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AND
COMMUNITY RENEWAL

NEW YORK STATE
HOUSING TRUST FUND
CORPORATION



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Green Building Criteria Reference Manual

DHCR/HTFC
Green Building Criteria
Reference Manual

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Introduction

The Division of Housing and Community Renewal (DHCR) and the Housing Trust Fund Corporation (HTFC) have developed this Green Building Criteria Reference Manual to educate and inform affordable housing developers in developing sustainable and healthier housing developments. The Manual is intended to provide detail on the various measures that developers must undertake in order to satisfy DHCR/HTFC requirements.

Green building design integrates materials and methods that promote environmental sustainability, economic vitality and social benefits through design, construction and operation of the built environment. DHCR/HTFC encourages green sustainable development that aligns affordable housing investment strategies with environmentally- responsible building practices.

The Green Building Initiative elements that are proposed to be incorporated in a project must be identified in the application attachments: Green Building Criteria Checklist, preliminary plans, and the outline specifications.

The New York State Division of Housing and Community Renewal and the Housing Trust Fund Corporation extend a special thank you to the Enterprise Foundation for the support and guidance provided in developing the DHCR/HTFC Green Building Initiative.

Green Building Criteria: An Overview

The green building criteria and sustainable development criteria promote public health, energy conservation, operational savings and sustainable building practices in all housing design. As a result, the strategies in the following pages enhance affordable housing 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 while enhancing quality of life for residents. When green building practices are incorporated into the location of affordable housing, placing homes near community amenities such as public transportation to create walkable, livable neighborhoods, the benefits for residents and communities include fewer sprawl-related transportation impacts.

Green Building Criteria Categories

An Integrated Design Process

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 by the development team that articulates the project's green building and sustainability criteria and 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 includes the developer, architect, engineer, landscape architect, LEED™ Accredited Professional for New Construction and Major Renovation (LEED-NC) or experienced green building design professional, contractor, and asset and property management staff. Whenever possible, the team also should include maintenance staff and resident representatives. The team must be committed to environmentally responsive and healthy building principles and practices.

Location and Neighborhood Fabric

Location within existing communities, or contiguous to existing development, helps conserve land and the spread of storm-water 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 can also contribute to 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. It also promotes physical activity and public health, while creating opportunities for social interaction and increased safety by bringing more eyes on public spaces.

Site Planning/Environmental Impacts

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.

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.

Energy Efficiency

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

Materials Beneficial to the Environment

Reducing, reusing and recycling building materials conserve natural resources and reduce 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.

Healthy Living Environment

The importance of a healthy living environment is a significant green building issue directly affecting residents. The goal of affordable housing is to provide safe, affordable housing for low-income residents. Safety includes using materials that do not cause negative health impacts for residents, especially for more sensitive groups such as children, seniors and individuals with existing respiratory problems and compromised immune systems. Creating a healthy living environment requires minimizing residents' and workers' exposure to toxic materials, and using safe, biodegradable materials and alternatives to hazardous materials.

Operations and Management

Operations and management (O&M) practices can positively 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 green building and sustainability criteria into the O&M plans.

Green Building Criteria Checklist

Applicant:				
Project Name:				
<p>Instructions: In order to qualify and receive points for the Green Building Initiative, applicants must complete the applicable sections of this checklist. The items listed in Section A are mandatory. Section B contains both mandatory and optional standard criteria. Section C must be completed if applicant is including green measures in the project beyond the standard criteria. All non-applicable items must be explained in the “Comments” section at the end of this attachment. More specific criteria information is included in DHCR’s Green Building Criteria Reference Manual.</p>				
SECTION A – Threshold Criteria - MANDATORY				
<p>All of the criteria in this section must be included in all projects. Possible exceptions include items A-2, A-5 and A-6 where the criteria may not be applicable to your project.</p> <p><i>Note:</i> These criteria have been included in the DHCR/HTFC Design Handbook.</p>				
Y	N	N/A	Item	Criteria
			A-1	Utilize Energy Star appliances, light fixtures and heating systems or the equivalent which will produce the same or comparable energy efficiency or savings
			A-2	Landscaping: Select native trees and plants to minimize water usage and maximize energy efficiency
			A-3	Use water conserving fixtures
			A-4	Use daylight sensors or timers on outdoor lighting to maximize energy efficiency
			A-5	Install a passive radon-reduction system to be activated should tests confirm the presence of radon gas in the building, or for rehabilitation projects, install an active radon-reduction system and measures should tests confirm the presence of radon gas in the building (in EPA Zones 1 and 2)
			A-6	Use lead-safe work practices during renovation, remodeling, painting and demolition (for properties built before 1978)
SECTION B – Standard Criteria (Required to qualify for the Green Building Initiative)				
Use this section to identify the criteria included in your project.				
Integrated Design Process - MANDATORY				
Y	N	N/A	Item	Criteria
			B-1	Green Development Plan: Submit document outlining options explored in the design phase with multi-disciplinary team including a qualified green design expert
Location and Neighborhood Fabric (Applicants must include a minimum of 4 criteria)				
Y	N	N/A	Item	Criteria
			B-2a	Smart Site Location: Proximity to Existing Development: Locate on a site with access to existing roads, water, sewers and other infrastructure within or contiguous to existing development
			B-2b	Smart Site Location: Protecting Environmental: Do not locate new development in close proximity to wetlands, critical habitat or on steep slopes, prime farmland or park land

			B-2c	Smart Site Location: Proximity to Services, New Construction: Locate projects in close proximity to community and retail facilities
			B-2d	Compact Development: Achieve densities for new construction of at least six units per acre for detached/semi-detached houses; 10 for town homes; 15 for apartments
			B-2e	Walkable Neighborhoods: Sidewalks and Pathways: Include sidewalks or suitable pathways within a multifamily property or single-family subdivision linking residential development to public spaces, open spaces and adjacent development
			B-2f	Smart Site Location: Make Use of Passive Solar Heating/Cooling: Orient building to make the greatest use of passive solar heating and cooling
			B-2g	Transportation Choices: Locate project in close proximity to public transit services
Site Planning/Environmental Impacts				
Y	N	N/A	Item	Criteria
			B-3a	Surface water management plan - MANDATORY
			B-3b	Conduct a Phase I Environmental Site Assessment
Healthy Living Environment (Applicants must include a minimum of 7 criteria)				
Y	N	N/A	Item	Criteria
			B-4a	Low/No Volatile Organic Compounds (VOC) Paints, Primers, Adhesives and Sealants: All interior paints, primers, adhesives and sealants must contain low or no VOCs
			B-4b	Formaldehyde-free Composite Wood: Do not use any composite wood that has exposed particleboard (which contains added urea-formaldehyde), unless the exposed area has been sealed
			B-4c	Green Label Certified Floor Covering: Do not install carpets in basements, entryways, laundry rooms, bathrooms or kitchens. If using carpet, use the Carpet and Rug Institute's Green Label certified carpet and pad
			B-4d	Exhaust Fans – Bathroom: New Construction: Install Energy Star-labeled bathroom fans that exhaust to the outdoors which has a humidistat sensor or timer, or operates continuously
			B-4e	Ventilation: New Construction: Install a ventilation system for the dwelling unit that provides 15 cubic feet per minute of fresh air, per occupant
			B-4f	Cooling Equipment: Size cooling equipment in accordance with the Air Conditioning Contractors of America Manual, Parts J and S
			B-4g	Water Heaters: Mold Prevention: Use tankless hot water heaters or install conventional hot water heaters in rooms with drains or catch pans piped to the exterior of the dwelling and with non-water sensitive floor coverings
			B-4h	Water Heaters: Minimizing CO: Specify direct vented or combustion sealed water heaters if the heater is located in a conditioned space
			B-4i	Cold Water Pipe Insulation: Insulate exposed cold water pipes
			B-4j	Materials in Wet Areas: Use materials that have smooth, durable, cleanable surfaces. Do not use mold-propagating materials such as vinyl wallpaper and unsealed grout. Use one-piece fiberglass or similar tub and shower enclosure or, if using any form of grouted material, use backing materials such as cement board, fiber cement board, fiberglass-reinforced board or cement plaster
			B-4k	Clothes-Dryer Exhaust: Clothes dryers must be exhausted directly to the outdoors.

			B-4l	Integrated Pest Management: Seal all wall, floor and joint penetrations to prevent pest entry. Provide rodent and corrosion proof screens (e.g., copper or stainless steel mesh) for large openings
Operations and Maintenance - MANDATORY				
Y	N	N/A	Item	Criteria
			B-5a	Provide a building owner maintenance manual
			B-5b	Provide an occupant's green building manual or guide
			B-5c	Provide new resident orientation
SECTION C (Applicants must include a minimum of one criteria if including green building measures beyond the standard criteria.)				
Location and Neighborhood Fabric				
Y	N	N/A	Item	Criteria
			C-1	Smart Site Location: Grayfield, Brownfield or Adaptive Reuse Site: Locate the project on a grayfield, brownfield or adaptive reuse site
Energy Efficiency				
Y	N	N/A	Item	Criteria
			C-2	Photovoltaic (PV) Panels: Install PV panels to provide at least 10 % of the project's estimated electricity demand
Materials Beneficial to the Environment				
Y	N	N/A	Item	Criteria
			C-3a	Construction Waste Management: Develop and implement a construction waste management plan to reduce the amount of material sent to the landfill by 25%
			C-3b	Recycled Content Material: Use 25% 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
			C-3c	Certified, Salvaged and Engineered Wood: Use at least 50 % (by cost or value) wood products and materials that are certified in accordance with the Forest Stewardship Council, salvaged wood, or engineered framing materials
			C-3d	Water-permeable walkways and parking areas: Use water-permeable materials in 40% or more of walkways and 40% or more of paved parking areas
			C-3e	Reduce Heat-Island Effect: Roofing and Paving: 1) Use Energy Star-compliant and high-emissive roofing for the entire roof or, install a "green" (vegetated) roof covering at least 50% of the roof; <u>and</u> 2) Use light-colored/high-albedo materials and/or an open-grid pavement over at least 30% of the site's hardscaped area
Signed (Applicant): _____ Date: _____				
Signed (Green Design Professional): _____ Date: _____				

Comments:

SECTION A – Threshold Criteria (Mandatory)

These criteria have been added to the DHCR/HTFC Design Handbook and are now mandatory for all projects, as applicable.

A-1 Energy Star appliances, light fixtures, and heating systems or the equivalent which will produce the same or comparable energy efficiency or savings.

MANDATORY

How

Install Energy Star refrigerators and any other provided appliances. Install Energy Star labeled, or equivalent heating systems (Energy Star qualified furnaces have an annual fuel utilization efficiency (AFUE) of 90% or greater; Energy Star qualified boilers have an annual fuel utilization efficiency (AFUE) rating of 85% or greater). Install Energy Star-labeled lighting fixtures or 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.

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. 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

For more information on Energy Star labeled appliances, lighting and heating systems go to the products section of the Energy Star homepage, www.energystar.gov.

A-2 Landscaping: Selective native trees and plants to minimize water usage and maximize energy efficiency.

MANDATORY

How

Provide a landscape plan showing that the selection of new trees and plants are non-invasive native species appropriate to the site's location soils and microclimate, and that any newly planted trees are located to provide shading in the summer and allow for heat gain in the winter.

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.

Things to Consider

- Consult a local arborist and involve a landscape architect in the architectural design process to identify appropriate areas for landscaping and energy savings.
- Combine landscape plan with storm-water management to provide surface water filtration and aesthetic benefits.
- Non-native turf needs about 35 inches of water per year to thrive, whereas native turf needs much less water per year.
- While lawns are appropriate for some landscaping, such as for play areas, they should be minimized wherever possible, except in climates where they need no irrigation.

A-3 **Use water conserving fixtures**

MANDATORY

How

Install water-conserving fixtures with the following specifications:

Toilets – 1.6 GPF (gallons per flush) or better

Showerheads – 2.2 GPM (gallons per minute) or better

Kitchen faucets – 2.2 GPM or better

Bathroom 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.

A-4 **Use daylight sensors** or timers on outdoor lighting to maximize energy efficiency.

MANDATORY

How

Install daylight sensors or timers on all outdoor 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

- 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.

A-5 **Install a passive radon-reduction system** to be activated should tests confirm the presence of radon gas in the building, or for rehabilitation projects, install an active radon-reduction system and measures should test confirm the presence of radon gas in the building (in EPA Zones 1 and 2).

MANDATORY

How

In EPA Zone 1 and 2 areas, for new construction 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 rehabilitation projects, install an active radon-reduction system and measures, should test confirm the presence of radon gas in the building.

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

- Consult www.epa.gov/iaq/radon/zonemap, or contact your state radon coordinator through the state health office, if your development is located in a Zone 1 and 2 radon area.
- For rehab, test the homes 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.
- EPA. “Building Radon Out.” U.S. Environmental Protection Agency, 2006. (#EPA/402-K-01-002, available at www.epa.gov/iaq/radon/pubs)

A-6 **Use lead-safe work practices** during renovation, remodeling, painting and demolition (for properties built before 1978)

MANDATORY

How

For properties built before 1978, use lead-safe work practices during renovation, remodeling, painting and demolition. There can be no exemptions from all requirements of 24 CFR Part 35, HUD Guidelines for the Evaluation and Control of Lead-Based Hazards in Housing.

Intent

Any activity that disturbs painted surfaces or building components in pre-1978 dwellings that contain lead-based paint may generate and spread lead dust and debris, increasing the risk of

lead poisoning for exposed children and families. Controlling lead dust and debris helps minimize lead in the environment.

Things to Consider

Get a lead-based paint inspection or risk assessment if it is likely that the surfaces to be disturbed contain lead-based paint. Information about lead-safe work practices can be found at www.epa.gov/lead/pubs/traincert.htm and www.hud.gov/offices/lead/training/index.cfm.

SECTION B – Standard Criteria

Required to qualify for the Green Building Initiative

Integrated Design Process - Mandatory

B-1 Green Development Plan

MANDATORY

How

Submit a written development plan outlining the integrated design approach taken for this development that demonstrates involvement of the entire development team. The professional development team includes the developer, architect, engineer, landscape architect, LEED Accredited Professional for New Construction and Major Renovation (LEED-NC) or experienced green building design professional, contractor, and asset and property management staff. A green building design professional is someone who has successfully completed green building projects. Submission of experience is required with the application.

The plan must provide the following:

- The name and role of each member of the professional design and development team.
- 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 the rationale for choosing each of the green features and a description of how each of the mandatory and selected items will be included in the project.
- Identification of which members of the design and development team are responsible for implementing the green features.
- A description of follow-up measures to be taken through the completion of design, permitting, construction 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 capture and summarize components of the integrated design process that have been completed at the time of application.

Indicate whether this is the first time the developer has completed a project with green features. If so, explain why the developer 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 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 project's green objectives throughout the project's life cycle.

Things to Consider

- Conduct a green design charrette with the full development team.

Location and Neighborhood Fabric

Applicants must include a minimum of four criteria in this category to qualify for Green Building Initiative.

B-2a Smart Site Location: Proximity to Existing Development

How

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. Do not build on tracts of land that require installing a septic tank or a sanitary sewer 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 storm-water 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.

B-2b Smart Site Location : Protecting Environmental Resources

How

Do not locate new development on:

- Land within 100 feet of wetlands or wetland protection buffer zones
- Land within 100 feet of steep slopes
- Prime farmland
- Park land
- Land within 1,000 feet of a critical habitat

Intent

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

Definitions

- “Prime, unique or farmland” is defined by the U.S. Department of Agriculture (USDA) in the U.S. Code of Federal Regulations, Title 7, Volume 6, Parts 400-699, Section 657.5 and NYS Agriculture and Markets Law, Part 371. Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops, and is available for these uses. This restriction covers cropland, pastureland, rangeland, forestland and other land, and excludes urban built-up land.
- “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. 1532(5).
- “Wetlands” is defined by the U.S. Code of Federal Regulations, 40 CFR, Parts 230-233 and Part 22 subject to Article 24 of the Environmental Conservation Law or a New York State Department of Environmental Conservation (DEC) mapped wetland. Maps of federal and state-protected wetlands are available at DEC regional offices, as well as municipal and county offices. For state wetlands, a project can only build within the 100' adjacent area if granted a Freshwater Wetland permit by DEC, which would likely entail mitigation measures and monitoring of the viability of the wetland after the development is completed. For federal wetlands, the project can be built near a wetland as long as the developer shows on a site plan that the "limits of site disturbance" is less than 1/10th of an acre and will not be in or close to the delineated wetland area. i.e., they can site the building/paved areas so as to avoid contact with wetland areas. If the area of disturbance is greater than 1/10 acre and wetlands will be disturbed after all attempts have been made to re-configure the site plan, the developer must

file a "Preconstruction Notice" with the U.S Army Corps of Engineers for consultation, another "process" with a federal agency that can be very time consuming.

- "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.

B-2c Smart Site Location: Proximity to Services

How

Provide a location map with exact distances indicating that the project is located within close proximity of at least four, of the following facilities: Adequate public transportation, supermarket, public school, library, licensed child care center, usable park space, 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 nourish the connection between humans and the natural world.

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.

B-2d Compact Development: New Construction

How

The Project architect must complete the density calculation as defined below and certify its correctness. The minimum density for new construction must be:

- Six units per acre for detached or semi-detached houses
- Ten for townhomes
- Fifteen for apartments

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, buffered wetlands 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.

B-2e Walkable Neighborhoods: Sidewalks and Pathways

How

Provide a site map indicating that sidewalks or suitable pathways were created within a multifamily property or single-family subdivision to link the residential development to public spaces, open spaces and adjacent development.

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 increased safety by bringing more eyes on public spaces.

Things to Consider

Use porous pavement for sidewalks and other paved surfaces to reduce storm-water runoff and the distribution of pollutants to streams, rivers and water bodies. Design sidewalks to distribute storm water to open space for recharge and to prevent flooding.

B-2f Smart Site Location: Passive Solar Heating / Cooling

How

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

Intent

Solar energy is a radiant heat source that causes 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 building. Passive solar energy means that mechanical means are not employed to utilize solar energy.

Things to Consider

- Elongate building on an east-west axis.
- Interior spaces requiring the most light, heating and cooling should be along the south face of the building.
- Shading through overhangs and canopies on the south and trees on the west prevent the summer sun from entering the interior.

B-2g **Transportation Choices**

How

Provide a context map demonstrating that the site is within close proximity to public transit service.

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.

Site Planning/Environmental Impacts

B-3a **Surface Water Management Plan**

MANDATORY

How

Provide a surface water management plan that identifies how storm water runoff will be captured and addressed on the project site.

Intent

Reducing storm-water 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

Minimize impervious areas (surfaces that do not allow storm-water infiltration), including roofs, driveways, sidewalks and streets, or use porous materials for such areas. Make use of innovative, low-impact techniques such as rain gardens, green roofs, rain barrels and cisterns to capture and re-use storm water.

B-3b Environmental Remediation: Conduct a Phase I Environmental Site Assessment

How

Conduct a Phase I Environmental Site Assessment in accordance with the American Society for Testing and Materials (ASTM) Standard Practice for ESAs: Phase I ESA Process (ASTM Designation E 1527 and E 1528) to identify the presence or likely presence of any hazardous substances or petroleum products on the property; and any additional assessments required to determine whether any hazardous materials are present on site. Provide an executive summary of the Phase I Environmental Site Assessment, and a Phase II abatement plan, if available.

Intent

A Phase I Site Assessment is an investigation of the site's conditions, often performed before purchase of the property to satisfy the due-diligence requirements of a property transaction. The site assessment helps to assess potential environmental liabilities associated with real property acquisition and ownership.

Healthy Living Environment

Applicants must include a minimum of seven criteria to qualify for Green Building Initiative.

B-4a Low / No VOC Paints, Primers, Adhesives and Sealants

How

Specify that all interior paints and primers must comply with current Green Seal standards for low VOC limits.

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.

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

Things to Consider

- The website www.greenseal.org/standards/paints.htm lists VOC limits for paints.
- The website www.toolbase.org/secondaryT.asp?TrackID=&CategoryID=1312 has information on low- and no-VOC paints, including a list of paint manufacturers that carry

these products.

- Pontolilo, Brian. "Making Sense of Caulks and Sealants." *Fine Homebuilding Magazine* 62 (April/May 2004): 97-101.
- www.taunton.com/fh/ (From spec 4.2)
- NREL. *Weatherize Your Home – Caulk and Weatherstrip*. U.S. Department of Energy, National Renewable Energy Laboratory, p. 4.
- www.eere.energy.gov/buildings/building_america/

B-4b Formaldehyde-free Composite Wood

How

Do not use any composite wood in any area that has exposed particleboard (which contains added urea-formaldehyde), unless the exposed area has been sealed.

Intent

Particleboard and MDF (medium density fiberboard) may emit 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 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.

B-4c Green Label Certified Floor Coverings

How

Do not install carpets in basements, entryways, laundry rooms, bathrooms or kitchens. If using carpet, use the Carpet and Rug Institute's Green Label certified carpet and pad.

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.
- 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 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).

B-4d Exhaust fans – Bathroom: New Construction

How

Install Energy Star-labeled bathroom fans that exhaust to the outdoors and are equipped with a humidistat sensor or timer, or operate continuously.

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

- For more information on bathroom fans, go to the Products section of the Energy Star homepage: www.energystar.gov.
- The cfm for intermittent bath fans should be at least 50cfm or 20 cfm if operating continuously, per ASHRAE 62.2.

B-4e Ventilation - New Construction

How

Install a ventilation system for the dwelling unit that provides 15 cubic feet per minute of fresh air, per occupant.

Intent

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

Things to Consider

- Design the ventilation system to take maximum advantage of regional climate characteristics in order to help cut down on energy costs.
- Natural ventilation is acceptable in “paradise” climates defined under ASHRAE 62.2 Exceptions to 4.1.
- Specify a mechanical whole-house ventilation system per ASHRAE 62.2 and the EPA Energy Star with Indoor Air Package Specifications.

B-4f HVAC Sizing

How

Size heating and cooling equipment in accordance with the Air Conditioning Contractors of America Manual, Parts J and S, to prevent short-cycling of heating or air conditioning and ensure adequate dehumidification.

Intent

Appropriately sized equipment can 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

The HVAC 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 designer 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.

B-4g Water Heaters – Mold Prevention

How

Use tankless hot water heaters or install conventional hot water heaters in rooms with drains or catch pans, piped to the exterior of the dwelling, and with non-water sensitive floor coverings.

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.

B-4h Water Heaters – Minimizing CO

How

Specify direct vented or combustion sealed water heaters if the heater is located in a conditioned space.

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.

B-4i Cold Water Pipe Insulation

How

Insulate exposed cold 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.

B-4j **Materials in Wet Areas – Surfaces and Tub and Shower Enclosures**

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. Use one-piece fiberglass or similar enclosure or, if using any form of grouted material, use backing materials such as cement board, fiber cement board, fiberglass-reinforced board or cement plaster.

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.

B-4k **Clothes-Dryer Exhaust**

How

Clothes dryers must be exhausted directly to the outdoors.

Intent

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

Things to Consider

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 required to help ensure clean ducts and reduce build up on particles and moisture.

B-4l **Integrated Pest Management**

How

Seal all wall, floor and joint penetrations 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.

Operations and Maintenance – Mandatory

Applicants must include these three criteria to qualify for Green Building Initiative

B-5a **Owner's Manual**

MANDATORY

How

Provide a manual that includes the following: a routine maintenance plan; instructions for all appliances, HVAC operation, water-system turnoffs, lighting equipment and other systems that are part of each occupancy unit; an occupancy turnover plan that describes in detail the process of educating the tenant about proper use and maintenance of all building systems; and information on how to maintain the green features of the site, including paving materials and landscaping.

Intent

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

Things to Consider

NCHH. "Healthy Homes Maintenance Checklist." National Center for Healthy Housing, 2005. See www.centerforhealthyhousing.org.

For an example of an Owner's manual template, see:

www.practitionerresources.org/showdoc.html?id=63995

B-5b **Occupant's Guide**

MANDATORY

How

Provide a guide for homeowners and renters that explains the intent, benefits, use and maintenance of green building features, and encourages additional green activities such as recycling, gardening and use of healthy cleaning materials.

Intent

Homeowners and renters may be unfamiliar with green systems or features installed in their houses or buildings. Assistance with understanding, operating and maintaining them will allow both homeowners and renters to fully realize the environmental, health and economic benefits that Green Communities offer.

Things to Consider

For an example of an Occupant's manual template, see:

www.practitionerresources.org/showdoc.html?id=63997

B-5c Homeowner and New Resident Orientation

MANDATORY

How

Provide a walk-through and orientation to the homeowner or new resident that reviews the building's green features, operations and maintenance.

Intent

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

SECTION C – Required only if the applicant is including green building measures beyond the standard criteria.

Location and Neighborhood Fabric

C-1 Smart Site Location: Grayfield, Brownfield or Adaptive Reuse Site

How

Locate the project on a grayfield, brownfield site or adaptive reuse of an existing structure.

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 regions. Reuse of existing structures reduces the need for new materials and utilizes embodied energy.

Definitions

- A grayfield is a property that is abandoned and obsolete such as empty retail building, parking garages, or surface parking lots that are generally absent of substantial groundwater of soil contamination.
- Brownfields are abandoned, idled or under-used properties where expansion or redevelopment is complicated by real or perceived environmental contamination. They typically are former industrial or commercial properties where operations may have resulted in environmental contamination. Brownfields often pose not only environmental, but legal and financial burdens on communities. Provide a Phase I Environmental Site Assessment (ESA) and a follow-up Phase II ESA, if completed.
- 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.

Energy Efficiency

C-2 Photovoltaic (PV) Panels

How

Install PV panels, or other acceptable alternative energy measures, to provide at least 10 percent of the project's estimated electricity demand.

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, can also result in energy cost savings. PVs are composite materials that convert sunlight directly into electrical power.

Materials Beneficial to the Environment

C-3a Construction Waste Management

How

Reduce the amount of construction waste sent to the landfill by 25%. Submit calculations that estimate the entire amount of construction waste, and then describe how the reduction of 25% will be obtained.

Intent

The amount of job-site waste resulting from construction of the average 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)

C-3b Recycled Content Material

How

Use 25% materials with recycled content. The percentage of recycled content material is based on cost or value 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

- Consider the incorporation of recycled content building 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 now 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).

C-3c Certified, Salvaged and Engineered Wood

How

Use at least 50 percent (by cost) wood products and materials that are certified in accordance with the Forest Stewardship Council Sustainable Forestry Initiative, salvaged wood, or engineered framing materials. The percentage of certified, salvaged and engineered wood products is based on cost or value. The project architect 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.

C-3d Water-Permeable Walkways and Parking Areas

How

Use water-permeable materials in 40 percent or more of walkways. Use water-permeable materials in 40 percent or more of paved parking areas.

Intent Water-permeable materials reduce storm-water runoff by allowing water to soak into the ground. Storm-water runoff pollutes receiving waterways by carrying sediment and other pollutants and by raising water temperature. Storm-water runoff also causes downstream flooding and erosion, and hampers aquifer recharge and transmission of moisture for vegetation. Water-permeable materials reduce storm-water runoff by allowing water to soak into the ground.

Things to Consider

Use water-permeable materials such as pervious interlocking concrete paving blocks, concrete grid pavers, perforated brick pavers and compacted gravel.

C-3e Reducing Heat-Island Effect: Roofing and Paving

How

- 1) Use Energy Star-compliant (reflectivity of greater than 6.5) 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; and
- 2) 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% of the site’s hardscaped area.

Intent

Urban heat islands disturb the atmosphere and cause energy waste by increasing loads on cooling systems and increasing local air temperatures due to the absorption of solar energy by the built environment. 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. Use paving surfaces that do not retain heat and reduce the heat island effect.