

NC HBH Reference Manual v3.0

Table of Contents

Click below to be taken directly to each section

Minimum Requirements and Rating Scale
Documentating the Process
Prerequisites
Site Opportunities
Water Opportunities
Energy Opportunities:
 <i>Building Envelope</i>
 <i>Comfort Systems</i>
 <i>Appliances, Lighting and Renewables</i>
Indoor Air Quality Opportunities
Materials Opportunities
Bonus Opportunities



This Reference Manual provides details and documentation requirements for each item on the NC HealthyBuilt Homes Statewide Checklist, Version 3.0.

NOTE: *All projects started after July 1st 2006 will be required to use Checklist v3.0.*

The NC HealthyBuilt Homes Program delivers technical and marketing assistance to small and medium size home builders who wish to reduce the environmental impact of the homes they construct.

[This work is made possible through our partners and sponsors \(click here for more info\):](#)



Minimum Requirements for each Section:

Site Opportunities:	7 pts
Water Opportunities:	9 pts
Energy Opportunities:	
<i>Building Envelope</i>	10 pts
<i>Comfort Systems</i>	18 pts
<i>Appliances, Lighting, and Renewables</i>	10 pts
Indoor Air Quality Opportunities:	15 pts
Materials Opportunities:	18 pts
Bonus Opportunities:	2 pts
Community Checklist (where available):	5 pts

Rating Scale

100-150	points:	Certified
151-200	points:	Bronze Certified
201-250	points:	Silver Certified
251+	points:	Gold Certified



DOCUMENTATION REQUIRED

- **Documentation** should be submitted to the NC HBH Statewide Partner unless you are served by a HBH Community Partner, in which case all documentation is given to the Community Partner
- Providing a “**Signature**” as documentation for a checklist item indicates that the party signing is accepting responsibility that the item has been completed in full and that all reasonable care has been taken to meet the stated intent of that checklist item. A photo(s) will be accepted as the documentation for signature items if the photo clearly indicates item implementation/completion.
- An “**Inspection**” for a checklist item must be performed by an approved NC HBH inspector. Currently the only approved HBH inspectors are HBH Statewide and Community partner staff and HERs raters that have completed HBH training. The required documentation for a completed inspection is the signature of the inspector next to the item on the project's checklist. A photo(s) will be accepted as the documentation for inspection items if the photo clearly indicates item implementation/completion.
- Many checklist items can be verified at the required “**Final Walkthrough**” conducted in the completed home by an HBH inspector. Several items require both a FW verification as well as some other form of documentation.
- “**Signature or Inspection**” indicates that **either** a signature by a Responsible Party **or** an inspection by an approved HBH inspector are required to receive credit for the item; **not both**
- “**FW; Signature or Inspection**” indicates that a Final Walkthrough inspection **and either** a signature by a Responsible Party **or** an inspection by an approved HBH inspector are required for the item.

Feel free to ask for clarification at any time, we are here to help you achieve a NC HealthyBuilt Home.

To contact the NC HealthyBuilt Homes Program you can email the NC HBH Coordinator at: hbhcoordinator@ncsu.edu

Prerequisites

Item	Intent	Resources
<p>Prerequisite 1: Must comply with all federal, state and local government requirements including but not limited to: NC Building Code, NC Energy Code, local development regulations and other local regulations.</p> <p>EXPECTED DOCUMENTATION: Copy of the site layout and building floor plan(s) indicating the finished conditioned and unconditioned square footage; and Copy of the Certificate of Occupancy</p> <p>INFORMATION: If local government codes exceed state or federal regulations, a home may be eligible to use those local government codes as points for compliance with the requirements of another section or item of this checklist. It is the responsibility of the builder to provide appropriate documentation for any request which could potentially result in points towards a home's HBH certificate.</p>	<p><i>Intended to insure that a home meets the basic legal requirements in NC and defines the size and layout of the home.</i></p>	<p>NC Building Code: www.ncdoi.com/OSFM/Engineering/BCC/engineering_g_bcc_home.asp</p> <p>Federal Water Conservation Act: www.sustainablenc.org/thewaytogo/water/chap_4.htm</p> <p>Local Ordinance Database: www.ces.ncsu.edu/nreos/forest/ordinance/ordinance_s.php?hidden1=municipalities&select1=all_local_governments</p>
<p>Prerequisite 2: Home must be qualified by EPA Energy Star program</p> <p>EXPECTED DOCUMENTATION: Copy of form verifying home has qualified for the ENERGY STAR Label.</p> <p>INFORMATION: This will require that the builder engage a Home Energy Rater to provide this qualification. As of July 1, 2006, home must meet new EPA Energy Star requirements.</p>	<p><i>Intended to insure that a home meet a minimum standard of energy efficiency.</i></p>	<p>Energy Star: www.energystar.gov/index.cfm?c=new_homes.hm_index</p>
<p>Prerequisite 3: Must perform a blower door test and meet minimum standard of 0.35 CFM50/sf of a building envelope's surface area or 3.5 ACH/50Pa</p> <p>EXPECTED DOCUMENTATION: Copy of blower door test results signed by certified Home Energy Rater who performed the test.</p> <p>INFORMATION: This is third party testing verification. All homes must meet this minimum requirement as approved by the Home Energy Rater and their provider agreement. Sample testing is expected to be allowed (protocol: 15% of homes built) when a minimum of 3 homes in a row have passed the testing protocol on the first test.</p>	<p><i>Intended to insure that a home meet a minimum level of air tightness.</i></p>	<p>NC Energy Star, Locate HERS raters: www.ncenergystar.org/layout2.php?page=hers</p> <p>Residential Energy Services Network: www.natresnet.org/resources/builder/default.htm and www.natresnet.org/standards/RESNET_Standards-2006.pdf</p>
<p>Prerequisite 4: Seal all ductwork joints and penetrations permanently with low toxic mastic or aerosolized sealant. All air distribution systems must be tested for leakage and must not exceed 5% of the home's heated square footage when measured in CFM/25Pa of leakage.</p> <p>EXPECTED DOCUMENTATION: Copy of duct leakage test results provided by certified Home Energy Rater who performed the test.</p> <p>INFORMATION: This is third party testing verification. All ductwork must meet this minimum requirement as approved by the Home Energy Rater and their provider agreement. Sample testing is expected to be allowed (protocol: 15% of homes built) when a minimum of 3 homes in a row have passed the testing protocol on the first test. If a home does not include ductwork, then this prerequisite is not applicable.</p>	<p><i>This prerequisite applies to homes that have an air distribution system and is intended to insure that a homes ductwork has a minimum level of airtightness.</i></p>	<p>Residential Energy Services Network: www.natresnet.org/resources/builder/default.htm and www.natresnet.org/standards/RESNET_Standards-2006.pdf</p>

Prerequisites

Item	Intent	Resources
<p>Prerequisite 5: All building space heating and cooling equipment must be sized according to heating and cooling load calculations using ANSI/ACCA Manual J 8th Edition or equivalent; Cooling equipment installed must be within 6,000 BTU's of cooling calculations.</p> <p>EXPECTED DOCUMENTATION: Signature provided by party responsible for Manual J calculations.</p> <p>INFORMATION: It is an NC Energy Code requirement to provide Manual J calculations for each home. This item extends that requirement to sizing cooling equipment within 1/2 ton (6,000 BTU's) of the cooling calculations because oversizing of cooling equipment can lead to reduced removal of humidity in a home in most NC climate areas. Excess humidity in a home can potentially lead to mold growth.</p>	<p>Intended to minimize the over design of HVAC systems.</p>	<p>ACCA Manual J website: www.acca.org/tech/manualj/</p> <p>EERE article on Sizing of HVAC Equipment: www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12340</p>
<p>Prerequisite 6: Combustion equipment including (but not limited to) furnaces and water heaters, must be located outside the conditioned space unless the equipment is sealed combustion or power vented. Unvented fireplaces are not permitted. Gas logs having a fan that blows any portion of the combustion gases into the living space are not permitted. One carbon monoxide (CO) detector shall be installed per 1,000 sq. feet of living space (minimum 1 per floor) in all houses with an attached garage or with any combustion appliance.</p> <p>EXPECTED DOCUMENTATION: Final Walkthrough</p> <p>INFORMATION: The by product of combustion appliances is carbon monoxide. Carbon Monoxide can cause health issues at low level exposures and death at high level exposures. Unvented or vent free fireplaces produce low levels of carbon monoxide.</p>	<p>Intended to reduce exposure to carbon monoxide by providing a minimum standard for the use of an attached garage or combustion appliances in an indoor environment.</p>	<p>Oikos Carbon Monoxide detector locations and standards: http://oikos.com/esb/32/co.html</p> <p>EPA Indoor Sources of Air Pollution-Carbon Monoxide: www.epa.gov/iaq/co.html</p>
<p>Prerequisite 7: A ventilation system is required that provides make-up air from a clean source that is equal to 7.5 cfm per bedroom plus an additional 7.5 cfm plus .01 cfm per sq.ft.</p> <p>EXPECTED DOCUMENTATION: Final Walkthrough and Signature of Responsible Party.</p> <p>INFORMATION: Make-up air is outdoor air mixed with the re-circulating indoor air of an HVAC system. A clean source is defined as outside air that is not brought into the home through an unconditioned building assembly. For exhaust only ventilation strategies, the clean air source must be defined and approved by a Home Energy Rater.</p>	<p>Intended to provide a minimum standard for good indoor air quality.</p>	<p>EPA: Three Basic Strategies to Indoor Air Quality: www.epa.gov/iaq/pubs/index.html#Carbon Monoxide quality</p>
<p>Prerequisite 8: For an attached garage, provide air barrier between conditioned living space and garage. Include weatherstripping at all penetrations, sealed drywall joints and other measures as necessary.</p> <p>EXPECTED DOCUMENTATION: Final Walkthrough and Signature of Responsible Party.</p> <p>INFORMATION: Air barrier shall be continuous. Conditioned living space includes any space that is heated and/or cooled. If the garage is conditioned, it should be separated from all other living spaces and should not use the same heating and cooling system as the living space.</p>	<p>Intended to set a minimum standard for sealing attached garages.</p>	<p>Air Sealing Details: www.buildingscience.com/designsthatwork/airsealing/default.htm</p>
<p>Prerequisite 9: Must be enrolled in the statewide NC HealthyBuilt Homes program to become a "Certified (or better) HealthyBuilt Home".</p> <p>EXPECTED DOCUMENTATION: Completed enrollment form and receipt for payment of enrollment fees.</p> <p>INFORMATION: Builders are encouraged to enroll in the NC HealthyBuilt Homes program prior to beginning construction on a home they intend to receive a certificate. Homes can receive a certificate if enrolled after construction begins but may not qualify for the maximum number of points available without additional documentation.</p>	<p>Intended to verify that the Builder or Developer is a member of the NC HBH program.</p>	<p>Program enrollment form: www.healthybulthomes.org/docs/FINAL%20HBH%20Enrollment%20formv2.1.doc</p> <p>Custom home enrollment form: www.healthybulthomes.org/docs/Custom%20Home%20Registration%20formv2.1.doc</p>

Site Opportunities (Minimum Points: 7)

[Back](#)

Item	Pt	Intent	Resources
<i>Erosion Control</i>			
<p>1 <i>Develop an erosion control site plan</i></p> <p><u>EXPECTED DOCUMENTATION:</u> Signature provided by responsible party that a plan was developed to manage erosion.</p> <p><u>INFORMATION:</u> Plan should indicate and include areas where topsoil will be removed, contours of slopes will be cleared or reshaped, location and type of erosion control measures, stormwater and sediment management systems, and a vegetative plan for temporary and permanent soil stabilization.</p> <p>The North Carolina Sedimentation Pollution Control Act of 1973 requires anyone involved in land disturbing activities to take special precautions to reduce soil erosion and prevent sedimentation damage to waterways and property. Disturbances larger than one acre are required to file an erosion control plan with the state and obtain an Erosion Control Permit, or face serious fines.</p> <p>Disturbances on areas less than one acre are still required to implement erosion control strategies. Contact the NC Department of Natural Resources, Division of Land Resources, for information on county or city ordinances that may apply to your area.</p>	2	<p><i>Intended to give a project credit for creating a cohesive erosion control plan.</i></p>	<p>Local Erosion Control Programs and additional erosion and sedimentation control information: www.dlr.enr.state.nc.us/pages/sedimentation.html</p> <p>Residential Erosion Control guide, courtesy of Catawba County Erosion Control Program www.co.catawba.nc.us/depts/u&e/ECbrochure.pdf</p>
<p>2 <i>Use of redundant mulch, compost, or straw bales for erosion control</i></p> <p><u>EXPECTED DOCUMENTATION:</u> Approved by NC HBH inspector</p> <p><u>INFORMATION:</u> In addition to or in place of required silt fencing, builder shall install mulch, straw bales, or compost berms or blankets. Recommended locations for these strategies include steep slopes, locations where silt fences do not hold up, and around storm drains.</p> <p>Redundant mulch is the use of excess mulch in order to provide effective erosion control. Best Management Practices indicate that a combination of strategies appropriate for the site results in more effective control of sediment and minimizes soil erosion.</p>	3	<p><i>Intended to give a project credit for using organic matter that can be reused on site as erosion control devices.</i></p>	<p>Erosion Control for Home Builders fact sheet w/ diagrams: http://clean-water.uwex.edu/pubs/pdf/storm.erosio.pdf</p> <p>Compost for Erosion Control: www.carolinacompost.com/USE%20COMPOST/Erosion%20Control.htm</p>
<p>3 <i>Temporary planting of cover crops on disturbed land areas within two weeks of completing rough grading activities</i></p> <p><u>EXPECTED DOCUMENTATION:</u> Approved by NC HBH inspector</p> <p><u>INFORMATION:</u> Temporary planting of cover crops is the use of rapid growing annual grasses, small grains or legumes to provide initial, temporary soil stabilization for erosion control on disturbed areas for less than twelve (12) months. Rough grading is defined as the initial land disturbance that allows building construction to begin at sub finish grade levels.</p>	2	<p><i>Intended to give a project credit for providing temporary vegetative cover for erosion control on disturbed areas</i></p>	<p>Storm Water Technology Fact-sheet: Vegetative Covers www.epa.gov/owm/mtb/vegcvr.pdf</p> <p>Further seeding measures as per Asheville Standard Specs and Details Manual: www.ci.asheville.nc.us/engineer/specs/sdsect4a.pdf</p>

Item	Pt	Intent	Resources
Vegetation			
<p>4 Trees and natural features on site protected during construction (min 25% of development or lot)</p> <p><u>EXPECTED DOCUMENTATION:</u> Approved by NC HBH inspector</p> <p><u>INFORMATION:</u> Natural features include but are not limited to regionally appropriate vegetation, areas important to wildlife habitat, streams and creek beds. For areas with vegetation and trees, place plastic mesh or snow fence barriers around groups of trees and vegetation to protect the root areas below their branches. Fencing should be placed, at minimum, to the outermost edge of the tree canopy (drip line). To prevent root damage, do not grade, place soil piles, or park vehicles near trees or vegetation marked for preservation. Compacted soil will damage root systems and can ultimately destroy the vegetation, even though its demise may occur as much as a year after construction.</p>	3	<p><i>Intended to give a project credit for protecting existing groups of trees, native vegetation, streams and other natural features from damage during construction so that they flourish after construction.</i></p>	<p>Techniques to minimizing site disturbance: www.psat.wa.gov/Publications/LID_tech_manual05/05_clearing.pdf</p> <p>Find a professional to help inventory your natural features: www.asca-consultants.org/directory/</p>
<p>5 Tree planting (min. 12 trees per acre of developed land)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> For example, if the house is built on a ½ acre lot, 6 trees must be planted.</p>	4	<p><i>Intended to give a project credit for increasing the quantity of trees on developed land.</i></p>	<p>Information on tree planting, types and care: www.ces.ncsu.edu/depts/hort/consumer/factsheets/trees-new/</p>
<p>6 Provide tree preservation plan</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature provided by Responsible Party indicating preservation plan visibly posted on job site.</p> <p><u>INFORMATION:</u> Identify areas to be preserved and develop a strategy for avoiding mechanical and chemical damage, grade changes, trenching, filling, and compaction. An arborist (sometimes available through the local planning department) can help you decide which trees can be saved and can work with the builder to protect the trees throughout each construction phase. It is important to involve a knowledgeable professional during this planning phase to ensure actual survival of trees. End result should be a document (written or graphic) that can be physically posted on job site. Tree Preservation Plan shall be reviewed with subcontractors and posted on job site at the beginning of the project.</p>	2	<p><i>Intended to give a project credit for creating a plan for not disturbing existing trees.</i></p>	<p>Find a certified Arborist: www.isa-arbor.com/findArborist/findarborist.aspx</p> <p>Create a successful landscape preservation plan: www.extension.umn.edu/info-u/environment/BD443.html</p>
<p>7 Individual trees fenced at drip line (1 point per tree, max. 5 trees)</p> <p><u>EXPECTED DOCUMENTATION:</u> Approved by NC HBH inspector</p> <p><u>INFORMATION:</u> Trees, which can add to the value of a property, should be protected by fencing around the tree at minimum to the drip line (the outermost edge of the tree canopy). A simple rule of thumb accepted by the American Forestry Association is to allow one foot out in horizontal distance for each inch of the tree's diameter, extending at minimum to the dripline.</p> <p>The bulk of a tree's roots are a mat of finely meshed feeder roots that fan out well beyond the dripline of a tree and occur primarily within the top 12 inches of soil. These feeder roots, critical to a tree's survival, are easily affected or damaged during typical residential construction even though its demise may occur as much as a year after construction.</p>	1-5	<p><i>Intended to give a project credit for saving specific trees.</i></p>	<p>National Arbor Day Foundation's Building with Trees program: www.arborday.org</p> <p>Preventing Construction Damage to trees: http://muextension.missouri.edu/explore/agguides/hort/g06885.htm</p>

	Item	Pt	Intent	Resources
8	<p>Preserve or create Backyard Wildlife Habitats using the National Wildlife Federation certification or equivalent</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party that Backyard Wildlife Habitat meets the requirements indicated by the National Wildlife Federation</p> <p><u>INFORMATION:</u> Habitat restoration is critical for wildlife where commercial and residential development has eliminated most natural areas. Wildlife especially need your help during the cold winter months. Gardening practices that help wildlife, like reducing chemicals and conserving water, also help to improve air, water and soil quality throughout your neighborhood. For habitat restoration ideas and assistance, visit the National Wildlife Federation website.</p>	2	<p><i>Intended to give a project credit for preservation or creation of natural areas that can function as habitats for wildlife.</i></p>	<p>National Wildlife Federation website: www.nwf.org/backyardwildlifehabitat/</p> <p>Backyard Conservation www.nrcs.usda.gov/feature/backyard/</p>
9	<p>Grind 80% of stumps and limbs for mulch</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved NC HBH inspector</p> <p><u>INFORMATION:</u> Builder shall grind a minimum of 80% of all tree stumps and limbs for mulch. Mulched material cannot be buried in a landfill and use on site is encouraged.</p>	2	<p><i>Intended to give a project credit for reuse of small tree debris removed during construction, either on or off site.</i></p>	<p>Mulching Tip Sheet: www.nrcs.usda.gov/feature/backyard/Mulching.htm</p>
10	<p>Mill 80% of cleared logs</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved NC HBH inspector</p> <p><u>INFORMATION:</u> A minimum of 80% of logs that meet commercial sawmill standards (minimum diameter of 6") shall be taken to a sawmill for processing into lumber, pulp or other use. Logs cannot be buried in a landfill, burned or chipped.</p>	2	<p><i>Intended to give a project credit for reuse of large tree debris removed during construction, either on or off site.</i></p>	<p>Tree volume estimation: www.snr.missouri.edu/natr211/topics/volume.html</p> <p>Find a sawmill: www.woodfinder.com</p>
Development				
11	<p>Sidewalk connects house to business district (max 2 miles)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> A walkable path will connect the home to a business district located no more than 2 miles from the home. Walkable communities encourage sustainability of resources (both natural and economic) in urban environments as well as curb urban sprawl.</p>	5	<p><i>Intended to give credit for connecting a house to amenities to encourage walkable communities and the reduction of transportation.</i></p>	<p>Designing Walkable Communities: www.walkable.org</p> <p>The Practice of Low Impact Development: www.huduser.org/publications/destech/lowImpactDev.html</p>
12	<p>Use B20 blend bio-diesel for 90% of all diesel fueled construction equipment</p> <p><u>EXPECTED DOCUMENTATION:</u> Name of fuel provider and signature provided by responsible party.</p> <p><u>INFORMATION:</u> B20 blend Biodiesel can be used directly in any diesel vehicle, no vehicle modification is needed. Using biodiesel in place of petroleum diesel provides a significant reduction in harmful emissions such as CO, CO2, Air Toxins, and Particulates. The contractor may propose to use additional fuels at the beginning of a project, based on their environmental qualities.</p>	4	<p><i>Intended to give a project credit for using an alternative fuel in construction equipment.</i></p>	<p>Alternative Fuel providers: www.trianglecleancities.org/afprov.htm</p> <p>Retail fueling sites in NC: www.biodiesel.org/buyingbiodiesel/retailfuelingsites/default.shtm</p> <p>Biodiesel/alternative fuels technical info: www.biofuels.coop/ www.ncsc.ncsu.edu/</p>

Water Opportunities (Minimum Points: 9)

[Back](#)

Item	Pt	Intent	Resources
<i>Outdoor</i>			
<p>1 Drought resistant guidebook given to homeowner</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party</p> <p><u>INFORMATION:</u> Builder shall present the homeowner with a drought resistant guidebook including but not limited to: 1. A list of drought resistant plants applicable to the climate zone 2. Examples of drought resistant/xeriscaping landscaping plans 3. A list of resources for more information on drought resistant landscaping.</p> <p>If a builder has developed a specialized guidebook for a specific project and is not using a commercial, standard, statewide or community produced guidebook, the builder will receive one additional point for providing a copy of this book to NC HBH (point available on a one time basis per builder).</p>	1	<p><i>Intended to give a project credit for providing a resource for owner planting and vegetation maintenance.</i></p>	<p>Wise Water Use in Landscaping, NC Cooperative Extension: www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag508_1.html</p> <p>Drought tolerant plants for NC Landscapes, NC Cooperative Extension: www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag508_3/</p>
<p>2 Provide a site specific drought resistant planting plan for homeowner / potential buyer</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party</p> <p><u>INFORMATION:</u> Drought resistant planting plans, sometimes referred to as Xeriscaping in more arid regions, focus on how the landscape as a whole can work to conserve and efficiently manage water. Several characteristics of a drought resistant plan include the designed use of shade to cool the landscape, use of native and drought tolerant species to reduce water demand, and zoning of plants with similar water needs for effective water management.</p> <p>The drought resistant planting plan should be a complete landscape plan of the actual building site, designed to conserve water use, identifying the species of plants and turf installed. If minimal landscaping is installed, points will be awarded for providing an example of a drought resistant planting plan, identifying specific plants and turf that could potentially be installed in addition to the existing landscaping on the site. It is highly recommended that the plans be developed by a landscape architect, horticulturist, or other landscape professional, but this is not required.</p>	2	<p><i>Intended to give a project credit for providing guidance to a homeowner's future planting of plants that do not need to be irrigated during typical climate conditions.</i></p>	<p>How to Plan & Design a Wise-Water-Use Landscape, NC Cooperative Extension: www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag508_2.html</p> <p>Xeriscaping, NC Division of Water Resources: www.ncwater.org/Water_Supply_Planning/Water_Conservation/xeriscaping.php</p>

	Item	Pt	Intent	Resources								
3	<p>Permeable materials used for driveways</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough</p> <p><u>INFORMATION:</u> Driveways shall have a pavement system that allows for infiltration of water. Water-pervious materials include but are not limited to pervious concrete, pervious asphalt, gravel, crushed stone, open paving blocks or pervious paving blocks. A pervious paving material that can use the most porous subbase appropriate for the soil type is recommended. Builders should take precautions to prevent concentrated compaction of the soil and sediment filling of the pore spaces during and after the installation process.</p> <p>According to data compiled by the EPA in 1995, urban run-off contributes to damage in more than 26,000 miles of rivers and streams, and pollutes more than one million acres of lakes. Permeable materials act as a storage reservoir for run-off, offering improved filtration, recharging of groundwater as well as reducing the runoff of pollutants such as oil, grease, hydrocarbons, and nutrients.</p>	4	<p><i>Intended to give a project credit for allowing water infiltration through surfaces that would normally not absorb water.</i></p>	<p>Examples of pervious paving in NC (search keyword "pervious paving") www.ncgreenbuilding.org/site/ncg/public/search.cfm</p> <p>Pervious Paving Materials, Sourcebook for Green and Sustainable Building www.greenbuilder.com/sourcebook/PerviousMaterials.html</p>								
4	<p>Permeable materials used for 50% walkways and patios</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough</p> <p><u>INFORMATION:</u> At least 50% of walkways and patios shall allow for infiltration of water. Brick, block, and concrete/stone pavers reduce the percentage of a site's impervious surface area as well as the demand for conventional storm water management facilities. It is important to note that all pavers which are intended to receive this credit should be loose laid (no grout, cement or concrete between joints) and be placed on a drainable subsurface material such as stone or sand.</p>	2	<p><i>Intended to give a project credit for allowing water infiltration through surfaces that would normally not absorb water.</i></p>	<p>Examples of pervious paving in NC (search keyword "pervious paving") www.ncgreenbuilding.org/site/ncg/public/search.cfm</p> <p>List of permeable paving and surfacing products: http://oikos.com/green_products/menu.php?sub_div=Paving%20and%20Surfacing</p>								
5	<p>Install vegetated roof system to reduce impervious surface:</p> <table border="1" data-bbox="119 906 1220 1045"> <tr> <td data-bbox="119 906 1213 938">25% of roof is vegetated roof system</td> <td data-bbox="1213 906 1220 938">2</td> </tr> <tr> <td data-bbox="119 938 1213 971">50% of roof is vegetated roof system</td> <td data-bbox="1213 938 1220 971">4</td> </tr> <tr> <td data-bbox="119 971 1213 1003">75% of roof is vegetated roof system</td> <td data-bbox="1213 971 1220 1003">6</td> </tr> <tr> <td data-bbox="119 1003 1213 1045">100% of roof is vegetated roof system</td> <td data-bbox="1213 1003 1220 1045">8</td> </tr> </table> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough</p> <p><u>INFORMATION:</u> The benefits of a vegetative roof system include roof membrane protection, potential savings on heating and cooling costs, sound insulation from noise pollution, storm-water management, and aesthetic appeal, potentially increasing property value. Vegetative roof systems can be extensive (requiring little to no maintenance with vegetation 2-3 inches high) or intensive (light to heavier weight soil with plants 3-15 feet high, maintenance required).</p> <p>The slope, structural loading capacity, roof materials, drainage systems, waterproofing, electrical and water supplies, maintenance expectations, as well as sun and wind exposure to the roof should all be considered when developing a design.</p>	25% of roof is vegetated roof system	2	50% of roof is vegetated roof system	4	75% of roof is vegetated roof system	6	100% of roof is vegetated roof system	8		<p><i>Intended to give a project credit for allowing water infiltration through surfaces that would normally not absorb water.</i></p>	<p>Green Roof Research, NCSU www.bae.ncsu.edu/greenroofs/</p> <p>Green Roofs for Healthy Cities: www.greenroofs.net/</p>
25% of roof is vegetated roof system	2											
50% of roof is vegetated roof system	4											
75% of roof is vegetated roof system	6											
100% of roof is vegetated roof system	8											

	Item	Pt	Intent	Resources
6	<p>Installed landscape is drought resistant for non-paved area:</p> <p>50% of non-paved area</p> <p>100% of non-paved area</p> <p><u>EXPECTED DOCUMENTATION:</u></p> <p>Signature of Responsible Party Final walkthrough</p> <p><u>INFORMATION:</u></p> <p>As water use increases during the Spring and Summer months, drought resistant planning and planting are key factors to conserving water resources.</p> <p>Landscaping with native trees, shrubs, and ground covers will help conserve water as they are already suited to survive the specific climate. Turf is generally the largest consumer of water in the landscape. A drought tolerant type of turf grass should be used in sunny areas of the landscape and no turf should be planted in densely shady areas.</p> <p>For information on native and drought tolerant plants in your area, contact your local County Cooperative Extension Office</p>	<p>4</p> <p>8</p>	<p><i>Intended to give a project credit for using plants that require little or no supplemental irrigation for survival during typical climate conditions.</i></p>	<p>Native plant species, NC Botanical Gardens: http://ncbg.unc.edu/</p> <p>Using Drought Tolerant Grasses, Landscape Cary Style publication: www.townofcary.org/news/lcs3.htm#Landscape%20Cary%20Style</p> <p>Local Cooperative Extension Offices by county: www.ces.ncsu.edu/</p> <p>Organic Lawn Care and Pest Management: www.turffiles.ncsu.edu/pubs/management/lawn_s2.pdf</p>
7	<p>Rainwater harvested and directed toward landscaping needs</p> <p><u>EXPECTED DOCUMENTATION:</u></p> <p>Final Walkthrough Signature of Responsible Party</p> <p><u>INFORMATION:</u></p> <p>As a general rule of thumb, for every inch of rainfall, approximately 0.62 gallons of water per square foot of collection surface can be collected (1 inch of rain on 1000 square feet roof area equals about 625 gallons of water).</p> <p>Rainwater is generally harvested from a roof surface, and system components include properly designed gutters, piping, roof washers, screens, and a storage tank/cistern. Grounds should be graded to capture and distribute water from rainfall to the landscape in a controlled manner. System capacities can range from thousands of gallons with pumping to trashcan-sized rain barrels with faucets.</p>	4	<p><i>Intended to give a project credit for collecting stormwater from impervious surfaces before it becomes part of a stormwater drainage system and using collected and stored water to irrigate landscaping (by hand or with a plumbed system).</i></p>	<p>Rainwater Harvesting Systems and info, Town of Cary: www.townofcary.org/depts/pwdept/water/waterconservation/rainbarrels.htm</p> <p>Rainwater system design and sizing information: http://ag.arizona.edu/pubs/water/az1052/</p> <p>Rainwater System Pictures: www.bae.ncsu.edu/stormwater/downloads.html</p>

	Item	Pt	Intent	Resources
8	<p>Install rain gardens, bio-retentions basin, or infiltration strips to reduce storm water impacts</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Stormwater runoff (rainfall onto impervious surfaces that does not filter into the ground) mixes with pollution such as fertilizer, pesticides, sediment, motor oil, litter, and pet and yard waste. In most cities of North Carolina, stormwater runoff does not go to a treatment plant, but flows directly into streams and rivers.</p> <p>Rain gardens are placed between storm water runoff sources (roofs, driveways, parking lots) and runoff destinations (storm drains, streets, streams). A rain garden (referred to as a bio-retention cell in commercial sizes) is a shallow depression in the ground that captures runoff from a driveway or roof and allows it to soak into the ground, rather than running across roads, capturing pollutants, and delivering them to a stream. Plants and soil work together to absorb and filter pollutants and return cleaner water through the ground to nearby streams. Rain gardens reduce flooding by moving water underground rather than into the street; additionally they can provide habitat for beneficial insects and wildlife.</p>	3	<p><i>Intended to give a project credit for utilizing the landscape to manage and/or filter stormwater.</i></p>	<p>Plants for Raingardens (see plant list), New Hanover Cooperative Extension www.gardeningnhc.org/plant_info.asp</p> <p>Backyard Rain Gardens, NC Cooperative Extension www.bae.ncsu.edu/topic/raingarden/</p> <p>Stormwater Management for Homeowners: www.soil.ncsu.edu/assist/homeassist/stormwater/</p>
9	<p>Installed irrigation system is zoned separately for turf and bedding areas</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party indicating will demonstrate system to owner. Final Walkthrough</p> <p><u>INFORMATION:</u> Irrigation system must utilize approved techniques, such as a multiple program controller, that can divide the landscape into zones and operate the different zones for different and appropriate lengths of time. Therefore, lawns that require a large amount of water from sprayers or rotors can be separated from more drought-tolerant plants that require little or no water, resulting in efficient water use and care of plants.</p>	2	<p><i>Intended to give a project credit for an irrigation system that conserves water and treats different vegetation with the appropriate amount of water.</i></p>	<p>Efficient Irrigation Systems, NC Cooperative Extension: www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag508_6.html</p>
10	<p>Installed irrigation system includes a soil moisture or rain sensor, or other irrigation efficiency device</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party indicating will demonstrate system to owner. Final Walkthrough</p> <p><u>INFORMATION:</u> Installed devices should, at minimum, automatically turn off the irrigation system if it is operating during a rain event. Additional management features, such as sensors that operate at times when more water will be used by the plant, are encouraged but not required. Systems should be installed and checked for proper installation by a qualified technician.</p>	2	<p><i>Intended to give a project credit for an irrigation system that conserves water.</i></p>	<p>Irrigation Controllers: Recommended Water Saving Features www.epa.gov/owm/water-efficiency/irrigation_booklet.pdf</p>

Item	Pt	Intent	Resources
<p>11 Greywater irrigation system is installed where allowed by code.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party indicating will demonstrate system to owner. Final Walkthrough</p> <p><u>INFORMATION:</u> The use of a greywater irrigation system shall be approved by the local building and/or health department(s), and at a minimum shall have a dedicated clothes washer box with 2-inch drain connected to a subterranean drain field. A separate clothes washer box shall be provided that connects to the sanitary drain system as a backup system.</p> <p>Greywater is defined as wastewater from the bathtub, shower drain, sinks, washing machines, and dishwashers. 60% of the outflow water produced in homes is greywater, which contains no pathogens and thus does not require the same treatment as blackwater (water from toilets). By designing plumbing systems that separate greywater from blackwater, greywater can be recycled for irrigation, toilets, and exterior washing, resulting in water conservation. When using greywater for edible plant irrigation, care should be taken to have the water tested to identify any chemicals that could be passed along through the plant if eaten.</p>	9	<p><i>Intended to give a project credit for reuse of greywater as an irrigation only system.</i></p>	<p>PATH link: www.toolbase.org/Technology-Inventory/Sitework/greywater-reuse</p> <p>Wastewater rules and regulations, NC Division of Water Quality http://h2o.enr.state.nc.us/wastewater.html</p>
<i>Indoor</i>			
<p>12 Kitchen faucet fitted with aerator restricting flow to 2.2 gpm</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough spot check</p> <p><u>INFORMATION:</u> Faucet aerators reduce the flow emitted by a faucet fixture, while also increasing flow velocity by injecting air into the water stream. The flow rate is typically written on the outside edge of the of the faucet cover where the water exits.</p>	1	<p><i>Intended to give a project credit for conserving water in food preparation areas.</i></p>	<p>Consumer's Guide to Energy Efficiency: www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13050</p>
<p>13 All bathroom faucets fitted with aerator restricting flow to 2.0 gpm</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough spot check</p> <p><u>INFORMATION:</u> Faucet aerators reduce the flow emitted by a faucet fixture, while also increasing flow velocity by injecting air into the water stream. The flow rate is typically written on the outside edge of the of the faucet cover where the water exits.</p>	1	<p><i>Intended to give a project credit for conserving water in bathroom sinks.</i></p>	<p>Consumer's Guide to Energy Efficiency: www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13050</p>
<p>14 Toilets are high efficiency toilets (max 1.45 gpf) or dual flush (1.6/0.8-1.1gpf) (1 point per toilet, max 3 points)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Toilets installed in a home must be high efficiency toilets with a maximum of 1.45 gallons per flush (gpf), or dual flush toilets with 1.6/0.8-1.1 gpf. High Efficiency Toilets use a minimum of 20% less water than standard 1.6 gpf toilets. Dual Flush Toilets save water by offering a separate, low water use flush setting for liquids (between .8-1.1 gpf) in addition to the standard 1.6 gpf for solids. Toilets represent the largest source of indoor water use in the home, accounting for up to 30%-40% of water demand.</p>	1-3	<p><i>Intended to give a project credit for water efficient human waste removal systems.</i></p>	<p>High Efficiency Toilets factsheet: www.bewaterwise.com/rebates_toilets_01.pdf</p>

	Item	Pt	Intent	Resources
15	<p>All showerheads rated with a maximum 2.25 gal/min flow or less</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> All showerheads in the home must be rated as having a 2.25 gal/min flow or less. Present types of high-efficiency shower heads use one to two gallons per minute if the user controls the water pressure to the shower head, and about two to three gallons per minute with full-flow valves. Water usage while showering can be reduced by at least half by switching to installing high efficiency showerheads.</p>	1	<p><i>Intended to give a project credit for conserving water in shower and tub areas.</i></p>	<p>Consumer's Guide to Energy Efficiency: www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13050</p>
16	<p>Clothes washer is an Energy Star labeled product</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> ENERGY STAR® washers use nearly 50% less water and 30%-40% less energy per load. The washer design also causes less wear and tear on clothes. In addition, better water extraction means less drying time, which yields further energy savings. Both top-loading and front-loading Energy Star labeled clothes washers are available.</p>	4	<p><i>Intended to give a project credit for using less water and energy per load of clothes washed.</i></p>	<p>Energy Star appliances: www.energystar.gov/</p> <p>Energy Efficient Appliances Consumer Guide: www.aceee.org/consumerguide/mostenef.htm</p>
17	<p>Dishwasher is an Energy Star labeled product or meets or exceeds Energy Star criteria</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough, Model Number should be accessible.</p> <p><u>INFORMATION:</u> ENERGY STAR® dishwashers save by using both improved technology for the primary wash cycle, and by using less hot water to clean. These appliances include energy efficient motors and other advanced technologies such as sensors that determine the length of the washing cycle and the temperature of the water necessary to clean the dishes. ENERGY STAR® dishwashers also minimize water use, saving the energy required to heat it. ENERGY STAR® dishwashers must exceed minimum federal standards by at least 13% to be considered ENERGY STAR®.</p>	2	<p><i>Intended to give a project credit for appliances that exceed minimum energy efficiency standards.</i></p>	<p>Energy Star appliances: www.energystar.gov/</p> <p>Energy Efficient Appliances Consumer Guide: www.aceee.org/consumerguide/mostenef.htm</p>
18	<p>Install whole house water filter system (NSF certified)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> A 2003 study by the Natural Resources Defense Council found that pollution and deteriorating, out-of-date plumbing are sometimes delivering drinking water that might pose health risks to some residents. Household water filter systems can be used to address the specific contaminants that may be present in tap water. Water Quality testing should be performed to determine the system that is most appropriate for a home. County Cooperative Extension Offices can provide you with a list of certified water quality laboratories in North Carolina.</p> <p>Whole house water filtersand systems filter water before it is distributed throughout the home and have a capacity for significantly higher flow rates than point-of-use systems. They are an ideal choice for homes affected by heavy sediment problems. A whole house system will prevent contaminant build up from damaging water heaters and soiling laundry or dishes in addition to creating clean drinking water. If it is suspected that the home's plumbing system may be contributing contaminants to the water supply, consider point-of-use filtration/purification.</p>	4	<p><i>Intended to give a project credit for cleaning water on site for human use and increasing the durability of water-using appliances.</i></p>	<p>Selecting a household water treatment system: www.nsf.org/consumer/drinking_water/selecting_DWTU.asp?program=WaterTre</p> <p>Guidelines to test your home water quality: www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag473_2.html</p>

	Item	Pt	Intent	Resources
19	<p><i>Under sink water filter system installed (1 point per system, max 3pts)</i></p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Water Quality testing should be performed to determine the system that is most appropriate for a home. County Cooperative Extension Offices can provide you with a list of certified water quality laboratories in North Carolina.</p> <p>Under sink or point-of-use water filter systems treat water as it reaches a specific faucet, as opposed to whole house filter systems. As a general rule, look for filters labeled as meeting NSF/ANSI standard 53. Under sink filters, often installed in the kitchen and drinking water areas, can be effective in filtering many pollutants of concern and can be less expensive than a whole house filter system.</p>	1-3	<p><i>Intended to give a project credit for cleaning water on site for human use and increasing the durability of water-using appliances.</i></p>	<p>Consumers guide to water filters: www.nrdc.org/water/drinking/gfilters.asp</p> <p>NC Clean Water Lead Testing site: www.leadtesting.org/</p>

Building Envelope (Minimum Points: 10)

		Back	
Item	Pt	Intent	Resources
1 Exceeds IECC by 50 % (HERS score = 50 or less)	5		
<p><u>EXPECTED DOCUMENTATION:</u> Dated report documenting analysis results based on actual finished conditions provided by the certified HERS rater who performed the test.</p> <p><u>INFORMATION:</u> Federal tax credits for energy efficient construction are based upon exceeding IECC 2004 by a minimum of 50%. The corresponding HERS index will be a maximum of 50. The builder will be awarded 5 points. Efficiency must be verified/documentated by a certified HERS rater.</p>		<p><i>Intended to give credit for saving additional energy above and beyond the prerequisite requirements.</i></p>	<p>List of Certified raters at Residential Energy Services Network: www.natresnet.org</p>
2 Energy Bill Guarantee program: Examples include, but are not limited to System Vision and Environments for Living.	5		
<p><u>EXPECTED DOCUMENTATION:</u> Form provided by Energy Bill Guarantee Program identifying that the house is enrolled in the program.</p> <p><u>INFORMATION:</u> Energy bill guarantee programs allow the builder to guarantee to the homeowner that the home will perform with the energy efficiency and comfort level for which it has been certified within a specific cost range. Most programs will guarantee that the energy used to heat and cool the home will not exceed a specified amount and that the temperature in the center of any conditioned room will not vary more than three degrees from the thermostat setting. If for any reason the home does not perform as specified, the guarantee program will correct the issue at no cost to the homeowner and/or reimburse the homeowner for energy costs that exceed the guaranteed amount.</p>		<p><i>Intended to give credit for being part of an energy bill guarantee program.</i></p>	<p>Advanced Energy's SystemVision™ Guarantee: www.advancedenergy.org/buildings</p> <p>Masco's Environments for Living guarantee program: www.eflbuilder.com.</p>
3 Must perform a blower door test and meet minimum standard of 0.25 cfm₅₀/sf of surface area or 2.5 ACH/50Pa	3		
<p><u>EXPECTED DOCUMENTATION:</u> Dated report documenting analysis results based on actual finished construction conditions provided by the certified HERS rater who performed the test.</p> <p><u>INFORMATION:</u> Air leakage can increase heating and cooling costs over 30% and contribute to comfort, health and safety problems. Finding hidden air leakage sites, called bypasses, can be difficult without the use of a blower door. This diagnostic equipment uses a fan to pressurize (force air into) or de-pressurize (force air out of) a building and allows the buildings leakage to be measured in terms of airleakage per cubic feet per minute (CFM).</p>		<p><i>Intended to give credit for exceeding the Prerequisite 4 requirement for air infiltration.</i></p>	<p>List of Certified raters at Residential Energy Services Network: www.natresnet.org</p> <p>Building America Technical Resources www.eere.energy.gov/buildings/building_america</p> <p>Diagrams of air sealing techniques in the Builder's Guide to Mixed Humid or Hot Humid Climates available from: www.eeba.org</p>
4 Must perform a blower door test and meet minimum standard of 0.15 cfm₅₀/sf of surface area or 1.5 ACH/50Pa	5		
<p><u>EXPECTED DOCUMENTATION:</u> Dated report documenting analysis results based on actual finished construction conditions provided by the certified HERS rater who performed the test.</p> <p><u>INFORMATION:</u> see Item 3 above.</p>		<p><i>Intended to give credit for exceeding the Prerequisite 4 requirement for air infiltration.</i></p>	<p>List of Certified raters at Residential Energy Services Network: www.natresnet.org</p> <p>Building America Technical Resources www.eere.energy.gov/buildings/building_america</p> <p>Diagrams of air sealing techniques in the Builder's Guide to Mixed Humid or Hot Humid Climates available from: www.eeba.org</p>

	Item	Pt	Intent	Resources
<i>Insulation and Framing</i>				
5	Rigid insulation installed as a thermal break at the slab edge (R5, 6" minimum, vertically installed). <u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector. <u>INFORMATION:</u> Slabs lose energy primarily as a result of heat conducted outward and through the perimeter of the slab. Insulating the edge of the slab can reduce winter heating bills by up to 10-20%. Slab insulation will not only save energy, but also improve comfort.	2	<i>Intended to give credit for creating a thermal break at the exterior bottom face of a wall.</i>	For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america
6	Provide rigid insulation under entire slab: Minimum R5 Minimum R8 <u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector. <u>INFORMATION:</u> An alternative to slab edge insulation is to create a contained or floating slab with interior foam insulation. This non-monolithic approach provides termite resistance since the insulation is sealed under and above the slab. Preventing termite problems is a key goal of any building, especially where a visual inspection of the foundation is not possible. Over the past decade, reports of termite infestations in homes with slab insulation have become more frequent. These pests tunnel undetected through the foam to gain access to the wood framing in the walls. Some insurance companies no longer guarantee homes with slab insulation against termite damage. Recent rulings by national code organizations prohibit installing foam insulation in contact with the ground in several Southern states.	2 3	<i>Intended to give credit for creating a thermal barrier between a concrete slab floor and underslab drainage material (washed stone, gravel base, etc.).</i>	For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america
7	Provide rigid insulation at minimum of 2ft from slab edge for the entire perimeter of the slab (minimum R5) <u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector. <u>INFORMATION:</u>	1	<i>Intended to give credit for creating a thermal barrier between a concrete slab floor and underslab drainage material (washed stone, gravel base, etc.).</i>	For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america
8	Insulated concrete or masonry basement walls (continuous floor to ceiling R13) <u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector. <u>INFORMATION:</u> Basement walls are covered on the interior or exterior (depending on insulation system used) from floor level to ceiling. For exterior method, it is advisable to insulate to the top of the wall footing. Care should be taken that a thermal break is not created at the top or bottom of the wall.	2	<i>Intended to give credit for creating a thermal barrier between the basement and the earth or air.</i>	For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america

	Item	Pt	Intent	Resources
9	<p>Insulated foundation walls with rigid R-10 foam insulation from footer to top of wall</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Foundation walls are covered on the exterior with permanent R-10 foam insulation from the top of the wall to the footing. Several product-types are appropriate for this application, with extruded polystyrene (XPS) and polyisocyanurate being two of the more common. EPS or “bead board” should not be used in exterior applications. One of the challenges with this application is protecting the section of insulation that is above-grade from UV degradation. Several products exist to suit this purpose, from self-adhering membranes to lengths of fiber-cement board. *Built Green Colorado checklist guide</p>	3	<p><i>Intended to give credit for creating a thermal barrier between the foundation wall and the earth or air.</i></p>	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p>
10	<p>Sealed crawl space as per NC Building Code</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party indicating compliance with accepted sealed crawlspace recommendations (www.crawlspaces.org) <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Sealed crawl spaces have been proven to reduce energy consumption as well as provide better moisture management in crawlspaces, ensuring improved building durability and indoor environmental quality. Review plans for with local building officials to ensure code compliance.</p>	5	<p><i>Intended to give credit for creating a dry, sealed and insulated crawl space.</i></p>	<p>For additional updated information: www.crawlspaces.org</p>
11	<p>Insulate framed floor over unconditioned space (insulation in continuous contact with subfloor; R21 Zones 6-7; R25 Zones 8-9, 11)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Framed floors over unconditioned space shall have continuous R21, or greater, insulation. Batt insulation shall be in direct and continuous contact with subfloor and supported at least every 18 inches. Spray Foam insulation, when installed to meet the local building code requirements, creates an air barrier as well as a thermal barrier.</p>	2	<p><i>Intended to give credit for increasing the floor’s thermal barrier between conditioned and unconditioned space.</i></p>	

	Item	Pt	Intent	Resources
12	<p>Framing Efficiency Package for wood stud construction with at least 4 of the following components (requires a framing inspection by a third party)</p> <ol style="list-style-type: none"> 1. Insulated headers, minimum R-10. 2. 2-stud corner with drywall clips or alternate framing detail. 3. Insulated framing corners 4. T-walls with drywall clips or alternative framing detail. 5. Insulated T-walls (exterior/interior wall intersection) 6. Window rough openings eliminate jack stud. 7. Non-structural headers in exterior non-load bearing walls. 8. Non-load bearing wall studs @ 24-in. centers. 9. Single top plate with stacked (in-line) framing. 10. Reduced framing, interior partitions (24. O.C. studs at interior non-bearing walls). <p><u>EXPECTED DOCUMENTATION:</u> Inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u></p> <ol style="list-style-type: none"> 1. Insulated headers, minimum R-10. Exterior walls with headers (over window and door openings) shall be framed with at least ½ inch of rigid foam insulation between the 2x members. Other methods of achieving insulated headers, such as boxed headers with insulation batts or structural insulated panel headers, are also acceptable. 2. Insulated framing corners. The intersecting corner of two outside walls shall be framed so that insulation is continuous in the external wall (corners with unnecessary 2x4's are not permitted). A "California corner" is a method of achieving this. 3. Insulated T-walls (exterior/interior wall intersection). The intersection of an interior wall and an exterior (outside) wall shall be framed so that insulation is continuous in the exterior wall. An example of this type of framing is called a "ladder" intersection. 4. Window rough openings eliminate jack stud. Exterior framing shall not include jack studs to support header(s) in load bearing walls. Structural hangers, structural insulated panel headers or other support as required by the local building code shall be used. 5. Non-structural headers in exterior non-load bearing walls. Non-load bearing walls shall not have structural window and door headers. * Earthcraft House Guide to checklist 6. 2-stud corner with drywall clips or alternate framing detail. Corner framing shall eliminate non-structural studs and allow for full corner insulation through the use of drywall clips, horizontal nailers, or other means to support drywall.*Earthcraft House Guide to checklist 7. T-walls with drywall clips or alternative framing detail. The intersection of exterior and interior walls shall eliminate non-structural studs and allow for increased exterior wall insulation area and coverage through the use of drywall clips or other alternative techniques. 8. Non-load bearing wall studs @ 24-in. centers. All non-load bearing exterior walls shall be framed with wood stud walls at 24 in. on center to allow for increased insulation area and coverage. 9. Single top plate with stacked (in-line) framing. Center of roof rafters and ceiling joists or trusses shall align within 1 inch of exterior wall studs such that a single top plate can transfer loads to the wall framing increase insulation coverage. May require review by Structural engineer, architect or other design professional, particularly in complex designs. 10. Reduced framing, interior partitions (24. O.C. studs at interior non-bearing walls). All non-load bearing interior walls shall be framed with wood stud walls at 24 in. on center. 	5	<p><i>Intended to give credit for using framing techniques that allow more areas for insulation to be installed as a thermal barrier.</i></p>	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p> <p>Diagrams of Efficient Framing in the Builder's Guide to Mixed Humid or Hot Humid Climates available from: www.eeba.org</p>

	Item	Pt	Intent	Resources
13	<p>R-2.5 or better insulated exterior wall sheathing on 75% or more exterior wall area.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party indicating 75% required coverage <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> The sheathing for exterior walls shall be equal to or greater than R2.5. Sheathing shall be installed with no gaps larger than 0.25 inch and provide complete coverage except for where structural sheathing is required by code (maximum of 25%).*Earthcraft House Guide to checklist</p>	3	<p><i>Intended to give credit for providing increased insulation used as a thermal break over the wall studs.</i></p>	<p>For technical bulletins and climate specific building envelope details and best practices go to:http://www.eere.energy.gov/buildings/building_america/</p>
14	<p>Exterior wall stud cavities insulated (R19 Zones 6-7; R21 Zones 8-9, 11)</p> <p><u>EXPECTED DOCUMENTATION:</u> Inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Insulation between stud cavities in exterior walls shall be equal to or greater than R19 based on the NC climate zone in which the home is built.. Insulation shall be installed according to manufacturer's specifications and provide complete coverage and full contact with the air barrier.</p>	3	<p><i>Intended to give credit for increasing the thermal barrier of exterior walls' between conditioned and unconditioned space, above the amount required in the NC Building Code.</i></p>	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p>
15	<p>Pre-cast Autoclaved Aerated Concrete used as exterior wall material. (R10 minimum/use 10" thickness)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Autoclaved aerated concrete blocks are solid blocks composed of cement, sand, lime, and an aerating agent, which is baked in an autoclave oven. The result is a very lightweight insulated concrete product. Blocks and panels are stacked similar to bricks and held together with adhesive* type latex based thin set mortar.</p>	5	<p><i>Intended to give credit for using an alternative structural wall system that incorporates virtually continuous insulation.</i></p>	<p>AAC Details and Discussion (PATH) www.toolbase.org/Technology-Inventory/Foundations/autoclaved-aerated-concrete</p> <p>Autoclaved Aerated Concrete Products Association www.aacpa.org/</p>
16	<p>Insulated Concrete Form wall system (R20 minimum)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Insulated concrete forms are a family of exterior wall systems that provide the strength of structural concrete walls with the thermal performance of integral insulation and high thermal mass. Generally a Styrofoam form is filled with poured concrete.</p>	6	<p><i>Intended to give credit for using an alternative structural wall system that incorporates virtually continuous insulation.</i></p>	<p>ICF Details at Discussion (PATH) www.toolbase.org/Technology-Inventory/walls/Insulating-Concrete-Forms</p> <p>Insulating Concrete Forms Association www.forms.org</p>

	Item	Pt	Intent	Resources
17	<p>Structural Insulated Panels:</p> <p>Roof (R30 minimum)</p> <p>Floor (R25 minimum)</p> <p>Exterior walls (R14 minimum)</p> <p>Exterior walls (R20 minimum)</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Structural Insulated Panels (SIP's) consist of two (outer) layers of oriented strand board and foam core, ranging from 2 to 12 inches thick. They can be used to build exterior walls, roofs, and floors. To receive points SIP walls must be elevated minimum 24" above soil grade and use Molded Expanded Polystyrene (MEPS) type foam* treated with borates or other non-ozone depleting alternative blowing agent; provide code compliance data for SIP panel (not just its components).</p>	3 4 4 6	Intended to give credit for using an alternative structural wall system that incorporates virtually continuous insulation.	<p>SIPS Guidelins from Energy Star www.energystar.gov/ia/partners/downloads/SIP_Guidelines.pdf</p> <p>Structural Insulated Panel Association www.sips.org</p>
18	<p>Energy (raised) heels of 6" or more on trusses to provide for proper insulation installation over top plates</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Raised heel or cantilever trusses must allow at least 6 inches of insulation to be placed without compression at the top plate of the exterior wall. A truss qualifies as long as there is room for 6 inches of insulation at the top plate. Additional sheathing and siding is required with raised heel trusses.</p>	2	Intended to give credit for providing continuous and consistent insulation for the entire ceiling area, including the area above the wall structural system.	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p>
19	<p>Flat ceilings (R38-Zones 6-7 where R-30 required; R42 Zones7-8 where R-38 required; R48 Zones 9,11)</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Ceilings with unconditioned attic space above shall have complete coverage of attic insulation equal to or greater than R38 (see zone requirements above). A maximum of 5% of ceiling area shall be R25 or greater to accommodate elevated attic flooring for storage and mechanical equipment.</p>	2	Intended to give credit for increasing the level of insulation in the roof/ceiling area above the prescriptive or performance code requirements.	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p>
20	<p>Vaulted and tray ceilings (R38-Zones 6-7 where R-30 required; R42 Zones7-8 where R-38 required; R48 Zones 9,11)</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Vaulted, tray, or cathedral ceilings shall be insulated to R38 or greater (see zone requirements above).</p>	2	Intended to give credit for increasing the level of insulation in the roof/ceiling area above the prescriptive or performance code requirements.	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p>

	Item	Pt	Intent	Resources
21	<p>Attic kneewall stud cavities insulated with either R19 (2x6 studs) with air barrier toward attic or R13 with R2.5 or better sheathing towards attic</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u></p>	3	<p><i>Intended to give credit for properly insulating and air sealing vertical kneewalls in the attic area that separate conditioned from unconditioned space.</i></p>	
22	<p>Attic kneewall stud cavities insulated with R13 with R5 sheathing towards attic</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u></p>	4	<p><i>Intended to give credit for properly insulating and air sealing vertical kneewalls in the attic area that separate conditioned from unconditioned space.</i></p>	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p>
23	<p>Install attic ceiling radiant heat barrier facing attic space</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough if visible Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> A radiant heat barrier must be installed over at least 80% of the vented attic space. The radiant barrier must have a reflective surface facing down and have an emissivity rating of 0.05 or less elevated attic flooring for storage or mechanical equipment.</p>	2	<p><i>Intended to give credit for properly installing a radiant barrier in an attic.</i></p>	<p>For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america</p>
24	<p>Water heater with insulating blanket installed to water heater manufacturer's specifications</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Significant energy loss with hot waterheater tanks is through thermal losses associated with the tank. Increasing insulation, when appropriate , can improve the energy efficiency of the tank.</p>	1	<p><i>Intended to give credit for increasing the thermal performance of the hot water heater</i></p>	

	Item	Pt	Intent	Resources
25	<p>Insulate hot water pipes to R-4 in unconditioned spaces</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough if visible Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> All hot water piping (including that which is buried) must be insulated with a minimum of ½ ” insulation. In order to receive the 2 points, a photo of the buried insulated lines must be available or a receipt for the appropriate amount of pipe insulation must be provided.* FGBC Green Home Designation Standard Reference Guide</p>	2	Intended to give credit for reducing the loss of thermal energy used to heat water.	For technical bulletins and climate specific building envelope details and best practices: www.eere.energy.gov/buildings/building_america
<i>Windows and Doors</i>				
26	<p>Low-E windows NFRC rated U value of .40 or less minimum 75% of units</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough or inspection by approved NC HBH inspector; <i>NFRC Energy Performance sticker MUST REMAIN INTACT on window for inspection in order to receive points.</i></p> <p><u>INFORMATION:</u> Windows shall have a minimum of two glazing layers and the inner surface of one layer shall contain a low emissivity (low e) coating. The U-factor rating can be found on the NFRC Energy Performance sticker, usually adhered to the window. Sticker must be left on the window so that appropriate U-factor can be verified by approved NC HBH inspector.</p>	1	Intended to give credit for providing windows with a lower u-value than currently required by code.	<p>National Fenestration Research Council www.nfrc.org</p> <p>Energy Efficient Window Collaborative www.efficientwindows.org/nfrc.cfm</p>
27	<p>Low-e windows NFRC rated U value of .32 or less, 75% of units</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough or inspection by approved NC HBH inspector; <i>NFRC Energy Performance sticker MUST REMAIN INTACT on window for inspection in order to receive points.</i></p> <p><u>INFORMATION:</u> See item #27</p>	2	Intended to give credit for increasing the window u-value.	<p>National Fenestration Research Council www.nfrc.org</p> <p>Energy Efficient Window Collaborative www.efficientwindows.org/nfrc.cfm</p>
28	<p>Exterior doors (includes door to garage) insulated to R5, or greater</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> All exterior doors, including doors to the garage, but not including sliding glass doors, should be insulated to R-5 or better. Most insulated (foam core) fiberglass and metal exterior doors qualify for this point. * Built Green Colorado checklist guide</p>	2	Intended to give credit for providing doors that reduce energy losses.	<p>National Fenestration Research Council www.nfrc.org</p>
29	<p>10 year warranty on all insulated glazing</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Insulated glazing units for exterior windows and doors shall have a minimum 10-year manufacturer's warranty against sealed glass failure. Warranty documentation must be provided to the home buyer.* *Earthcraft House Guide to checklist</p>	1	Intended to give credit for showing proof that the manufacturer backs the life of the installed product.	<p>National Fenestration Research Council www.nfrc.org</p> <p>Energy Efficient Window Collaborative www.efficientwindows.org/nfrc.cfm</p>

Comfort Systems (Minimum Points: 18)

[Back](#)

Item	Pts	Intent	Resources													
<i>Passive Solar Heating and Cooling Strategies</i>																
<p>1 One Ceiling fan per 750 ft² of conditioned space (each sized appropriately for the space) (no more than 5 fans required)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Locate fans over areas where groupings of people are expected. In the summer, moving air with ceiling fans allows building occupants to feel comfortable at higher temperatures, typically 2 to 4 °F higher. In the winter, the warmest air naturally raises and collects near the ceiling. A ceiling fan can push this warmer air down to the living level people. Look for Energy Star fans to assure you have an energy efficient fan. In a standard room with 8' ceilings, a ceiling fan should have a minimum clearance of ten inches between ceiling and fan to provide adequate ventilation. In rooms with higher ceilings, fans should be mounted 7.5 to 8.0 feet above the floor. See the table below for help determining the proper size of fan.</p> <p>Summer Operation: Set thermostat temperature higher. Turn fans off when the last person leaves the room.</p> <p>Winter Operation: Set fans to the lowest speed so there will be no wind chill effect and flip the switch on the fan to winter mode (which runs the fan clockwise); this allows the ceiling fan to push warm air down from the ceiling without blowing directly on anyone.</p>	<p>1</p> <p><i>Intended to give a project credit for providing a strategy that will encourage the building owners to use less heating and cooling energy by changing thermostat settings while maintaining comfort levels.</i></p>	<p>Energy Star Ceiling Fan Information: www.energystar.gov/index.cfm?c=ceiling_fans.pr_ceiling_fans</p> <table border="1" data-bbox="1495 397 1984 706"> <thead> <tr> <th colspan="2">Ceiling Fan Sizes</th> </tr> <tr> <th>Largest Room Dimension</th> <th>Minimum Fan Diameter (inches)</th> </tr> </thead> <tbody> <tr> <td>12 feet or less</td> <td>36</td> </tr> <tr> <td>12 – 16 feet</td> <td>48</td> </tr> <tr> <td>16 – 17.5 feet</td> <td>52</td> </tr> <tr> <td>17.5 – 18.5 feet</td> <td>56</td> </tr> <tr> <td>18.5 or more feet</td> <td>2 fans</td> </tr> </tbody> </table>	Ceiling Fan Sizes		Largest Room Dimension	Minimum Fan Diameter (inches)	12 feet or less	36	12 – 16 feet	48	16 – 17.5 feet	52	17.5 – 18.5 feet	56	18.5 or more feet	2 fans
Ceiling Fan Sizes																
Largest Room Dimension	Minimum Fan Diameter (inches)															
12 feet or less	36															
12 – 16 feet	48															
16 – 17.5 feet	52															
17.5 – 18.5 feet	56															
18.5 or more feet	2 fans															
<p>2 Provide overhang, between one and two feet above south windows, minimum depth as follows below (may include gutter as part of the overhang):</p> <p>Mountain region: 1'-8" Piedmont region: 2'-0" Coastal region: 2'-4"</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Fixed overhangs are an inexpensive feature, and require no operation by the home owner. Proper overhangs above the south windows will shade the entire window from midday sun in the summer yet expose the full window to the warming winter sun. Homes in warm climates will benefit from larger overhangs that provide good window shade into spring and fall. Homes in cooler climates will benefit from slightly smaller overhangs that will limit the shading on the south windows in early and late winter. To achieve the desired performance, overhangs must be sized as specified based on your climate, as determined by your region of the state. The lengths provided in this item assume the windows are no more than 6' tall. For windows over 6' tall refer to more detailed overhang design information in the NC Solar Center Passive Solar Design Checklist resource. It is important to provide an overhang for each level of the home so that all south windows are properly shaded in the summer.</p>	<p>3</p> <p><i>Intended to give a project credit for providing fixed shading over the south windows.</i></p>	<p>NC Solar Center Passive Solar Design Checklist: www.ncsc.ncsu.edu/information_resources/factsheets/PassiveDesignChecklist.pdf</p> <p>Online graphic overhang design tool by Susdesign: www.susdesign.com/overhang/</p>														

Item	Pts	Intent	Resources
<p>3 Strategies to reduce heat gain and/or heat loss, such as exterior-mounted sunscreens, operable insulated window coverings, or operable awnings</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> A house can achieve a large unwanted solar heat gain during the non-winter morning and early evening hours as the sun rises and sets. At these times the sun is not necessarily shaded by fixed overhangs above the windows because of the angle of the sun, but other simple devices can be used to block the solar heat gain at these times. Strategies that reduce unwanted solar heat gain in late spring, summer, and early fall can reduce air conditioning costs and improve indoor comfort. Strategies can include but are not limited to:</p> <ul style="list-style-type: none"> • External sun screens – block solar gain and look similar to regular insect screens • Awnings that can be operated to block unwanted solar gain • Porches to shade the home and windows • Operable insulated window coverings <p>On winter nights when windows are not used for views or to collect solar heat gain, they lose a lot of heat. Operable, insulated window coverings can greatly reduce these heat losses through windows in the wintertime.</p>	5	<p><i>Intended to give a project credit for providing moveable exterior insulation or shading designed appropriately for the direction the window faces.</i></p>	<p>NC Solar Center Factsheet on Summer Window Shading and Window Insulation: www.ncsc.ncsu.edu/information_resources/factsheets/03shading.pdf</p>
<p>4 Home orientation allows solar heating (long dimension faces w/in 20 degrees East or West of solar south) and reduces overheating potential</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Passive solar collection occurs on the south facing side of a home. By orienting a home so that its long dimension faces true south (not magnetic south) the amount of area for solar collection is maximized. When glazing is oriented more than 20 degrees off true south, not only is winter solar performance reduced, but summer air conditioning loads increase. The ideal orientation for solar glazing is within 5 degrees of true south to provide maximum performance. Glazing oriented to within 20 degrees of true south will perform almost as well. In general, southeast orientations present less of a problem than southwest. When applying for Passive Solar Tax Credits in NC this orientation must be with 15 degrees of solar south for new construction and 20 degrees of solar south for retrofits.</p>	7	<p><i>Intended to give a project credit for orienting a home to take advantage of passive and active solar technologies, currently or in the future.</i></p>	<p>Find the difference between magnetic south and true south for your zip code: www.ngdc.noaa.gov/seg/geomag/jsp/Declination.jsp</p> <p>See list of downloadable tax forms and instructions in left column (NC Solar Center): www.ncsc.ncsu.edu/information_resources/publications.cfm</p>

Item	Pts	Intent	Resources
<p>5 East facing glazing less than 3% of total conditioned floor area</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough or approved by NC HBH inspector on site</p> <p><u>INFORMATION:</u> East facing glazing area can equal no more than 3% of the floor area. East windows catch the morning sun. Because the sun rises much further south in the winter than in the summer, east facing windows get much more summer sun than winter sun. This imbalance means that east windows are not able to provide significant energy in the winter, but collect enough solar energy in the summer to cause the home's air conditioner to work much harder. This has the potential to cause overheating problems. There are few shading systems that will be effective enough to offset the potential for overheating from a large east-facing window. East windows should use glass with a low solar heat gain coefficient (SHGC) to limit solar heat gain. If the views or other elements in the house's design dictate many east windows, shading should be designed with particular care.</p>	2	<p><i>Intended to give a project credit for reducing heat gain on the eastern face of the home.</i></p>	<p>See passive solar resources in item # 8</p> <p>Efficient Windows Collaborative: www.efficientwindows.org/</p>
<p>6 West facing glazing less than 2% of total conditioned floor area</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough or approved by NC HBH inspector on site</p> <p><u>INFORMATION:</u> West facing glazing area can equal no more than 2% of the floor area. West windows catch the afternoon sun. Because the sun sets much further south in the winter than in the summer, west facing windows get much more summer sun than winter sun. This imbalance means that west windows are not able to provide significant energy in the winter, but collect enough solar energy in the summer to cause the home's air conditioner to work much harder. This has the potential to cause overheating problems. West windows are more problematic than east windows because the outdoor temperatures are much higher in the afternoons when the west windows receive the most sunlight. There are few shading systems that will be effective enough to offset the potential for overheating from a large west-facing window. West windows should use glass with a low solar heat gain coefficient (SHGC) to limit solar heat gain. If the views or other elements in the house's design dictate many west windows, shading should be designed with particular care.</p>	2	<p><i>Intended to give a project credit for reducing heat gain on the western face of the home.</i></p>	<p>See passive solar resources in item # 8</p> <p>Efficient Windows Collaborative: www.efficientwindows.org/</p>
<p>7 South facing glazing between 6-7% of total conditioned floor area</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough or approved by NC HBH inspector on site</p> <p><u>INFORMATION:</u> In a conventional house about 25% of the windows face south, which amounts to about 3% of the house's total floor area. In a suntempered house, the percentage is increased to a maximum of about 7% of the floor area. Suntempering systems are a very low cost strategy, using no additional thermal mass beyond that which is already in the drywall, framing, and furnishings of a typical house. As would be expected, energy savings are more modest than full passive solar design. Above this 7% limit, thermal mass material such as a 4" thick concrete floor must be added to prevent the house from overheating during the day.</p>	5	<p><i>Intended to give a project credit for creating a suntempered passive solar design that meets the requirements of the NC Passive Solar Tax credits for a suntempered design</i></p>	<p>See passive solar resources in item # 8</p>

Item	Pts	Intent	Resources
<p>8 Passive solar heating:</p> <p>20% of heating needs provided through passive solar design</p> <p>35% of heating needs provided through passive solar design</p> <p>50% of heating needs provided through passive solar design</p> <p><u>EXPECTED DOCUMENTATION:</u></p> <p>Final walkthrough</p> <p>Copy of calculations indicating the contribution of the passive solar system to the homes heating requirement. Calculation worksheets for your region available upon request.</p> <p><u>INFORMATION:</u></p> <p>The solar contribution to the home's heating requirement can be calculated using an approved design tool such as the Sustainable Buildings Industries Council (SBIC) BuilderGuide worksheets (available upon request for your region from the HBH program) or Energy-10 software. Passive solar heating can be a simple and low cost method to provide significant renewable energy to a home. By placing most of the home's windows on the south side of the home, using proper window overhangs, and providing adequate thermal mass (concrete, brick, or tile for example) the heating costs for a home can be greatly reduced. See the resources for more information on passive solar design.</p>	<p></p> <p>10</p> <p>15</p> <p>20</p>	<p><i>Intended to give a project credit for creating a passive solar heating system that meets the NC Passive Solar Tax credit requirements for a direct gain or sunspace design.</i></p>	<p>NC Solar Center Factsheet on Summer Window Shading and Window Insulation: www.ncsc.ncsu.edu/information_resources/factsheets/03shadng.pdf</p> <p>Energy-10 www.sbicouncil.org/store/e10.php</p> <p>ASU affordable passive solar designs: www.tec.appstate.edu/construction/APSplanbook%20WEB%20PAGE/Index.htm</p>
<p>Mechanical Comfort Systems</p>			
<p>9 Duct blaster test indicates leakage of less than 3% of the home's heated square footage when measured in CFM / 25Pa of leakage</p> <p><u>EXPECTED DOCUMENTATION:</u></p> <p>Copy of duct leakage test results provided by certified Home Energy Rater who performed the test.</p> <p><u>INFORMATION:</u></p> <p>Duct leakage can reduce the heating and cooling efficiency of a forced air HVAC system by as much as 30%. Unbalanced duct leakage cause pressure imbalances in the home which can lead to major indoor air quality problems and put an increased strain on the heating and cooling system. To properly seal ducts, all transverse seams in supply and return ducts, including supply and return plenums and leakage sites in the air handler, should be sealed with duct mastic. Duct tape is not a suitable sealant for ducts, but may be used for sealing leakage sites at the air handler's removable access panels and at filter access panels. The leakiness of a duct system is tested via a duct blaster test. A minimum leakage rate must be met in order to qualify as an Energy Star home. This item gives credit for exceeding the minimum specified by Energy Star.</p>	<p>5</p>	<p><i>Intended to give a project credit for the installation of substantially leak free air distribution systems.</i></p>	<p>Ductwork questions and answers from Southface: www.southface.org/web/resources&services/publications/factsheets/2duct_q&a.pdf</p> <p>Better Duct Systems for Heating and Cooling (DOE): www.eere.energy.gov/buildings/building_america/pdfs/30506_better_ducts.pdf</p>
<p>10 Ducts located within thermal envelope. (min. 90%)</p> <p><u>EXPECTED DOCUMENTATION:</u></p> <p>Final walkthrough</p> <p><u>INFORMATION:</u></p> <p>Typically ducts are run in unconditioned spaces. These spaces often contain very hot or cold, and sometimes very humid, air. This situation increases unwanted heat loss and heat gain to the outside and maximizes the negative effects of any duct leakage. By placing at least 90% of all supply and return ducts within conditioned space, the unwanted heat loss and heat gain from the ducts to outside of the home is almost eliminated and the negative effects of any duct leakage is minimized. Thus, having the ducts in within the thermal envelope reduces the energy required for the heating and cooling of the home.</p>	<p>4</p>	<p><i>Intended to give a project credit for minimizing energy consumption by the conductive heat losses being in conditioned space.</i></p>	<p>Better Duct Systems for Heating and Cooling (DOE): www.eere.energy.gov/buildings/building_america/pdfs/30506_better_ducts.pdf</p> <p>Ducts in conditioned space (PATH): http://toolbase.org/TechInventory/TechDetails.aspx?ContentDetailID=762&BucketID=6&CategoryID=6</p>

Item	Pts	Intent	Resources
<p>11 Duct system sized, designed, and installed in accordance with latest ANSI/ACCA Manual D</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Proper duct system design is important to achieve the desired heating and cooling from an HVAC system. Ductwork design shall comply with the ANSI/ACCA Manual D guidelines.</p>	3	<p><i>Intended to give a project credit for properly designed air distribution system.</i></p>	<p>Air Distribution System Design (PATH): www.toolbase.org/Building-Systems/HVAC/good-duct-design</p>
<p>12 No building cavity used as part of forced-air distribution system</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> It is virtually impossible to adequately seal building cavities used as air ducts. When building cavities are used as return ducts they will often pull in air from unconditioned spaces. When used as part of the supply line they will leak conditioned air to the outside. Not only does this increase the energy required to heat or cool a home, it may contribute to the depressurization of the home thereby potentially increasing the indoor air pollutants and unplanned air infiltration.</p>	2	<p><i>Intended to give a project credit for avoiding building assemblies as part of the air distribution system.</i></p>	<p>Air Distribution System Design (PATH): www.toolbase.org/Building-Systems/HVAC/good-duct-design</p>
<p>13 Airflow measured and balanced within 10% of ACCA Manual J room by room load calculations</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> ACCA Manual J calculations specify the flow rate of conditioned air to each room needed to meet the heating and cooling load of that room. To receive credit for this item the airflow to each room must be measured to be within 10% of the airflow requirement determined by the Manual J calculations. If initial measurements are not within 10% of Manual J calculations, the system must be adjusted/balanced until the airflow from each room is measured to be within 10% of Manual J calculations.</p>	3	<p><i>Intended to give a project credit for properly installed air distribution system.</i></p>	<p>ACCA Manual J Residential Design Center: www.acca.org/tech/manualj/</p>
<p>14 No ducts in exterior walls or vaulted ceilings</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> There are several reasons why placing ducts in exterior walls should be avoided. Ducts in exterior walls displace wall insulation, are exposed to more extreme temperatures which leads to greater heat loss, and typically require longer duct runs. To receive credit for this item, no supply or return ducts, boots, or registers may be located in exterior walls. This includes vaulted ceilings and insulated walls between conditioned and unconditioned space such as the common wall between the garage and the rest of the house.</p>	3	<p><i>Intended to give a project credit for avoiding duct locations that increase the risk of condensation and heat loss.</i></p>	<p>Air Distribution System Design (PATH): www.toolbase.org/Building-Systems/HVAC/good-duct-design</p>

Item	Pts	Intent	Resources
<p>15 Ducts outside conditioned space insulated to a minimum of R-8 (supply) or R-4 (return)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough, where visible. Signature of Responsible party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> When ducts are located outside of conditioned space they undesirably either gain or loss heat to the air in the unconditioned space. This includes ducts in cantilevers, exterior walls, and garage ceilings. The amount of energy wasted can be greatly reduced by properly insulating all ducts outside conditioned space.</p>	2	<p><i>Intended to give a project credit for installation of air distribution systems that will minimize thermal losses over the life of the system.</i></p>	<p>Energy Star fact sheet on duct insulation: www.energystar.gov/ia/home_improvement/home_sealing/DuctInsulationFS_2005.pdf</p>
<p>16 Transfer air grills or insulated jump-ducts or return-air ducts are provided in every bedroom</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough, where visible. Signature of Responsible party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Closing off rooms that have a supply-air duct but no return-air duct, or other clear return flow path, can create positive air pressure in the affected rooms and starve the HVAC system for return air, forcing the system to take air from unintended sources (attics, crawl spaces, flues). This situation most often occurs in bedrooms. The results of this situation are decreased heating and cooling system efficiency and increased risk of drawing in indoor air pollutants. The solution to this problem is to provide the air in a room that can be closed off a clear path to a return grill. This can be done with the installation of transfer air grills or insulated jump-ducts. Alternatively a return grill could be placed in each of these rooms. When using transfer grills, privacy can be maintained by offsetting low and high grills in the bedroom wall. Houses with undercut doors are not acceptable for points at this time.</p>	2	<p><i>Intended to give a project credit for air pressure balancing of air distribution systems.</i></p>	<p>Better Duct Systems for Heating and Cooling (DOE): www.eere.energy.gov/buildings/building_america/pdfs/30506_better_ducts.pdf</p> <p>Air Distribution System Design (PATH): www.toolbase.org/Building-Systems/HVAC/good-duct-design</p>
<p>17 Rigid metal supply plenum</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough or approved by NC HBH inspector on site</p> <p><u>INFORMATION:</u> To receive credit for this item a substantial rigid metal supply plenum shall supply multiple take-offs with supply air. An “octopus” system with all duct runs originating at a small supply plenum is not acceptable. See the provided resources for more information on proper duct design, including the use of a rigid metal supply plenum.</p>	2	<p><i>Intended to give a project credit for durable air distribution system components.</i></p>	<p>Better Duct Systems for Heating and Cooling (DOE): www.eere.energy.gov/buildings/building_america/pdfs/30506_better_ducts.pdf</p> <p>Air Distribution System Design (PATH): www.toolbase.org/Building-Systems/HVAC/good-duct-design</p>

Item	Pts	Intent	Resources
<p>18 Ductless Heating/Cooling system designed and installed to meet building heating and cooling load as per ANSI/ACCA Manual J; equipment installed must be w/in 6000 btu's of calculations</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough (note existence and operation of visible components) Signature of Responsible Party indicating ductless system has been installed as designed and that the building envelope has not been compromised and that a copy of operation and maintenance instructions will be provided by builder to homeowner.</p> <p><u>INFORMATION:</u> Ductless heating and cooling systems avoid the potential issues and inefficiencies of ducts and can provide many years of good service if they are designed, operated, and maintained properly. Two possible ductless systems are through-the-wall units (mini-split systems) that are well sealed and radiant floor heating without air conditioning, although other types of systems are possible. Most ductless systems are two- or four-pipe systems with a fan coil unit to provide the heating, cooling, and distribution of air.</p> <p>The main point to consider in the role of ductless systems is indoor air quality. The building envelope must not be compromised by installation and humidity in the home must be dealt with in order to avoid mold and mildew problems. Dampers on through-the-wall units require maintenance because they can jam and be rendered inoperable. It is important to note that chilled-water pipes that run through a building can sweat, which is a problem that can go largely unseen.</p>	10	<p><i>Intended to give a project credit for innovative systems and high performance homes that avoid the need for central HVAC and/or air distribution at all.</i></p>	<p>Ductless (mini-split) heat pump system overview (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=137</p> <p>A consumers guide to ductless (mini-split) systems (DOE): www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12630</p> <p>Radiant Floor system overview (when not installed in slab) (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=108</p> <p>A consumer's guide to radiant floor heating (DOE): www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12590</p>
Controls			
<p>19 Programmable thermostat (with written instructions and demonstration given to homeowner)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough Signature of Responsible Party</p> <p><u>INFORMATION:</u> A programmable thermostat will allow at least day and night settings. Some models offer more than two programmed temperature settings per day which can offer an increased degree of control and savings. A programmable setback thermostat can save a significant amount of energy when properly used (approximately 1% percent savings for each degree setback). The thermostat must be able to operate the fan independently of additional heating or cooling systems if the air handler is used to provide ventilation to the home. Providing clear instructions, or demonstrating its operation, to the homeowners will help ensure proper operation.</p>	1	<p><i>Intended to give a project credit for providing programmable controls that maximize the systems potential for comfort control.</i></p>	<p>Overview of programmable thermostats (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=282</p>

Item	Pts	Intent	Resources
<p>20 Controls to provide separate heating and/or cooling to multiple zones from a single system. (with written instructions and demonstration given to homeowner)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party</p> <p><u>INFORMATION:</u> Zoned heating and/or cooling systems send heating and/or cooling to only the rooms calling for conditioning. Savings will be realized only if zones are properly adjusted for the conditions of the room (occupancy, appropriate comfort levels, etc.). Hydronic heating systems make particularly efficient use of zoning. An attic furnace serving the upper floors of a home may qualify for this point.</p>	3	<p><i>Intended to give a project credit for mechanical system design that maximizes comfort and efficiency by serving only those area that require conditioning.</i></p>	<p>HVAC 'smart' zoning controls (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=185</p>
Equipment			
<p>21 Furnace at least 90% efficient</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough or approved by NC HBH inspector on site</p> <p><u>INFORMATION:</u> The heating system efficiency (AFUE) must be at least 90 percent. In order to reach this level of efficiency a gas furnace must collect the heat in the exhaust gases to the point that the exhaust cools enough to condensate the water vapor produced in the combustion process (a condensing furnace). The AFUE rating for a condensing unit can be much higher (by more than 10 percentage points) than a non-condensing furnace. Although condensing units cost more than non-condensing units, the condensing unit can save you money in fuel costs over the 15- to 20-year life of the unit, and is a particularly wise investment in cold climates. Condensing furnaces are much less likely to suffer from corrosion caused by condensation in the unit or its flue and chimney. These models typically exhaust through a plastic pipe that exits through a side wall, and do not use the chimney.</p> <p>Furnaces can reach even higher AFUE by modulating their firing rates (and distribution fan speed) to reflect the actual energy needs of a home as a function of current weather conditions. Since the distribution fan runs for a greater part of the heating season, a good quality filter can be employed to contribute to enhanced indoor air quality with this system. It is important to also be aware that longer fan run times amplify any problems that may exist in the duct system.</p>	6	<p><i>Intended to give a project credit for installing furnaces that exceed minimum efficiency standards.</i></p>	<p>Consumer guide to furnaces and boilers: www.aceee.org/consumerguide/topfurn.htm</p> <p>Consumer guide to furnaces and boilers (DOE): www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12530</p> <p>Modulating furnace overview (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=259</p>
<p>22 Boiler at least 87% efficient</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough or approved by NC HBH inspector on site</p> <p><u>INFORMATION:</u> The heating system efficiency (AFUE) must be at least 87 for boilers. In order to reach this level of efficiency a gas boiler must collect the heat in the exhaust gases to the point that the exhaust cools enough to condensate the water vapor produced in the combustion process (a condensing furnace). See item above on 90% AFUE furnace and resources provided for more information.</p>	6	<p><i>Intended to give a project credit for installing boilers that exceed minimum efficiency standards.</i></p>	<p>Consumer guide to furnaces and boilers: www.aceee.org/consumerguide/topfurn.htm</p> <p>Consumer guide to furnaces and boilers (DOE): www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12530</p>

Item	Pts	Intent	Resources
<p>23 SEER 14 or higher cooling equipment (min 75% of conditioned space)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough or approved by NC HBH inspector on site</p> <p><u>INFORMATION:</u> Central air conditioners are rated according to their seasonal energy efficiency ratio (SEER). SEER indicates the relative amount of energy needed to provide a specific cooling output. Many older systems have SEER ratings of 6 or less. The minimum SEER for air conditioners manufactured today is 13.</p>	3	<p><i>Intended to give a project credit for air conditioning equipment that exceeds minimum efficiency standards.</i></p>	<p>Consumers guide to central air conditioners (DOE): www.eere.energy.gov/consumer/your_home/spac_e_heating_cooling/index.cfm/mytopic=12440</p>
<p>24 HSPF 8.5 or higher heat pump (min 75% of conditioned space)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough or approved by NC HBH inspector on site</p> <p><u>INFORMATION:</u> Heating efficiency for air-source electric heat pumps is indicated by the heating season performance factor (HSPF), which is the ratio of the seasonal heating output in Btu divided by the seasonal power consumption in watts. The Heating Season Performance Factor (HSPF) rates both the efficiency of the compressor and the electric-resistance elements. In September 2006, the new standard for central heat pumps limited heat pumps to a minimum HSPF of 7.7. In warmer climates, SEER is more important than HSPF; in colder climates, focus on getting the highest HSPF feasible.</p>	3	<p><i>Intended to give a project credit for heat pumps that exceed minimum efficiency standards.</i></p>	<p>Consumer guide to air-source heat pumps (DOE): www.eere.energy.gov/consumer/your_home/spac_e_heating_cooling/index.cfm/mytopic=12620</p>
<p>25 Outdoor thermostat for heat pump</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough or approved by NC HBH inspector on site</p> <p><u>INFORMATION:</u> In any climate, installing an outdoor thermostat for an air source heat pump set at 32°F or 34°F prevents the heat strips from activating unless outdoor temperatures fall lower. This increases the heating seasonal performance factor of the system by limiting the amount of time the system must relay on the much less efficient back-up resistance heating elements to provide heat to the home.</p>	2	<p><i>Intended to give a project credit for heat pumps that exceed minimum efficiency standards.</i></p>	<p>Specification of Energy-Efficient Installation and Maintenance Practices for Residential HVAC Systems (Consortium for Energy Efficiency): www.cee1.org/resid/rs-ac/hvac1-36.pdf</p>
<p>26 Air handler located within conditioned space (all units)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough or approved by NC HBH inspector on site</p> <p><u>INFORMATION:</u> All air handlers must be located within conditioned space to receive credit for this item. Vented combustion closets are not considered conditioned space.</p>	2	<p><i>Intended to give a project credit for increasing access for maintenance and service by locating the air handler in a conditioned space.</i></p>	<p>Better Duct Systems for Heating and Cooling (DOE): www.eere.energy.gov/buildings/building_america/pdfs/30506_better_ducts.pdf</p> <p>Ducts in conditioned space (PATH): http://toolbase.org/TechInventory/TechDetails.aspx?ContentDetailID=762&BucketID=6&CategoryID=6</p>

Item	Pts	Intent	Resources
<p>27 Cooling equipment has non-HCFC refrigerant</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> The HCFCs are one class of chemicals being used to replace the CFCs. They contain chlorine and thus deplete stratospheric ozone, but to a much lesser extent than CFCs. Hydrofluorocarbons (HFCs) are a family of refrigerants that have been specifically developed to provide alternatives to CFCs and HCFCs. They have many of the favorable characteristics of CFCs especially those of zero flammability and zero toxicity. However, HFCs are powerful greenhouse gases should try to minimize emissions of global warming refrigerants. "Freon" is a trade name for CFC and HCFC refrigerants sold by DuPont.</p>	3	<p><i>Intended to give a project credit for using refrigerants that minimize their impact on atmospheric degradation.</i></p>	<p>Questions and Answers on Alternative Refrigerants (EPA): www.epa.gov/ozone/snap/refrigerants/qa.html</p>
<p>28 Energy recovery ventilator (ERV) or heat recovery ventilator (HRV) installed</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> A ducted mechanical ventilation system exchanges inside and outside air while recovering the heat of the exiting air. Controlled ventilation is increasingly important as houses are built tighter to prevent excessive air infiltration and energy losses. A combination of tighter homes and out gassing from new building materials (glues, paints, carpets, pads, cabinets) can create indoor air quality problems that range from mildly irritating to severe. An Energy (aka enthalpy) recovery ventilator (ERV) is preferable in a humid climate because it can not only exchange heat between the outgoing stale air and the incoming fresh, but it can also exchange moisture between the two air streams. This is very helpful in most of North Carolina in the summer when outdoor air is very humid.</p>	7	<p><i>Intended to give a project credit for whole house ventilation systems that recover exhaust heat as a means of conditioning outside air.</i></p>	<p>Energy and Heat Recovery Ventilators (ERV/HRV) (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=122</p> <p>Use and Misuse of Energy Recovery Ventilators (ERVs) in Hot, Humid Climates: www.advancedenergy.org/buildings/knowledge_library/ventilation/erv.pdf</p>
<p>29 Geothermal (ground source) heating and cooling system</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Ground-source heat pump systems typically return 3 to 4 units of energy for every one unit put in. Using basic refrigeration science, heat pumps can extract heat from the ground for space heating in the heating season, and move heat from the building to the ground in the cooling season. Electricity is used to move fluids to and from the ground, as well as to run the internal refrigerant compressor. Total energy usage is generally one half to one third the amount used to accomplish the same heating and cooling performance as conventional systems. * Built Green Colorado checklist guide</p>	12	<p><i>Intended to give a project credit for utilizing the long term efficiency benefits by using the earths constant temperature as a heat transfer source.</i></p>	<p>Ground Source Heat Pump Overview (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=130</p>

Item	Pts	Intent	Resources
<p>30 In-floor heating system</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough (controls/equipment) Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> There are three types of radiant floor heat: radiant air floors (air is the heat-carrying medium); electric radiant floors; and hot water (hydronic) radiant floors. Hydronic systems are by far the most common and most cost effective type of in-floor heating system. There are two general classes of radiant floor installations, “wet installations” in which the tubes are set into concrete and “dry installations” in which the tubes are sandwiched between two layers of plywood or attached under the finished floor or subfloor. Regardless of the type of hydronic floor installation, it is very important to properly insulate under, and at the edges of, the heated floor or slab in order to direct the heat in the desired direction. Hydronic systems can conveniently make effective use of solar hot water for home heating.</p>	10	<p><i>Intended to give a project credit for radiant floor heating systems</i></p>	<p>Consumer’s guide to radiant heating (DOE): www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12590</p>
<p>31 Responsible 3rd Party performs or reviews and approves Manual J calculations</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough (controls/equipment) Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Proper Manual J calculations are needed to correctly size and design a heating and cooling system. To receive credit for this item the Manual J calculations for the home must be performed or reviewed and approved by a responsible 3rd party (someone other than the builder or HBH). Responsible parties include Home Energy Raters (HER) and certified HVAC contractors.</p>	2	<p><i>Intended to give a project credit for right sizing the mechanical system.</i></p>	

Appliances, Lighting and Renewables (Minimum Points: 10)

[Back](#)

Item	Pt	Intent	Resources
<p>1 Refrigerator is an Energy Star labeled product or meets or exceeds Energy Star criteria</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Refrigerators are the single largest power consumer of all household appliances in most households. ENERGY STAR® models incorporate better insulation, more efficient compressors, better heat transfer surfaces, and more precise temperature and defrost mechanisms. To be considered ENERGY STAR® they must exceed current federal standards by 15%. Current ENERGY STAR® refrigerators use 40% less energy than the typical refrigerator sold in 2001. As a result of the better insulation and more efficient operation, installation of such a refrigerator will also keep the kitchen cooler, providing more savings from space cooling. An ENERGY STAR® refrigerator can be recognized by the blue ENERGY STAR® label.</p>	2	<p><i>Intended to give a project credit for appliances that exceed minimum energy efficiency standards.</i></p>	<p>EnergyStar Website on Refrigerators: www.energystar.gov/index.cfm?c=refrig.pr_refrigerators</p> <p>Find a Store: www.energystar.gov/index.cfm?fuseaction=store.store_locator</p> <p>Savings Calculator: www.energystar.gov/ia/business/bulk_purchasing/bpsavings_calc/CalculatorConsumerResidentialRefrigerator.xls</p>
<p>2 Refrigerator is super energy efficient, rated to use less than 360 kWh per year</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough, Model Number should be accessible.</p> <p><u>INFORMATION:</u> There are some refrigerators that are still significantly more energy efficient than ENERGY STAR refrigerators. Also, some households do not have the need for a larger refrigerator and can easily reduce the annual energy use of their refrigerator by simply purchasing a smaller refrigerator. Please note that a builder can earn a maximum of 4 points for the energy efficiency of a refrigerator. Therefore, this item is taken in place of Item 1 (Energy Star Labeled Refrigerator) and not in addition to it. Further, a builder can not receive credit for this item for a small secondary refrigerator; it can only be received for the home's primary refrigerator.</p>	4	<p><i>Intended to give a project credit for appliances that are among the most energy efficient that are commercially available.</i></p>	<p>List of Energy Refrigerators and Annual Energy Usages: www.energystar.gov/index.cfm?fuseaction=refrig.display_products_html</p>
<p>3 Gas clothes dryer with electronic ignition</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> The clothes dryer is typically the second-biggest electricity-using appliance after the refrigerator. A gas clothes dryer will cost less to operate and use less primary energy than an electric dryer because directly using the heat from the gas to dry clothes is much more efficient than using heat to create electricity at a power plant to be used as heat for drying. All new gas clothes dryers are now required to have an electronic ignition, and therefore do not have a pilot light. There is not currently an ENERGY STAR certification for clothes dryers because except for differences in fuel type, most use similar amounts of energy. However, a dryer with moisture sensors that can automatically shut down when the clothes are dry can reduce energy use by 15%. Models with temperature sensors may be able to reduce energy use by 10% compared to a timed dry control.</p>	1	<p><i>Intended to give a project credit for appliances that exceed minimum energy efficiency standards.</i></p>	<p>Consumer Energy Center: Clothes Dryers (California Energy Commission): www.consumerenergycenter.org/home/appliances/dryers.html</p>

Item	Pt	Intent	Resources
<p>4 Gas cook top with electronic ignition</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> For gas ovens, new electronic pilot-less ignitions reduce gas usage by about 30% over a constantly burning pilot light. They are also more convenient, eliminating the need to restart a standing pilot light. About 58% of American households cook with electricity, but gas cooking is making a steady comeback. Gas ovens use much less energy compared to their electric counterparts because the fuel is used directly for cooking.</p>	2	<p><i>Intended to give a project credit for appliances that exceed minimum energy efficiency standards.</i></p>	<p>Consumer Energy Center: Ranges/Stoves (California Energy Commission): www.consumerenergycenter.org/home/appliances/ranges.html</p>
<p>5 If appliances are not included, a list of energy efficient appliances is provided to homebuyer</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party indicating copy of list will be provided to owner.</p> <p><u>INFORMATION:</u> If major appliances are not installed at the time of occupancy, the builder can encourage the homeowners to install energy efficient appliances by providing the homeowner with a printed list of energy efficient appliances. See www.energystar.gov for current lists of ENERGY STAR models. Providing explanatory information with the list of appliances is highly encouraged.</p>	1	<p><i>Intended to give a project credit for promoting appliances that exceed minimum energy efficiency standards.</i></p>	<p>Energy Star Appliances (links to lists of Energy Star models): www.energystar.gov/index.cfm?c=appliances.pr_appliances</p>
<p>6 High efficiency or tankless water heater, minimum Energy Factor as follows:</p> <p>Gas (EF): 40 Gal = 0.61 60 Gal = 0.57 80 Gal = 0.53 Electric (EF): 40 Gal = 0.93 50 Gal = 0.92 80 Gal = 0.89</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> The energy efficiency of a domestic water heater is indicated by its energy factor (EF), an overall efficiency based on the use of 64 gallons of hot water per day. The energy factor ranges required for a typical water heater to be classified as a high efficiency water heater and receive credit for this item are listed above. These EF requirements are based on ENERGY STAR Qualified Homes National Builder Option Package. All tankless water heaters meet the requirements of this item, however credit for this item can only be taken once (i.e. 2 or more tankless water heaters will not each receive credit for this item).</p>	3	<p><i>Intended to give a project credit for appliances that exceed minimum energy efficiency standards.</i></p>	<p>Consumer Guide to Water Heaters (American Council for an Energy Efficient Economy): www.aceee.org/consumerguide/topwater.htm</p>

Item	Pt	Intent	Resources
<p>7 Geothermal water heating</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party</p> <p><u>INFORMATION:</u> There are two different features that can be included in a ground source heat pump that will allow it to provide 50 to 100% of a home's domestic hot water needs. The least costly option is a desuperheater. A desuperheater is a small, auxiliary heat exchanger that uses superheated gases from the heat pump's compressor to heat water. This hot water then circulates through a pipe to the home's normal water heater tank. In summer, when the geothermal heat pump is in the cooling mode, the desuperheater merely uses excess heat that would otherwise be expelled to the loop. When the geothermal heat pump is running frequently, homeowners can obtain all of their hot water in this manner virtually for free. A conventional water heater meets all household hot water needs that the desuperheater isn't able to meet.</p> <p>The second option to heat water with a geothermal heat pump is known as integrated demand water heating (sometimes referred to as full-demand or demand water heating). This feature includes a water heating function in the refrigeration cycle. Integrated demand water heating differs from desuperheater in that the integrated demand water heating model provides all, or nearly all, of the domestic hot water needs and provides hot water even when space conditioning is not required.</p>	2	<p><i>Intended to give a project credit for appliances that exceed minimum energy efficiency standards.</i></p>	<p>Geothermal Heat Pumps (Energy Star): www.energystar.gov/index.cfm?c=geo_heat.pr_geo_heat_pumps</p> <p>Geothermal Heat Pumps (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=130</p>
<p>8 Shower drain waste heat recovery device.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Any hot water that goes down the drain carries away energy with it. That's typically 75% or more of the energy used to heat water in a home. Drain-water (or greywater) heat recovery systems capture this energy to preheat cold water entering the water heater or going to other water fixtures. Drain-water heat recovery technology works with all types of water heaters. Drain-water heat exchangers can recover heat from the hot water used in showers, bathtubs, sinks, dishwashers, and clothes washers. A unit with storage capacity is required for effective use with a dishwasher or clothes washer. Without storage capacity, useful energy can only be recovered during the simultaneous flow of cold water and heated drain water, for example while showering.</p>	1	<p><i>Intended to give a project credit for utilizing waste heat recovery to condition incoming water.</i></p>	<p>Drain-Water Heat Recovery (DOE): www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13040</p>

	Item	Pt	Intent	Resources
Lighting				
9	Recessed light fixtures use compact fluorescents (1 pt per light, max.3 pts) <u>EXPECTED DOCUMENTATION:</u> Final Walkthrough <u>INFORMATION:</u> Recessed light fixtures typically use incandescent lighting which uses three or four times the amount of energy to produce the same amount of light as an equivalent compact fluorescent (CFL). Screw-in type CFLs can be used in recessed light fixtures, but this is not the preferred type of CFL for recessed light fixtures. Much of the light from a standard CFL will be lost inside the recessed fixture. Reflector lamps address this problem, but there are currently few CFL reflector lamps available in consumer markets (see resources for some available bulbs). Further, when higher-wattage screw-in CFLs are used in an airtight recessed can, an additional challenge arises: heat generated by the lamp and ballast can become trapped inside the fixture, and excessive heat can cause CFLs to have lower light output and a shorter lifespan. These issues with screw-in CFLs can be avoided with the preferred type of CFL for recessed cans, a pin-based CFL, also called hard-wired. Use of this type of CFL requires a recessed light fixture made for pin-based CFLs. This type of fixture contains the CFL ballast, so, when a bulb does burn out only the bulb will need to be replaced. Screw-in CFLs contain both the ballast and the bulb which requires a working ballast to be discarded whenever a bulb burns out.	1-3	<i>Intended to give a project credit for utilizing energy efficient lighting that remakes a significant impact on electric baseload.</i>	Compact Fluorescents (Energy Star): www.energystar.gov/index.cfm?c=cfls.pr_cfls Light Fixtures (Energy Star): www.energystar.gov/index.cfm?c=buyers_guide.pr_lighting_guide_fixtures Compact Fluorescent reflector bulbs (Pacific Northwest National Lab): www.pnl.gov/rlamps/
10	Airtight recessed can fixtures (min 90% of recessed can fixtures) <u>EXPECTED DOCUMENTATION:</u> Signature of Responsible party <u>or</u> inspection by approved NC HBH inspector. <u>INFORMATION:</u> Recessed can fixtures can be a major source of air leakage between conditioned and unconditioned spaces. The cost upgrade to airtight recessed can fixtures is minimal, but the impact on building envelope leakage can be significant. Airtight recessed can fixtures are typically available at major home improvement stores.	2	<i>Intended to give a project credit for utilizing energy efficient lighting that remakes a significant impact on electric baseload.</i>	Air Sealing Fact Sheet (DOE): www.eere.energy.gov/buildings/info/documents/pdfs/26448.pdf
11	Fluorescent light bulbs utilized in: 50% of light fixtures 75% of light fixtures 100% of light fixtures <u>EXPECTED DOCUMENTATION:</u> Final Walkthrough <u>INFORMATION:</u> Lighting can easily account for 15% of a home's yearly electric bill. Compact Fluorescents (CFLs) use 66% less energy than a standard incandescent bulb and last up to 10 times longer. Replacing a 100-watt incandescent with a 32-watt CFL can save you at least \$30 in energy costs over the life of the bulb. Fluorescent lights (tubes and CFLs) provide the same amount of light (lumens) as standard incandescent bulbs, but do so with only 1/3 to 1/4 of the electricity.	3 4 5	<i>Intended to give a project credit for utilizing energy efficient lighting that remakes a significant impact on electric baseload.</i>	Compact Fluorescents (Energy Star): www.energystar.gov/index.cfm?c=cfls.pr_cfls

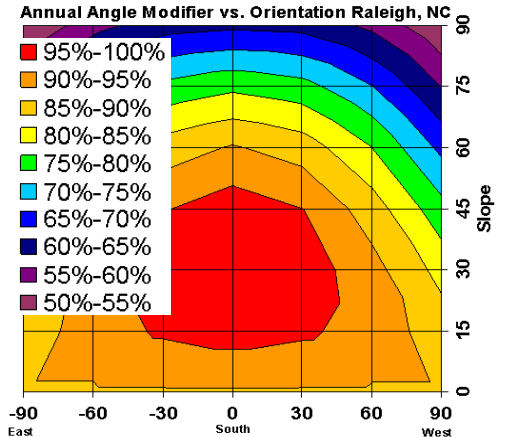
Item	Pt	Intent	Resources
<p>12 Switchable automatic outdoor lighting controls (e.g. motion/photo sensor).</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Outdoor lighting is often inadvertently left on when not needed, even during daylight hours. Installation of simple controls can greatly reduce the amount of time outdoor lighting is needlessly operating. Adding an on/off switch (switchable) in addition to automatic controls gives the user an option to override automatic controls and turn off power to the lighting. Typical automatic control options include automatic photocells that turn the light on and off based on whether it is night or day, motion sensor controls that turn the light on when motion is detected, and timer controls that limit how long the lights stay on after they are turned on. These control options can be combined one or two other controls to give even greater control over outdoor lighting use. High efficiency exterior lighting (high pressure sodium, fluorescent, or equivalent high efficiency) is greatly preferred over typical incandescent lighting.</p>	<p>1</p>	<p><i>Intended to give a project credit for utilizing lighting controls that minimize unnecessary lighting usage.</i></p>	<p>Outdoor Lighting Design (DOE): www.eere.energy.gov/consumer/your_home/lighting_daylighting/index.cfm/mytopic=12020</p>
Renewables			
<p>13 Solar hot water system</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough Signature of Responsible party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> In the southeast, heating hot water is typically about 15% of the energy use in a home. A typical solar hot water system can provide 50 to 70% of the energy needed to heat hot water in a year. The amount of hot water that solar energy will provide depends on the type and size of the system, the climate, and the quality of the site in terms of solar access (direction it faces and shading). All types of solar hot water systems include a back-up heating system so that the homeowners are never without hot water.</p> <p>North Carolina offers a 35% tax credit (\$1,400 cap) for solar hot water systems. Currently, there is also a federal tax credit (until end of 2007) of 30% (\$2,000 cap) available for solar hot water systems.</p>	<p>12</p>	<p><i>Intended to give a project credit for utilizing renewable technologies for meeting energy needs.</i></p>	<p>Solar Water Heating overview (PATH): www.toolbase.org/techinv/techDetails.aspx?technologyID=112</p> <p>Solar Water Heating overview (DOE): www.eere.energy.gov/RE/solar_hotwater.html</p> <p>Solar Hot Water Education Resources including Training Video on Installation: www.solar-rating.org/education/education.htm</p> <p>NC Tax Credit Guidelines (NC Solar Center): www.ncsc.ncsu.edu/information_resources/tax_documents/Tax_Credit_Guidelines.pdf</p> <p>Federal and State Renewable Energy Incentives Database: www.dsireusa.org</p>

Item	Pt	Intent	Resources
<p>14 <i>Rough-in for future solar hot water system</i> (Must insulate pipes and provide appropriate wiring for controls)</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party indicating that pipes and wiring are appropriate for future solar hot water system needs <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Besides providing south-facing roof area (item #20), the next step in preparing for a future solar hot water system is to install plumbing from the hot water tank location up to the roof. The piping should terminate in an attic space under the roof that will support the solar collectors, and it should be above the insulation for easy sighting. If there is no attic, the piping should end after penetrating the roof that will support the collectors. The two runs of piping shall be type M copper and be a minimum of ¾ inch in diameter. All joints shall be soldered with lead-free solder. The piping shall be continuously insulated without any exposed piping with a minimum R-6. The pipe route should be as short as possible to limit heat losses and should be sloped so that the pipes can drain (1/4 inch per foot). If the pipes are not sloped so that they can drain the types of future solar hot water systems will be limited. Also, two conductor twisted pair sensor wire (minimum gauge of 22) must be run along with the piping.</p>	3	<p><i>Intended to give a project credit for utilizing renewable technologies for meeting energy needs.</i></p>	<p>Solar Hot Water Education Resources including Training Video on Installation: www.solar-rating.org/education/education.htm</p>
<p>15 <i>Photovoltaic (solar electric) panel for powering solar hot water circulation pump.</i></p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party</p> <p><u>INFORMATION:</u> Solar domestic hot water systems can use PV modules to convert sunlight into direct current (DC) electricity to power a DC pump that circulates water through the solar collectors. Typically a PV powered pump is limited to pressurized glycol systems because the pump never has to pump fluid up to a dry collector. Drainback systems on the other hand require a larger pump to overcome the head of pumping fluid to a dry collector each time the system starts up. Therefore, in order to use a PV powered pump on a drainback system a much larger panel is needed. A PV powered pump can only run when there is enough sunlight to pump water through the collectors, thus PV powered pump serves as the system controls as well. These systems are very simple, and tend to be reliable and efficient, providing hot water when other systems have been shut down by power outages.</p>	3	<p><i>Intended to give a project credit for utilizing renewable technologies for meeting energy needs.</i></p>	<p>Passive and Active Solar Domestic Hot Water Systems (NC Solar Center) www.ncsc.ncsu.edu/information_resources/factsheets/SolarDHW.pdf</p>

Item	Pt	Intent	Resources
16 Photovoltaic (solar electric) system provides:			
10% of home's annual electricity use <u>or</u> 1.0 kW (DC nameplate) PV system	10		
25% of home's annual electricity use <u>or</u> 2.5 kW (DC nameplate) PV system	20		
50% of home's annual electricity use <u>or</u> 5.0 kW (DC nameplate) PV system	40		
75% of home's annual electricity use <u>or</u> 7.5 kW (DC nameplate) PV system	60		
100% of home's annual electricity use <u>or</u> 10.0 kW (DC nameplate) PV system	80		
<p>EXPECTED DOCUMENTATION:</p> <p>Final Walkthrough; <u>Performance Option:</u> A printout of PV Solar Estimator results from FindSolar.com or a more rigorous approved calculation. <u>or</u> <u>Size Option:</u> The DC nameplate size of system (kW) with an ICSS signed by responsible party.</p> <p>INFORMATION:</p> <p>Two compliance options are offered:</p> <p><u>Performance Option:</u> To determine and document the number of points to be awarded with the performance option a printout of the results of the Solar Estimator on www.FindSolar.com(or a more rigorous approved calculation) must be provided. The online Solar Estimator does not require any downloads and is extremely user friendly. The Solar Estimator indicates the size of system needed to reach the desired percent of total electrical usage. Of course, if the size of the system is known, the user can adjust the percent of total electrical usage met by PV until the system size determined by the Solar Estimator equals the known system size. The required inputs are:</p> <p>1) Expected total electricity use in the home entered in one of three ways. It is very important that this estimate as accurate as possible. i) average monthly electricity bill dollar amount (with name of your utility) ii) average monthly kWh use iii) average monthly kWh for each of the four seasons 2) County in which the home is located</p> <p><u>Size Option:</u> Points awarded solely on the nominal size of PV system. The nominal PV system size for each point level was determined by the size of system that would provide the indicated percent of total electricity use for the average NC home (1,121 kWh per month) (EIA 2004 data).</p> <p><u>Note:</u> There is a 35% NC (\$10,500 cap) and a 30% Federal (\$2,000 cap) tax credit available for PV systems.</p>			<p>Solar Estimator www.FindSolar.com</p> <p>PV Overview (DOE): www.eere.energy.gov/RE/solar_photovoltaics.html</p> <p>PV for New Construction (California Energy Commission): www.consumerenergycenter.org/pv4newbuildings/overview.html</p> <p>NC Tax Credit Guidelines (NC Solar Center): www.ncsc.ncsu.edu/information_resources/tax_documents/Tax_Credit_Guidelines.pdf</p> <p>Federal and State Renewable Energy Incentives Database: www.dsireusa.org</p>

Intended to give a project credit for utilizing renewable technologies for meeting energy needs.

Item	Pt	Intent	Resources
<p>17 Battery back-up system for photovoltaic system</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Provide size of system and ICSS signed by Responsible Party</p> <p><u>INFORMATION:</u> A battery back-up system can be added to a grid-tied PV system to supply a source of electricity, and a means for energy storage, during a power outage. Battery back-up for PV systems require high quality “deep-cycle” batteries, such as those used in fork lift or golf cart applications. PV systems with battery storage need a good quality charge controller to insure that the battery is never over-charged. Some chargers have a load controller built in to prevent the battery from being overly discharged. Over-charge and over-discharge can cause permanent damage to a battery. Sealed batteries require less maintenance than un-sealed batteries. Depending on the amount of use, batteries will need to be replaced every 3 to 7 years.</p>	10	Intended to give a project credit for utilizing renewable technologies for meeting energy needs.	<p>Photovoltaic Fact Sheet (NC Solar Center): www.ncsc.ncsu.edu/information_resources/factsheets/PVElecSun.pdf</p>
<p>18 Photovoltaic (solar electric) powered well water pumping system</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Item Compliance Signature Sheet signed by responsible party indicating compliance</p> <p><u>INFORMATION:</u> PV is an ideal candidate for water pumping applications. These systems may be either direct systems, operating the pump only when the sunlight is sufficient, or they may pump water to an elevated or pressurized storage tank during sunny hours to provide available water at any time. Either system avoids the use of batteries, resulting in a decrease in initial cost and reducing maintenance needs.</p>	6	Intended to give a project credit for utilizing renewable technologies for meeting energy needs.	<p>Photovoltaic Applications (NC Solar Center): www.ncsc.ncsu.edu/information_resources/factsheets/PVApplication.pdf</p> <p>Detailed Information on PV Water Pumping: www.itdg.org/docs/technical_information_service/solar_pv_waterpumps.pdf</p>
<p>19 Active solar thermal heating system provides:</p>			
<p>25% of space heating needs</p>	10		
<p>50% of space heating needs</p>	20		
<p>75% or more of space heating needs</p>	30		
<p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough Copy of calculations/simulation summary showing how the annual energy expected from the solar thermal system and the annual expected total space heating needs (after passive solar gains) were determined, signed by responsible party.</p> <p><u>INFORMATION:</u> Active space heating typically consists of a series of typical solar hot water collectors plumbed to a large hot water tank. Such a system can be used for both space heating and for domestic hot water. The solar heated water, which is kept above a minimum temperature with a backup energy source, is pumped through an in-floor heating system (radiant flooring) to provide heating for the home. Such a system is a very economical use of solar energy and creates a very comfortable environment inside the home during the winter. A system that supplies a large percentage of space heating will have some unused capacity in the summer time, which will cause collectors to reach very high temperatures when there is no fluid moving through them. These high temperatures can start to breakdown the antifreeze (glycol) in a pressurized glycol system and cause it to turn acidic. If the glycol is not tested for acidity and replaced every few years when it becomes too acidic there is a chance for corrosion and even failure of the system. This situation can be avoided by using a drainback system for space heating applications.</p>		Intended to give a project credit for utilizing renewable technologies for meeting energy needs.	<p>Space Heating with Active Solar Energy Systems (NC Solar Center): www.ncsc.ncsu.edu/information_resources/factsheets/20acsph.pdf</p>

Item	Pt	Intent	Resources
<p>20 South roof area suitable for future solar hot water or photovoltaic collectors facing within 30° East or West of solar South</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough</p> <p><u>INFORMATION:</u> A roof facing due south will receive more sun than if it faced any other direction. By staying within 30° of south, collectors, solar hot water and photovoltaic, will receive at least 95% of the total annual radiation of identical collectors facing true south (for most roof angles). The annual radiation available to the collectors begins to fall off more rapidly beyond 30° off of true south. See the figure to the right for the relative amount of annual solar radiation that would strike a collector (in Raleigh) at various orientations. These relationships will change very little for other locations in the state.</p>	2	<p><i>Intended to give a project credit for utilizing renewable technologies for meeting energy needs.</i></p>	 <p>Annual Angle Modifier vs. Orientation Raleigh, NC</p> <ul style="list-style-type: none"> 95%-100% 90%-95% 85%-90% 80%-85% 75%-80% 70%-75% 65%-70% 60%-65% 55%-60% 50%-55%
<p>21 Wind Turbine provides:</p> <p>25% of the home's annual electricity use</p> <p>50% of the home's annual electricity use</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p>Copy of calculations/simulation summary showing how the annual energy expected from the wind power system and the annual expected total electricity use were determined, signed by responsible party.</p> <p><u>INFORMATION:</u> Most wind turbines require a steady wind of 5.5 to 10 mph in order to provide any electricity; this is known as the cut-in wind speed. In order for a site to be an economical location for a residential wind turbine the site needs to consistently provide winds above 6 or 7 mph. Modern residential wind turbine systems are grid-tied, which means any electricity the home needs that is not supplied by wind will come for the utility grid. Conversely, if the wind turbine produces more than the home needs this power is sold to the utility and put onto the grid. All of this is done automatically. There are no batteries in a modern residential wind system. Wind turbine systems are eligible to supply NC GreenPower with clean energy. For more information see the GreenPower website listed in resources.</p>	20 40	<p><i>Intended to give a project credit for utilizing renewable technologies for meeting energy needs.</i></p>	<p>American Wind Energy Association site on Small Wind in North Carolina: www.awea.org/smallwind/northcarolina.html</p> <p>Wind Energy for Homeowners (NREL): www.nrel.gov/learning/ho_wind.html</p> <p>Consumers Guide to Small Wind Systems (DOE) (27 page PDF) www.eere.energy.gov/windandhydro/windpowerinamerica/pdfs/small_wind/small_wind_guide.pdf</p> <p>North Carolina GreenPower: www.ncgreenpower.org</p>

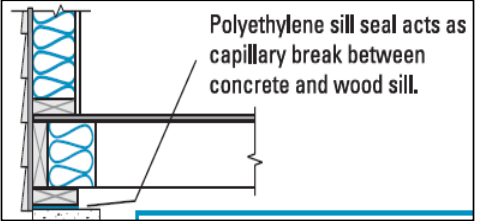
Item	Pt	Intent	Resources
<p>22 Micro-hydro system provides:</p> <p>25% of the home's annual electricity use</p> <p>50% of the home's annual electricity use</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Copy of calculations/simulation summary showing how the annual energy expected from the micro-hydro system and the annual expected total electricity use were determined, signed by responsible party.</p> <p><u>INFORMATION:</u> Micro-hydro is often defined as an installation producing less than 10kW of electrical energy, small hydro as one producing less than 10 MW. Only installations that can produce power with minimal impact on the stream and its life should be considered. Often micro-hydro can divert only part of the water flow and does not require a dam. A hydro system requires a suitable rainfall catchment area, a hydraulic head, a pipe or millrace carrying water to the turbine, and a turbine house containing power generation and water regulation equipment. While hydro could be used as mechanical energy to do any number of tasks, it is almost always used to generate electricity.</p>	<p>20</p> <p>40</p>	<p><i>Intended to give a project credit for utilizing renewable technologies for meeting energy needs.</i></p>	<p>Hydroelectric Energy (NCSEA): www.ncsustainableenergy.org/renewable/hydro.html</p> <p>Introduction to Micro-hydro and list of more resources (DOE): www.eere.energy.gov/tribalenergy/guide/hydropower_small.html</p>
<p>23 Sealed-combustion solid fuel (biomass based) burning stove with outside combustion air</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party</p> <p><u>INFORMATION:</u> Today you can choose from a new generation of wood- and pellet-burning appliances that are cleaner burning, more efficient, and powerful enough to heat many average-sized, modern homes. However, these stoves still emit more carbon dioxide and other pollutants than a natural gas furnace producing the same amount of heat. It is important to use a properly sized appliance for the space to be heated. When an appliance is too big, residents tend to burn fires at a low smolder to avoid overheating, which wastes fuel and causes a significant increase in air pollution.</p>	<p>3</p>	<p><i>Intended to give a project credit for utilizing a renewable fuel source and utilizing combustion air from outside the living space.</i></p>	<p>Consumer's guide to Wood and Pellet Heating (DOE): www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12570</p> <p>Information on the Emissions of Biomass Burning: burningissues.org/</p>
<p>24 Provide information on the NC GreenPower Program</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party indicating information on the NC GreenPower Program will be provided to the owner or with the home upon closing.</p> <p><u>INFORMATION:</u> NC GreenPower is an independent, nonprofit program that uses voluntary contributions to purchase electricity generated from renewable energy sources to add to the state's power supply. Individuals may contribute as little as \$4 per month to add one block of 100 kilowatt-hours of renewable energy to the grid. More contributions mean more renewable energy produced in North Carolina, making North Carolina's environment healthier for everyone. All NC GreenPower contributions are tax-deductible. Each \$4 block purchased for a full year saves over 2,500 lbs of carbon dioxide and provides as much electricity as burning over 950 lbs of coal at a power plant.</p>	<p>1</p>	<p><i>Intended to give a project credit for utilizing renewable technologies for meeting energy needs.</i></p>	<p>North Carolina GreenPower: www.ncgreenpower.org</p> <p>Two Page Color Overview of NC GreenPower, including how to sign up: www.ncgreenpower.org/elements/pdfs/NCGP%20Glance%20Residential.pdf</p>

Item	Pt	Intent	Resources
<p>25 Buyer enrolls for one year in the NC GreenPower program for estimated energy use. Buyer purchases amounts based on the number of bedrooms in the home. (note: houses less than 1500 sf may use the 1 bedroom enrollment figure)</p> <p>1 bedroom 100 kWh (1 block per month at \$4 each) 2 bedroom 200 kWh 3 bedroom 400 kWh 4 bedrooms 600 kWh 5 bedrooms or more 800 kWh</p> <p><u>EXPECTED DOCUMENTATION:</u> Copy of NC GreenPower enrollment form signed by the buyer.</p> <p><u>INFORMATION:</u> See item 24 above.</p>	5	<p><i>Intended to give a project credit for utilizing renewable technologies for meeting energy needs.</i></p>	<p>North Carolina GreenPower: www.ncgreenpower.org</p>
<p>26 Utility release signed by homeowner granting HBH program access to utility bills for 1 year</p> <p><u>EXPECTED DOCUMENTATION:</u> Waiver signed by the party whose name is on the utility bill in which the utility customer authorizes release of their information to the NC HBH Program.</p> <p><u>INFORMATION:</u> The NC HealthyBuilt Homes program would like to collect data on how much energy NC HealthyBuilt homes use. By signing the utility release form, which can be obtained from the NC HBH coordinator, the homeowner will be granting HBH permission to access the home's utility bills.</p>	3	<p><i>Intended to give a project credit for providing energy and/or performance data to the HBH program.</i></p>	<p>To obtain a copy of the Utility Release Waiver, email the NC HealthyBuilt Homes Coordinator at: hbhcoordinator@ncsu.edu.</p>

Indoor Air Quality Opportunities (Minimum Points: 15)

[Back](#)

Item	Pt	Intent	Resources
<p>1 House meets American Lung Association Health House standards or complies with Energy Star Indoor Air Package Specification.</p> <p><u>EXPECTED DOCUMENTATION:</u> Copy of documentation certificate or label provided by the above program that indicates the home has meet their specific requirements.</p> <p><u>INFORMATION:</u> Both the American Lung Association Health House standards and the Energy Star Indoor Air Package Specification provide prescriptive measures to achieving a healthy indoor air environment. Other programs or specifications providing similar measures would also qualify.</p>	15	<p><i>Intended to give credit for participating in a recognized program promoting healthy living environments.</i></p>	<p>American Lung Association: www.healthhouse.org</p> <p>Energy Star IAQ package www.energystar.gov/index.cfm?c=bldrs_lenders_raters.pt_builder_news</p>
Structural Air Quality			
<p>2 Attached garage is isolated from house by extensive air-sealing so that when the house is depressurized by 50 Pascals, the garage to house pressure is at least 49 Pascals.</p> <p><u>EXPECTED DOCUMENTATION:</u> Pressure test results indicating compliance</p> <p><u>INFORMATION:</u> Penetrations between a home and its attached garage must be sealed properly. An air barrier must be created to restrict air exchange between the garage/attic space over the garage and the living space. This can be accomplished by caulking and sealing of the top and bottom wall plates of the shared garage living space walls, constructing an airtight partition between the garage attic space and the attic space over the living area, and weather stripping the garage door.</p> <p>A pressure test must be performed demonstrating that the garage to house pressure is at least 49 Pascals in order to receive item points.</p>	4	<p><i>Intended to give credit for minimizing potential for air pollutants associated with garages and storage spaces from entering the condition living space.</i></p>	<p>The garage-to-house issue: controlling the dangers of carbon monoxide: www.builtgreen.org/articles/0402_carbonmonoxide.htm</p> <p>Air Sealing Factsheet: www.southface.org/web/resources&services/publications/factsheets/sf_factsheet-menu.htm</p>
<p>3 Detached garage in lieu of attached garage.</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Home has a detached garage that does not share any common walls or passageways with the enclosed living space. A Minnesota study found from 5% to 85% of the air leaking into the house came from the garage, carrying carbon monoxide and other contaminants into the house. The American Lung association suggests building a detached garage to protect against exposure to carbon monoxide levels in the garage.</p>	5	<p><i>Intended to give credit for minimizing potential for air pollutants associated with garages and storage spaces from entering the condition living space.</i></p>	<p>Carbon Monoxide and Garages: www.abe.iastate.edu/human_house/aen207.asp</p>

Item	Pt	Intent	Resources
<p>4 Capillary break between foundation and framing.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> A capillary break shall be installed between a concrete foundation wall and the sill plate. Capillary break should be a sill gasket, EPDM-type rubber, or other suitable membrane that can prevent bulk moisture from reaching the framing by way of capillary action.</p>	1	<p><i>Intended to give credit for integrating water management strategies into the building assembly to reduce moisture related problems.</i></p>	 <p>www.dos.state.ny.us/CODE/energycode/Forms_code/Rmanfound.pdf</p>
<p>5 Drainage board for below grade walls.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> All below grade walls shall be damp-proofed and feature a drainage plane material on the exterior of the wall that channels water down to the drain tile. Drainage plane materials include special drainage mats, high-density fiberglass insulation products, and washed gravel.</p>	2	<p><i>Intended to give credit for integrating water management strategies into the building assembly to reduce moisture related problems.</i></p>	<p>Drainage plane detail on a basement wall: www.eere.energy.gov/consumer/your_home/insulation_airsealing/index.cfm/mytopic=11770</p> <p>Drainage board overview: www.toolbase.org/TechInventory/techDetails.aspx?ContentDetailID=709</p>
<p>6 Continuous foundation drain at outside perimeter edge of footing.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> A continuous foundation drain, flush with the bottom of the footing and covered with silt protection fabric, gravel, or both, shall be installed. All footing drain lines shall be connected away and downhill from the foundation.</p>	2	<p><i>Intended to give credit for integrating water management strategies into the building assembly to reduce moisture related problems.</i></p>	<p>Foundation Drainage technical sheet: www.pathnet.org/sp.asp?id=14136</p>
Appliance Air Quality			
<p>7 Filters rated <i>MERV 9</i> or greater installed on forced air systems. System static pressure must be designed and calculated to perform with the higher efficiency filter installed.</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough (must be accessible) Signature of Responsible Party indicating system pressure has been adjusted to perform with the Merv 9 or greater filter installed.</p> <p><u>INFORMATION:</u> MERV stands for Minimum Efficiency Reporting Value, and is an industry standard to rate how well a filter filters. The higher the MERV rating, the more efficient the filter is, and the more particulates it can filter. A MERV 9 or greater filter will provide greater resistance to air flow than other filters. In order to achieve proper performance with a high MERV filter, your air handler must be adjusted to provide adequate pressure to maintain the designed air flows.</p>	2	<p><i>Intended to give credit for providing higher efficiency air filtration.</i></p>	<p>Choosing an air filter (details effectiveness for different particle sizes): http://oikos.com/esb/31/airfilters.html</p>

Item	Pt	Intent	Resources
<p>8 Carbon monoxide detector installed in mechanical equipment area.</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of responsible party</p> <p><u>INFORMATION:</u> In addition to the requirement stated in Prerequisite 6, a carbon monoxide detector is installed in the area of any major gas burning appliances such as a furnace or water heater. Installation in these areas ensures rapid detection of any potentially malfunctioning appliances and the ability to hear the alarm from all sleeping areas. Detectors should not be placed within five feet of gas fueled appliances or near cooking or bathing areas. Leading brands of carbon monoxide detector technologies suggest mounting the detector high or on the ceiling for most effective use.</p>	1	<p><i>Intended to give credit for increasing the safety of occupants by providing monitoring of a potentially dangerous indoor air pollutant.</i></p>	<p>Carbon Monoxide detectors—UL standard: www.homesafe.com/coalert/detect.htm</p>
<p>9 Bath exhaust fan measured to be exhausting 50 cfm, minimum, to the outside (all full baths).</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough Signature of Responsible Party stating that fan has been tested and shown to be exhausting minimum of 50cfm to the outside or inspection by HBH approved inspector</p> <p><u>INFORMATION:</u> Bath fans in all full baths must pull at least 50 cfm and be exhausted to the outside to provide adequate spot ventilation. Spot ventilation is critical in the bathrooms as well as the kitchen of high performance homes because this is where much of the moisture and odors in a home are created. Neglecting to provide adequate ventilation in a tight home will lead to moisture related building failures and/or mold growth. Since installation can affect the actual cfm's a fan will pull, fans must be tested once installed to demonstrate they are exhausting a minimum of 50 cfm to the outside in order to receive credit for this item.</p>	1	<p><i>Intended to give credit for providing effective spot ventilation.</i></p>	<p>Spot Ventilation fact sheet: http://www.nrel.gov/docs/fy03osti/26466.pdf</p>
<p>10 Bath exhaust fan with a low sone rating of 1.5 or less and measured to be exhausting 50 cfm, minimum, to the outside (all full baths).</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough Signature of Responsible Party stating that fan has been tested and shown to be exhausting minimum of 50cfm to the outside</p> <p><u>INFORMATION:</u> To receive credit for this item, bath exhaust fan must be shown to exhaust a min of 50cfm to the outside, as well as operate at 1.5 or less sones. Since installation can affect the actual cfm's a fan will pull, fans must be tested after installation to demonstrate they are exhausting a minimum of 50 cfm to the outside. Factory ratings alone are not sufficient. A fan with a low sone rating operates at nearly undetectable noise levels, reducing the amount of "white noise" in a household and increasing the likelihood they will be used when needed. Energy Star lists several models of bath fans that would qualify at this low sone rating.</p>	3	<p><i>Intended to give credit for providing effective spot ventilation with minimal noise pollution.</i></p>	<p>Energy Star rated bath fans factsheet: www.energystar.gov/ia/products/heat_cool/vent_fans/Arverne_case_study.pdf</p> <p>List of Energy Star rated fans: www.energystar.gov/index.cfm?c=vent_fans.pr_ve nt_fans</p>

	Item	Pt	Intent	Resources
11	<p>Ducts protected from dirt and debris until construction is completed.</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough (look at filter, spot check ducts) Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> All duct boots shall be protected from contamination during construction, including during sheetrock, finish floor installation, and painting. Duct boots should be protected with a fixed, stable cover or other technique that securely prevents entry of dirt and debris on a continuous basis.</p>	2	<p><i>Intended to give credit for taking preventive measures to assure air distribution systems are not a point source of indoor contaminants</i></p>	<p>Indoor Environmental Quality During Construction: www.ehs.uci.edu/programs/ih/IEQinConstruction.html</p> <p>Energy and Environmental Guidelines for Construction www.eere.energy.gov/buildings/info/design/construction.html</p>
12	<p>Automatic bath fan controls for full baths (e.g. timer/humidistat).</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Bath fans installed in rooms with tubs or showers shall have a timer or humidity controls. Full baths are a main source of moisture and humidity that needs to be efficiently and consistently managed in a home. An effective method to manage moisture in the bathroom is to install automatic timers and controls that provide consistent ventilation to the room with little to no involvement from the occupants. Both sensory (operate based on environmental conditions in a room) and timer (operate on a timed basis) controls are acceptable. However, it is recommended that occupants have the option to activate ventilation when it's needed, thus systems may require at least two controls wired together. It is also recommended that an "on/off" switch be installed for the system as well, but located separately from other controls to avoid the system being shut off accidentally.</p>	1	<p><i>Intended to give credit for maximizing the effectiveness of spot ventilation systems for moisture management.</i></p>	<p>Home Ventilation Options For Home Builders, Control Options section: http://oikos.com/esb/39/VentOpt.html</p> <p>Ventilation Controls for Lifestyles: www.hvi.org/associations/4692/files/Ventilation_Ccontrols_for_Life-Styles.pdf</p>
13	<p>Attached garage has exhaust fan (min 100cfm) controlled by motion sensor or timer.</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Install a fan capable of fully exchanging the garage air with the outside air in 15 minutes or less. A typical 20ft x 20ft x 8ft garage would require a 220 cfm fan. The fan must be programmed to run for a sufficient amount of time to fully exchange the garage air every four hours when on a timer, or when activated via a motion sensor to exhaust carbon monoxide fumes from automobiles. Fan must exhaust to the outside.</p>	2	<p><i>Intended to give credit for providing effective exhaust ventilation strategies in attached garages to minimize containment of pollutants from combustion engines.</i></p>	<p>Spot Ventilation Fact Sheet: www.toolbase.org/Home-Building-Topics/Indoor-Air-Quality/spot-ventilation</p>
14	<p>Radon/soil gas vent system installed.</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> It is more cost-effective to include radon-resistant techniques while building a home, rather than installing a radon reduction system in an existing home. A radon gas vent system can be effectively and inexpensively constructed out of common construction materials. The EPA provides details of radon gas vent systems on the EPA Radon website.</p>	3	<p><i>Intended to give credit for installing effective radon mitigation strategies in homes.</i></p>	<p>EPA Radon website: www.epa.gov/radon/index.html</p> <p>Radon information, test kits and construction details: www.ncradon.org/</p>


Item	Pt	Intent	Resources
<p>15 Central dehumidification system installed.</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party</p> <p><u>INFORMATION:</u> A vapor compression, desiccant, or similar system shall be installed to remove moisture from all conditioned areas and be designed to maintain interior relative humidity at or below 50% at 75 degrees Fahrenheit. Maintaining a relative humidity below 60% will help inhibit the mobility of dust mites as well as reduce the occurrence of mold. Dehumidification by a ventilation and purification system is most useful when outdoor humidity is high, but temperatures are low enough to preclude cooling.</p>	3	<p><i>Intended to give credit for providing a system to manage the latent heating load (i.e. humidity) in a home.</i></p>	<p>Central Air Purification/Ventilation/Dehumidification Systems tech sheet: www.toolbase.org/techinv/techDetails.aspx?technologyID=155</p>
<p>16 Filtered fresh air supply ventilation system designed for 12 month operation.</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Filtered fresh air supply ventilation system must be equipped with a pressure activated or electronic control should regulate when fresh air will be brought into the home. Fresh air should come from a clean source: no roof options, gables are acceptable, must be at least 4 feet off the ground and cannot be within 10 feet of any other exhaust device. System should be designed to operate year round (i.e., Air Cycler type system).</p>	3	<p><i>Intended to give credit for providing a supply only ventilation system for the home.</i></p>	<p>Home Ventilation Options For Home Builders: http://oikos.com/esb/39/VentOpt.html</p> <p>Central Fan Integrated Supply Ventilation – The Basics www.buildingscience.com/resources/mechanical/fancycling/CFIS_Basics.pdf</p>
<p>17 Radon test of home prior to occupancy.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party indicating results will be given to homeowner</p> <p><u>INFORMATION:</u> The home can be tested once it is finished using a charcoal canister that is sent to a lab for analysis. Radon test must comply with EPA guidelines. If test indicates greater than 4 picocuries per liter radon concentration, builder must follow EPA guidelines to reduce radon levels. Please note that indoor radon levels vary from home to home. Do not rely on radon test results taken in other homes in the neighborhood - even ones next door - to estimate the radon level in your home.</p> <p>Exposure to radon is the second leading cause of lung cancer in the US behind smoking. Radon has been found in elevated levels in many counties throughout North Carolina, with homes in the coastal plain usually having low radon levels and the upper piedmont and mountain areas having the greatest proportion of homes with elevated levels of radon.</p>	2	<p><i>Intended to give credit for being proactive and determining if the home has elevated radon levels.</i></p>	<p>Radon information, test kits and construction details: www.ncradon.org</p>

Item	Pt	Intent	Resources
<p>18 Kitchen range hood or downdraft vented to exterior exhausting a min. of 100cfm. Intentional make-up air must be provided if rated greater than 350 cfm.</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> All kitchen range or downdraft hoods shall be vented directly to the outdoors. Fans rated greater than 350cfm can cause a significant negative pressure in the home while running, creating an environment that will pull air through any areas of least resistance (often leaks through the building envelope, attic, and/or crawlspace) which can result in potential indoor air quality issues and building failures. To balance the pressure and avoid pulling air into the home from undesirable locations, intentional make-up air shall be provided for any kitchen vent fan rated at greater than 350 cfm.</p>	3	Intended to give credit for providing effective spot ventilation in the cooking area.	<p>Range Hoods affect Indoor Air Quality: http://oikos.com/esb/53/rangehood.html</p>
<p>19 Install a whole house HEPA filter.</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough Signature of Responsible Party indicating owner will be provided with maintenance information <u>or</u></p> <p><u>INFORMATION:</u> To trap a reasonable range of household pollutants, filters should block particles as small as 0.3 microns. High Efficiency Particle Arresting (HEPA) filters, by definition, will trap 99.97% of all particles down to 0.3 microns in size. Particles under the 5 micron size are the most troubling for asthmatics since that is the ideal size to penetrate deep into the lungs.</p> <p>The chart on the right, from Oikos Green Building Source (http://oikos.com/esb/31/airfilters.html), demonstrates filter effectiveness for pollutants of various particle sizes. The filter types represented include: Furnace Filter, Passive Electrostatic filters, Pleated filters, Electronic filters, and HEPA filters. Red indicates that more than 95% of particles are being removed, pink indicates less than 95% of particles are being removed, and white indicates that particles of that size are passing through (not trapped by the filter).</p>	6	Intended to give credit for providing a very high efficiency air filter to improve indoor air quality	
IAQ Material Use			
<p>20 Zero formaldehyde OSB (PMDI binder only) used in subfloor.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party</p> <p><u>INFORMATION:</u> Most OSB contains resins with formaldehyde binders and will continue to off gas for several months after installation. Look for OSB subfloor with the binder PMDI (polymeric methylene diisocyanate), which does not contain formaldehyde. OSB with phenol-formaldehyde (PF) binders, while they do omit less VOC's than urea-formaldehyde (UF) binders, will not qualify for these points. Be sure to specify formaldehyde free OSB subfloor when purchasing.</p>	2	Intended to give credit for utilizing building materials that have minimal or no pollutants that are associated with poor indoor air quality.	<p>Sources of Indoor Air Pollution – Formaldehyde: www.epa.gov/iaq/formalde.html</p>

Item	Pt	Intent	Resources
<p>21 Formaldehyde-free particle board/MDF used for cabinets.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party</p> <p><u>INFORMATION:</u> Medium density fiberboard (used for drawer fronts, cabinets, and furniture tops) contains a higher resin-to-wood ratio than any other UF pressed wood product and is generally recognized as being the highest formaldehyde-emitting pressed wood product.</p> <p>Formaldehyde is a colorless, pungent-smelling gas that can cause watery eyes, burning sensations in the eyes and throat, nausea, and difficulty in breathing in some humans exposed at elevated levels (above 0.1 parts per million). High concentrations may trigger attacks in people with asthma. There is evidence that some people can develop a sensitivity to formaldehyde. It has also been shown to cause cancer in animals and may cause cancer in humans.</p>	2	<p><i>Intended to give credit for utilizing building materials that have minimal or no pollutants that are associated with poor indoor air quality.</i></p>	<p>Sources of Indoor Air Pollution – Formaldehyde: www.epa.gov/iaq/formalde.html</p>
<p>22 Formaldehyde-free particle board/MDF used for shelving/countertops.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party</p> <p><u>INFORMATION:</u> Medium density fiberboard (used for drawer fronts, cabinets, and furniture tops) contains a higher resin-to-wood ratio than any other UF pressed wood product and is generally recognized as being the highest formaldehyde-emitting pressed wood product.</p> <p>Formaldehyde is a colorless, pungent-smelling gas that can cause watery eyes, burning sensations in the eyes and throat, nausea, and difficulty in breathing in some humans exposed at elevated levels (above 0.1 parts per million). High concentrations may trigger attacks in people with asthma. There is evidence that some people can develop a sensitivity to formaldehyde. It has also been shown to cause cancer in animals and may cause cancer in humans.</p>	2	<p><i>Intended to give credit for utilizing building materials that have minimal or no pollutants that are associated with poor indoor air quality.</i></p>	<p>Sources of Indoor Air Pollution – Formaldehyde: www.epa.gov/iaq/formalde.html</p>
<p>23 All surfaces of any particle board product are sealed to prevent off gassing.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party</p> <p><u>INFORMATION:</u> If urea formaldehyde materials are used in conditioned space, all 6 sides inside the cabinets must be coated with a water based polyurethane sealant or a specialty formaldehyde sealant, as well as the underside of countertops, shelving, and top and bottom of stair treads. Sealant shall have a maximum VOC (Volatile Organic Compounds) content of 250 g/l.</p>	1	<p><i>Intended to give credit for utilizing sealants and sealant techniques to minimize off gassing of pollutants associated with poor indoor air quality.</i></p>	<p>Sources of Indoor Air Pollution – Formaldehyde: www.epa.gov/iaq/formalde.html</p>

	Item	Pt	Intent	Resources																		
24	<p>Paints and finishes with low to zero VOC content. Standard is less than 50 grams/liter of VOCs for flat coatings and 150 grams/liter of VOCs for non-flat coatings (Green Seal standard GS-11).</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party</p> <p><u>INFORMATION:</u> Most major paint manufacturers now offer a low to zero VOC paint product. Be sure to check the actual VOC content printed on the paint label to verify the paint meets the low VOC standards identified in this item (max 50g/l VOC flat coatings, max 150 g/l VOC non-flat coatings). Just the title "low-VOC" does not ensure that the actual VOC content meets the Green Seal GS-11 standard.</p>	2	<p><i>Intended to give credit for utilizing sealants and sealant techniques to minimize off gassing of pollutants associated with poor indoor air quality.</i></p>	<p>Green Seal standard GS-11 for paints: www.greenseal.org/standards/paints.htm</p> <p>Low and No-VOC Paint factsheet, City of Austin: www.ci.austin.tx.us/greenbuilder/fs_paint.htm</p>																		
25	<p>Use non-toxic paints as defined by Green Seal standard GS-11.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Non-toxic paints do not carry chemical residuals and/or use only very highly refined raw materials that have either eliminated or reduced toxic residuals to minimal levels. While non-toxic paints are typically low-VOC, low-VOC paints are not always non-toxic. For a complete list of chemicals in paint considered toxic, refer to Green Seal standard GS-11 for paints. Toxic chemicals should be listed on the Material Safety Data Sheet for the product. Toxic chemicals include but are not limited to:</p> <table border="0" data-bbox="149 781 1186 979"> <tr> <td>*Benzene, Ethylbenzene</td> <td>*Naphthalene</td> <td>*MTBE (methyl tert-Butyl ether)</td> </tr> <tr> <td>*Toluene</td> <td>*Ethylene Glycol</td> <td>*Formaldehyde or heavy metals</td> </tr> <tr> <td>*Crystalline silica (a known carcinogen)</td> <td>*n-Hexane</td> <td>*Tetrachloroethylene and trichloroethylene</td> </tr> <tr> <td>*Ammonia, chlorine, acetone, butyl ethers or other corrosive cleaning agents</td> <td>*Isopropanol</td> <td>*Aromatic hydrocarbon compounds</td> </tr> <tr> <td></td> <td>*Chloroform</td> <td></td> </tr> <tr> <td></td> <td>*Phenols</td> <td></td> </tr> </table>	*Benzene, Ethylbenzene	*Naphthalene	*MTBE (methyl tert-Butyl ether)	*Toluene	*Ethylene Glycol	*Formaldehyde or heavy metals	*Crystalline silica (a known carcinogen)	*n-Hexane	*Tetrachloroethylene and trichloroethylene	*Ammonia, chlorine, acetone, butyl ethers or other corrosive cleaning agents	*Isopropanol	*Aromatic hydrocarbon compounds		*Chloroform			*Phenols		4	<p><i>Intended to give credit for utilizing sealants and sealant techniques to minimize off gassing of pollutants associated with poor indoor air quality.</i></p>	<p>Green Seal standard GS-11 for paints: www.greenseal.org/standards/paints.htm</p> <p>Health Concerns related to paint: www.co.thurston.wa.us/health/ehrp/paint.html</p>
*Benzene, Ethylbenzene	*Naphthalene	*MTBE (methyl tert-Butyl ether)																				
*Toluene	*Ethylene Glycol	*Formaldehyde or heavy metals																				
*Crystalline silica (a known carcinogen)	*n-Hexane	*Tetrachloroethylene and trichloroethylene																				
*Ammonia, chlorine, acetone, butyl ethers or other corrosive cleaning agents	*Isopropanol	*Aromatic hydrocarbon compounds																				
	*Chloroform																					
	*Phenols																					
26	<p>Allow VOC's to dissipate prior to dwelling occupancy. Air should be exhausted to outside for one week minimum.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> If low VOC paints are not used, another method to mitigate exposure to VOC's is to allow the paint and materials to off-gas for a minimum of one week prior to occupation of dwelling. Continuous airflow exhausted to the outside must be supplied for effective VOC dissipation.</p>	2	<p><i>Intended to give credit for minimizing exposure of occupants to pollutants associated with poor indoor air quality.</i></p>	<p>Health Concerns related to paint: www.co.thurston.wa.us/health/ehrp/paint.html</p>																		

	Item	Pt	Intent	Resources																
27	<p>Only low toxicity, solvent free adhesives used throughout that meet or exceed Green Seals Standard for Commercial Adhesives (GS-36) .</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Water based sealants and adhesives typically qualify. A “non-solvent” based product in this case is a product that does not use a volatile organic compound (such as ethanol, acetone, hexane or toluene) as its solvent and therefore is less toxic and produces fewer to zero VOC’s. Using water as a base solvent instead of a carbon-based chemical is one way to achieve low-VOC ratings.</p> <p>Listed below are the VOC content limitations as required by Green Seal for a few common construction adhesives. To access the complete list, refer to the Green Seal Standard for Commercial Adhesives (GS-36) link listed under Resources.</p> <table border="1" data-bbox="157 532 781 797"> <thead> <tr> <th>Adhesive Type</th> <th>VOC’s in g/l minus water</th> </tr> </thead> <tbody> <tr> <td>Carpet Pad Installation</td> <td>150</td> </tr> <tr> <td>Ceramic Tile Installation</td> <td>130</td> </tr> <tr> <td>Contact Bond</td> <td>250</td> </tr> <tr> <td>Indoor Floor Covering Installation</td> <td>150</td> </tr> <tr> <td>Multipurpose Construction</td> <td>200</td> </tr> <tr> <td>Waterproof Resorcinol Glue</td> <td>170</td> </tr> <tr> <td>Wood Flooring Adhesive</td> <td>150</td> </tr> </tbody> </table>	Adhesive Type	VOC’s in g/l minus water	Carpet Pad Installation	150	Ceramic Tile Installation	130	Contact Bond	250	Indoor Floor Covering Installation	150	Multipurpose Construction	200	Waterproof Resorcinol Glue	170	Wood Flooring Adhesive	150	2	<p><i>Intended to give credit for utilizing sealants and sealant techniques to minimize off gassing of pollutants associated with poor indoor air quality.</i></p>	<p>Green Seal Standard for Commercial Adhesives (GS-36) www.greenseal.org/standards/commercialadhesives.htm</p> <p>Air Pollution and Health: http://www.arb.ca.gov/research/health/fs/fs1/fs1.htm</p>
Adhesive Type	VOC’s in g/l minus water																			
Carpet Pad Installation	150																			
Ceramic Tile Installation	130																			
Contact Bond	250																			
Indoor Floor Covering Installation	150																			
Multipurpose Construction	200																			
Waterproof Resorcinol Glue	170																			
Wood Flooring Adhesive	150																			
28	<p>Use low VOC stains and finishes on all wood floors and wood work</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Low VOC stains and varnishes can use water as a carrier instead of petroleum-based solvents, resulting in lower levels of harmful emissions than solvent-borne coatings. Factory applied finishes generally contribute less VOC’s than finishes applied in the field. Depending upon the process, a pre-finished floor might qualify for this item. Contact the NC HealthyBuilt Home coordinator at hbhcoordinator@ncsu.edu for questions on pre-finished floors.</p>	2	<p><i>Intended to give credit for utilizing sealants and sealant techniques to minimize off gassing of pollutants associated with poor indoor air quality.</i></p>	<p>List of low-VOC wood floor finishes: http://oikos.com/green_products/category.php?category_id=480</p>																
29	<p>Use water-based urethane finishes on wood floors</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Water based urethane finishes result in lower levels of harmful emissions than petroleum solvent-borne coatings. A water-based urethane finish can also be used as a seal to prevent offgassing from flooring materials.</p>	2	<p><i>Intended to give credit for utilizing sealants and sealant techniques to minimize off gassing of pollutants associated with poor indoor air quality.</i></p>	<p>Finishes and IAQ: http://www.aiasdr.org/sdrp.aspx?Page=26</p>																

Item	Pt	Intent	Resources
<p>30 Use low VOC carpet certified by the Carpet & Rug Institute</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of responsible party indicating carpet installed has the CRI Green Label.</p> <p><u>INFORMATION:</u> Builder shall provide carpet manufacturer name and product number if requested. To identify carpet products that are truly low-VOC, look for the Carpet and Rug Institute (CRI) Green Label on the product or displayed on carpet samples in showrooms. The CRI Green Label identifies that the product type has been tested by an independent laboratory and has met the criteria for very low emissions.</p>	1	<p><i>Intended to give credit for utilizing building materials that have minimal or no pollutants that are associated with poor indoor air quality.</i></p>	<p>List of CRI Green Label approved carpet products: http://www.carpet-rug.com/drill_down_2.cfm?page=8&sub=6</p> 
<p>31 No use of permanently installed carpeting in the home</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> New carpet, and products that accompany carpet installation such as adhesives and padding, can be a source of chemical emissions. Carpet can also act as a "sink" for chemical and biological pollutants including pesticides, dust mites, and fungi.</p> <p>Carpeting (such as rugs) that can be removed from the space and cleaned by washing or beating or fresh air is acceptable.</p>	3	<p><i>Intended to give credit for minimizing floor coverings that may foster the development and/or harboring of allergens.</i></p>	<p>EPA factsheet on Indoor Air Pollution (see FAQ section) http://www.epa.gov/iaq/pubs/hpguide.html#faq6</p> <p>Carpeting, Indoor Air Quality, and the Environment http://www.buildinggreen.com/auth/article.cfm?fileName=030601a.xml</p>
<p>32 Ceramic tile installed with low toxic adhesives (max 130 g/l VOC's as per Green Seal Standard GS-36) and plasticizer-free grout</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> When set in cement (thin-set) without additives, ceramic tiles can have very low VOC off-gassing emissions. If using an adhesive to set the tile, specify for a low VOC (130g/l or less) adhesive as well as a plasticizer-free grout. Plasticizers in grout are additives, most commonly phthalates, that soften the final product, increasing its flexibility. Plasticizers can evaporate or emit VOC's while curing, which tend to concentrate in an enclosed space and potentially be inhaled by the occupants.</p>	1	<p><i>Intended to give credit for utilizing building materials that have minimal or no pollutants that are associated with poor indoor air quality.</i></p>	<p>Green Seal Standard GS-36: www.greenseal.org/standards/commercialadhesives.htm</p>
<p>33 100% Formaldehyde-free insulation throughout house</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Formaldehyde has no thermal or acoustical value therefore does not affect the insulating quality of a product. All insulation applications in the house must be formaldehyde-free in order to receive points for this item.</p>	2	<p><i>Intended to give credit for utilizing building materials that have minimal or no pollutants that are associated with poor indoor air quality.</i></p>	<p>IAQ and Formaldehyde, Texas Cooperative Extension: http://fcs.tamu.edu/housing/healthy_homes/indoor_air_quality/formaldehyde/formaldehyde.php</p>

	Item	Pt	Intent	Resources
34	<p>Zero formaldehyde OSB (PMDI binder only) sheathing.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Most OSB contains resins with formaldehyde binders and will continue to off gas for several months after installation. Look for OSB sheathing with the binder PMDI (polymeric methylene diisocyanate), which does not contain formaldehyde. OSB with phenol-formaldehyde (PF) binders, while they do omit less VOC's than urea-formaldehyde (UF) binders, will not qualify for these points. Be sure to specify formaldehyde free OSB sheathing when purchasing.</p>	3	<p><i>Intended to give credit for utilizing building materials that have minimal or no pollutants that are associated with poor indoor air quality.</i></p>	<p>Sources of Indoor Air Pollution – Formaldehyde: http://www.epa.gov/iaq/formalde.html</p>
35	<p>Alternative termite treatment that uses low toxicity chemicals or eliminates chemical termite treatments. For a list of approved termite treatments contact the NC Dept. of Agriculture (see Reference Section for web addresses)</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party</p> <p><u>INFORMATION:</u> Alternative termite treatments use low toxic chemicals or do not use a chemical treatment at all to prevent or control termites. The NC Department of Agriculture approves the effectiveness of a product to kill termites, both traditional and alternative strategies. Alternative treatments currently approved by the NC DOA include but are not limited to:</p> <ul style="list-style-type: none"> • Impasse • Bora-Care Termiticide, Insecticide, Fungicide • Sentricon Termite ! Colony Elimination System • EXTERRA Termite Interception and Baiting System <p>Some bait systems are non-toxic and others are not. Bait systems do not attract termites to the property, but act as traps to deter termites from the home should they happen to drop by. They come with various monitoring programs. Many alternative termite treatments are combined with other strategies as part of an integrated pest management system. Note that a "sole source" product is one that can be used as the only termiticide on a project.</p>	4	<p><i>Intended to give credit for minimizing the use of pesticides in a project while adhering to NC State regulations focused on durability and safety of structures.</i></p>	<p>List of termite treatments approved by the NC Dept. of Agriculture (only some approved treatments are considered alternative, see INFORMATION to the left): http://www.agr.state.nc.us/SPCAP/structural/Termiticide_List.html</p> <p>Examples of chemical and non-chemical strategies: http://www.ces.ncsu.edu/depts/ent/notes/Urban/termite/pre-con.htm</p>

Materials Opportunities (Minimum Points: 18)

[Back](#)

	Item	Pt	Intent	Resources
1	<p>House does not exceed 2500 square feet of conditioned area (excluding crawl space).</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Conditioned area includes all heated and/or cooled living spaces. Unconditioned spaces such as porches, sunspaces, decks and crawlspaces (conditioned sealed crawlspaces included) are not included in the square footage count. Small homes use less material for construction. They usually use less energy for heating and cooling and occupy a smaller footprint (less impervious area).</p>	8	<p><i>Intended to give credit for homes that are built smaller than the average size home.</i></p>	<p>Characteristics of New Housing (census): www.census.gov/const/www/charindex.html</p> <p>Average House size comparison: www.eia.doe.gov/emeu/recs/sqft-measure.html</p>
2	<p>House does not exceed 2000 square feet of conditioned area (excluding crawl space).</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> See item 1 above</p>	16	<p><i>See item 1 above</i></p>	<p>See item 1 above</p>
3	<p>House does not exceed 1500 square feet of conditioned area (excluding crawl space).</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> See item 1 above</p>	24	<p><i>See item 1 above</i></p>	<p>See item 1 above</p>

Construction Material Waste

4	Recycle construction site waste:	
	Recycle jobsite waste min 1lb per sf of conditioned space	3
	Recycle jobsite waste min 2lbs per sf of conditioned space	5
	Recycle jobsite waste min 3lbs per sf of conditioned space	7

EXPECTED DOCUMENTATION:

Need calculations from waste hauler [total lbs recycled/sf]. May use letter stating [% recycled of total waste hauled] for calculation of [total lbs recycled].

INFORMATION:

The National Association of Home Builders (NAHB) has been able to collect data nationally and compiled estimates on the amounts of wastes generated during construction on a "typical" 2,000 square foot home. These estimates are based on the assumption that three sides of the home's exterior are covered with vinyl siding and the front facade is brick veneer. Exhibit MR6-C contains NAHB's data for this typical home.

NAHB Construction Waste Estimate of a Typical 2000 Sq.-Ft House

Material	Weight		Volume (cu. yd)	Density (lbs/cu. Yd)
	(lb)	(lb/SF)		
Solid Dimensional Wood	1600	0.8	6.0	267
Engineered Wood	1400	0.7	5.0	280
Drywall	2000	1.0	6.0	333
Cardboard	600	0.3	20.0	30
Metal	150	0.08	1.0	150
PVC	150	0.08	1.0	150
Masonry	1000	0.5	1.0	1000
Hazardous Materials	50	0.03	-	-
Other	1050	0.53	11.0	95
Total	8000	4.0	51.0	160

Intended to give credit for minimizing construction waste that needs to be disposed of at a landfill.

The NAHB Research Center:
www.nahbrc.org

See NAHB Research Center's "Builder's Field Guide to Residential Construction Waste Management":
www.nahbrc.org/tertiaryR.asp?TrackID=&CategoryID=1656&DocumentID=4803

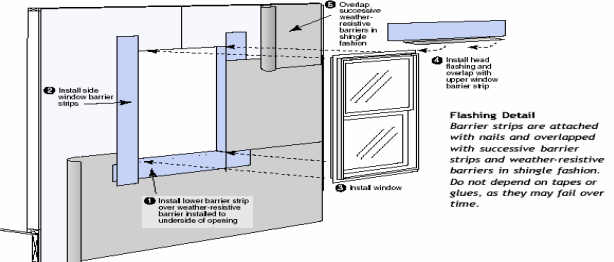
EPA Construction and Demolition Debris:
www.epa.gov/epaoswer/non-hw/debris-new/index.htm

NCSU Cooperative Extension-Managing Construction and Demolition Debris:
www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag473_19.html

	Item	Pt	Intent	Resources
5	<p>Recycle specific materials that have known markets (99%)</p> <p><i>Drywall (recycle or grind and spread on site)</i></p> <p><i>Recycle wood waste (or grind and spread on site)</i></p> <p><i>Recycle metal waste</i></p> <p><i>Recycle cardboard waste</i></p> <p><i>Recycle plastic(s) waste</i></p> <p><i>Recycle shingle waste</i></p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Drywall waste: Use approved recycling program or perform on-site grinding and application of drywall as soil amendment. Wood Waste: Use approved recycling program or perform on-site grinding and application of wood chips as mulch. Pressure treated wood shall not be milled or applied as mulch. Allow freshly ground mulch to leach tannic acid for 4-6 months prior to application. Asphalt Shingle Waste: In 1997 nearly 174,000 tons of potentially recoverable asphalt shingles were generated in North Carolina. One of the most promising uses of recovered asphalt shingles is as an ingredient in road pavement. Asphalt shingle scrap, along with other tar-based materials such as tar paper and flat roof asphalt aggregate, can be processed into road paving mix. Currently, almost all recycled asphalt shingles are used in paving. *North Carolina Recycling Assistance Business Center http://www.ncrcab.com/</p>	2 3 1 1 1 1	Intended to give credit for alternative methods of surplus material utilization other than the landfill.	<p>A searchable directory for recycling construction material is available at: www.p2pays.org/DMMR/start.aspx</p> <p>Construction Site Waste: A new profit center?: www.p2pays.org/ref/24/23678.pdf</p>
6	<p>Prohibit burying construction waste on site</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Construction waste that has been planned and declared to be used as appropriate fill or drainage material (such as rock encountered during site excavation and turned into drainable fill or ground up drywall used as a soil amendment) is not included. All other waste shall be disposed of through recycling or other appropriate method. Burning of waste is not allowed as an acceptable method of disposal when receiving credit for this item.</p>	1	Intended to give credit for not burying materials on site in an inappropriate manner to avoid landfill costs.	<p>Sample waste management plan: www.metrokc.gov/dnrm/swd/construction-recycling/documents/const_waste_management_2003.pdf</p>
7	<p>Central, organized cutting area for project site</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Locate the cutting area for cutting lumber and wood panel products in one area. Store leftover lumber ends and panel pieces with other similar sized cuttings for ease of use when small pieces are needed. The goal is to use leftover in lieu of full sized lumber when appropriate.</p>	2	Intended to give credit for maximizing the opportunity to fully utilize lumber.	<p>Pages 11-13 in the Builder's Guide to Reducing, Reusing and Recycling Residential Construction Waste (1993): www.p2pays.org/ref/24/23678.pdf</p>

	Item	Pt	Intent	Resources
8	<p>Donation of excess materials or re-use of materials (min \$500/job)</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Avoid disposal of excess construction materials by donating excess to a nonprofit 501c(3) organization, K-12 art/wood shop program, university craft center or shop, other appropriate and willing entity or by re-using the construction materials for another project. The value of donated or re-used materials must be a minimum of \$500.</p>	3	Intended to give credit for the donation of unused building materials.	School System Listing for 2005-2006 in two formats (text and Excel) with contact information are available here: www.schoolclearinghouse.org/
9	<p>Job site framing plan with locations of studs, joists, and roof structure with cut list</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Create a written plan that designates the location and size of all structural framing for the roof, walls, and floors. Review plan with the framing crew to ensure minimization of unnecessary framing. Builder may be requested to provide a copy of the framing plan to NC HBH.</p>	3	Intended to give credit for maximizing efficient use of framing materials.	A complex example of a framing plan and cut list is available at: www.vhdesign.com/framing.htm
Exterior/Structural System Materials				
10	<p>Concrete with fly ash (min 25% fly ash) for slab/floor</p> <p><u>EXPECTED DOCUMENTATION:</u> Name of Supplier, Signature of Responsible Party</p> <p><u>INFORMATION:</u> All concrete used in building shall have a minimum of 25% of the total cement composed of recycled fly ash or blast furnace slag. Builder may be requested to provide a copy of the concrete composition report to NC HBH.</p>	2	Intended to give credit for using the waste product fly ash.	<p>PATH program-Fly Ash Concrete: www.toolbase.org/techinv/techDetails.aspx?technologyID=217</p> <p>Austin GB Program-Fly Ash Concrete: www.ci.austin.tx.us/greenbuilder/fs_flyashconcrete.htm</p> <p>EPA recommendations for concrete containing recycled content: www.epa.gov/cpg/products/cemspecs.htm</p>
11	<p>Recycled concrete or glass cullet used for aggregate in concrete</p> <p><u>EXPECTED DOCUMENTATION:</u> Name of Supplier, Signature of Responsible Party</p> <p><u>INFORMATION:</u> Use demolished concrete, recycled glass or other appropriate recycled product as an aggregate in poured concrete slabs, walls or other concrete construction.</p>	2	Intended to give credit for using recycled aggregates in concrete.	<p>Portland Cement Association: www.cement.org/tech/cct_aggregates_recycled.asp</p> <p>Crushed Stone Aggregate Sources in NC: www.geology.enr.state.nc.us/NAE%20aggregates%20Internet%20NRC%20with%20USGS%20sheet/Aggregate%20overview%20new.htm</p>
12	<p>Dimensional or engineered lumber from third-party certified sustainably harvested sources used in various locations:</p> <p>Floor framing members</p> <p>Wall framing members</p> <p>Roof framing members</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector</p> <p><u>INFORMATION:</u> Framing system is composed predominantly of certified lumber. Documentation of the third party certification must be available. Wood from old growth forests is not identified in final products, making the option of avoiding it very difficult.</p>	4 3 3	Intended to give credit for utilizing lumber that meets sustainable harvesting practice guidelines.	<p>Search for certified wood products: www.certifiedwoodsearch.org/searchproducts.aspx</p> <p>Forest Stewardship Council: www.fsc-info.org/</p> <p>Sustainable Forestry Initiative: www.afandpa.org/Content/NavigationMenu/Environment_and_Recycling/SFI/SFI.htm</p>

	Item	Pt	Intent	Resources
13	<p>Continuous foundation termite flashing</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough, where visible Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> A continuous termite shield shall cover 100% of the foundation stem wall, piers, and other potential entry points. The termite shield can be fabricated from metal, plastic, rubberized membrane or similar material that forms a physical barrier to termites. All seams and penetrations in the termite shield shall be completely sealed to prevent termite entry and the shield should be readily visible to allow inspection.</p>	1	Intended to give credit for providing a non-toxic insect barrier.	<p>NCSU Cooperative Extension, termite shields: www.ces.ncsu.edu/depts/ent/notes/Urban/termite_s/shields.htm#top</p> <p>DOE Energy Efficiency and Renewable Energy Website: www.energycodes.gov/support/slab_faq.stm#</p> <p>PATH Durability Details: www.pathnet.org/sp.asp?id=14147</p>
14	<p>Engineered alternative replaces large dimension solid lumber (2x10 or greater) in 90% or more of various structural systems (i.e. trusses, joists):</p> <p>Floor structural system(s)</p> <p>Roof structural system(s)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough, where visible Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Engineered lumber and components shall meet or exceed the performance of solid lumber products that they replace. Resource conserving, smaller trees are used to manufacture the products and there is little or no waste involved in the production and/or end use of the products.</p>	3 2	Intended to give credit for utilizing large dimension lumber products which are less dependent on larger, older growth wood resources.	<p>PATH-Engineered Wood Framing: www.toolbase.org/techinv/techDetails.aspx?technologyID=193</p> <p>American Wood Council: www.awc.org/index.html</p> <p>The Engineered Wood Association: www.apawood.org/</p>
15	<p>Use engineered lumber for 90% or greater of wall framing members. Includes finger-jointed studs</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Finger-jointed material is lumber that is made of off-cuts from manufacturing processes; it is then finger jointed and glued together to make usable lengths of lumber. Finger-jointed lumber may only be used in manufacturer approved applications; vertical stud use is the typical approved application. Engineered lumber and components shall meet or exceed the performance of solid lumber products that they replace. Resource conserving, smaller trees are used to manufacture the products and there is little or no waste involved in the production and/or end use of the products.</p>	2	Intended to give credit for utilizing wall framing members which are less dependent on larger, older growth wood resources.	<p>American Wood Council: www.awc.org/index.html</p> <p>The Engineered Wood Association: www.apawood.org/</p> <p>Southern Pine Council-Finger Jointed Studs (shows labels): http://newstore.southernpine.com/images/ref212.pdf</p> <p>PATH-Engineered Wood Wall Framing: www.pathnet.org/sp.asp?mc=resources_techinventory</p> <p>Picture of finger jointed studs: www.ufpi.com/product/fjstud/index.htm</p>
16	<p>Use engineered alternatives to wood framing for 90% or greater of all structural systems</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough, where visible; Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> This item can not be taken in conjunction with item 14 or 15. Engineered lumber and components shall meet or exceed the performance of solid lumber products that they replace. Resource conserving, smaller trees are used to manufacture the products and there is little or no waste involved in the production and/or end use of the products.</p>	7	Intended to give credit for utilizing all structural roof, floor and wall framing members which are less dependent on larger, older growth wood resources.	<p>American Wood Council: www.awc.org/index.html</p> <p>The Engineered Wood Association: www.apawood.org/</p> <p>Southern Pine Council-Finger Jointed Studs (shows labels): http://newstore.southernpine.com/images/ref212.pdf</p>

Item	Pt	Intent	Resources
<p>17 All headers are steel (with thermal break) or engineered wood</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> A minimum of 95% of the total headers (doors, windows, framed openings, etc.) shall be manufactured from non-solid sawn wood, such as laminated wood, or from steel beams or other shapes. Provide a thermal break (example: sill gasket material) at all steel headers.</p>	1	<p>Intended to give credit for utilizing engineered lumber or non-lumber product in a typical large dimension lumber location.</p>	<p>PATH program-Steel L headers: www.toolbase.org/techinv/techDetails.aspx?technologyID=113</p> <p>PATH program-Insulated Headers: www.toolbase.org/techinv/techDetails.aspx?technologyID=119</p>
<p>18 Install window and door flashings at all exterior openings. Install as recommended by the window manufacturer, in conjunction with the weather resistant barrier manufacturer</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> All windows and exterior doors shall have appropriate flashing installed a maximum of six inches above the top of the window or door. All windows and exterior doors shall have a water-resistant flashing installed on the side and base of window and door rough openings to direct water leaks out of the framing. Flashing shall be compatible with materials it touches (for example, steel and aluminum are incompatible and shall not be installed so that they touch) and shall meet manufacturers' (window, door and flashing) specifications. Flashing example below:</p> 	2	<p>Intended to give credit for providing an effective water management system at all exterior openings to minimize water intrusion and increase durability.</p>	<p>The Engineered Wood Association-nice pictures of flashing at windows and doors- www.apawood.org/bbh_walls.cfm</p> <p>IBACOS (shows steps for flashing example picture): www.ibacos.com/qhome/Jan03/jan03_windows.html</p>
<p>19 Stucco, with drainage plane, on 50% or more of exterior wall area</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough, Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> A drainage plane is a designed location where water that penetrates exterior cladding drains away from the building envelope. This provides increased durability of the envelope. A drainage plane is part of a rain screen system, along with an air space and exterior cladding. In the case of EIFS, the drainage plane is critical to the proper installation of the product due to many failures of EIFS installations that use a barrier system instead of the drainage plain design.</p>	3	<p>Intended to give credit for providing an effective water management system when using stucco as a wall finish.</p>	<p>PATH program-Rain Screen Exterior Walls: www.toolbase.org/techinv/techDetails.aspx?technologyID=231</p> <p>NAHB Toolbox-EIFS Drainable Systems: www.toolbase.org/techinv/techDetails.aspx?technologyID=231</p>
<p>20 Exterior cladding (min 3 sides with 40-year product life warranty or masonry)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough, Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Warranty documentation must be provided to the homeowner. Builder may be requested to provide a copy of the warranty to NC HBH.</p>	1	<p>Intended to give credit for providing a durable cladding system.</p>	<p>Brick 101 year warranty example: http://na.hansonbrick.com/en/global/warranty.php</p>

	Item	Pt	Intent	Resources
21	<p>Back and edge-primed siding and trim</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> All cut or un-primed sides of painted or stained exterior siding and trim shall be primed prior to installation. Pre-primed product does not need to be re-primed, as long as no cut has been made. This includes the ends, the top and bottom edges and the front and back face.</p>	2	<p><i>Intended to give credit for providing durable cladding system.</i></p>	<p>Good definition of back priming: www.calredwood.org/faqs/fqbprim.htm</p> <p>NAHB toolbase-Why House paint fails: http://www.toolbase.org/PDF/DesignGuides/FPL_Why_House_Paint_Fails.pdf</p>
22	<p>Indigenous stone (within 300 miles) on 50% or more of exterior wall area</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough, Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Indigenous stone is stone that is found locally, preferably in North Carolina. Due to its weight, transport of stone over a long distance uses substantial fuel resources. Stone is considered a durable material.</p>	4	<p><i>Intended to give credit for utilizing a local building material as the exterior cladding that requires minimal processing.</i></p>	<p>Dimension stone in NC: www.geology.enr.state.nc.us/03072002buildingstones/NC%20building%20stones/Building%20stones/Dimension%20stone%20overview.htm</p>
23	<p>Wood siding is 100% from third-party certified sustainably harvested sources, 50% or more of exterior wall area</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough, Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Wood siding is composed predominantly of certified lumber. Documentation of the third party certification must be available. Wood from old growth forests is not identified in final products, making the option of avoiding it very difficult.</p>	2	<p><i>Intended to give credit for utilizing lumber that meets sustainable harvesting practice guidelines.</i></p>	<p>Search for certified wood products: www.certifiedwoodsearch.org/searchproducts.aspx</p> <p>Forest Stewardship Council: www.fsc-info.org/</p> <p>Sustainable Forestry Initiative: www.afandpa.org/Content/NavigationMenu/Environment_and_Recycling/SFI/SFI.htm</p>
24	<p>Fiber cement siding on 50% or more of exterior wall area</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Warranty documentation must be provided to the homeowner. Builder may be requested to provide a copy of the warranty to NC HBH.</p>	1	<p><i>Intended to give credit for providing a durable cladding system.</i></p>	<p>Hardiplank 50 year warranty example: www.jameshardie.com/homeowner/prodhome/hardiplank_warranty.php</p>
25	<p>Recycled and/or recovered-content siding (minimum 50% pre- or post-consumer) on 50% or more of exterior wall area</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough, Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Pre-consumer recycled content is generally waste created during manufacture of a product. Post-consumer waste is created when a consumer recycles an existing product. Down cycling occurs when a product is recycled to a lower use than the original material. Builder may be requested to provide a copy of the recycled content to NC HBH.</p>	2	<p><i>Intended to give credit for providing a recycled cladding system.</i></p>	<p>Oikos article on siding options: http://oikos.com/library/vision/index.html</p>

	Item	Pt	Intent	Resources
26	<p>All beams are steel, engineered wood, or trusses</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> All structural beams shall be manufactured from non-solid sawn wood, such as laminated wood, or from steel beams or other shapes. Provide a thermal break (example: sill gasket material) at all locations where beams are part of the building envelope assembly.</p>	1	<p><i>Intended to give credit for utilizing engineered lumber or non-lumber product in a typical large dimension lumber location.</i></p>	<p>American Wood Council: www.awc.org/index.html</p> <p>The Engineered Wood Association: www.apawood.org/</p>
27	<p>Fiber cement or engineered wood exterior trim:</p> <p>Fascia</p> <p>Soffit</p> <p>Other exterior trims</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Separate incompatible trim products as required by manufacturer for corrosion resistance.</p>	1 1 1	<p><i>Intended to give credit for providing a durable cladding trim system.</i></p>	<p>Installation example from James Hardie Company for fiber cement (note corrosion resistant attachment requirements): www.jameshardie.com/builder/installation/hardiplank_installation.php</p>
28	<p>Recycled-content roofing material</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Roofing may be made of 100% recycled rubber and plastic; 100% recycled polymer and rubber; 100% recycled wood and plastic; metal with 70% recycled content or fiber cement with recycled content.</p>	3	<p><i>Intended to give credit for utilizing roofing made from recycled materials.</i></p>	<p>National Association of Home Builders Web: www.nahb.org.</p>
29	<p>Light roof color (tile or metal). Light Reflectance Value (LRV) of .50 or greater for roofs with a slope >2:12 or .65 or greater for low slope roofs <2:12</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough, Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> The US Environmental Protection Agency (EPA) defines a cool roof as one with a high reflectance, greater than .65 (65%) for low sloped roofs (<2:12); greater than .25 (25%) for high sloped roof (>2:12); and a high emittance, greater than .8 (80%). High sloped roofs must have a LRV of .50 or greater to receive credit for this item.</p>	2	<p><i>Intended to give credit for reducing radiant heat gain through the roof.</i></p>	<p>Cool Roofing Rating Council: www.coolroofs.org/ratedproductsdirectory.html</p> <p>ORNL-Cool Roofing Materials Database: http://eetd.lbl.gov/CoolRoofs/</p>
30	<p>Provide metal roof drip edge</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Install drip edge below flashing. Metal drip edge supports shingles which extend beyond the fascia, particularly over gutters. As with all roofing components, care should be taken to install metal drip edge using storm resistance techniques recommended for the local wind zone.</p>	1	<p><i>Intended to give credit for providing an effective water management system to minimize problems associated with water intrusion.</i></p>	<p>NAHB Toolbase-Drip Edge placement (PATH): www.toolbase.org/ToolbaseResources/level4DG.aspx?ContentDetailID=3179&BucketID=4&CategoryID=10</p> <p>Storm Resistant Roofing: www.pathnet.org/sp.asp?id=17310</p>

	Item	Pt	Intent	Resources
31	<p>Roof gutters/downspouts discharge water min 5 feet from foundation</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> It is important that the downspout extensions create a positive drainage away from the building foundation. Water held in the extension may create a breeding ground for unwanted pests, for example, mosquitoes.</p>	1	<p><i>Intended to give credit for providing an effective water management system to minimize problems associated with water intrusion.</i></p>	<p>NAHB Toolbase-Durability Checklist: www.toolbase.org/PDF/TechSets/techset2_checklist.pdf</p> <p>NCSU Cooperative Extension-Mosquito Control: www.ces.ncsu.edu/depts/ent/notes/Urban/mosquito.htm#breed</p>
32	<p>Covered entry ways all doors; min. 2' deep, max. 2' above door</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Home shall have covered entries no less than two feet above every exterior door which opens into conditioned space.</p>	2	<p><i>Intended to give credit for providing an effective water management system to minimize problems associated with water intrusion.</i></p>	<p>NAHB Toolbase-Durability Checklist: www.toolbase.org/PDF/TechSets/techset2_checklist.pdf</p>
33	<p>Recycled-content insulation:</p> <p>Minimum 25% recycled content</p> <p>Minimum 75% recycled content</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Examples of insulation with recycled content for several products: <ul style="list-style-type: none"> •Wet spray cellulose insulation with 75% recycled content •Cotton denim insulation – recycled denim material •Mineral wool insulation – 92% recycled content--Fibrex, Inc. Aurora, IL •Perlite composite board – with 23% post consumer paper--Schuller International, Denver, CO •Cellulose – 75% post consumer recycled paper •Fiberglass – 20-50% recycled content with no formaldehyde--Johns Manville Co. </p>	1	<p><i>Intended to give credit for utilizing insulation made from recycled materials.</i></p>	<p>EPA Procurement Guidelines-Building Insulation: www.epa.gov/cpg/products/building.htm</p>
		2		
34	<p>HCFC-free rigid foam insulation</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Rigid foam insulation has many excellent properties but does use blowing agents to create the insulative properties of the materials. Some insulation manufacturers use more benign blowing agents and these are given credit in the NC HBH program.</p>	1	<p><i>Intended to give credit for utilizing materials that do not use chemicals that have a negative impact on the atmosphere.</i></p>	<p>The Green Zone-Green Polyiso: www.greenpolyiso.com/what_is_green.asp Atlas Roofing HCFC free insulation (see label example): www.atlasroofing.com/acultra/index.asp EPA Blowing Agents approved for insulations: www.epa.gov/ozone/snap/foams/index.html</p>

	Item	Pt	Intent	Resources
35	<p>Outdoor structures, decking and landscaping materials:</p> <p>Made from recycled materials. (min. 40%)</p> <p>Made from 3rd-party certified sustainably harvested lumber (min 40%)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> 1. Structure is composed of at least 40% recycled content decking/landscaping materials such as Recycled wood/Plastic composite lumber. 2. Structure is composed of at least 40% certified lumber. Documentation of the third party certification must be available. Wood from old growth forests is not identified in final products, making the option of avoiding it very difficult.</p>	2 3	Intended to give credit for utilizing alternative exterior building landscape materials focused on resource efficiency.	<p>PATH-Recycled Wood/Plastic Composite Lumber: www.toolbase.org/techinv/techDetails.aspx?technologyID=237</p> <p>Minnesota Office of Environmental Assistance</p> <p>Plastic Lumber: www.moea.state.mn.us/lc/purchasing/plasticlumber.cfm</p> <p>Search for certified wood products www.certifiedwoodsearch.org/searchproducts.aspx</p> <p>Forest Stewardship Council www.fsc-info.org/</p> <p>Sustainable Forestry Initiative www.afandpa.org/Content/NavigationMenu/Environment_and_Recycling/SFI/SFI.htm</p>
36	<p>Specify salvaged, reclaimed or refurbished materials for 10% of structural material.</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Use salvaged materials of good quality and of appropriate type for the installation. Local Habitat for Humanity affiliates and architectural salvage companies are good sources of these type of products.</p>	5	Intended to give credit for utilizing building products that reduce the need for new resources and reduces waste to landfills.	<p>Architectural Salvage Company: http://preservation-hall.com/</p> <p>Wake Habitat Reuse Store: www.habitatwake.org/ReuseCenterpage.htm</p>
37	<p>Use engineered (includes finger-jointed) plate materials</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Engineered lumber and components shall meet or exceed the performance of plate lumber products that they replace. Resource conserving, smaller trees are used to manufacture the products and there is little or no waste involved in the production and/or end use of the products.</p>	2	Intended to give credit for utilizing plate materials which are less dependent on larger, older growth wood resources.	<p>PATH-Engineered Wood Framing: www.toolbase.org/techinv/techDetails.aspx?technologyID=193</p> <p>American Wood Council: www.awc.org/index.html</p> <p>The Engineered Wood Association: www.apawood.org/</p>
38	<p>Provide 34" wide doors to all habitable rooms and all hallways shall be at least 42" clear, finished</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Wider doors allow for easier access to main rooms and provide a turning space in hallways. Rooms considered habitable include bedrooms, bathrooms, living, dining and kitchen spaces, at minimum. Closets, mechanical rooms, pantries and other accessory rooms are encouraged to have wide doors but are not required.</p>	3	Intended to give credit for integrating universal design features.	<p>NCSU Center for Universal Design: http://design.ncsu.edu:8120/cud/pubs_p/docs/UDinHousing.pdf</p>

	Item	Pt	Intent	Resources
39	<p>Provide one accessible bathroom on the main floor with 1/2" sheet good blocking for future accessory installations</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Bathroom door must be at least 34" wide. Inform homeowner of location of sheet good blocking for future accessory installation. Use sheet good blocking rated for moisture installations such as green faced drywall, treated lumber, or other materials that do not deteriorate when exposed to moisture.</p>	3	Intended to give credit for integrating universal design features.	<p>NCSU Center for Universal Design: http://design.ncsu.edu:8120/cud/pubs_p/docs/UDinHousing.pdf</p> <p>NCSU CUD-bathroom fact sheets: http://design.ncsu.edu:8120/cud/pubs_p/docs/qa_p_tech_screen.pdf</p>
Interior Materials				
40	<p>Install regionally obtained salvaged or reclaimed materials for min. 25% of floors and interior trim</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Use salvaged materials of good quality and of appropriate type for the installation. Local Habitat for Humanity affiliates and architectural salvage companies are good sources of these type of products.</p>	4	Intended to give credit for utilizing building products that reduce the need for new resources and reduces waste to landfills.	<p>Architectural Salvage Company: http://preservation-hall.com/</p> <p>Wake Habitat Reuse Store: www.habitatwake.org/ReuseCenterpage.htm</p>
41	<p>Use alternative underlayment product (no Luan):</p> <p>Natural cork / 100% recycled or recovered content underlayment used</p> <p>Padding containing 50-100% recycled content</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Luan is a tropical hardwood native to endangered rainforests.</p>	3 2	Intended to give credit for using a rapidly renewable or recycled material as underlayment.	<p>Oikos-Natural Cork Flooring: http://oikos.com/products/finishes/naturalcork/</p> <p>Hierarchy of Wood Use: www.rainforestrelief.org/What_to_Avoid_and_Alternatives/Rainforest_Wood/Hierarchy_of_Wood_Use.html</p>
42	<p>Natural fiber carpet made with natural latex rather than SB latex backing</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party.</p> <p><u>INFORMATION:</u> Natural fiber carpet is made from 100% materials such as wool, sisal, jute, and hemp. Carpet pad must also be of a natural material such as fibrous jute plants.</p>	2	Intended to give credit for utilizing natural finish materials that are rapidly renewable.	<p>Green Sage-Natural Fiber Carpet: www.greensage.com/SLCP-FLOORING/SLCPnatrlcarpet.htm</p> <p>Green Sage-Carpet Padding Sources: www.greensage.com/09682carpetpad.html</p>

	Item	Pt	Intent	Resources
43	<p>Natural linoleum in place of any vinyl sheet flooring or vinyl composition tile, with low toxic adhesives or backing</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Natural linoleum is composed of jute, linseed oil, wood flour, limestone, and pigments--generally rapidly renewable products. Low toxic adhesives must be used. It is recommended that no flexible vinyl wall covering or flooring should be used in the project. Vinyl acts as a moisture barrier and can trap water which can lead to mold and mildew problems in mixed humid climates.</p>	3	<p><i>Intended to give credit for utilizing natural finish materials that are rapidly renewable.</i></p>	<p>Oikos-Linoleum: http://oikos.com/green_products/category.php?category_id=414</p>
44	<p>Minimum 25% of flooring manufactured from rapidly renewable resource material (engineered product is acceptable)</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Examples of flooring from renewable resource material include but are not limited to: Bamboo, Cork, Palm and other plant based materials.</p>	2	<p><i>Intended to give credit for utilizing natural finish materials that are rapidly renewable.</i></p>	<p>Oikos-Flooring: www.oikos.com/green_products/menu.php?sub_div=Flooring</p>
45	<p>3rd party certified sustainably harvested wood flooring</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Flooring is composed predominantly of certified lumber. Documentation of the third party certification must be available. Wood from old growth forests is not identified in final products, making the option of avoiding it very difficult.</p>	3	<p><i>Intended to give credit for utilizing flooring that meets sustainable harvesting practice guidelines.</i></p>	<p>Search for certified wood products: www.certifiedwoodsearch.org/searchproducts.aspx</p> <p>Forest Stewardship Council: www.fsc-info.org/</p> <p>Sustainable Forestry Initiative: www.afandpa.org/Content/NavigationMenu/Environment_and_Recycling/SFI/SFI.htm</p>
46	<p>3rd party certified sustainably harvested interior trim</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Wood trim is composed predominantly of certified lumber. Documentation of the third party certification must be available. Wood from old growth forests is not identified in final products, making the option of avoiding it very difficult.</p>	3	<p><i>Intended to give credit for utilizing wood trim that meets sustainable harvesting practice guidelines.</i></p>	<p>Search for certified wood products: www.certifiedwoodsearch.org/searchproducts.aspx</p> <p>Forest Stewardship Council: www.fsc-info.org/</p> <p>Sustainable Forestry Initiative: www.afandpa.org/Content/NavigationMenu/Environment_and_Recycling/SFI/SFI.htm</p>
47	<p>Interior paints or finishes with recycled-content</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Paint recycling centers or free paint days exist in some counties. Includes: Carteret, Craven, Durham and Pamlico.</p>	1	<p><i>Intended to give credit for using recycled paint.</i></p>	<p>Minnesota Office of Environmental Assistance Recycled Paint: www.moea.state.mn.us/lc/purchasing/latexpaint.cfm</p>

Item	Pt	Intent	Resources
<p>48 Engineered interior trim--Finger-jointed and/or MDF trim</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Finger-jointed trim material is made of off-cuts from manufacturing processes; it is then finger jointed and glued together to make usable lengths of trim. Engineered trim and components shall meet or exceed the performance of solid lumber products that they replace. Resource conserving, smaller trees are used to manufacture the products and there is little or no waste involved in the production and/or end use of the products. It is important to back and edge prime engineered trim that is not pre-finished and where pre-finished trim is cut for installation purposes.</p>	1	<p><i>Intended to give credit for utilization of engineered wood products for interior trim.</i></p>	<p>Oikos-Finger jointed trim: http://oikos.com/green_products/category.php?category_id=148</p> <p>American Wood Council: www.awc.org/index.html</p> <p>The Engineered Wood Association: www.apawood.org/</p>
<p>49 Recycled and/or recovered content gypsum wallboard</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Gypsum is a mined product. Using recycled gypsum wallboard (sometimes referred to as "synthetic" along with other types of reclaimed products comprising gypsum wallboard) avoids habitat destruction and resource depletion. When purchasing drywall, consider whether your supplier will recycle your scrap wallboard.</p>	2	<p><i>Intended to give credit for utilizing building products that reduce the need for new resources and reduces waste to landfills.</i></p>	<p>Whole Building Design Guidelines-Gypsum Drywall: www.wbdg.org/design/09200.php</p> <p>Oikos: Gypsum Board: www.oikos.com/green_products/menu.php?sub_div=Gypsum%20Board</p>
<p>50 No Lauan doors (tropical hardwood)</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Lauan is a tropical hardwood native to endangered rainforests.</p>	1	<p><i>Intended to give credit for not using a tropical hardwood door.</i></p>	<p>Oikos-Wood Doors: www.oikos.com/green_products/category.php?category_id=356</p> <p>Hierarchy of Wood Use: www.rainforestrelief.org/What_to_Avoid_and_Alt_ernatives/Rainforest_Wood/Hierarchy_of_Wood_Use.html</p>
<p>51 Doors made from third-party certified sustainably harvested wood</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Doors are composed predominantly of certified lumber. Documentation of the third party certification must be available. Wood from old growth forests is not identified in final products, making the option of avoiding it very difficult.</p>	2	<p><i>Intended to give credit for using doors that meet sustainable harvesting practice guidelines.</i></p>	<p>Search for certified wood products: www.certifiedwoodsearch.org/searchproducts.aspx</p> <p>Forest Stewardship Council: www.fsc-info.org/</p> <p>Sustainable Forestry Initiative: www.afandpa.org/Content/NavigationMenu/Environment_and_Recycling/SFI/SFI.htm</p>
<p>52 Recycled and/or recovered content doors</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party <u>or</u> inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Pre-consumer recycled content is generally waste created during manufacture of a product. Post-consumer waste is created when a consumer recycles an existing product. Down cycling occurs when a product is recycled to a lower use than the original material. Builder may be requested to provide a copy of the recycled content to NC HBH.</p>	2	<p><i>Intended to give credit for using recycled or salvaged doors.</i></p>	<p>Oikos-Doors has some resources: www.oikos.com/green_products/menu.php?sub_div=Doors</p>

	Item	Pt	Intent	Resources
53	<p>100% agricultural waste or 100% recycled wood particleboard/MDF for shelving/countertops</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough Signature of Responsible Party or inspection by approved NC HBH inspector.</p> <p><u>INFORMATION:</u> Shelving and Countertops can be made from sunflower hulls, wheat straw, post and pre-consumer wood waste and other biomass products. These products are considered rapidly renewable and can replace the use of fossil fuel based plastics, metal, stone and other non-renewable in countertop, cabinet and shelving materials.</p>	3	<p><i>Intended to give credit for utilizing natural cabinetry materials that are rapidly renewable.</i></p>	<p>Oikos-Countertops has some resources: http://oikos.com/green_products/category.php?category_id=408</p> <p>Oikos-Wood Cabinets: http://oikos.com/green_products/category.php?category_id=157</p>

Bonus Opportunities (Minimum Points: 2)

[Back](#)

Item	Pt	Intent	Resources
<p>1 Built-in kitchen recycling center with two or more bins</p> <p><u>EXPECTED DOCUMENTATION:</u> Final Walkthrough</p> <p><u>INFORMATION:</u> Kitchen recycling centers are modified kitchen cabinets or other systems that neatly conceal recycling bins.</p>	3	<p><i>This checklist item is intended to give a project credit for promoting recycling .</i></p>	<p>Kitchen Recycling Centers (PATH) www.toolbase.org/Technology-Inventory/Appliances/recycling-centers-kitchen</p> <p>Home Recycling www.greenbuilder.com/sourcebook/HomeRecycling.html</p>
<p>2 Provide local recycling contact</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party indicating that local recycling contacts will be provided to homeowner or in closing packet.</p> <p><u>INFORMATION:</u></p>	1	<p><i>This checklist item is intended to give a project credit for promoting recycling.</i></p>	<p>Carolina Recycling Association www.cra-recycle.org</p> <p>Local NC Waste Reduction Programs And Contacts www.p2pays.org/localgov/PAYT/ncwaste.asp</p>
<p>3 Provide household hazardous waste resources</p> <p><u>EXPECTED DOCUMENTATION:</u> Signature of Responsible Party indicating that household hazardous waste resources will be provided to homeowner or in closing packet.</p> <p><u>INFORMATION:</u></p>	1	<p><i>This checklist item is intended to give a project credit for promoting responsible waste management.</i></p>	<p>Carolina Recycling Association www.cra-recycle.org</p> <p>Local NC Waste Reduction Programs And Contacts www.p2pays.org/localgov/PAYT/ncwaste.asp</p>
<p>4 Environmental checklist provided to the following subcontractors, as applicable to the project: Mechanical (and associated subs), Electrical (and associated subs), Plumbing, Controls, Solar/renewables, Landscaping, Site, Concrete/Floor System, Framing/Wall System, Siding, Masonry, Insulation, Roofing/Roof System, Drywall, Paint/Sealants, Casework, Flooring</p> <p><u>EXPECTED DOCUMENTATION:</u> Copy of document An environmental checklist for subcontractors may include jobsite specific information and requirements regarding worker safety, waste management, hazardous/toxic materials, site managements, etc.</p> <p><u>INFORMATION:</u></p>	4	<p><i>This checklist item is intended to give a project credit for promoting environmental stewardship among sub-trades.</i></p>	
<p>5 Markets NC HealthyBuilt Homes program</p> <p><u>EXPECTED DOCUMENTATION:</u> Detailed description of marketing activities, presentations, etc. - each to include organization, location, date, description of activity and number/names of attendees if possible.</p> <p><u>INFORMATION:</u> Marketing possibilities of the NC HBH program by the builder include but are not limited to: HBA presentation (if no community program is in place), education of leasing agents/realtors/appraisers, getting financial institutions interested and knowledgeable about the program, Parade of Home display, etc.</p>	3	<p><i>This checklist item is intended to give a project credit for promoting green building market development.</i></p>	<p>Contact: www.healthybuilt homes.org</p>

Item	Pt	Intent	Resources
<p>6 Provides environmental features checklist for walk through to owner</p> <p><u>EXPECTED DOCUMENTATION:</u> Copy of checklist provided Signature of Responsible Party indicating that environmental features checklist will be provided to the owner.</p> <p><u>INFORMATION:</u></p>	1	<p><i>This checklist item is intended to give a project credit for promoting environmental stewardship.</i></p>	
<p>7 Held for: Home safety certification</p> <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough (look for items from Lowe's Home Safety Council top twenty list)</p> <p><u>INFORMATION:</u> Home must meet all the requirements as provided by the Lowe's Home Safety Council top twenty list, downloadable at http://www.loweshomesafety.org/sh_top20.asp List must be verified by the builder. Builder can issue the certification. www.homesafetycouncil.org/index.aspx</p>	1	<p><i>This checklist item is intended to give a project credit for promoting home safety.</i></p>	<p>Held</p>

Item	Pt	Intent	Resources
<p>8 Universal Design Integration (must complete all 6 items).</p> <ol style="list-style-type: none"> 1. No step entrance (1/2" max threshold) with weather protection. Avoid ramps unless they are short, gently sloped (1' in 20'), integrated, and preferably covered. 2. Materials #38 (also receive points for the Materials item) 3. Key function areas on a reachable and useable level: <ol style="list-style-type: none"> a) Top of kitchen counters and stove no more than 34" above floor. b) Front controls on stove and oven. c) Kitchen and bathroom sink no more than 34" high, plumbing allows for knee space d) Front loading washer and dryer 4. Maneuverable kitchen and bathroom layout: <ol style="list-style-type: none"> a) 60" turning diameter in kitchen and in at least one bathroom on main floor b) Clear space (3') in front and to one side of toilet c) Toilet centerline 18" from any wall, cabinet, or tub on either side of the toilet 5. Materials #39 (also receive points for the Materials item) 6. Reachable and usable switchable controls: <ol style="list-style-type: none"> a) Light switches, thermostat controls (center line) 44"-48" above the floor b) Power outlets 18"-24" above the floor c) Reachable electrical panel (top no more than 54" above floor and 30" x 40" clear floor in front) <p><u>EXPECTED DOCUMENTATION:</u> Final walkthrough for all items, item 5 requires signature or inspection</p> <p><u>INFORMATION:</u></p> <ol style="list-style-type: none"> 1. No step entrance, Avoid ramps. Create at least one stepless entrance with a maximum threshold of 1/2" by earth berming, site grading, and earth work to create sloping walks at 1 in 20 maximum slope. Other entrance related design ideas include lighting the entrance area and providing a view of a caller for children and for those seated. Attempt to provide 18" of clear floor space beside latch jamb at entrance door to provide space to move out of the way of the door swing when pulling it open. 2. Wide doorways and hallways (Materials #38). Create wide doorways (use 34" or wider doors) and hallways (42" clear) in order to allow for easy passage through them for those who are seated as well as those who use walking assistance devices. (i.e. walkers). 3. Reachable key function areas. Kitchen appliances and countertop space on a reachable level (top no more than 34" from the floor) with oven and stove controls on the front of the appliance. Side by side refrigerator and freezer are preferred. Where possible, knee space should be provided beside or under appliances for access when seated. Sinks in bathroom reachable as well, with knee space underneath to allow for wheelchair access, or pipes plumbed for easy no-plumbing retrofit for wheelchair access. Front loading washer and dryer should be installed. These should be raised, or be simple to raise in the future, to reduce amount of bending over required, but still reachable when seated. 4. Maneuverable kitchen and bathroom layout. 60" diameter turning space in the kitchen and in at least one bathroom on the main floor of the home. Clear space (3') in front and to one side of toilet with toilet centerline 18" from any wall, cabinet, or tub on either side of the toilet. 5. Blocking in bathrooms (Materials #39). Recommended whole wall reinforcing by installing wood between studs in the bathroom, at minimum blocking for handrails in shower/tub and accessing toilet. This allows for grab bars to be securely installed without tearing out the existing wall. 6. Reachable and usable controls and outlets. Light switches should be placed 44"-48" above the floor, measured to the centerline. Easy touch rocker switches are preferred. Electrical outlets no lower than 18" allows easy reach from a sitting position as well as for those who have trouble bending over. Electrical panel with top no more than 54" above the floor located with a minimum of 30" x 40" clear floor space in front to allow for maneuverability and easy reach for those in wheelchairs. 	5	<p><i>This checklist item is intended to give a project credit for meeting Universal Design criteria which makes a home easily livable for a handicapped individual without altering aesthetics.</i></p>	<p>Center for Universal Design (CUD) at NC State University www.design.ncsu.edu/cud/</p>

Item	Pt	Intent	Resources
<p>9 Innovation points - Builder submits specifications for innovative products or design (max 10 pts awarded per innovation)</p> <p><u>EXPECTED DOCUMENTATION:</u> varies</p> <p><u>INFORMATION:</u> There are many opportunities to improve the sustainability of a home that have not been included in the checklist. Contact the HBH program coordinator to discuss special features that are being included in your home to determine if they may qualify for points.</p>	1-10	<p><i>This checklist item is intended to give a project credit for innovative healthy building strategies</i></p>	
<p>10 Builder is enrolled in Community HealthyBuilt Homes Program</p> <p><u>EXPECTED DOCUMENTATION:</u> Completed enrollment form indicating Community HBH program</p> <p><u>INFORMATION:</u></p>	2	<p><i>This checklist item is intended to give a project credit for supporting community based services</i></p>	

Statewide Partners

North Carolina Solar Center:



The **North Carolina Solar Center** serves as a clearinghouse for solar and other renewable energy programs, information, research, technical assistance, and training for the citizens of North Carolina and beyond.

www.ncsc.ncsu.edu

Energy Star:



ENERGY STAR is a federal government-backed program helping businesses and individuals protect the environment through superior energy efficiency. For more information on how to make your home or business energy efficient, visit

www.energystar.gov

North Carolina State University:



Located in Raleigh, **North Carolina State University** is a progressive, research and extension land-grant institution. It forges unique partnerships that generate economic development, and applies its research discoveries for the benefit of people in North Carolina and across the United States. Visit NC State online at www.ncsu.edu

Community Partner

Western North Carolina Green Building Council:



WNCGBC is a non-profit organization whose mission is to promote environmentally sustainable and health conscious building practices through community education. As of 2005 WNCGBC has grown to nearly 100 members and is implementing the first NC HealthyBuilt Homes Community Program in Asheville.

www.wncgbc.org/healthybuilt/

Sponsors

North Carolina Department of Administration, State Energy Office:



The **State Energy Office** is North Carolina's lead agency for energy programs and services and is the official source for energy information and assistance for consumers, businesses, government agencies, non-profit organizations, schools and policy-makers.

www.energync.net

US Department of Energy, Energy Efficiency and Renewable Energy:



DOE's **EERE program** is focused on creating a prosperous future where energy is clean, abundant reliable and affordable. The US Department of Energy has funded various projects for the NC HealthyBuilt Homes program, including expanded training content development for builders and a market study of the features a Zero Energy Home needs in the NC market (focused on coastal and piedmont communities). Keep up with national energy news at www.eere.energy.gov.