 and the EPA Energy Star with Indoor Air Package Specifications.
- ASHRAE Standard 62.2-2007 and ASHRAE Standard 62.1-2007, www.ashrae.org/technology/page/548
This site provides a viewable version of ASHRAE Standard 62.2-2007. The online version cannot be printed or saved but can be previewed.
- University of Minnesota, Common Questions about Heat and Energy Recovery Ventilators
See www.extension.umn.edu/distribution/housingandclothing/DK7284.html.
This site provides a brief, easy-to-understand overview of heat- and energy-recovery ventilators.
- Building Science.com, Review of Residential Ventilation Technologies
See www.buildingscience.com/documents/reports.
This page provides a link to "Review of Residential Ventilation Technologies," a report that reviews current and potential ventilation technologies for residential buildings with particular emphasis on North American climates and construction.

Additional Things to Consider

(source: Minnesota Sustainable Building Guidelines)

Ventilation Performance Validation: in addition to required ventilation baseline criteria above, design the ventilation system so that CO₂ concentrations can be monitored continuously in all continuously occupied spaces. Continuously occupied spaces are those intended for human occupancy excluding spaces intended for other purposes such as storage rooms or equipment rooms. Compare the expected values of CO₂ concentrations found in high-occupancy spaces* in the building with those expected from the building design using ASHRAE 62.1. This should be done at three-month intervals during the initial year of occupancy and annually thereafter.

Carbon Dioxide Limits on Ventilation: in addition to required and recommended criteria within this guideline above design the ventilation system so that they CO₂ concentration in continuously occupied breathing zones (between 3 and 72 inches above the floor and 2 feet or larger from walls) shall not exceed 450 ppm above outdoor concentrations. Compare the expected values of CO₂ concentrations found in high-occupancy spaces* in the building with those expected from the building design using ASHRAE 62.1 supplemented by the more rigorous CO₂ monitoring described above. Do this at three-month intervals during the initial year of occupancy and annually thereafter.

* Note: For this guideline, “high-occupancy spaces” are defined as spaces in the building with normal occupancy densities higher than the average density for the entire building.

- ASHRAE Standard 62.1-2007, www.ashrae.org/technology/page/548
This site provides a viewable version of ASHRAE Standard 62.1-2007.
- University of Minnesota, Common Questions about Heat and Energy Recovery Ventilators
See www.extension.umn.edu/distribution/housingandclothing/DK7284.html
This site provides a brief, easy-to-understand overview of heat- and energy-recovery ventilators.

7.6b	Ventilation: Rehabilitation Adhere to the ventilation requirements below for residential and non-residential projects.	10
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How

For residential projects:

Install a ventilation system for the dwelling unit providing adequate fresh air per ASHRAE 62.1- 2007 for residential buildings above 3 stories or ASHRAE 62.2 for single family and low-rise multifamily dwellings.

For non-residential projects:

Meet or exceed the current ASHRAE ventilation standard 62.1-2007 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.

Intent

Optimal ventilation improves indoor air quality by providing fresh air to the living space on a regular basis.

Things to Consider

- Projects that achieve this measure also meet the requirements of LEED for Homes prerequisite EQ 4.1 “Basic Outdoor Air Ventilation,” which is a mandatory requirement for LEED certification. Projects that meet this measure may also be eligible for a point toward LEED certification under EQ 4.2 “Enhanced Outdoor Air Ventilation.
- Specify a mechanical whole-house ventilation system per ASHRAE 62.2-2007 and the EPA Energy Star with Indoor Air Package Specifications.
- ASHRAE Standard 62.1-2007, www.ashrae.org/technology/page/548
This site provides a viewable version of ASHRAE Standard 62.1-2007.
- University of Minnesota, Common Questions about Heat and Energy Recovery Ventilators
See www.extension.umn.edu/distribution/housingandclothing/DK7284.html.

7.7	Water Heaters: Mold Prevention	Mandatory
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How

Install conventional hot water heaters in rooms with drains or catch pans with drains piped to the exterior of the dwelling and with non-water sensitive floor coverings or use tankless hot water heaters. Drain pans shall be sloped and corrosion resistant (e.g., stainless or plastic) with drains at the low point. Condensate lines shall be drained to drainage system; not just deposited under slab.

Intent

The use of heaters or heaters with drains and catch pans prevents moisture problems caused by leakage or overflow. Capturing water overflow from hot water heaters or allowing for proper drainage will prevent water from sitting idle, creating excess moisture and allowing mold to germinate. Cooling coils, as part of the HVAC equipment for air conditioning, can generate significant amounts of water through condensation on the surface of the coils. If this water is not constantly drained from the “drip pan” under the coil, mold and other organisms can grow in the standing water. HVAC-system air blowing across this area can distribute this mold and other material throughout the home.

Things to Consider

- ASHRAE. *User's Manual of Standard 62.1-2004*. American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 2004. (Fig 4.9a and 4.9b). See www.ashrae.org.
- International Residential Code; see www.iccsafe.org.

7.8	Cold and Hot Water Pipe Insulation
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Mandatory

How

Insulate exposed cold and hot water pipes in climates and building conditions susceptible to moisture condensation.

Intent

Insulation of cold water pipes prevents condensation that can lead to mold growth. Wherever there is a high differential between indoor air temperatures and the temperature of water supplies – i.e., in locations with moderate-to-high humidity – condensation on cold water pipes is likely to occur. Plumbing on exterior walls may be exposed to substantial variations in temperature making it more vulnerable to leakage or damage.

Things to Consider

- Any wet blown insulation product installed in wall cavities must be tested and verified to have a moisture content level of less than 15 percent prior to enclosure.

7.9a	Materials in Wet Areas: Surfaces
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Mandatory

How

In wet areas, use materials that have smooth, durable, cleanable surfaces. Do not use mold propagating materials such as vinyl wallpaper and unsealed grout.

Intent

The use of moisture-resistant materials in wet areas such as bathrooms reduces moisture buildup, diminishing the potential for indoor mold growth that may yield odors and pose health hazards to residents.

Things to Consider

- This measure will help a project to meet part of a prerequisite in LEED for Homes. Prerequisite ID 2.1, part c) requires, among other things, that kitchens, bathrooms, laundry rooms, spa areas, and entryways within 3 feet of the exterior door make use of water-resistant flooring. Carpet is not allowed.

7.9b	Materials in Wet Areas: Tub and Shower Enclosures
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Mandatory

How

Use fiberglass or similar enclosure or, if using any form of grouted material, use backing materials such as cement board, fiber cement board or equivalent (i.e., not paper-faced).

Intent

The use of moisture-resistant materials in wet areas such as bathrooms reduces moisture buildup, diminishing the potential for indoor mold growth that may yield odors and pose health hazards to residents.

Things to Consider

- This measure will help a project to meet part of a prerequisite in LEED for Homes. Prerequisite ID 2.1, part c) requires, among other things, that nonpaper-faced backer board is used on the walls of tubs, showers, and spa areas.

How

- Provide vapor barriers under all slabs.
- For concrete floors either in basements or the on-grade slab, install a capillary break of 4 inches of clean or washed gravel (0.5 inch diameter or greater) placed over soil.
- Cover all gravel with a 6 millimeter polyethylene sheeting moisture barrier, with joints lapped 1 foot or more to prevent moisture from migrating from the soil through the slab to a living or storage area.
- Install at least 1" extruded polystyrene below the slab in addition to the vapor barrier to control mold growth.
- Place a capillary break on top of footing between footing and foundation wall to stop capillary action.
- On interior below-grade walls, avoid using separate vapor barrier or a below-grade vertical insulation (such as polyethylene sheeting, vinyl wallpaper or foil faced), which can trap moisture inside wall systems. Semi-vapor permeable rigid insulation is not considered a vapor barrier.

Intent

Water can migrate through concrete and most other masonry materials. Proper foundation drainage prevents water from saturated soils from being pushed by hydrostatic pressure through small cracks. Vapor barriers and waterproofing materials can greatly reduce the migration of moisture that can occur even in non-saturated soils. Installation of radon-resistant features will reduce concentrations of radon, a cancer-causing soil gas that can leak into homes through cracks in the slab and foundation.

Things to Consider

- Ensure that other trades' work does not puncture the vapor barrier.

LH Follow the residential and non-residential specifications below for mitigating radon gas.

How**For residential construction:**

Following appendix F, "Radon Control Methods," 2006 International Residential Code, or other codes as appropriate for your project size and type, install passive radon-resistant features below the slab along with a vertical vent pipe with junction box available, if an active system should prove necessary. Install sealed sump pump.

For gut rehabilitation projects, test the home or building for presence of radon. If elevated levels of radon exist, introduce radon-reduction measurements. Check technical guidance at www.epa.gov/iaq/radon/pubs/index.html.

For non-residential construction:

For new construction projects, follow the guidance contained in the EPA document, "Radon Prevention in the Design and Construction of Schools and other Large Buildings."

For gut rehabilitation projects, test the building for presence of radon. If elevated levels of radon exist, introduce radon-reduction measurements. Check technical guidance at www.epa.gov/iaq/radon/pubs/index.html.

Intent

Installation of radon-resistant features will reduce concentrations of radon, a cancer-causing soil gas that can leak into homes through cracks in the slab and foundation. Also, water can migrate through concrete and most other masonry materials. Proper foundation drainage prevents water from saturated soils from being pushed by hydrostatic pressure through small cracks. Vapor barriers and waterproofing materials can greatly reduce the migration of moisture that can occur even in non-saturated soils.

Things to Consider

- Projects that achieve this measure also meet part of the requirements under LEED for Homes prerequisite EQ 9.1 “Radon-Resistant Construction in High-Risk Areas,” a mandatory requirement for LEED certification. Projects located outside EPA Zone 1 may achieve a point toward LEED certification under EQ 9.2 “Radon-Resistant Construction in Moderate-Risk Areas” if the home is designed and built using radon-resistant construction techniques.
- See Iowa Department of Public Health radon information at www.idph.state.ia.us/eh/radon.asp.
- Consult www.epa.gov/radon/zonemap.
- EPA. “Building Radon Out.” U.S. Environmental Protection Agency, 2006. (#EPA/402-K-01-002, available at www.epa.gov/iaq/radon/pubs)
- EPA. “Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings.” U.S. Environmental Protection Agency. Available at www.epa.gov/radon/pubs/mitstds.html.
- For health risk information see EPA’s site at www.epa.gov/radon/risk_assessment.html.
- EPA document, “Radon Prevention in the Design and Construction of Schools and other Large Buildings,” www.epa.gov/nrmrl/pubs/625r92016/625r92016.htm
- American Lung Association, “Radon Fact Sheet,” www.lungusa.org

7.11	Water Drainage
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	Mandatory
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How

Provide drainage of water to the lowest level of concrete away from windows, walls and foundations by implementing the following techniques:

- Water management – Walls
 - Provides a housewrap/weather resistive barrier with sheets lapped, shingle style, especially over windows, doors and other penetrations to prevent rain water that penetrates the finished exterior cladding system, from entering the wall assembly or being introduced into window or door openings
 - Provides a pathway for liquid water that has penetrated the cladding system or accumulates due to daily or seasonal changes in thermal and humidity levels behind the cladding system to safely exit the exterior wall assembly
 - Flashing and/or weather-resistive barriers installed in rough window and door openings must integrate with window and door unit flashings, particularly at the sill and head OR
 - Install pan flashing, side flashing that extends over pan flashing, and Head Flashing (top flashing) that extends over side flashing on windows and exterior door openings. Apply window pan flashing over building paper at sill and corner patches.
 - Flashings at roofs wall intersections and at penetrations through the wall (i.e. plumbing, electrical, vents, HVAC refrigerant lines, etc.) that are provided by other trades must be integrated with the drainage plane to keep water from entering the wall assembly.
- Water Management - Roof Systems
 - Installation of drip edge at entire perimeter of roof
 - Flashing where sloped roofs meet gable wall end/all vertical wall integrated into building drainage plane
 - Use of kick-out flashings at all wall eave intersections integrated into drainage plane
 - At wall/roof intersections maintain ≥ 2 " clearance between wall cladding and roofing materials
 - Integrity and Continuity of the Thermal Barrier
 - The drainage plane, when properly sealed, can also reduce airflow through the wall assembly, which improves the thermal performance of the cavity insulation

Intent

Diverting water from the building prevents bulk water entry into foundations and basements, which can contribute to moisture-related problems such as mold and the deterioration of wood and other building materials. Flashing helps direct water away from wall cavities to the drainage plane. Careful architectural detailing of the drainage system and construction supervision ensures proper water drainage.

Things to Consider

- Best practices include a grade of 0.5 inches per foot, or approximately a 4 percent pitch. EPA recommends a 2 percent pitch (0.25 inches per foot) for hard surfaces such as patio slabs, walks and driveways.
- See Building America Best Practice Guides- free downloads at: www.eere.energy.gov/buildings/building_america/
- See EEBA Water Management Guide (for purchase only) at: www.eeba.org/bookstore
- Search examples of model wall assemblies online at the Energy and Environmental Building Alliance, www.eeba.org, and Building Science Corporation, www.buildingscience.com.
- Any wet blown insulation product installed in wall cavities must be tested and verified to have a moisture content level of less than 15 percent prior to enclosure.

7.12 LH	Garage Isolation Follow the specifications below to prevent CO from migrating into residential and non-residential projects.	Mandatory
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How

For residential projects:

- Provide a continuous air barrier between the conditioned (living) space and any unconditioned garage space to prevent the migration of any contaminants into the living space.
- Do not install HVAC equipment in a garage unless required by code.
- All connecting doors between living space and garage shall include an automatic closer, and shall be fixed with gaskets or otherwise made substantially air-tight with weather stripping.
- In single-family houses install a CO alarm inside the house on the wall that is attached to the garage and outside the sleeping area.

For non-residential projects:

Meet or exceed the current ASHRAE ventilation standard 62.1-2007 for commercial and institutional buildings but not less than the values required by local code unless approved by the authority with jurisdiction.

Intent

The CO alarm will help ensure that residents are alerted in the case of accidental accumulation of CO. The air barrier will help prevent CO migration from the garage to the living space.

Things to Consider

- Projects that achieve this measure also meet some of the requirements of LEED for Homes prerequisite EQ 10.1 “No HVAC in Garage,” which is a mandatory requirement for LEED certification. Projects that meet this measure also may be eligible for points toward LEED certification under credits EQ 10.2 and 10.3 for minimizing pollutants from the garage and/or installing an exhaust fan in the garage.
- Refer to ASHRAE 62.2 to specify garage contaminant isolation measures for residential projects.
National Institute of Standards and Technology, “Air and Pollutant Transport from Attached Garages to Residential Living Spaces”
See www.fire.nist.gov/bfrlpubs/build03/art068.html.
- Install a fan in the garage for ventilating exhaust and high moisture.
This report provides an overview of the major issues, as well as a review of relevant scientific studies and a series of field studies.

- *Builder's Guide* series for specific North American climate zones: Cold Climates, Mixed Humid Climates, Hot-Humid Climates, and Hot-Dry & Mixed Dry Climates, by Joseph Lstiburek, Ph.D., P.Eng. Building Science Press. Refer to the discussion and construction details regarding air sealing and connected garages. Available at www.eeba.org/bookstore/default.asp.
- See ASHRAE 62.1-2007 for contaminant isolation measures for non-residential projects, www.ashrae.org/technology/page/548.

7.13 LH	Clothes Dryer Exhaust	Mandatory
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How

Clothes dryers must be exhausted directly to the outdoors with a rigid type vent or via a heat or energy recovery ventilation system if applicable and appropriate.

Intent

Outdoor venting of clothes dryers substantially reduces air moisture that can lead to mold growth.

Things to Consider

- This measure will help a project meet part of a prerequisite in LEED for Homes. Prerequisite ID 2.1, part c) requires, among other things, that clothes dryers must be exhausted directly to the outdoors.
- It is important to minimize the duct run to avoid build up of moisture and particles that can inhibit the flow of air through the duct. Rigid duct materials are preferred to help ensure clean ducts and reduce build up on particles and moisture.

7.14 LH	Integrated Pest Management	Mandatory
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How

Seal all wall, floor and joint penetrations with low VOC caulking to prevent pest entry. Provide rodent and corrosion proof screens (e.g., copper or stainless steel mesh) for large openings.

Intent

Sealing of cracks and penetrations will minimize entry points for pests such as rodents and cockroaches.

Things to Consider

- Projects that meet this measure may be eligible for points toward LEED certification under LEED for Homes credit SS 5 "Pest Control Alternatives," with .5 point offered for each acceptable pest management practice, with 2 points maximum. See SS 5 in the LEED for Homes Rating System for a list of acceptable pest management practices.
- Iowa State University's Department of Entomology is a good resource, www.ent.iastate.edu/.
- Iowa State University Extension Wildlife is a good resource, www.extension.iastate.edu/wildlife/.
- Consider a no spray policy to be included in maintenance and resident manuals for cockroaches and rodents.

7.15	Healthy Flooring Materials: Alternative Sources	15
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How

Use non-vinyl, non-carpet floor coverings in all rooms.

Intent

While certain health hazards are linked with the production of vinyl products, some alternative flooring materials that are natural and renewable have demonstrated low-VOC emissions and an environmentally friendly production. Avoid the use of carpet, which can serve as a sink for dust, allergens and other substances that may pose health hazards to susceptible residents.

Things to Consider

- Projects that achieve this measure also meet the requirement under LEED for Homes credit MR 2.2 “Environmentally Preferable Products,” worth .5 points per component toward LEED certification for products that are environmentally preferable. See MR 2.2 in the LEED for Homes Rating System for more information.
- Use alternative flooring materials such as linoleum, laminate, ceramic tile, bamboo, cork, wood (especially salvaged wood) or rubber.
- For basements, leave the slab exposed and stained with low-VOC material rather than providing any floor treatments.
- Scientific Certification Systems, FloorScore Program See www.scscertified.com/iaq/floorscore.html
This website includes information about the SCS FloorScore program, as well as a list of certified products that is updated regularly.
- Green Building Products: The GreenSpec Guide to Residential Building Materials. BuildingGreen, Inc., and New Society Publishers. Available online, at www.buildinggreen.com/ecommerce/gbp.cfm

7.16	Smoke-free Building
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How

Implement and enforce a “no smoking” policy in all common and individual living areas of all buildings. Common areas include rental or sales offices, entrances, hallways, resident services areas, and laundry rooms.

Intent

Secondhand smoke is the third leading cause of preventable death in the country. Air filtration and ventilation systems do not eliminate the health hazards caused by secondhand smoke. Tobacco smoke from one unit may seep through the cracks, be circulated by a shared ventilation system, or otherwise enter the living space of another. In addition to the negative health effects, smoking significantly increases fire hazard, and increases cleaning and maintenance costs. Also, many property insurance companies offer a discount for buildings with no-smoking policies.

Things to Consider

- Building owners and property managers should ensure residents are aware that they are prohibited to smoke in the building. A designated outdoor smoking area should be provided as an alternative arrangement for residents who smoke.
- Provide suitable receptacles in the designated outdoor smoking area for the disposal of cigarette butt litter. Ensure the receptacles are inside the building line and do not encroach into public space.
- Iowa Smokefree Air Act, www.iowasmokefreeair.gov/
- American Lung Association, Air Quality in the Home, www.lungusa.org
This site includes an entire section devoted to indoor air quality in the home. Choose “Air Quality” at the bottom of the screen and then click “Indoor Air Quality” and “Air Quality in the Home” to find numerous articles and educational pieces about maintaining a healthy indoor environment.
- U.S. Environmental Protection Agency, Indoor Air Quality Division, www.epa.gov/iaq
This site has numerous resources related to indoor air quality in homes, including reports and Web links.

7.17 LH	Combustion Equipment: Includes Space and Water-Heating Equipment
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	Mandatory
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How

Specify power vented or combustion sealed equipment. One hard-wired carbon monoxide (CO) detector shall be installed for each sleeping area, minimum one per floor.

Intent

Direct vent systems draw all the air needed directly from the outside so there is no risk of spilling combustion contaminants into the residence. Power vented equipment uses a fan or blower to create the pressure difference that causes air to flow from inside the house, through the combustion device out an approved chimney or vent system to the outdoors.

Things to Consider

- This measure will help a project meet two of the four requirements of LEED for Homes prerequisite EQ 2.1 “Basic Combustion Venting Measures,” a mandatory requirement for LEED certification. Projects must also fulfill the following two requirements to meet this prerequisite:
 - No unvented combustion appliances (e.g., decorative logs) are allowed.
 - All fireplaces and woodstoves must have doors.
- U.S. Environmental Protection Agency, Combustion Gases and Carbon Monoxide
See www.epa.gov/iaq/combust.html and www.epa.gov/iaq/co.html.
These two extensive EPA sites describe the sources of carbon monoxide and other combustion gases, their health effects, steps to reduce exposure, related standards and guidelines, and additional resources and links.
- Canada Mortgage and Housing Corporation
See www.cmhc-schl.gc.ca/en/co/maho/yohoyohe/inaiqu/inaiqu_004.cfm.
This site is part of CMHC’s “About Your House” series of educational articles. It includes information about combustion gases, the effects of exposure, and strategies for limiting exposure.
- Underwriters Laboratories, Product Safety Tips: CO Alarms
See www.ul.com/consumers/co.html.
This site provides a basic overview of the problems associated with carbon monoxide, as well as tips about purchasing and installing carbon monoxide alarms.

Section 8: Operations and Maintenance

8.1 LH	Building Maintenance Manual	Mandatory
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How

Provide a manual that includes the following: a routine maintenance plan, operations and maintenance guidance for all appliances, HVAC operation, water-system turnoffs, lighting equipment, paving materials and landscaping, pest control, and other systems that are part of each occupancy unit. Also include an occupancy turnover plan that describes in detail the process of educating the tenant about proper use and maintenance of all building systems.

Intent

A regularly maintained building and site will provide optimum health benefits and ensure environmental and economic performance.

Things to Consider

- Refer to Building Maintenance Manual Template under Information Resources at www.greencommunitiesonline.org
Projects that achieve this measure also meet one of the two requirements for LEED for Homes credit AE 2 “Education of Building Manager,” worth one point toward LEED certification. Note that the required LEED documentation must be included in the manual. The other requirement for this LEED credit is a one-hour walkthrough of the building before occupancy to identify installed equipment, provide instructions for operation and describe necessary maintenance protocol.
- Incorporate a “no-spray” policy in the ongoing maintenance of a green property, as sprays are ineffective at managing pests and very harmful for residents.
- “Healthy Homes Maintenance Checklist,” www.centerforhealthyhousing.org

How

Provide a guide for homeowners, building owners and renters that explains the intent, benefits, use and maintenance of green building features and native landscaping along with the location of transit stops and other neighborhood conveniences and features, and encourages additional green activities such as recycling, gardening, use of healthy cleaning materials, alternative measures to pest control, and purchase of green (renewable) power from their local energy provider. For homeowners, include appropriate instructions from the Owner's Manual in 8-1 above.

Intent

Building owners and occupants may be unfamiliar with green systems or features installed in their homes or buildings, or with nearby amenities that can provide transportation choices and conveniences within walking distance. Assistance with understanding, operating and maintaining them will allow owners and occupants to fully realize the environmental, health and economic benefits that Green Communities offer.

Things to Consider

- See Occupant Manual Template under Information Resources, www.greencommunitiesonline.org
- Projects that achieve this measure also meet one requirement for LEED for Homes prerequisite AE 1.1 "Basic Operations Training," a mandatory requirement for LEED certification. Note that the required LEED documentation must be included in the manual. The other mandatory requirement of this LEED prerequisite is a one-hour walkthrough of the home (as required by Green Communities 8-3). Projects may also be eligible for additional points toward LEED certification for enhanced training or public awareness under AE 1.2 and 1.3.
- Provide homeowners/tenants with two radon test kits designed for 48-hour exposure with instructions for use and follow up action, per EPA's Indoor Air Package.
- Connecticut Department of Environmental Protection, "Health Home Brochure," www.ct.gov/dep/lib/dep/p2/individual/healthyhome.pdf. This site links to the "A Green Home Is a Healthy Home" brochure, a good brochure with a readable layout and presentation.
- Minnesota Building Industry Foundation, Home-Smart, www.home-smart.org
This site provides information for homeowners on maintaining their home. It includes seasonal checklists and step-by-step instructions for general maintenance, as well as special instructions for new-home buyers on maintaining their home the first year.

How

Provide a comprehensive walk-through and orientation to the homeowner/building owner or new occupant using the Occupant Manual from 8-2 above that reviews the building's green features, operations and maintenance, along with neighborhood conveniences that may facilitate a healthy lifestyle.

Intent

A walk-through and orientation will help ensure that the Green Development Plan achieves its intended environmental and economic benefits.

Things to Consider

- Projects that achieve this measure also meet one requirement for LEED for Homes prerequisite AE 1.1 "Basic Operations Training," a mandatory requirement for LEED certification. The other mandatory requirement of this LEED prerequisite is provision of an operations and maintenance manual (as required by Green Communities 8-2). Projects may also be eligible for additional LEED certification points for enhanced training or public awareness under AE 1.2 & 1.3.

Appendix A

Green Development Plan and Checklist

A Microsoft Excel version of the Green Development Plan can be completed electronically online at www.iowalifechanging.com/community.

Green Development Plan

Developer Name:

Project Name:

Address (Street/City/State):

Description of Process

A description of the process that was used to select the green building strategies, systems and materials that will be incorporated into the project. (500 word maximum)

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Project Team Members

A listing of the team members who participated in the integrated design charrette. Please include name, affiliation/company, discipline.

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Goals

Bullet points of the overall green development goals of the project and the expected intended outcomes from addressing those goals.

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Appendix A

Green Development Plan and Checklist

Must include a **Site Plan** indicating distance of utilities and sidewalk connections as appropriate. Must include Context Map indicating locations of minimally required community facilities and their distances from project boundaries. A Microsoft Excel version of the checklist that provides a drop-down list for completing the “Intended Method of Satisfying Green Criteria” is available online at www.iowalifechanging.com/community.

Mandatory Optional

Completed	Sub-Section	Item	Intended Method of Satisfying Green Criteria	Yes, No or N/A	Points	Champion (name and profession/role)	Additional Comments by Applicant
Section 1: Integrated Design							
	1-1	Green Development Plan & Checklist (Mandatory)					
	1-2	Applicant/Recipient, Architect/Project Designer, and/or Contractor Certification (Mandatory)					
	1-3	Universal Design (Optional 5 points)					
Section 1 Subtotal							
Section 2: Site, Location and Neighborhood Fabric							
	2-1a	Smart Site Location - Proximity to Existing Development (Mandatory except for rehab) (Context map must demonstrate that project satisfies this item)					
	2-1b	Smart Site Location – Protecting Environmental Resources (Mandatory except for infill sites or rehab) (Site and Context map must demonstrate that project satisfies this item)					
	2-1c	Smart Site Location - Proximity to Services (Mandatory except for infill sites or rehab) (Context map must demonstrate that project satisfies this item)					
	2-2a	Compact Development (Optional 25 points) (Submit density calculation and documentation from local jurisdiction)					
	2-2b	Compact Development (Optional 5 points) (Site map and architect’s density calculation must demonstrate that project satisfies this item)					
	2-3	Walkable Neighborhoods - Sidewalks and Pathways (Mandatory) (Site map must demonstrate that project satisfies this item)					

Completed	Sub-Section	Item	Intended Method of Satisfying Green Criteria	Yes, No or N/A	Points	Champion (name and profession/role)	Additional Comments by Applicant
	2-4	Walkable Neighborhoods - Connections to Surrounding Neighborhood (Optional 5 points) (Site map must demonstrate that project satisfies this item)					
	2-5a	Smart Site Location - Passive Solar Heating / Cooling (Optional 2 or 5 points) (Site map must demonstrate that project satisfies this item)					
	2-5b	Smart Site Location – Grayfield, Brownfield or Adaptive Reuse Site (Optional 15 points)					
	2-6	Transportation Choices (Optional 6 or 12 points) (Context map must demonstrate that project satisfies this item)					
Section 2 Subtotal							
Section 3: Site Improvements							
	3-1	Environmental Remediation (Mandatory)					
	3-2	Erosion and Sedimentation Control (Mandatory)					
	3-3	Landscaping (Mandatory - if providing landscaping)					
	3-4	Surface Water Management (Mandatory)					
	3-5	Storm Drain Labels (Optional 2 points)					
Section 3 Subtotal							
Section 4: Water Conservation							
	4-1	Water Conserving Appliances and Fixtures - New Construction and Gut Rehab (Mandatory)					
	4-2	No Irrigation (Mandatory existing systems grandfathered in)					
Section 4 Subtotal					0		
Section 5: Energy Efficiency							
	5-1a	Efficient Energy Use (Mandatory for new construction)					
	5-1b	Efficient Energy Use (Mandatory for moderate and substantial rehab)					
	5-2	Energy Star Appliances (Mandatory if providing appliances)					
	5-3a	Efficient Lighting - Interior (Mandatory)					
	5-3b	Efficient Lighting - Exterior (Mandatory)					
	5-4	HVAC Sizing and Installation (Mandatory)					
	5-5	Electricity and Gas Meter, Individual (Optional 2 points)					
	5-6	Additional Reductions in Energy (Optional 1 point for each additional point awarded by the HERS or for each 1 percent change in energy efficiency)					

Completed	Sub-Section	Item	Intended Method of Satisfying Green Criteria	Yes, No or N/A	Points	Champion (name and profession/role)	Additional Comments by Applicant
	5-7a	Renewable Energy (Optional 5 points for first 10 percent, plus 5 points for each additional 10 percent increment, up to a maximum of 15 points)					
	5-7b	Photovoltaic (PV) Ready (Optional 2 points)					
Section 5 Subtotal							
Section 6: Materials Beneficial to the Environment							
	6-1a	Construction Waste Management (Mandatory)					
	6-1b	Construction Waste Management: Additional Diversion (Optional 5 to 15 points)					
	6-2	Durable & Low Maintenance Exteriors (Mandatory)					
	6-3	Recycled Content Material (Optional 2 points for the first 5 percent, plus 2 points for each additional 5 percent increment, not to exceed 14 points)					
	6-4	Certified, Salvaged and Engineered Wood (Optional 5 points)					
	6-5a	Reducing Heat-Island Effect – Roofing (Optional 5 points)					
	6-5b	Reducing Heat-Island Effect – Paving (Optional 5 points)					
	6-5c	Reducing Heat-Island Effect –Plantings (Optional 5 points)					
Section 6 Subtotal							
Section 7: Healthy Living Environment							
	7-1	Low/No VOC Paints and Primers (Mandatory)					
	7-2	Low/No VOC Adhesives and Sealants (Mandatory)					
	7-3	Urea Formaldehyde-free Composite Wood (Mandatory)					
	7-4	Green Label Certified Floor Coverings (Mandatory - if providing carpeted floor coverings)					
	7-5a	Exhaust Fans - Bathroom (Mandatory)					
	7-5b	Exhaust Fans - Kitchen (Mandatory for new construction and substantial rehab)					
	7-5c	Exhaust Fans - Kitchen: Moderate Rehab (Optional 5 points)					
	7-6a	Ventilation (Mandatory for new construction and substantial rehab)					
	7-6b	Ventilation: Moderate Rehab (Optional 10 points)					
	7-7	Water Heaters - Mold Prevention (Mandatory)					
	7-8	Cold and Hot Water Pipe Insulation (Mandatory)					

Completed	Sub-Section	Item	Intended Method of Satisfying Green Criteria	Yes, No or N/A	Points	Champion (name and profession/role)	Additional Comments by Applicant
	7-9a	Materials in Wet Areas - Surfaces (Mandatory)					
	7-9b	Materials in Wet Areas - Tub and Shower Enclosures (Mandatory)					
	7-10a	Basements and Concrete Slabs - Vapor Barrier (Mandatory)					
	7-10b	Basements and Concrete Slabs - Radon (Mandatory for new construction and gut rehab)					
	7-11	Water Drainage (Mandatory)					
	7-12	Garage Isolation (Mandatory)					
	7-13	Clothes Dryer Exhaust (Mandatory)					
	7-14	Integrated Pest Management (Mandatory)					
	7-15	Healthy Flooring Materials - Alternative Sources (Optional 15 points)					
	7-16	Smoke-free Building (Optional 2 points)					
	7-17	Combustion Equipment - Space and Water-Heating Equipment (Mandatory)					
Section 7 Subtotal							
Section 8: Operations and Maintenance							
	8-1	Building Maintenance Manual (Mandatory)					
	8-2	Occupant's Manual (Mandatory except for non-residential)					
	8-3	Homeowner and New Resident Orientation (Mandatory except for non-residential)					
Section 8 Subtotal							
Grand Total							

I/we hereby acknowledge and certify to the Iowa Department of Economic Development that it is our responsibility to ensure that all relevant consultants, contractors, and/or subcontractors scheduled to provide services for or perform work on the above referenced development are aware that I/we have committed to incorporate all of the MANDATORY criteria of the Iowa Green Streets Criteria applicable to the above referenced development. Additionally, I/we assume responsibility for ensuring that all MANDATORY criteria are met.

Project Architect/Project Designer	Applicant
Signature:	Signature:
Name:	Name:
Title:	Title:
Tel. No.:	Tel. No.:
E-mail:	E-mail:
Accreditation:	Accreditation:
Date:	Date: