



**CEDAR RAPIDS**

*City of Five Seasons*

**SINGLE FAMILY NEW CONSTRUCTION PROGRAM  
4th ROUND**

**Mandatory and Optional Green Building Guidelines**

## SECTION 1: INTEGRATED DESIGN

1-1

### Green Development Plan MANDATORY

Using *Attachment B: Green Building Checklist* outline the integrated design approach used for the development that demonstrates involvement of the entire development team identified in the application. The plan must include the following:

- ✓ 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.

1-2

### Universal Design MANDATORY

- ✓ 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 shall be located between thirty-three inches (33”) and thirty-six inches (36”) above finished floor. The wood blocking shall be located in all walls adjacent to a toilet, shower stall or bathtub.
- ✓ Switch Requirements – All wall switches controlling light fixtures and fans, shall be located at a height not to exceed forty-eight inches (48”). Height is determined from finished floor to center of switch.
- ✓ Receptacle Requirements – All receptacles shall be located at a height no less than fifteen inches (15”) above the finished floor. Height shall be determined from finished floor to center of receptacle.

1-3

### Universal Design OPTIONAL

- ✓ Interior Doors (2 Points)  
All interior 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.
- ✓ No-Step Entrance (3 Points)  
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”). The entrance shall also have a five foot by five foot (5’ x 5’) landing for maneuvering space.
- ✓ Faucets (1 Point)  
Install faucets that are single lever faucets that also meet the mandatory flow rates. Showerhead to be adjustable height removable head type which meets mandatory flow rates.

- ✓ Accessible Toilets (1 Point)  
Install ADA toilets in all applications that are centered on at least 36" wide space with no less than 18" from the sidewall.
- ✓ Door Handles (1 Point)  
Install lever-style handles on all interior and exterior door applications.
- ✓ Grab Bars (1 Point)  
Install grab bars no less than twenty-four inches (24") in walls adjacent to toilet and in shower at a height of thirty-six inches (36") from the finished floor to the center of the bar.

## SECTION 2: SITE IMPROVEMENTS

<b>2-1</b>	<b>Erosion and Sedimentation Control MANDATORY</b>
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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 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 8320R-92-005).

Erosion control measures must include 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 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 (25% or 4:1 slope) are disturbed during construction, use tiers, erosion blankets, compost blankets, filter socks and berms, or comparable approach to keep soil stabilized;
- ✓ No compaction inside the drip ring of existing trees and shrubs.

<b>2-2</b>	<b>Landscaping MANDATORY</b>
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Provide selection of new trees and plants are at least 50% native species, 100% appropriate to the site's soil and microclimate, and do not include invasive species. Prohibit the use of non-native turf species.

Maintaining a sense of lawn in the front setback is an objective. In general, a minimum of 70% of the required front setback area should be plant material. This may include grasses, groundcovers, shrubs, trees and other vegetation.

## SECTION 3: WATER CONSERVATION

3-1

### Water-Conserving Fixtures MANDATORY

Install water-conserving fixtures with the following specifications:

- ✓ Toilets – 1.28 gallons per flush or better
- ✓ Showerheads – 1.75 GPM (gallons per minute) or better
- ✓ Kitchen faucets – 2.0 GPM or better
- ✓ Bathroom Faucets – 1.5 GPM or better
- ✓ No irrigation systems

3-2

### Energy Efficient Appliances MANDATORY

- ✓ Gas water heaters (up to 60 gallons)  $\geq$  0.62 EF (energy factor)
- ✓ Gas water heaters (60-80 gallons)  $\geq$  0.85 thermal efficiency
- ✓ Electric water heaters  $\geq$  0.93 EF
- ✓ Energy Star<sup>®</sup> labeled ceiling fans (as applicable)

3-3

### Water Efficient Design OPTIONAL

- ✓ Dual-flush Toilets (2 Points)  
Install high-efficiency WaterSense qualifying dual flush toilets in all applications; dual flush units can exceed mandatory GPM requirements.
- ✓ Engineered Parallel Piping (3 Points)  
Use parallel piping (manifold) system in all units using cross-linked polyethylene (PEX) pipe. Integrate the use of demand-controlled circulation loops.
- ✓ On-demand Water Heaters (2 Points)  
Use on-demand portable water heaters in all applications.
- ✓ Central Core plumbing (3 Points)  
Locate water heater within 15 feet (plan view) of all hot water fixtures in the unit.
- ✓ Rainwater Harvesting (4 Points)  
Implement a rainwater harvesting system consisting of three elements: collection system, conveyance system and storage system. The system can be implemented for either roof or ground catchment and be used for source irrigation.

## SECTION 4: ENERGY EFFICIENCY

4-1

### Energy Star and Energy Efficient Appliances MANDATORY

If providing appliances, install Energy Star refrigerators, and washer/dryers with built in moisture sensors. When the energy performance of the home is modeled to produce a HERS Index for 5-1, 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.

4-2

### Efficient Lighting MANDATORY

Install the Energy Star® Advanced Lighting Package in all interior units, and the use of Energy Star® or high-efficiency commercial grade fixtures in all common areas and outdoors.

Install daylight sensors or timers on all outdoor lighting. Design and install outdoor lighting to eliminate light trespass from the building and site and to minimize impact on nocturnal environments.

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.

4-3

### HVAC MANDATORY

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 UL 181 foil tape.

Minimum standards for HVAC System Equipment:

- ✓ Gas Furnaces  $\geq 92\%$  AFUE
- ✓ Electric furnaces (forced air, air-source heat pumps)  $\geq 8.5$  HSPF
- ✓ Electric furnaces (ground source heat pumps)  $\geq 3.3$  COP
- ✓ Air conditioning units (forced air, air-source heat pumps)  $\geq 14$  SEER
- ✓ Closed loop geothermal = EER 14.1 and COP 3.3
- ✓ Open loop geothermal = EER 16.2 and COP 3.6
- ✓ Energy Star® labeled ventilation fan units in all bathrooms.

**4-4****Energy Efficient Building Components  
MANDATORY**

- ✓ Attic insulation  $\geq$  R-49
- ✓ Exterior Walls  $\geq$  R-19 or R-13+5
- ✓ Floor (above unheated space)  $\geq$  R-30
- ✓ Rim joist  $\geq$  R-19
- ✓ Slab  $\geq$  R-10 or greater under edge
- ✓ Low-E Energy Star<sup>®</sup> labeled windows for Northern climate with 0.35 U-Factor rating or less.
- ✓ Energy-heel (raised heel) roof truss systems
- ✓ Roofing Products  $\geq$  30 year life

**4-5****Renewable Energy  
OPTIONAL**

- ✓ Photovoltaic Panels (5-15 Points; 5 points are given for each additional 10 percent)  
Install photovoltaic (PV) panels, 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.
- ✓ PV Ready (2 Points)  
Site, design, engineer and wire the development to accommodate installation of PV in the future. General contractor 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. General contractor and PV contractor must provide documentation to the building owner and manager.

**4-6****Energy Efficient Building Design  
OPTIONAL**

- ✓ Advanced Framing (5 Points)  
Incorporate the use of Optimum Value Engineering (OVE) advanced framing techniques that meet all applicable codes.
- ✓ SIPS Wall Systems (4 Points)  
Use structural insulated panel system (SIPS) in exterior wall applications.
- ✓ Post-occupancy Sensors (3 Points)  
Use post-occupancy sensors in all livable room lighting fixtures.

<b>4-7</b>	<b>HVAC OPTIONAL</b>
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- ✓ Use non-HCFC refrigerant (3 Points)  
Use advanced refrigerant such as R-410A in all air conditioning units.
- ✓ 16 SEER Units (5 Points)  
Use 16 SEER Air Conditioning units or greater in all air conditioning units.
- ✓ Radiant Hydronic Space Heating (5 Points)  
Combine domestic water heating with high efficiency radiant hydronic system for space heating.  
Installations include: slab-on-grade, thin-slab, and baseboard applications.

## SECTION 5: MATERIALS BENEFICIAL TO THE ENVIRONMENT

<b>5-1</b>	<b>Durable and Low Maintenance Exteriors OPTIONAL</b>
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(10 Points)

Specify durable siding materials such as masonry or fiber-cement to reduce or eliminate rot and reduce need for painting. Use at least 25% reclaimed materials or recycled content materials such as brick, framing lumber, recycled concrete and aggregates, and fly as concrete OR select long lived non-toxic materials such as brick or cement fiber siding.

<b>5-2</b>	<b>Reducing Heat-Island Effect OPTIONAL</b>
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- ✓ Roofing (5 Points)  
Use Energy Star®-compliant (reflectivity of greater than 0.65) and high-emissive roofing (with an emissivity of at least 0.8 when tested in accordance with ASTM 408).
- ✓ Vegetative Roof (5 Points)  
Install a “green” (vegetative) roof for at least 50 percent (50%) of the roof area. Combinations of high-albedo and vegetated roof can be used, providing they collectively cover 75 percent (75%) of the roof area.
- ✓ Paving (5 Points)  
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 (30%) of the site’s hardscaped area.

<b>5-3</b>	<b>Recycled Content Material OPTIONAL</b>
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(2 Points, plus 2 points for each additional 5% increment, not to exceed 14 points)

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 percentages 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.

<b>5-4</b>	<b>Certified, Salvaged and Engineered Wood OPTIONAL</b>
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(5 Points)

Commit to using at least 25% (by cost) wood products and materials that are certified in accordance with the Forest Stewardship Council (FSC), salvaged wood, or engineered framing lumber. The percentage of certified, salvaged and engineered wood products is based on cost value. The project architect or designer must complete and submit the following calculation: divide the sum of the value of all certified wood, salvaged or engineered wood products by the value of all wood products.

### SECTION 6: HEALTHY LIVING ENVIRONMENT

<b>6-1</b>	<b>Low/No VOC's MANDATORY</b>
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- ✓ Specify that all interior paints and primers must comply with current Green Seal Standards for low VOC limits (in grams/Liter):

Flats .....	50
Non-Flats .....	50

- ✓ Specify pre-finished products or low VOC stains, varnishes and lacquers.
- ✓ Specify that all adhesives must comply with Rule 1168 of the South Coast Air Quality Management District VOC limits (in grams/Liter):

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

<b>6-2</b>	<b>Ventilation MANDATORY</b>
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- ✓ 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. If using a heat recovery ventilator or energy recovery ventilator connect the exhaust fan to the heat recovery or energy recovery ventilator system.
- ✓ Install Energy Star® power vented fans or range hoods that exhaust to the exterior (as applicable).

<b>6-3</b>	<b>Mold Prevention MANDATORY</b>
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- ✓ 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 water heaters. Drain pans shall be sloped and corrosion resistant with drains at the lowest point. Condensation lines shall be drained into the drainage system – not deposited under the slab.
- ✓ Insulate exposed cold and water pipes in climates and building conditions susceptible to moisture condensation.
- ✓ In wet areas, use materials that have smooth, durable, cleanable surfaces. Do not use mold propagating materials such as vinyl wallpaper or unsealed grout.
- ✓ Use fiberglass or similar tub/shower enclosure, if using any form of grouted material, use backing materials such as cement board, fiber cement board or equivalent (i.e. non paper faced).

<b>6-4</b>	<b>Basements and Concrete Slabs – Vapor Barrier MANDATORY</b>
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- ✓ 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 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 through the slab.
- ✓ On interior below-grade walls, avoid using separate vapor barrier or a below-grade vertical insulation that can trap moisture inside wall systems. Semi-vapor permeable rigid insulation is not considered a vapor barrier.

<b>6-5</b>	<b>Water Drainage MANDATORY</b>
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Provide drainage of water away from walls, windows and foundations using the following methods:

- ✓ Water Management – Walls

Provide housewrap/weather resistive barrier with sheets lapped, shingle style, especially over windows, doors and other penetrations to prevent infiltration of water from behind cladding system.

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  $\geq 2$ " 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.

6-6

**Garage Isolation**  
**MANDATORY**

- ✓ 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.

<b>6-7</b>	<b>Clothes-Dryer Exhaust MANDATORY</b>
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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.

<b>6-8</b>	<b>Integrated Pest Management MANDATORY</b>
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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.

<b>6-9</b>	<b>Combustion Equipment MANDATORY</b>
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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.

<b>6-10</b>	<b>Green Label Certified Floor Coverings OPTIONAL</b>
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(10 Points)

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.

<b>6-11</b>	<b>Air Quality OPTIONAL</b>
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- ✓ Non-vinyl, non-carpet (5 Points)

Use non-vinyl, non-carpet flooring non-living rooms (bathrooms, kitchen, closets, etc). Alternative flooring might include: linoleum, laminate, ceramic tile, bamboo, cork, wood, or rubber.

## REFERENCES

- ✓ Alliant Energy Home Energy  
<http://www.alliantenergy.com/UtilityServices/ForYourHome/RewardsIncentives/lowIncentivePrograms/index.htm>
- ✓ Build it Green: Multi-family Green Building Guidelines 2008-2011 Edition -  
[http://www.builditgreen.org/system/files/uploads/GreenPoint%20Rated/Guidelines\\_checklists/2008%20Multifamily\\_Guide%20Low%20Part%201.pdf](http://www.builditgreen.org/system/files/uploads/GreenPoint%20Rated/Guidelines_checklists/2008%20Multifamily_Guide%20Low%20Part%201.pdf)
- ✓ Energy Star: [www.energystar.gov](http://www.energystar.gov)
- ✓ Green Communities Criteria 2008 -  
<http://www.practitionerresources.org/cache/documents/666/66641.pdf>
- ✓ Housing and Urban Development: Policy Development and Research Information Service: Principles of Universal Design -  
<http://www.huduser.org/Publications/PDF/FAIRHOUSING/fairfull.pdf>
- ✓ Iowa Department of Economic Development: Iowa Green Streets Criteria v. 1.0 (2008) -  
<http://www.iowalifechanging.com/community/downloads/green-criteria08.pdf>
- ✓ LEED for New Construction & Major Renovations Version 2.2 -  
<http://www.usgbc.org/ShowFile.aspx?DocumentID=1095>
- ✓ MidAmerican Energy New Home Program -  
[http://www.midamericanenergy.com/ee/include/pdf/ia\\_newhomes\\_specsheet.pdf](http://www.midamericanenergy.com/ee/include/pdf/ia_newhomes_specsheet.pdf)
- ✓ National Association of Home Builders: NAHB Model Green Home Building Guidelines (2008) -  
[http://www.nahbgreen.org/content/pdf/nahb\\_guidelines.pdf](http://www.nahbgreen.org/content/pdf/nahb_guidelines.pdf)