



Measures Guide

Green Star



Energy



Health



Land



Materials



Water

Welcome and thank you for choosing to use GreenStar to certify your next home/remodeling project. GreenStar was designed to help you navigate the complex world of Green building to ensure that your home/project is built Green.

GreenStar defines Green building as the application of the five key concepts of Green to the traditional building practice for the purpose of improving the life of the occupant and the impact of the home on the occupant, the surrounding community, and the environment.

The pillars that govern Green building are: Energy, Health, Water, Place (land) and Materials. These pillars are all considered to have equal weight in the process and the potential for impact on the home and the community.

The GreenStar certification program is designed to ease the process of determining what is Green and how to evaluate it. The interactive and continuously updated and improved online tool is meant to remain in electronic form as long as possible to reduce consumption of resources. The checklist is comprised of strategies that you may choose to employ in your project. Each strategy is followed by five pillars that contain the point or points that are applicable to that strategy.

The second tool that has been developed to help facilitate the Green building process is this User's Manual. Each strategy that appears in the checklist also appears in this manual with an explanation of the credit, the intent, any exceptions that might apply, and some considerations that should be taken into account when implementing that strategy. We have also included some resource information periodically to help you understand and research more about a particular building system, technology, or conservation strategy.

The manual is divided up into chapters that mirror the sections in the checklist. The manual which is not meant to read back to back gives insight into how some of the strategies were conceived and to help you understand why certain strategies are encouraged more than others. Some sub-sections will have a brief explanation of the subsequent credits.

Green building is an ever evolving subject of study and revelation. New insights into building performance, material impact and durability, better life cycle analysis tools, and a better understanding of the world around us as it changes, are constantly being reviewed and incorporated into the GreenStar program. Our intent is that this program and these documents continue to grow and evolve over the coming years with input from those who are using the program.

We are also aware that there are imperfections in the program and the checklist. There may be strategies that you do not see listed or technologies that are not credited. Some of these may have been deemed not worthy of recognition in our climate or may have developed since the latest update to the checklist and user's manual were made. We encourage you to submit strategies or products for review using our strategy/product review forms available on our website.

If you have an innovative solution or unusual condition that either does not fit within one of our strategies, or is missing from the program, you are asked to complete an innovation credit request form and submit it with your project application.



Thank you once again for selecting GreenStar to help ensure that your next project is healthier, more durable, affordable, efficient and overall better!

Sincerely, GreenHome Institute: GreenStar Leadership Committee

Acknowledgements

GreenStar is the quintessential grass-roots story that begins with the creation of the Minnesota Green Remodeling Program, upon which the GreenStar Program is based. The Minnesota program was initiated by the ad hoc Green Remodeling Group that quickly partnered with The Green Institute and the University of Minnesota's Center for Sustainable Building Research to develop the GreenStar Remodeling program. The program was primarily created by a large and diverse group of volunteers for the purpose of changing our built environment and creating meaningful change in our building process, both programs are the result of countless hours of dedicated hard-work and sacrifice.

Without the support of the following organizations, GreenStar would not be where it is today: The Green Institute (different than GreenHome Institute), which provided financial support, resources, expertise and balance. The National Association of the Remodeling Industry – Minnesota Chapter, which provided volunteers, staff support, expertise and perspective. And, the Minnesota Pollution Control Agency which provided the financial support for the program development and trainings for the original GreenStar participants, and support in introducing the program to cities around the state of . Finally, the GreenHome Institute which has played a huge role in tailoring the Green Remodeling Program to make Green Remodeling and New Home Certification available in an ever expanding list of states outside of Minnesota.

The individuals who make up the board of directors of the former MNgreenstar and GreenHome Institute, present and future, are to be thanked for their time and support of programs that seek to do the right thing and ensure that GreenStar continues to be the benchmark for Green Remodeling and New Homes.

Our great and humble thanks to these individuals and companies who made this possible:

Michael Anshel Marc Sloom Mark Spiers Stephen Roche Ben Shardlow Josh Crenshaw Sean Morrissey Ishmael Israel Matt Danielson Don Shelby Peter Jacobson Janneke Schaap Michael Holcomb Brett Little Jamison Lenz Jason LaFluer Erin Barnes-Driscoll Todd Bjerstedt Christine Bleyhl Corey Brinkema Rick Carter KC Chermak Bob Engstrom Dylan Howard Christopher Jones Dave Klun Joe Kneable Jonee Kulman-Brigham Laura Millberg Bruce Nelson Shawn Nelson Cindy Ojczyk Harvey Sherman Phil Smith Ron Smith Dave Welsch Better Homes & Garbage Building Arts Sustainable Architecture+Construction LLC Carl Seville Center for Sustainable Building Research at the University of Minnesota Cindy Ojczyk Design David Eisenberg David Johnston Dovetail Partners, LLC Great River Energy Kestrel Design Group Manomin Hardwood Floors Minnesota Department of Commerce Mississippi Headwaters Chapter of the U.S. Green Building Council New Spaces Design-Build Otogawa-Anshel Design-Build SALA Architects, Inc. Scherer Brothers Lumber Company Shaw/Stewart Lumber Company The Remodeler's Choice Vujovich Design-Build Xcel Energy

Huge thanks to our Platinum Checklist Sponsor Andersen Windows <http://www.andersenwindows.com/> along with Michael Atkins at Earth Advantage - Cakesystems for help develop the online checklist

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3. Overall Requirements

3.1 Prerequisites

3.1.1

Accountability Form: **General Contractor**

Prerequisite



Qualified project team leader

Default Value



Description:

Ideally the trade pulling the permits such as the GC should be the qualified individual. The qualified individual may also be the homeowner, designer, architect or consultant who is managing documentation. Becoming qualified can happen many different ways, attend a full or half day class, attend a live or on demand webinar, participate in a design charrette on registered greenstar project and/or be mentored on a green project.

You can access an upcoming live training here and sign up now

<http://greenhomeinstitute.org/event/greenstar-homes-certification-live-webinar-qualification-4-part-course/2015-06-18/>

Benefit:

A trained and qualified team leader will ensure a smooth project by understanding the basics of a green home and how to navigate the greenstar checklist and manual. Maintaining qualification requires working on green projects or getting relevant continuing education. Qualified individuals will also be listed online and solicited as green pros in their local markets on the GreenHomeInstitute.org website and MNgreenstar.org.

Verification:

GreenHome Institute will match records in data base of qualified individuals.

3.1.2 Accountability Form: **General Contractor**

Prerequisite     

Register project with GreenHome Institute

Default Value     

Description:

During the beta online roll out the checklist and manual are free to use but the team should register as soon as possible to submit for certification and get access to the pre construction plan review.

Member registration is \$350. 00

<http://www.alliancees.org/product/greenstar-homes-project-registration-member/>

Non Member registration is \$450.00 ([Learn about membership here](#))

<http://www.alliancees.org/product/greenstar-homes-project-registration-non-member/>

Multifamily projects will pay these fees + \$.10 a square foot. Please contact us directly set up your multifamily in the pilot program.

Benefit:

The GreenStar program is free to everyone as a guide to Green design and building. Anyone who wishes to certify their home as Green must register their intent with GreenStar, pay the appropriate GreenStar registration fee and follow the process as described in the program.

Verification:

GHI Staff will verify payment.

3.1.3 Accountability Form: **General Contractor**

Prerequisite     

Obtain all required permits & follow all required local and state bldg codes

Default Value     

Description:

If any strategy of the GreenStar program is in conflict with a local or state building code. The local building code is to be followed and GreenStar must be notified ASAP.

Benefit:

GreenStar has taken great care to ensure that all of the strategies contained herein are NOT in conflict with any local or state building codes, and GreenStar actively reviews new codes for possible conflicts when new codes are issued. However it is impossible for GreenStar to be aware of every unique code that may exist, and the final responsibility to know the codes that apply in the location of any given project belongs to the builder who is doing the actual construction work.

Verification:

3.1.4Accountability Form: **Building Architect / Designer**

Prerequisite

**Water Conservation Plan**

Default Value

**Description:**

Indicate the on-site water saving techniques that you hope to put in place and speculate (as much as possible) on their potential savings and impact to the site. If there are no possible water conservation measures that can be taken due to existing conditions of the site, explain why you are unable to impact the outdoor water use as it relates to the site.

For ease, you may wish to:

1. Download the template Water Conservation Plan. https://app.box.com/files/0/f/1618975950/TEMPLATES__RESOURCE_FILES
2. Edit the Template and tailor the content to reflect your project.
3. Upload the completed Water Conservation Plan with other project documentation.

Benefit:

Reducing the amount of potable (drinkable) water used to irrigate landscape and lawn conserves municipal water systems. Plant with native and drought tolerant landscaping, reduce the size of lawn areas for more native plantings, and size and locate plants appropriately on the site are all ways to conserve site watering. Use rain barrels and other water catchment methods to water outdoor plants and landscaping. Installing gutters with downspouts not only moves water away from the building foundation, but also presents opportunities to use the water for irrigating plants.

Considerations

Potential issues with collecting roof runoff can affect plantings, depending on the composition of the roof materials. Certain plants may be damaged by roof runoff when asphalt shingles or hazardous adhesives are used. Water collected from asphalt roofs may not be used for watering vegetable, fruit, or herb gardens.

Verification:

GreenStar Admin. check to verify this has been uploaded into the project documentation.

3.1.5Accountability Form: **General Contractor**

Prerequisite



Prepare and post a job-site materials management and recycling plan By posting a job-site materials management and recycling plan the details of the plan are communicated, shared and reinforced with everyone on-site



Default Value

Description:

1. - Identify all possible materials for reuse and recycling before construction starts.
2. - Create an easy-to-read plan and post at job-site. Recommend using the GreenStar Waste Management Plan template: Template can be downloaded from the GreenStar TEMPLATES & RESOURCE FILES:
<https://greenhomeinstitute.box.com/greenstar-checklist-manual>
3. - Photograph plan at job-site.

Benefit:

Contact the specific organizations, private businesses or individuals who accept, facilitate dispersal of or buy said materials and research details of how to work with them. Start communicating the plan to sub contractors on the initial sub walk through. Another option to disperse materials that are in demand by the public is to designate an area on-site that is highly visible to the public where reusable or recyclable items can be set out for free. Identify items for recycling, considering possible available management options:

- Hiring a job-site clean-up service
- Sending to a commingled recovery facility
- Separating onsite and hiring haulers
- Separating onsite and self-hauling

Verification:

Rater / Verifier to:

1. Check / Photograph that Waste Management Plan (WMP) is posted on site.
2. Check / Photograph dumpster showing that WMP is being followed by on-site crews.

3.1.6Accountability Form: **Rater**

Prerequisite



Pass Fresh Air Supply (FAS) and Worst Case Combustion Spillage (WCCS) tests at end of the project. Include any fireplace in WCCS



Default Value



Description:

Requirements:

1. Document fresh air supply (FAS) system.
2. Describe type of system (e.g., totally leakage based, leakage based with exhaust only fan, supply only fan, HRV, ERV, etc.).
3. -Submit calculations showing required FAS.
4. Perform blower door test at the end of the project to determine ACH natural and verify proper air flows.

Indicate whether adequate fresh air levels are being met using the following two criteria:

1. Total required ventilation rate (CFM) = $(0.02 \times \text{square feet of conditioned space}) + [15 \times (\text{number of bedrooms} + 1)]$
2. Continuous ventilation rate shall be a minimum of 50% of the total ventilation rate, but not less than 40 cfm. Note: If either of these two criteria is NOT met, ventilation must be improved. See Mechanical Systems section for strategies and points associated with this. (CFM-natural is considered continuous.)

A home that does not have an adequate amount of fresh air exchange naturally can be supplemented with a simple mechanical fresh air system. As one would expect, more elaborate systems are available; they typically have more features that increase comfort and energy efficiency, but also have an increased installation cost. This cost may be recovered over time due to their increased efficiency.

Perform blower door test at the end of the project to determine ACH natural.

ACH natural = Air Changes Per Hour @50 Pa (CFM50x60/House Volume)

If mechanical ventilation is required to meet FAS requirements, then:

- Test actual air flow of equipment and submit results.
- Submit WCCS report from Rater.

GreenStar approved Rater must perform WCCS test at the end of the project according to one of the following protocols: Minnesota Building Performance Association (MBPA) Existing Home Checklist

House Depressurization Limits (HDL) are listed on the MBPA Checklist.

TIP: Having the Rater

ASTM E1998-02 2007 Standard Guide for Assessing Depressurization-Induced Backdrafting and Spillage from Vented Combustion Appliances

Canadian Standard CGSB 51.71 2005

Other similar testing protocols may be acceptable. Rater should submit request for acceptance to GreenStar if they wish to use a different testing protocol.

Exceptions:

If project scope of work WILL NOT affect FAS in any way or the venting of atmospherically vented appliances, homeowners can choose to skip this requirement.

Replacing a pre-existing exhaust fan with one of equal cfm DOES NOT constitute a change to FAS or WCCS risk.

Making changes to the flue pipe of an atmospherically vented appliances such as adding elbows or reducing upward angle DOES constitute a change and is therefore subject to the testing of this prerequisite.

Benefit:

Everyone can agree that a clean Fresh Air Supply (FAS) is important in a home and that every home should be safe from too much combustion spillage from appliances.

There is a (usually unrealistic) concern that the cost of performing the blower door test and WCCS test on some small projects, that are not even making any changes to these systems, would put an unreasonable financial burden upon them.

Combustion Spillage:

Many people do not realize it, but SOME combustion spillage is common in almost all homes, unless there are no atmospherically venting appliances that exist at all. Even an atmospherically vented appliance that is properly vented will usually have some spillage when it initially fires and before the flue vent gets hot. Another common source of combustion spillage is from natural gas cooking appliances. Even if a proper range hood is installed, it usually will not capture all combustion gasses and most people do not turn it on every time they use the stove. Typically small amounts of combustion spillage are not thought to be noticeably harmful.

What people also do not realize is that even though they may not notice any problems, many existing homes do not meet FAS and WCCS standards.

This is where the issue gets a little more complicated. On existing homes, disagreement exists over how much fresh air is required, how much combustion spillage is acceptable, and when is it necessary to make changes to reduce or eliminate them.

Building code typically does not require any improvements to be made to a home on these two issues unless changes are being made to the home that would change the amount of air infiltration (leakage) of the home. The net result is that some sub-standard homes are allowed to go unchanged.

What we DO NOT fully know as an industry is to what degree people are being negatively affected by substandard fresh air supply and combustion spillage in their homes. This may change. Currently, some building science professionals believe that some people are being affected either intermittently or continually, and that the effects are not being directly traced back to fresh air supply and/or combustion spillage as they should.

What we DO know is that it is a best practice for ALL homes to pass FAS and WCCS tests at the end of the project, and that it is most prudent to perform these tests at the beginning of the project, at a minimum, to help inform the design and construction process.

For this reason it is highly recommended that ALL projects undergo FAS and WCCS testing

Resources

For a copy of the Minnesota Building Performance Association (MBPA) Existing Home Checklist, See TEMPLATES & RESOURCE FILES in the shared folder for the project.

TECTITE Software, which is available from the Energy Conservatory. (www.energyconservatory.com/products/products8.htm)

This software can be used to help predict if mechanical FAS will be needed at the end of the project based on pre-construction air leakage testing and expected improvements planned for the scope of work for the remodel project.

Verification:

Rater visually confirms and photographs fresh air supply equipment and submits blower calculations.

3.1.7Accountability Form: **General Contractor**

Prerequisite



No NEW atmospherically vented combustion appliances allowed. (use direct vented, power vented or sealed combustion). Existing atmospherically vented appliances can remain.



Default Value

Description:**Requirements:**

1. Notes on plans and/or specifications indicating equipment to be installed (highly recommended, not required).
2. Install equipment following the manufacturers specifications.
3. Photo of installed equipment –OR—rater check off.

Exceptions:

Existing atmospherically vented appliances can remain. Power venting for gas cooking appliance can consist of kitchen exhaust hood and/or kitchen exhaust fan in kitchen ceiling. Decorative wood burning fireplaces and stoves must meet the requirements in Miscellaneous Mechanical sub-section.

Benefit:

Atmospherically vented combustion appliances are much more susceptible to combustion spillage, especially in well built, air tight homes. Sealed combustion and/or power vented equipment is becoming readily available.

Considerations:

Note: See section Miscellaneous Mechanical sub-section for requirement related to decorative fireplaces and stoves.

Verification:

Rater / Verifier to perform visual confirmation and take photo of combustion equipment installed at the end of the project.

3.1.8Accountability Form: **General Contractor**

Prerequisite

**Minimum of one carbon monoxide alarm installed within ten (10) feet of each bedroom.**

Default Value

**Description:**

All carbon monoxide alarms must be certified by a nationally recognized testing laboratory that conform to the latest Underwriters Laboratories (U/L) Standards known as UL-2034.

It is important to recognize the differences between smoke alarms and carbon monoxide (CO) alarms. CO alarms activate based on the concentration of CO over a period of time; this allows for a brief period to ensure that everyone is alright and for the occupant(s) to investigate possible sources of CO accumulation within the home. When a smoke alarm sounds, all occupants should immediately vacate the premise and call 911. Alternatively, if a CO alarm sounds in the residence a person should verify that the occupants are not showing signs of CO poisoning (headache, nausea, vomiting, disorientation, etc.). If anyone in the home has symptoms of CO poisoning, call 911 immediately. If no one has symptoms of CO poisoning, open windows or doors to allow fresh air to enter and contact the utility company or appliance repair company as soon as possible.

There is a difference between smoke alarms and carbon monoxide alarms and they shall not be used interchangeably. Your local State Fire Code (MSFC) has regulations on the location, placement and power supply of smoke alarms inside residential dwelling units depending on the date of construction. Some manufacturers, however, have devices that are combination smoke alarm/carbon monoxide alarms. These devices are acceptable. In the case that these combination devices are installed, the smoke alarm installation requirements shall be followed.

Carbon monoxide alarms have an effective lifespan of 5-7 years. Many manufacturers recommend these devices be replaced at six (6) year intervals.

It is important that these devices be installed in accordance with the manufacturer's installation instructions and not be placed in 'dead' air pockets such as corners of rooms, at the junction of walls and ceilings, or within 36" of ventilation ducts.

Carbon monoxide alarms shall be installed at the height specified in the manufacturer's installation instructions.

Combination smoke alarm/carbon monoxide alarm units are acceptable.

Benefit:

The importance of carbon monoxide alarms in homes is indisputable. They are required by code for NEW construction in Minnesota, and many other states. This pre-requisite is included in the GreenStar Program since they are very important to occupant safety in homes and since many existing homes still do not have them installed.

Resources

CARBON MONOXIDE ALARMS – MINNESOTA STATUTE 299F.50

Verification:**3.1.9**Accountability Form: **General Contractor**

Prerequisite

**Perform thorough risk assessment of existing conditions and systems prior to doing basement finishing work.**

Default Value



**Description:****Required:**

1. Fill out GreenStar "[Basement Risk Assessment Worksheet](#)".
2. Document bulk water intrusion risk, existing protection and any protection being added. See "[Basement Risk Assessment Worksheet](#)".
3. Document existing and proposed drying mechanism for walls and floor. "[Basement Risk Assessment Worksheet](#)".
4. Perform Calcium Chloride Measured Vapor Emission Rate (MVER) test on floor – ASTM F 1869-04.
 - Perform a minimum of three (3) tests for the first 1,000 square feet and an additional test for every 1,000 square feet beyond.
 - Test results must be 3 lbs. or less of moisture per 1,000 square feet of area in 24 hours.
 - Install a barrier membrane if more than 3 lbs.
 - Installation specifications for the flooring being installed will have different moisture (MVER) tolerances.

Tip: Points can be obtained, and these documentation requirements can be met, by "Documenting all existing conditions, equipment and assemblies in house."

Exceptions

- Calcium Chloride Test is NOT required for GreenStar if slab is being replaced AND new slab has proper vapor retarder installed below it.
- Note: If finish material is being added to a new slab, the Calcium Chloride Test may be required by the manufacturer of the finish material. Verify with manufacturer & installer.

Benefit:

Insulating and/or finishing a basement are heavily debated issues from the Green building perspective. It is very risky if the intention is to finish the basement as living space, if at least one of the following systems does NOT exist:

1. Exterior bulk water management system consisting of foundation waterproofing and footing drain tile—OR—exterior drainage plane and drain tile.
2. Interior bulk water management system consisting of drainage plane on wall, which allows drainage into drain tile with filter fabric under slab, sump pump, and sub-slab soil gas ventilation system.

On the positive side, it is very Green to improve the energy efficiency of this area of the house that is typically not very well insulated or airtight. Also, finishing a basement falls into the Green strategy of increasing living space in a house without increasing the footprint or volume of the house.

The potentially negative side of finishing a basement has to do with the potentially harmful indoor environmental situation that can arise if bulk water and water vapor are not managed well with regard to how the floor, wall, and ceiling assemblies are designed, and the properties of the materials used in them.

If these issues seemed challenging on above-grade walls, basements take this challenge to an even a greater level. They should be addressed with great care, and consulting with a knowledgeable professional is highly recommended!

The following are some assumptions about basements that should always be addressed when insulating or finishing a basement.

Bulk water will make its way through the wall at some point in the life of the foundation. A good exterior bulk water management system can make this less likely, but designing the inside of the wall to accommodate bulk water if and when it ever does is the prudently safe approach to take.

Moisture levels can fluctuate greatly. The MVER test is a good way to determine if the slab is dry at a particular time, but that could change if a proper bulk water management system is not in place and weather is rainy for a period of time. Also, it may appear as though no bulk water ever comes through the walls, but that could also change if there is a water leak such as a garden hose left running near the foundation and saturates the outside of the foundation in a way that had not happened prior.

Radon levels can fluctuate over time as well. Cracks in the floor slab or foundation wall that are common over time, can let more radon in. Also radon seepage through the soil under or to the side of the foundation can change as well.

Taking care to understand the risks of finishing a basement cannot be over emphasized.

Suggestions

Use non paper face drywall for finishing and provide basement dehumidification to fully ensure no moisture.

Resources

See Basement Risk Assessment Worksheet in Checklist or from GreenStar.

Hiring a Rater or home inspector to perform this assessment may be a good idea if others on the design team are not qualified to perform this assessment.

Verification:

Rater / Verifier to visually confirm "Basement Risk Assessment Worksheet" is consistent with existing conditions on site.

Perform radon test in lowest possible habitable space. Mitigate if necessary. Remodel only
Default Value



Description:

Testing for Radon must be performed regardless of the scope of work in the lowest level of the home that could be habitable in the future even if it currently is not. This includes all basements with a ceiling height of 6'-6" or greater.

1. Perform the test prior to the start of construction. Ideally during the design/estimate phase of the project so that you can prepare to mitigate if required.
2. Perform test using qualifying test kit. Both a 48-hour test and a 90-day test are acceptable.
3. Send tests to an independent lab. Supply GreenStar and the homeowner with a copy of the test results. If disturbing the site or the slab (even a little) a second test is required after completion. Install mitigation system if test results indicate a radon gas level, which is greater than 4 picocuries/liter. Acceptable mitigation methods include:
 1. Install perforated drain tile under slab or localized pocket filled with granular material.
 2. Install solid 4" ABS vent pipe from foundation drain tile or localized pocket of granular fill through roof. Do not install vent pipe within exterior walls of the house. Install plumbing penetration boot on roof to prevent water leakage at roof penetration.
 3. All pipe connections and penetrations through the basement slab to be airtight.
 4. Test lowest inhabitable area of house for radon at the beginning of occupancy using qualified test kit. Either a 48-hour test or a 90-day test is acceptable. Levels must be below 4 pico-curies.
 5. If dangerous levels of radon are present (4 or more picocuries per liter), install continuously operating, in-line fan in vent pipe.
 6. Retest
 7. If dangerous levels of radon still exist, contact radon mitigation specialist.
 8. Supply homeowner with a copy of the test results.

Exceptions

If installing a radon mitigation system will create serious hardship for the owner and/or the home has restrictions because of a historical district, the test may be performed in the lowest bedroom in the home. When more than 4 picocuries are detected, two additional tests can be performed in the lowest finished room. If radon levels are safe there, the installation of a mitigation system is optional.

Benefit:

In order for a home to be considered Green the occupants' health cannot be knowingly placed at risk. Because we can test for and install systems that improve the indoor environmental quality of the home it is our responsibility to take this step.

Any time the soil gas barrier system is disturbed, there is the potential that radon levels will increase beyond the safety threshold. Testing after the work is completed is currently the only way to determine if the level of radon in the air is safe.

Considerations

Radon is a known carcinogen and a cancer-causing agent. Radon, a Nobel gas, will always occur, so full containment is impossible. However, removing radon and other soil gases from the home as a preventative measure to reduce a known cause of lung cancer has little cost when compared to the cost of human life.

Resources

Protecting Your Home From Radon: A Step-By-Step Manual for Radon Reduction, Second Edition.

Verification:

Rater / Verifier check for test results and operational mitigation system, if one was needed.

3.1.11	Accountability Form: General Contractor	Prerequisite     
Use Integrated Pest Management (IPM) methods to minimize pest entry.	Default Value     	

Description:

- Seal utility and joint penetrations. Use filler strips of metal or wood for larger openings. Use caulk or expanding foam insulation for smaller openings.
- Install metal screens on appliance vents to keep out rodents and large pests. Be sure the screen does not restrict air flow more than what is allowed by the appliance manufacturer.
- Protection for foundation insulation such as metal lathe over foam board.
- Repair any areas on the home where moisture may have an opportunity to enter the building assembly. -- Most pest species of termites have a high moisture requirement for the colony to survive. They have thin cuticles (skin), which must not dry out, or the termite will die.
- Design and construct any new areas of the project carefully to prevent water and moisture entry.
- In remodels, opening existing inaccessible areas is not required, but if they are already open, they should be inspected and then sealed properly when reclosing them to prevent moisture and pest and entry.

Benefit:

The intent of this Pre-Requisite is to ensure that at least the minimum IPM strategies are being implemented -- The scope of IPM strategies actually goes beyond the design and construction of building assemblies. For example, the landscape design can also have a major impact on the likelihood of pests entering the home as well.

Due to the risk of termites, IPM strategies for southern climates (where termites exist) are typically more developed and common than in cold climates. However, other pests are common in cold climates, and it is prudent to use well-developed IPM strategies, which are effective against cold climate pests as well. Furthermore, termites themselves appear to be migrating north into the southern areas of cold climates.

Keeping pests out of homes in the first place reduces or eliminates need for pesticides, pest management devices, and tracking down locations of entry for pests.

Considerations

Physical barriers are preferred over chemical barriers where possible. The use of pesticides can have negative side effects on human health and the environment and need to be weighed carefully when choosing to use them. Most insects (and mold for that matter) require moisture and a food source. Thus the importance of keeping moisture out of building assemblies cannot be over stated!

Resources

See International Residential Code (IRC) Fig. R 301.2(6) for termite infestation map.

See also Austin Energy Company website:

www.austinenergy.com/energy%20Efficiency/Programs/Green%20Building/Sourcebook/integratedPestManagement.htm

www.termiteinstitute.com

www.termimesh.com

Verification:

Visually inspect and photograph implementation of this measure.

3.1.12	Accountability Form: General Contractor	Prerequisite     
No intentional use of imported Forest Products on the "Controlled Imports List" unless FSC Certified. All Products from Canada are allowed without FSC Certification.		Default Value     



Description:

No intentional use of wood products on the Controlled Imports List.

“Intentional” is defined as any product called out for use on the project drawings and/or specifications.

Write a letter of intent to product suppliers:

Person who is responsible for ordering or purchasing materials for the project must notify all product suppliers for the project that it is their intention to NOT use any products on the “Controlled Imports List”. Optional template letter from GreenStar is available for your convenience in the “Resources” below.

Controlled Imports List (Do NOT use products listed here):

- Imported solid sawn lumber of any species that is not FSC. (Any lumber imported from Canada is an exception and **is** acceptable even if it is not FSC certified.)
- Imported luan that is not FSC. --Luan is a 1/4"-thick plywood product that is made of a core material covered in two layers of tropical mahogany or scrap wood from tropical regions. Luan also deteriorates quickly in the presence of moisture so it is inadequate as an underlayment for most flooring installations.
- “BreckenRidge” Plywood Siding. www.roseburg.com/Product/breckenridge-siding/

Provide COC number for any FSC product used on the project:

Each person or company that is certified to be part of the FSC Certification process will have a Chain Of Custody (COC) number. The final seller of the product will issue a copy of their number to the purchaser.

Exceptions:

Products from wood harvested in the USA and Canada are allowed without any special certifications.

Benefit:

FSC, or Forest Stewardship Council, certification is an international, third-party verified process that is one of the most recognized FSC Certification processes available.

Forest Stewardship Council Certification is a tracking system that follows the wood from the forest from which it is removed to each processing step along the way before reaching the job site.

FSC Certification is a way to significantly reduce greenwashing associated with less-than-optimal logging and processing practices such as claiming that replanting one or more trees for every tree harvested is good environmental practice. Replanting is sound business practice for any company that wants to ensure that there is product to harvest from land in the future. But, planting a tree tells nothing about the biodiversity of the forest, its ability to recover from disaster or to sustain plant and animal life, erosion control, or how illegal logging is eradicated.

Forest Stewardship Council Certification is a process that allows all users along the path to keep track of product, logging, and harvesting practices. The goal in FSC Certification is to improve integrity in the lumber growing, extraction and delivery process to favor practices that promote sustainability.

Canadian wood is regulated from forest to mill through government standards. While it is not FSC Certification, it is still recognized as having generally acceptable forestry practices.

Rationale Specific To Luan:

Luan is a 1/4"-thick multilayer plywood product that is made of a core material covered in two layers of tropical mahogany or scrap wood from tropical regions. It is an inexpensive product so its use has become widespread, yet its use is problematic for several reasons.



The use of tropical wood for building products is a contributor to the depletion of essential forests found in tropical regions of the world.

Luan deteriorates quickly in the presence of moisture so it is inadequate as an underlayment for most flooring products.

Considerations:

It is very difficult to track wood to its origin without Forest Stewardship Council Certification.

Resources:

www.fsc.org

Example letter of intent to material supplier:

TIP 1 - Copy the content of this template letter onto your own letterhead before sending to you material supplier(s).

TIP 2 - If you are planning to go beyond the overall pre-requisite regarding the GreenStar "Controlled Products List" (i.e. you are planning to pursue additional credit for using FSC products as listed this Checklist) then you may wish to modify the language of this letter to meet your needs more specifically.

***** Begin example letter of intent to material supplier *****

To Whom It May Concern:

Please be aware that a significant goal on the <Insert Project Name Here> is to be as sustainable and conscientious of the Global Eco-system as possible. To this end, we are pursuing Green Building Certification through the GreenStar program.

Please help us meet this goal by helping us abide by the Pre-Requisite pertaining to imported forest products. Thus it is our desire to NOT use any imported Forest Products on the GreenStar "Controlled Imports List" unless they are Forest Stewardship Council (FSC) Certified. All Products from Canada are allowed without FSC Certification.

The current "Controlled Imports List" is as follows:

(Do NOT use products listed here):

- *Imported solid sawn lumber of any species that is not FSC.*
- *Imported luan that is not FSC.*
- *"BreckenRidge" Plywood Siding. www.roseburg.com/Product/breckenridge-siding/*

Products from wood harvested in the USA and Canada are allowed without any special certifications.

For any FSC certified products that you do supply to us on this project, please help us fulfill our documentation requirements by including your FSC Chain Of Custody Number on the invoice.

More information about the entire GreenStar program, including the Checklist and Manual can be found at www.GreenStarHome.org.

Thank you in advance for helping us be a part of a change for the better.

Sincerely,

<Insert Your Name Here>

Verification:

Rater / Verifier to visually confirm and photograph.

3.1.13	Accountability Form: Insulation Contractor	Prerequisite     
If recessed light fixtures are being added or replaced where they penetrate into the unconditioned area of the attic, then new fixtures must be installed to prevent air and thermal leakage.		     Default Value

Description:

Documenting existing recessed cans:

1. Cans are inspected to see if they are in the insulated envelope (and it is discovered that they are).
2. Cans must be inspected and documented as to whether they are Washington State Energy Code (WSEC) compliant, and if they are Insulation Contact (IC) rated. If not IC rated, then all insulation must remain minimum 3" from can housing.
3. Must do before and after blower door test and infrared scan of recessed cans that are in an insulated ceiling and document the results.
4. Must inspect the cans from the attic side (if possible) and document the results.
5. Can lights may not be installed in slopped calls or vaulted ceilings unless a continuous R-38 can be met on top and sides of the can.

Tip: Points can be obtained, and these requirements can be met, by doing measure 1B-1: Document all existing conditions, equipment and assemblies in house

Installation Steps (for new or replacement applications):

1. Seal can to ceiling finish material with gasket, caulk or foam.
2. Air sealed with foam box or dome.
3. Insulate at fixture location to match R-value of surrounding ceiling.

Final Documentation Requirements:

1. Post-construction photo of recessed cans taken from top (attic) and bottom (room) view—OR—inspection.
2. Post-construction blower door test results.
3. Post construction Infrared scan results.

Benefit:

The use of recessed can lights is a difficult issue from the Green building perspective. If they are located where they penetrate the air and thermal boundary of a building they are typically difficult to properly air seal and insulate, however it can be done. If the careful steps described in this pre-requisite are NOT followed they can contribute to major energy usage and durability problems, which are certainly not Green. Additionally, can lights are inefficient at lighting a room and generally require using a greater number of fixtures, thereby significantly increasing the energy load of the home. Further concerns about the amount of heat generated by the number of bulbs, is another reason to consider eliminating the use of can lights entirely. For this reason, some designers and homeowners choose to avoid them as much as possible.

On the other hand, for many designers and homeowners, recessed can lights are seen as a necessary component at times to create a beautiful, comprehensive architectural and lighting design. A complete ban on can lights would present a significant barrier to entry and limit use of the GreenStar program. Furthermore they can serve to illuminate certain spaces better than other lighting devices.

Therefore the GreenStar recommendation is that they should be used as infrequent as possible. However, where the designer feels they are necessary, they can be used if proper steps are taken to ensure they will not cause problems with energy efficiency and durability.

GreenStar STRONGLY encourages those individuals who choose to use recessed lights in their projects to consider using only LED can lights. They are dramatically more efficient, produce the same style of light, do not produce the heat that traditional can lights do, and have a life of around 50,000 light hours (30 years).

Verification:

3.1.14	Accountability Form: General Contractor	Prerequisite     
All new connecting doors between living space and attached garage must be gasketed or made substantially air-tight with weather stripping and an automatic closer		Default Value     

Description:

1. Notes on drawings and/or specifications indicating work to be done, or product to use.
2. Post-installation photo—OR—rater verification

Benefit:

Garages contain many pollutants that should be kept out of the house. Doors that close automatically and are well sealed help reduce the amount of garage pollutants that migrate into the house.

Verification:

Verifier visually confirms and photographs this measure.

3.1.15 Accountability Form: **General Contractor** Prerequisite     
Any new installation of salvaged doors or windows in an exterior application must be weather stripped, or air sealed with appropriate gasket. Default Value     

Description:

1. Notes on drawings and/or specifications indicating work to be done, or product to use.
2. Post-installation photo—OR—rater verification

Benefit:

New windows and doors are designed and sold with air tightness measures in place. This prerequisite is designed to ensure that doors or window sashes that are installed into existing frames/openings are not installed without good air-sealing measures in place.

Verification:

Verifier visually confirms and photographs this measure.

3.1.16 Accountability Form: **General Contractor** Prerequisite     
All new appliances to be ENERGY STAR certified Or equivalent Default Value     

Description:

ENERGY STAR labels on all NEW appliances: clothes washers, dehumidifiers, dishwashers, refrigerators, freezers, and room air conditioners. They also have labeled dryers as of 2015.

Do not relocate old refrigerator or freezer to basement if not already an ENERGY STAR appliance. Recycling of old units is mandatory.

Existing appliances are not required to be replaced, However, if refrigerator is older than 1993, it is strongly encouraged to replace the unit.

ENERGY STAR website is good resource for researching products: <https://www.energystar.gov/products/certified-products?s=mega>

GreenStar points are available for products that exceed ENERGY STAR performance. See other measures within this checklist and see the Consortium for Energy Efficiency (CEE): <http://www.cee1.org/content/cee-program-resources>

Benefit:

ENERGY STAR is an excellent rating system for appliances to indicate that they meet strict standards for energy efficiency. Appliances that pre-date 1993 and are not labeled ENERGY STAR typically consume an inordinate amount of energy and should not be used. Purchasing a new fridge but keeping the old one in action only serves to increase the home's overall energy consumption, which runs counter to GreenStar goals.

Verification:

Rater / Verifier visually confirm and photograph this measure along with submitting receipts.

3.1.17	Accountability Form: General Contractor	Prerequisite     
New structural plywood & OSB must conform to PS1 and PS2 standards.	Default Value     	

Description:

"US wood panel product manufacturers follow the Voluntary Product Standards developed under procedures published by the Department of Commerce in *Procedures for the Development of Voluntary Product Standards*. Two product standards govern the manufacture of US wood-based panel products:

- US Voluntary Product Standard for Structural Plywood, PS 1-09 ([see details of compliance requirements](#))
- US Voluntary Product Standard PS 2-10, the Performance Standard for Wood-based Structural-Use Panels ([details of compliance requirements](#))"

Reference: <http://apawood-europe.org/official-guidelines/us-ps1-and-ps-2-standards/>

Thus shall be made with non-urea formaldehyde, exterior-type adhesives

Benefit:

- Exterior grade adhesives are designed to hold up under more extreme conditions than interior-type adhesives.
- Exterior grade adhesives are typically NOT urea-formaldehyde based and therefore pose a much smaller risk regarding the negative side effects of formaldehyde off gassing.
- Attention to this detail is sometimes overlooked, and it therefore warrants being mentioned here.

Resources

- Exterior-type adhesive is evidenced by the appearance of "Exposure 1" or "Exterior" in the panel trademark.
- Standards governing the manufacture and/or performance of structural plywood include Voluntary Product Standard PS 107 for Structural Plywood and Voluntary Product Standard PS 2, Performance Standard for WoodBased Structural Use Panels. Structural plywood trademarked by APA under these standards is manufactured only to Exterior or Exposure 1 bond classifications and is therefore produced with exclusively phenolic adhesives.
- Standards governing the manufacture and/or performance of OSB include Voluntary Product Standard PS 2, Performance Standard for WoodBased Structural Use Panels. This standard requires OSB to meet the Exposure 1 bond classification and therefore only permits moisture resistant adhesives such as phenolic or MDI adhesives.

Verification:

See accountability form.

3.1.18	Accountability Form: General Contractor	Prerequisite     
No mercury thermostats (remove/replace if pre-existing, dispose of properly)	Default Value     	

Description:

All mercury-containing thermostats must be removed and disposed of properly regardless of whether they are currently in operation. It is not allowed by this program and not legal for these to be put into the ordinary trash. Household items containing mercury should be taken to your county's household hazardous waste disposal site. Any mercury-containing thermostat that is in operation must be replaced with a non-mercury-containing replacement. Programmable thermostats must be programmed. Fluorescent lights, which contain small amounts of mercury, are allowed.

Benefit:

Mercury is a highly toxic substance that should be removed from our homes whenever possible.

Thermostats that use mercury usually have a relatively large capsule of liquid mercury in them, which poses a severe health risk in the event that it became damaged and allowed to leak out. The thermostats that use mercury usually are much less precise than modern electronic thermostats.

When replacing a thermostat that contains mercury, it is recommended that a programmable electronic type is used in its place. This will allow homeowners to program their thermostat to automatically adjust temperature levels in the home in a way that conserves energy and does not adversely affect occupant comfort. The amount of mercury in fluorescent lights at this time is small, and the overall benefit to the environment through the energy saved by their use currently outweighs the potential harm from the mercury they contain.

Considerations

Mercury poisoning can be acute or chronic depending on the length of exposure, and type of exposure. Mercury has been found in everything from thermometers to dental fillings and even immunizations. Short or long exposure to mercury can lead to everything from abdominal cramping to failed memory and a depletion of IQ (intelligence quotient).

Resources

To find the location of the household hazardous waste facility, visit www.pca.state.us/waste/hhw/index.html or call the MPCA at (651) 296-6399 (in the Twin Cities metro area) or 1 (800) 657-3864 (from outside the metro area).

For more information about mercury visit www.pca.state.us/air/mercury.html

To learn how to recycle fluorescent lights properly visit www.lamprecycle.org/

Some hardware stores accept used fluorescent lights from homeowners. For a list of these, visit www.earth911.org.

Other useful sites: www.pca.state.us/air/mercury-faq.html#homethermo

Verification:

Rater / Verifier inspect to determine the requirements of this measure have been met.

3.1.19	Accountability Form: General Contractor	Prerequisite     
No power roof vents unless adequate air inlets exist.	Default Value	    

Description:

Use water-based mastic or metal tape, which is specifically intended for duct sealing. Duct Tape is NOT acceptable, as it is not long lasting.

Seal all connections between ducts and connections at vents and registers.

New cold air returns are also required to be sealed

Benefit:

- Sealing ductwork is important for the following reasons:

- Comfort: Sealing and insulating ducts can help with common comfort problems, such as rooms that are too hot in the summer or too cold in the winter.

- Health: Sealing ducts can help improve indoor air quality by reducing the risks of pollutants entering ducts and circulating through your home. Fumes from household and garden chemicals, insulation particles, and dust can enter your duct system through leaks and can aggravate existing asthma and allergy problems.

- Safety: During normal operation, gas appliances such as water heaters, clothes dryers, and furnaces release combustion gases, like carbon monoxide, through their ventilation systems. Leaking ductwork in your heating and cooling system may cause backdrafting, where these gases are drawn into the living space, rather than expelled to the outdoors. Sealing leaks can minimize this risk.

- Save money: Leaky ducts can reduce heating and cooling system efficiency by as much as 20 percent. Duct sealing and insulating increases efficiency, lowers your energy bills, and can often pay for itself in energy savings. Plus, if you're planning to install new heating and cooling equipment, know that a well designed and sealed duct system may allow you to downsize to a smaller, less costly heating and cooling system.

- Protect the environment: Energy generation is one of the largest contributors to greenhouse gases. By sealing your ducts and reducing the amount of energy necessary to comfortably heat or cool your home, you can reduce the amount of air pollution generated.

Considerations

- A poorly functioning, or poorly sized furnace for new duct runs can lead to inefficient operation, or worse, health issues. Have a mechanical contractor review the size of the furnace to verify that it is adequate for the number of duct runs (new and existing), and that it is functioning properly.

Resources

www.energystar.gov

www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_ducts

Verification:

Provide documentation or calculations for this measure.

3.1.20 Accountability Form: **Insulation Contractor**

Prerequisite     

All insulation used must be formaldehyde free

Default Value     

Description:

Seal the space between the framing for window or door (including attic access door) Rough openings and the installed units with low-expanding spray foam sealant, closed cell foam backer rod, spray applied insulation, or other suitable sealant.

Cellulose, fiberglass, or rock wool batt insulation is not acceptable as a sealant, but can be used as a backing for a sealant (such as caulk). Thresholds for exterior doors shall be sealed to the subfloor.

Rater sign off at Pre-drywall inspection.

Benefit:

When replacing an entire window unit with a new one, walls are often partially opened, which exposes wall areas that have little or no insulation. Since proper flashing is also required in 4D -PR3, this is a good opportunity to properly insulate these areas as well.

Fiberglass insulation alone is not a good air barrier and is therefore not an acceptable solution.

Verification:

Verifier visually confirms and photographs this measure.

3.1.21 Accountability Form: **Insulation Contractor**

Prerequisite     

Provide attic insulation thickness markers

Default Value     

Description:

- The thickness of blown-in or sprayed roof and ceiling insulation (fiberglass or cellulose) shall be written in inches (mm) on markers that are installed at least one for every 100 square feet throughout the attic space.

- The markers shall be affixed to the trusses or joists and marked with the minimum initial installed thickness with numbers a minimum of 1" high.

- Each marker shall face the attic access opening.

- Spray polyurethane foam thickness and installed R-value shall be listed on the certificate provided by the insulation installer.

Benefit:

Necessary for installers, inspectors, and homeowners to know for sure that the designated amounts of insulation were installed. Makes it possible to observe insulation over time to see if settling has occurred.

Verification:

Verifier visually confirms and photographs this measure.

3.1.22	Accountability Form: General Contractor	Prerequisite     
Seal all ducts and air handlers to prevent contamination during construction		Default Value     

Description:

Exceptions:

If the ducts are required to heat, cool, or return air to the air handling equipment during construction, only seal the ducts in the area of work, and well seal the construction area from the rest of the house.

Benefit:

This measure is a best practice solution for preventing contaminants from entering ventilation ducts and minimizing contaminants in the ductwork. It is always important to clean ducts after construction, change filters immediately after construction, and change them again a maximum of two weeks after.

Considerations

It is nearly impossible to prevent contaminants and dust to enter the ductwork. Always take care to check sealing regularly as construction can damage tape or other materials used to seal ducts.

Verification:

Verifier visually confirms and photographs this measure.

3.1.23	Accountability Form: General Contractor	Prerequisite     
No burying or burning of construction waste		Default Value     

Description:

All construction debris must be directed to a waste management facility. General contractor to sign-off on checklist.

Exceptions

Any solid, untreated wood (other than kiln dried), or clean, unpainted drywall scrap can be either chipped for mulch, or in the case of drywall, be ground and used as a soil amendment.

Benefit:

Burning construction waste is illegal in many areas and is poor practice because most garbage burners have technologies to eliminate some of the pollutants. Burying construction waste is poor practice because landfills have liners and other strategies to reduce contamination into the soil and eventually the water table.

Verification:

Rater / Verifier visually confirm this measure is being followed.

3.1.24	Accountability Form: General Contractor	Prerequisite					
No construction debris shall be discarded and closed inside any wall assembly	Default Value						

Description:

All construction debris must be disposed of properly, be it recycled or sent to the waste management facility. No food reants, scraps, or other construction debris can be placed or left in the wall cavity. General contractor to sign-off on checklist.

Benefit:

Discarding construction debris in the wall assembly is a disregard for the integrity of the construction and should never be a part of the construction practice. Leaving debris in the wall assembly is a potential fire hazard.

Verification:

Rater / Verifier visually confirm this measure is being met.

3.1.25	Accountability Form: Homeowner	Prerequisite					
Mandatory Green education of homeowner during design and construction (4 hour min.)	Default Value						

Description:

4-hour minimum spent educating homeowner by Architect/Designer, General Contractor, and Subcontractors throughout the process of the entire project.

General Contractor must provide a users manual to the homeowner containing:

1. home maintenance instructions and recommendations,
2. home maintenance schedules, and
3. users manuals and any warranty information for all equipment installed by the contractor.

See also – Education Section, of this checklist.

Benefit:

It is widely understood that a homeowner needs to understand how to maintain and operate their home in order to ensure it continues to operate safely and at optimal levels. It is also understood that homeowners who understand what best practices exist and are available, will be more likely to choose them in the future.

Verification:

See accountability form. (home owner sign-off)

3.1.26Accountability Form: **Homeowner***Prerequisite*

Provide homeowner with a user's manual covering house maintenance and green features of home.

Default Value

**Description:**

Assemble and give to homeowner a manual containing the pertinent information on their Green remodel, including:

- Product manuals for all installed equipment, fixtures, products, and appliances, plus an outline of what needs to be maintained and how and when to do it
- Green features of the home including certifications
- Resources for help with repairs or maintenance
- Resources for finding replacement parts such as filters or hoses

Benefit:

It is easier for homeowners to accept their role in making their home function as intended when they are given clear explanations and illustrations of the necessary care of the home, especially if they are presented in an easy-to-access format. A manual takes the guesswork out of owning a home.

Verification:

See accountability form. (homeowner sign-off)

3.1.27	Accountability Form: Homeowner	Prerequisite     
Homeowner to sign utility release waiver Provide pre and post utility data.	Default Value     	

Description:

Provide 2 years before on remodels and 2 years after construction all projects.

Typically, it is easy to get utility data since most utility companies will provide free reports of utility usage. [You can use our simple EUI spreadsheet to enter in utility data](#) or just send us PDFs of your bills.

[Homeowner\(s\) must complete the utility release waiver which can be found here.](#)

Exempt if you or homeowner did not own home before remodel.

Benefit:

There are two reasons that utility tracking is an important Green building strategy. First, tracking utility usage is an important way for GreenStar to continue to understand the effectiveness of this program and to improve it in the future. Utility data will not be shared outside of GreenStar, nor will it be used for any other reason. Second, it is recognized that homeowners that are aware of their utility usage, are more likely to develop daily living habits that minimize wasteful utility usage.

Should the project team contractor want to use their 3rd party audited data as selling point we will recognize high performing contractors who time and time again have the ability to reduce usage in projects.

Verification:

Submit actual utility bills, utility data



4. Preconstruction Design Strategies

4.1 Integrated & Trained Project Team

4.1.1



Create multi-disciplinary project team, including homeowner, contractor and all subcontractors and include each in design and pre-construction meetings. 1 1 1 1 1

Description:

All project team members must sign-off. Pre-construction and post-construction meeting, including homeowner, to review performance and any known issues

Benefit:

Having a comprehensive team meeting of all key contractors is crucial to the performance of the home. Having the homeowner involved in these key kick-off and closeout meetings is important so they understand what will happen to the home, and how to use equipment.

Verification:

4.1.2



Trained Project Team. Unique trade team member(s) have GreenStar status of "Qualified" or higher. Not counting mandatory qualified team member
 (1 Qualified / 2 Qualified / 3 Qualified / 4 to 7 Qualified / 8 Qualified) 0/1/2/3/4/5 0/1/2/3/4/5 0/1/2/3/4/5 0/1/2/3/4/5 0/1/2/3/4/5

Description:

The credit is available for any unique trade who has been through a greenstar qualification training and still is maintaining status with greenstar. Trades include but are not limited to GC, designer, HVAC, plumber, electrician, masonry, insulator, interior designer, solar installer and etc. Each trade must be unique to count and serve a different role. Jack of all trades contractors who are licensed in different trade skillsets and are serving different roles can also count for multiple areas. Do not count the 1 qualified member required for the project. Must be 2 or more qualified.

Benefit:

A successful Green home begins with an understanding of Green building and the implementation of strategies, products, and systems into the design. Having more people on the project team trained, increases the quality of the project and the smoothness of the process.

Verification:

Verify proof of project team member who are qualified being present and hired on the job through submitting any contracts and having rater visually see trades in the field during site visits.

4.1.3



Post-construction meeting for contractor, homeowner, and key subcontractors to review performance and lessons learned

1 1 1 1 1

Description:

The contractor or project manager will conduct meeting/s between self and homeowner, self and subcontractors, or all parties together to gather feedback about the building process and strategies used. All project team members must sign-off on checklist.

Benefit:

By gathering feedback about the project and strategies at the completion of a home, lessons learned can be applied to future projects.

Verification:

4.1.4

Accountability Form: **HVAC**



Hire a credentialed HVAC contractor

2 2 0 0 0

Description:

"HVAC credentialing makes it easy for builders to identify contractors with the capabilities to help them build ENERGY STAR certified homes, for contractors to market best-practice services, and for consumers to be confident in the comfort and performance of their new ENERGY STAR certified homes." - Energystar.gov

http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_hvac_contractors_find

Benefit:

Credentialed and trained HVAC contractors have been tested to understand how to install high performance, right sized systems in tight homes and ensure adequate make up air is present. Energy efficiency, comfort and health are the result of a correctly installed system.

Verification:

HVAC to sign accountability form and submit credentials

4.1.6



GreenHome Designated Professional as team leader

Default Value 1 1 1 1 1

Description:

A GreenHome Professional (GHP) is someone who demonstrates an understanding of high performance, above code, and sustainable residential built environments by completing an actual 3rd party certified green new or existing project. The either completed the in-depth [GreenHome Associates](#) program or have a relevant credential such as the Green Certified Professional or LEED Green Rater. GHPs must maintain their designation through participation in green residential project and continuing education requirements.

Benefit:

A GreenHome Professional is someone with education, experience and a background in building or remodeling homes to a healthier, more durable and energy efficient standard. Having a GHP lead the project can help ensure a smooth greenstar project is completed and drive out potential issues during and after construction.

Verification:



4.1.7

Accountability Form: **General Contractor**



Complete preconstruction plan review Do before construction

Default Value 1 1 1 1 1

Description:

Submit the following

- Complete this online checklist
- Waste Management Plan (all projects) --> see GreenStar Resources Folder for template.
- Construction Documents (project drawings plus specifications if they exist for the project)
- Site Plan (If project is very simple and small, at least indicate how existing trees and landscape will be protected from construction traffic and materials storage which can damage root systems)
- Landscape Plan (if applicable)
- Water Conservation plan.

This must be submitted to 1 of the 3 following parties

- Greenstar Quality Assurance Director
- Greenstar 3rd party rater
- **GreenHome Professional** Consultant

Once your review is completed you should be given details on where there could be potential issues on your project and how to avoid them before you begin construction. Please allow projects submitted to greenstar up to 1 month review time unless otherwise specified.

Benefit:

Design is the critical element to building successful Green homes—those that are durable, energy, resource and water efficient, and impact homeowners and communities in a positive manner. It is difficult to build a Green home if it hasn't been designed Green from the start to be inclusive of all of the previous ideas.

Thinking about all of the elements needed to make a Green home before construction begins, enables the homeowner, designer/architect, builder and subcontractors the opportunity to collaborate on strategies that meet design needs and Green goals within the project budget.

Verification:

Sign accountability form

4.2 Design

4.2.1

Accountability Form: **Rater**



Energy Model + Post Construction Testing Calculate Energy Use Intensity (EUI) through approved model and post construction testing

10/14/18/22/26/30/34/38/42/46/50/54/58/62/66/70 0 0 0 0

(15 / 14 / 13 / 12 / 11 / 10 / 9 / 8 / 7 / 6 / 5 / 4 / 3 / 2 / 1 / 0)



Description:

Use an approved energy modeling software program along with a professional rater post construction testing and verification inspection to develop an Energy Use Intensity Score (EUI). The EUI should consist of Kilowatt Hour Equivalent / Conditioned Square Feet / Year / Heating & Cooling Degree days.

Software must account for total energy consumption of the home including heating, cooling, lights, appliances, plug loads, onsite renewables, etc.

Approved software include;

Recommended on remodels

CAKE Systems - Residential Energy Performance Score (REPS)
Department of Energy - Home Energy Score (HES)

Recommended on New Construction

RESNET - REM Rate & REM / Design (HERS certificate not required but encouraged)

Passive House Institute US - Wufi Passive

All projects require trained and credentialed [Building Performance Institute \(BPI\)](#) or [RESNET](#) raters to complete a full post construction inspection that includes blower door testing and visual verification of energy efficiency applications. Ideally this rater is also the Greenstar rater.

Calculations

Please convert KBTU energy by using the this conversation table to KWH
<http://rapidtables.com/convert/energy/index.htm>

Considerations -

Tools such as REM or Passive house may allow you to change default setting such as lifestyle details like how many washer loads on average. We require you maintain the defaults as there unless you can submit a good reason as to why you would alter it.

Have a different energy modeling software you want to use? Please submit a waiver for review. Energy modeling software that gets accepted should be able include;

1. Normalize Heating and Cooling Degree Days for climate. (This is one good resource for Degree Day Data www.degree-days.net)
2. Submit studies on usage of the program and any utility data studies for accuracy.
3. Details about market recognition and general consumer awareness.

Benefit:

Energy modeling informs design and is an objective measure of the energy efficiency of the house, removing the variability of occupant use habits. These models create an asset rating for the home similar to a car MPG.

Verification:

Rater visually inspects and verifies all measures after project is complete and submits energy model.

4.2.2



Document all existing conditions, equipment and assemblies in house. Remodel only

1 1 1 1 1

Description:

Use form from the checklist and provide required documentation. Form TBD

Benefit:

Every home can benefit from having all existing conditions reviewed. Think of it as a sort of packing list: what was included, what was missing yet needed, and what could be better.

Considerations

This is beneficial to all involved in the project. It sets a baseline of conditions from which to plan and design from.

Verification:

4.2.3



Contract with a GreenStar approved Rater for a pre-design, whole home inspection.

1 1 1 1 1

Description:

GreenStar approved Rater must produce report using data that should include but not be limited to the following:

- Blower door test before and after project
- Infrared scan before and after project
- Worst Case Combustion Spillage Test
- Duct blaster test
- Carbon footprint analysis
- Visual inspection for water leaks of both plumbing and site/building envelope
- Environmental hazards including lead, radon, mold and carbon monoxide
- Structural failures or deficiencies

Benefit:

Whole home performance rating is very beneficial to the overall efficiency of a home. In some cases, an energy rater can alert the homeowner or contractor to potential or known hazards that may otherwise go unnoticed. See Air Infiltration credits for additional points once the Rater has results and expected air tightness ratings based on improvements that are planned for the project.

Considerations

The GreenStar Rater may need to consult with additional building professionals if the home seems to have a complex series of issues or problems.

Alternatives

Have a full official home inspection completed.

Resources

Home Inspection Checklist Coming Soon.

Verification:

Submit inspection report.

4.2.4



Estimate carbon emissions of operating the home

0 0 1 0 0

Description:

Provide estimated carbon emissions from modeling software

Benefit:

When we are made aware of how our homes and lifestyle choices may impact the community around us in the present and the future, we may make different design and material decisions prior to construction.

Resources

Energy Raters often have software to calculate this.

Examples: REM / Rate and REM / Design.

Verification:

Verifier review calculations.

4.2.5

Accountability Form: **General Contractor**



Accessibility & Universal Design Utilize zerostep guidance

(Bronze met / Silver met / Gold met)

0 1/2/3 2 2 0

Description:

The ZeroStep program developed by the disability advocates of kent county provides guidance and a checklist to achieve different levels of accessibility, universal design, aging in place and assistive technologies goals in the home. [Access the guidelines and checklist here](#). The program has prerequisites and 3 levels of certification similar to greenstar. The project is not required to certify but must implement required measures and tally points to achieve more credits.

Benefit:

Growing numbers of people cannot access existing homes or even newly built homes as they are designed. ADA codes are set up for commercial and large multifamily buildings but not residential homes. Despite age or even present disability a zerostep home is more accommodating, easier to use and safe for all.

Considerations

Utilizing a Certified Aging in Place Specialist (CAPS) can help in developing the best layout.

Universal Design may require more interior space and could be trade off for smaller or right sized homes.

Verification:

Submit completed ZeroStep checklist with notes on plans of completed items. Rater to visually inspect in field completed measures.

4.2.6



Allocate space in the home as a disaster protection area 081114 MF

Default Value 0 1 0 0 0

Description:

Floor plan must demarcate such area and list amenities and strategies to protect occupants for a minimum of three (3) days.

Benefit:

Natural disasters can strike at any time. Different areas of the country and different regions within a state have different natural disaster threats; tornadoes, hurricanes, floods, power outages, and wildfires will each require different resources. Design a space where the rest of the home can be sealed off and occupants can survive without heat or electricity for three (3) days. Include in this area storage for rations like water, non-perishable food, and other resources.

Considerations

No space is entirely safe. Make sure that the area is suited for a particular disaster known to the area.

Resources

Environmental Building News, May 2006

Verification:

Verifier visually confirms and photographs this measure.

4.2.7



Passive solar heating design package (includes orientation, south glazing/floor area ratio orientation specific low-e tuning, summer shading and thermal mass design 081114 MF

6 0 0 0 0

Description:

- Implementation of a passive solar heating design package integrates several individual strategies into one comprehensive strategy that produces results greater than the sum of its parts.
- Provide design package and demonstrate impact through calculations
- Show the location and angle of the sun during winter and summer months and how it will impact the structure (this is usually best described in a wall section or elevation).
- Provide non-roof overhangs, awnings, or louvers to exterior of west and south side of home.
- Install exterior solar shades on clear-glazed windows
- Install adjustable interior solar shades, films, or reflective blinds on existing east/west
- Install low-e film on interior side of clear-glazed windows and skylights

Benefit:

Designing our homes to work with the sun is one of the easiest Green building strategies for new home builders and only slightly more difficult for remodeling projects. Glazing, thermal mass, and shading techniques should be considered together rather than as separate building elements.

Considerations

Passive solar design does not mean just adding more windows to a home. Too much glazing in the wrong location can create larger problems with overheating in the summer, and heat loss in the winter. True passive solar homes require maintenance and monitoring. They also can require some fine tuning and plans should be made to educate the homeowner and to service the project. Sun angles are lowest and span the shortest time in the middle of winter, where the sun can penetrate farther into the home. Generally, in Minneapolis, winter sun angles are around 30 degrees off the ground (at its lowest on December 22nd). The opposite is true in the summer when the sun angles are highest and span the longest time—around 60 degrees in Minneapolis (June 21st). Planting trees and building outdoor structures (such as pergolas and screened structures) and locating windows and doors to reflect the sun are key strategies in using the sun for its advantages—a free resource.

Resources

www.energy-10.com

Verification:

Verifier visually confirms and photographs this measure.

4.2.8



Passive cooling design package (including orientation, summer shading, thermal mass, attic ventilation, additional ceiling fans, heat recovery ventilation and natural ventilation design) 081114
MF

6 0 0 0 0

Description:

Existing house does not have A/C system and remodel designed to provide passive cooling. Implementation of passive cooling design package integrates several individual strategies into one comprehensive strategy that produces results greater than the sum of its parts. Provide design package and demonstrate implementation. No installation of any AC systems

Benefit:

Just as with passive solar homes, a home that is designed to be a passively cooled home requires careful planning and calculations. Glazing can help to facilitate good cross ventilation and create interior breeze, but glazing in the wrong location can cause the home to overheat and negate the benefits of the potential ventilation.

Considerations

True passive cooling requires homeowner education for operation and proper use.

Resources

www.energy-10.com

Verification:

Verifier visually confirms and photographs this measure.

4.2.9



Building and landscaping plan which reduces heating/cooling loads naturally 081114 MF

4 0 0 0 0

Description:

Provide plan that shows materials and strategies. Provide explanation of the system and how it will meet the needs of the home. Blocking the solar access of a neighbor's house is not allowed

Benefit:

Effective use of natural heating and cooling methods and strategies reduces energy loads with minimal environmental damage or with positive environmental impacts.

Considerations

Coniferous trees (like pine trees, which do not lose their needles) and deciduous trees (trees with leaves that drop in the fall) can have a great affect on how sunlight enters the home—plant locations and types of trees can either block or allow sunlight to enter the home. Designing awnings or other door and window overhangs must reflect the actual sun's angles.

Consider the long-term impacts of your plantings as well as the short-term. Planting rapid growth deciduous trees in sequence with slower growth deciduous trees will allow you to impact the home sooner, while still providing a good long-term solution for shading the home.

Take care to consider the solar access of a neighbor's house.

Verification:

Verifier visually confirms and photographs this measure.

4.2.10

Accountability Form: **General Contractor**



Home shares a common driveway with at least one other home 081114 MF

0 0 1 0 0

Description:

Site plan must locate the shared driveway and adjacent home. An alley is not a shared driveway. Two garages located off an alley that share a driveway can qualify provided the drive is truly shared, meaning for either car to enter or exit it must utilize a significant portion of the neighbors drive.

Benefit:

Sharing a common driveway saves space and construction materials, while leaving room for possible green open space or a more effective use of the space.

Verification:

Verifier review calculations.

4.2.11Accountability Form: **General Contractor**

Existing attached garage converted to living space and no new attached garage is constructed. New detached garage is allowed. Remodel only -081114 MF

0 5 0 4 0

Description:

Verify that the construction quality of the existing attached garage is worthy of becoming conditioned living space.

Benefit:

A detached garage minimizes hazardous emissions from vehicles and lawn equipment, cleaning solvents and contaminants on the garage floor from entering the home.

Verification:

Verifier review calculations.

4.2.12

Install a transition space between garage and living space with the following features. Select all that apply: 081114 MF

2/0/2 1/2/3 0 0 0

(Two gasketed self-closing doors. / Space has walk off mat. / Both options were applied)

Description:

Provide photographs of the installed measures

Benefit:

Many of the compounds in and around garages are known carcinogens. Attached garages represent a major source of pollutants that can easily make their way into the house. The above measures help to minimize the risk as much as possible.

Tip: Consider building a detached garage to completely eliminate the risk of garage pollutants from entering the house.

Verification:

4.2.13



Home utilizes incremental design techniques with documented provisions to expand to meet future growing needs 081114 MF 0 0 0 1 0

Description:

Document provisions to expand to meet future growing needs. Show on drawings where future additions can be made (e.g., dash in dormer locations, future second story addition) where integration can be made without incurring large amounts of construction waste.

Indicate how the plumbing and electrical design and installation is being done to anticipate future additions or changes to the home.

Roof trusses or framing shall be designed to allow for future additions.

Benefit:

This practice will save future resources and costs while reducing future waste, and encourages remodeling over purchasing a new home. In this way, occupants will make the most of the space they inhabit and only expand as needed. Planned remodeling and additions greatly reduce the environmental risks associated with construction sites.

Verification:

4.2.14 Accountability Form: **General Contractor**



Asbestos Inspection performed Remodel Only 0 1 0 0 0

Description:

Review the www.epa.gov/asbestos website for comprehensive information on asbestos risk, identification, and remediation.

Contact your local health department, or EPA regional offices for listings of licensed professionals in your area to identify, assess risk, and remove asbestos if necessary. It is not recommended that asbestos be removed by an inexperienced individual.

Considerations - Avoid blower door testing any home with loose asbestos. A trained BPI rater should know these protocols

Benefit:

Asbestos is a mineral fiber that was used in many housing products prior to the 1970s including duct insulation and gaskets, resilient floor tiles, their backing and adhesive, furnace and woodstove insulation, spray-on sound proofing, decorative wall and ceiling material, and asbestos-based cement roofing.

When asbestos fibers become airborne due to damage or disturbance, they may be inhaled into the lungs where they can cause significant health problems. Several different types of cancer and lung tissue scarring are linked to asbestos fiber inhalation.

Verification:

Inspect home for asbetos and document with photographs.

4.2.15	Accountability Form: General Contractor					
Lead paint test performed Remodel only (Pre 1978 Home)		0	1	0	0	0

Description:

There are lead test kits available for testing lead risk in the home, however, they are not always accurate and can't ensure user safety. It is highly recommended that a specialist trained to measure and assess lead risk be consulted prior to any handling of lead-based material.

To find a contractor that has been trained to handle the abatement of lead in a safe manner, contact the National Lead Information Center (NLIC) at www.epa.gov/oppt/lead/pubs/nlic.htm or 1 (800) 424-5323

If the lead risk is high in the home, occupants can be tested for lead levels in their blood

Considerations

Lead can also be present in soil in existing yards from old gasoline spills in lawnmowers. Recommendations are to also test soil and remediate if found.

Benefit:

Before 1978, the products found in and around our homes included the heavy metal, lead, as a component. Paint was one of the main housing products in which it was found. Chips of dry paint can contributor to lead poisoning along with the dust created by the disturbance of painted surfaces or soil contaminated by lead paint dust. Many negative health effects can occur from lead poisoning including behavioral problems, learning disabilities, seizures, and death.

Verification:

Review lead test documentation

4.3 Home Size

4.3.1						
No increase to building foot print Remodel only -081114 MF		2	0	0	2	0

Description:

Building plans must demonstrate no addition to the building footprint. Footprint is the square foot area of the site taken up by the house foundation along with any parts of the structure that DO NOT have a minimum of 7' of head clearance (e.g., decks or porches on pier footings)

Exceptions

Adding up is not considered part of the building footprint. Finishing a basement is not considered part of the building footprint. Cantilevers (extensions without adding to the foundation or adding footings) are not considered adding to the building footprint

Benefit:

Reorganizing existing space and adding "up" rather than "out" reduces the impact additional storm water runoff, building materials and reduced planted areas make on the environment.

Verification:

4.3.2



Total conditioned space of whole house after project completion is # of SF 5/4/3/2/1 5/4/3/2/1 5/4/3/2/1 5/4/3/2/1 5/4/3/2/1
Remodel Only
(<1500 square feet / 1749-1500 square feet / 1999-1750 square feet /
2249-2000 square feet / 2500-2250 square feet)

Description:

- Measure to the outside of the insulated envelope.
- In finished attics, measure the area that has a vertical dimension of 5' or more.
- Finished basements should be measured to the outside of the exterior walls.
- Basements that are insulated and air sealed, but otherwise unfinished (i.e., no drywall or floor finish) should be measured to the outside of the exterior walls.
- An unfinished basement where the insulation and air barrier are in the ceiling (or non-existent) is considered unconditioned space, and should not be included.
- A projecting mass such as a chimney should only be counted if it serves that particular level of the home.
- Porches that have a heat source (even if it is zoned separately), should be measured to the outside of the exterior walls.

The building envelope defines the conditioned and unconditioned spaces in the house. For the purposes of this program, the following rules should be used to determine conditioned space.

Benefit:

The easiest way to reduce the environmental impact of a home is to build smaller. A smaller home translates into less heating and cooling required, and fewer materials used in construction.

A smaller home means a more efficient use of space, which typically correlates to reduced materials and resources to build and maintain the home (i.e., reduced usage of resources such as electricity, water and construction materials).

Verification:

Verifier review calculations.

4.4 Home Location and Site Selection

4.4.1



Ability to walk to community services. (walkscore.com) Select one: 081114 MF
(walkscore between 1-24 / walkscore between 25-49 / walkscore between 50-69 / walkscore between 70-89 / walkscore between 90-100)

0 0 1/2/3/4/5 0 0

Description:

Provide copy of Walkscore from walkscore.com

Benefit:

Homes that are located within walk-able distance to community services encourage walking or biking as a means of transportation rather than reliance on automobile transportation.

Verification:

Provide documentation for this measure.

4.4.2



Access to public transportation. 081114 MF (1/4 mile / 1/2 mile / 5 miles from a park and ride) 0 0 4/3/1 0 0

Description:

Provide a map of area around home and create a circle on the map with a radius of 1/4 mile, 1/2 mile or 5 miles from a park and ride. Show location of transit stop(s) for public transportation. Describe type of transportation and frequency at which it stops at the transit stop per day

Benefit:

The availability of public transportation reduces reliance on automobile transportation and thereby reduces the collective energy needs of a community as well as the negative impact of automobile pollution. The availability of public transportation also helps to reduce the monthly transportation costs that individual families have to consider in their budget.

Resources

www.brookings.edu/reports/2006/01_affordability_index.aspx

Verification:

Provide documentation for this measure.



4.4.3



Site is bike friendly 081114 MF
(Somewhat bikeable, Bike Score 0-49. Or bike route within 1 mile / Bikeable, Bike Score 50-69 / Very bikeable. Bike Score 70-89 / Bikers paradise. Bike Score 90-100.)

0 0 1/2/3/4 0 0

Description:

- Option 1: Provide Bike Score using walkscore.com as a tool to see how bike friendly your site.
- Option 2: If walkscore.com does not produce a Bike Score for your address,
 - o Provide other documentation which shows your address falls within one of the existing Bike Score categories.
 - o List commuter trails, bike paths and their connection(s) to community services, etc.

Benefit:

Accessible bike transportation educes reliance on automobile transportation and thereby reduces the collective energy needs of a community as well as the negative impact of automobile pollution.

Verification:

Provide documentation for this measure.

4.4.4



Publicly accessible outdoor space (3/4 acre or greater) 081
(Within 1/4 mile from site / Within 1/2 mile from site)

0 0 2/1 0 0

Description:

Provide a map of area around home and create a circle on the map with a radius of ¼ mile or 1/2 mile. Show location of open space. Acceptable open space: state, county, city parks, playgrounds, ponds/lakes with walking paths, publicly accessible land, natural open spaces

Benefit:

Public open space encourages outdoor physical activity as well as a community gathering space that does not require automobile transportation for access.

Verification:



4.4.5



Community garden area

0 0 4/2/1 0 0

(Build a community garden on your site. / Other community garden is within 1/4 mile / Other community garden is within 1/2 mile)

Description:

Show garden on site plan, explain size and number of people it can serve, and describe how site is developed to support a garden. Build protection into covenants of development so that area remains community garden. Provide photograph of garden area. Show picture of other community garden and provide a map of the distance from the site.

Benefit:

Community gardens provide areas for people to gather and strengthen bonds within a neighborhood. They are important vehicles to building neighborhood pride and conserving resources.

Work with the neighborhood to designate a dedicated portion of land to community garden use, and preserve the plot with an agricultural easement or permanent restriction to insure its use in this manner for a minimum of ten (10) years. To qualify, the area of dedicated land must be greater than 10 sq. ft./dwelling unit.

In consultation with residents, community gardening plots shall be constructed, including soil improvements and raised accessible beds, and provide start-up gardening supplies. Encourage organic gardening techniques.

Resources

www.communitygarden.org/learn/what-is-a-community-garden/index.php

Verification:

Rater to inspect installed community garden and verify access is open to it from the community in some manner.



4.4.6

Accountability Form: **General Contractor**



Avoid ecologically sensitive sites

Default Value 0 0 3 0 0

Description:

Do not build the home or any portion of supporting development such as roads, driveways, parking areas, out buildings, swimming pools or recreational areas, or patios near any of the following:

- Land deemed in a flood plain or having elevation lower than the 100-year flood plain
- Land defined as habitat for threatened or endangered species
- Land within 100' of water or wetland
- Land that was parkland prior to purchase
- Prime farmland
- Provide proof of the land history (city, county or state land descriptions) that none of the conditions named above exist
- General contractor to sign-off on checklist

Benefit:

The land on which a Green home sits is equally as important as the home itself and needs complete consideration before developing. The areas listed above provide natural resources or prime farmland that should be part of the community at large—to be used as recreation, support quality farming, or protect natural spaces.

Resources

Check with local and state governmental agencies to acquire land descriptions and maps or engage the help of a real estate agent

Federal Emergency Management Agency, www.fema.gov

www.wetlands.com/regs/tlpge02c.htm

www.soils.usda.gov/about

Verification:

4.4.6

Accountability Form: **General Contractor**
Select the type of lot being built on New Home Only

0 0 2/3/5/10/10 0 0

(Edge Development / Infill / Previously Developed / Remediated Brown Field / Green Certified Area)

Description:

Edge Development - A minimum of 25% of the perimeter of the home site borders existing development and provide map of area around site and describe development on a minimum of 25% of the perimeter edge.

Infill - A minimum of 75% of the perimeter of the home site borders existing development. Provide map of area around site and describe development on a minimum of 75% of the perimeter edge.

Previously Developed - Site must have been previously developed with man-made structures such as roads or construction on at least 75% of the site area. Provide photograph of existing condition or documentation that validates site had been previously developed.

Green Certified Community, Neighborhood or Area include - [LEED ND](#), [NGBS Land Development Certification](#) or the [Living Community Challenge](#).

Brownfield - Provide documentation from the municipality that oversees property to validate that it has been deemed contaminated. Provide description of strategy to revitalize land to acceptable housing standards and approval documentation that shows home can be occupied and requirements for remediation have been met. [Learn more from the EPA](#)

Benefit:

Building near existing homes and commercial businesses reduces the effort necessary to expand infrastructure to the new home: roads, sewer, and water. The effort includes the amount of energy and resources used in the construction of the new infrastructure as well as the loss of habitat to create new roads and dig new services.

On remediating brownfields - Land that has been contaminated by a defunct business is problematic to cities and towns. The effort by a builder or developer to improve these properties for habitation is commendable as it helps reduce the need for the development of new land for housing in growing communities.

Green Certified Communities are built with goals to improve mixed use, walkability, alternative transportation, increased amount and differences in resources, stormwater mitigation and better building stock.

Verification:

Rater to verify location of the lot.



4.4.7 Accountability Form: **General Contractor**



Build in fire-safe area Rural New Home Only

Default Value 0 0 2 2 0

Description:

Build away from highly flammable trees and other vegetation. Provide description of strategies to reduce fire risk such as thinning brush and trees within 30' of the home, keeping grasses mowed, and using fire resistant plants. Provide homeowners with landscape maintenance plan to reduce fire risk.

Benefit:

Fire risk increases in rural areas where lack of fire hydrants and longer response times may impede the ability to contain a fire and reduce property loss. It is wise to take a proactive approach to fire prevention than to rely on firefighting as a means to save a home.

Verification:

Rater verifies site.

4.4.8



Housing density average >7 units per acre

0 0 4 0 0

Description:

Provide calculations and land development description to prove the housing density meets the criteria of 7 or more units of single family housing per acre. The calculation uses the number of housing units as the numerator and the buildable land area of the project only (not surrounding area) as the denominator.

Exceptions

Public streets and public right-of-way or non-residential structures are not included in the calculations

Benefit:

Increasing housing density allows for more land to be protected from development.

Considerations

Special considerations will need to be made for storm water management as homes are placed closer together and less surface area is available for absorption. Check with municipality to determine if this approach will be accepted or how it can be accepted.

Verification:



4.4.9

Accountability Form: **General Contractor**



Build within 1/2 mile of existing water & sewer New home only -081114 MF

0 0 3 0 0

Description:

General contractor to sign-off on checklist

Benefit:

The creation of services such as sewer, water, utilities and roads has a negative impact on the environment through the resulting disturbance to soil, habitat, and ecosystems. It is best to build homes where these services exist or within close proximity to minimize disruption.

Verification:

4.6 Air Tightness

4.6.1

Accountability Form: **Rater**



Air infiltration rate is 0.35 air changes per hour (ACH-natural) or Less

30 0 0 0 0

Description:

Upon project completion, regardless if changes made to tightness during project or not submit Blower Door and FAS calculations from Rater.

- GreenStar approved Rater must generate report using TECTITE Software, which is available from the Energy Conservatory. (www.energyconservatory.com/products/products8.htm)

- Accurate home floor size and volume must be entered into TECTITE for accurate results.

(See also OPR-13*** for Fresh Air Supply)

Benefit:

Reducing natural air infiltration is very important to improving energy efficiency, durability, and comfort.

Considerations

Inadequate fresh air ventilation can be detrimental to the health of the occupants and the durability of the home itself.

If asbestos is present, blower door test should not be performed when there is risk of asbestos becoming airborne in the house. See asbestos testing and remediation in the checklist.

Resources

www.builditgreenutility.org for asbestos information.

Diagram of Blower Door Testing Equipment

Verification:

Submit blower door details or incorporate as part of a whole home energy label and score.

4.6.2Accountability Form: **Rater**

Reduced Air Leakage Verified through blower inspection
(7.5 ach / 7 ach / 6.5 ach / 6 ach / 5.5 / 5 / 4.5 / 4 / 3.5 / 3 / 2.5 / 2 ach
/ 1.5 ach / 1.0 ach / .6)

2/4/6/8/10/12/14/16/18/20/22/24/26/28/30 0 0 0 0

Description:

Provide results of post-construction blower door test. (Rater Verified CFM @ 50 pascals)

Remember to address Fresh Air Supply requirements (see also OPR-12)

Document existing fresh air supply system. Describe type of system (e.g., natural ventilation only, exhaust only, balanced HRV, balanced ERV, etc.) and indicate whether adequate levels are being met using the following two criteria:

1. Total ventilation rate (CFM) = (0.02 x square feet of conditioned space) + [15 x (number of bedrooms +1)]
2. Continuous ventilation rate shall be a minimum of 50% of the total ventilation rate, but not less than 40 cfm. Natural ventilation is considered "continuous ventilation" for the purposes of this calculation.

Note: If either of these two criteria are NOT met, ventilation must be improved.

See Section 5 for strategies and points associated with them.

Considerations

If asbestos is present, blower door test should not be performed when there is risk of asbestos becoming airborne in the house.

Resources

www.builditgreenutility.org for asbestos information

Benefit:

Reducing air infiltration is very important to improving energy efficiency, health, durability, and comfort.

Verification:

Submit calculations. Rater accountability form sign off.



4.6.3

Accountability Form: **Rater**



Perform Infrared Inspection during Blower Testing

(Test In / Test Out / Test In & Out) 3/3/6 0/1/1 0 1/1/2 0

Description:

Infrared inspection can be done with any camera type. They even have cameras you can buy to put on your mobile phone now. Options in this credit include inspection before, after or to get full credit to a before and after test.

Benefit:

Infrared scan performed in conjunction with a blower door test is a very effective method to identify air leaks and insulation gaps.

Verification:

Rater signs accountability form and uploads photo documentation.

4.6.4

Accountability Form: **Rater**



Home is certified as an ENERGY STAR Home

10 0 0 0 0

Description:

Home shall be certified ENERGY STAR according to the requirements of Department of Energy (DOE) ENERGY STAR program available at www.ENERGY STAR.gov.

Submit ENERGY STAR documentation that is provided by the RESNET Energy Rater who does inspections and testing throughout the project.

Benefit:

Proven standard used to reduce energy consumption.

Considerations

Getting ENERGY STAR certification on existing home is possible but may require substantial improvements to achieve a qualifying HERS score of 70 or less.

NOTE: if Rater cannot visually inspect insulation, then they need to be conservative on their assumptions about the quality of the installation of the existing insulation in the house, which lowers the HERS score.

Verification:



5. Site & Landscape

5.1 Prerequisites

5.1.1 Accountability Form: **Landscape**

Prerequisite     

No invasive species are planted 122814 ms

Default Value     

Description:

No new invasive species are introduced to the site

Exceptions

If the conditions of the property are such that a significant removal is possible, but a complete removal of the invasive species is not possible, those conditions should be documented and submitted at the GreenStar pre-construction meeting for review.

Benefit:

Considerations

Invasive species (non-native) are part of our planted world and we see them every day and may not even know it. Even some flowers that we view as attractive choke out native plants and contribute to the breakdown of our ecosystems

Invasive species take considerable work, even well after the initial plants are removed, since they can continually send up new plant shoots

Mass removal of plantings like buckthorn may leave the soil exposed and erosion could occur; care should be taken to stabilize the soil as appropriate.

Resources

Consult the Extension Agency map at www.extension.u.edu/offices/

Verification:

5.1.2Accountability Form: **General Contractor**

Prerequisite

**No cypress mulch** 122814 ms

Default Value

**Description:**

No new cypress mulch added to the landscape.

Exceptions

Existing cypress mulch can remain as long as no new cypress mulch is added.

Benefit:

Cypress harvesting is poorly regulated and can come from poorly managed forests that support a fragile ecosystem. Local mulch is readily available, and much of the wood construction debris can be site mulched as well.

Considerations

If construction waste is being mulched, verify that no CCA treated (pressure treated) wood, ACQ (Alkaline Copper Quaternary) treated (pressure treated wood), or creosote railroad ties are a part of the mulch plan. These three wood types in particular must be disposed of properly.

Resources

See these helpful resources for rain garden design, or visit a local gardening store for helpful information.

For utility locations in the state of Minnesota, call 1 (800) 252-1166, or visit www.gopherstateonecall.org/.

Verification:

See accountability form.

5.1.3

Accountability Form: **General Contractor**

Prerequisite



No railroad ties or other landscape materials that contain creosote or chromated copper arsenate

Default Value



Description:

No use of phone poles, railroad ties or other landscaping posts which contain creosote, CCA, or ACQ can be placed in contact with soil, or exposed to rain. General contractor to sign-off on checklist.

Exceptions

ACQ as decking sub-structure is allowed although not recommended

Benefit:

Creosote and CCA are common wood preservatives in wood landscaping materials (especially ones not specifically intended for residential use). They can enter the respiratory and digestive system if touched; they are known carcinogens. Creosote and CCA can enter the air, soil and ground water when used as a landscape material; containment of creosote is difficult once this happens. Children are particularly susceptible to the ingestion of creosote and CCA as they may play on or around landscaping that may contain these preservatives.

Considerations

The recent use of ACQ (Alkaline Copper Quaternary) in the marketplace as an alternative to CCA raises concerns about its potentially harmful effects. GreenStar strongly suggests avoiding the use of any treated wood products when not absolutely necessary, especially when they may come in contact with the ground.

Verification:

Rater / Verifier confirm this measure has been met and take photo(s).



5.1.4

Accountability Form: **General Contractor**

Prerequisite



Following construction completion, no part of the disturbed site is left uncovered or destabilized

122814 ms

Default Value



Description:

Depending on the intended purpose of the exposed area, seed with a drought tolerant grass mix, wildflower mix, or approved other. Make sure a temporary irrigation plan is in place to ensure seeding takes hold.

—OR—

If planting is not the intended purpose of the exposed area, cover it with 4-6" of mulch or 2-4" of straw. This will help to control soil loss and also help avoid soil compaction until future site work takes place.

Benefit:

Soil loss is a major contributor to impaired waterways and deteriorated air quality, especially in drought seasons. As of 2006, the PCA has determined that over 40% of Minnesota’s waterways are already impaired. Other states have similar issues.

Verification:

Rater / Verifier visually confirm this measure is complete and take photo(s).

5.2 Soil and Permeability

5.2.1

Accountability Form: **Landscape**



Soil tested and amended to achieve optimal nutrient level and structure 122814 ms

0 0 1 0 1

Description:

- Collect soil sample and provide it for testing to your local Extension Agency, Master Gardener, or certified landscape professional.
- Provide report.
- Follow recommendations from your local Extension Agency.

Benefit:

Soil health can benefit the landscape immediately surrounding it. Poor soil conditions make it difficult for any plants to thrive or survive. Selecting plants appropriate for the soil condition can reduce the amount of amendments required and improve the plantings success rate.

Resources

For a resource in Minnesota look at www.extension.u.edu/offices/

Verification:

Provide documentation for this measure.



5.2.2

Accountability Form: **General Contractor**



No impervious surfaces constructed outside existing building footprint 122814 ms Default Value 0 0 2 0 0

Description:

Do not add any hardscape anywhere on the lot. For a remodel project, this credit is only available if there are no additions proposed to the building footprint This credit is only available if no additional steps, stoops, walkways, driveways, roof surfaces—such as sheds or covering existing decks—are proposed. Even open-cell pavers, stepping stones and the like have a percentage of impervious surface (hardscape) even though there is open space between them—using these materials does not qualify for this credit.

Benefit:

The addition of hardscape reduces the ability for water to penetrate the soil, therefore, maintaining the amount of impervious surface or reducing it is desired. Impervious materials include concrete, stone, and class-5 aggregate.

Verification:

See accountability form.

5.2.3

Accountability Form: **Landscape**



Total site has XX% permeable surface. Select one: 081114 BL 0 0 2/3/4/0 0 0
 (65% of undeveloped site is permeable / 85% of undeveloped site is permeable / 100% of undeveloped site is permeable / Permeability of site is reduced)

Description:

Total site refers to property boundaries.

You must include all covered structures (driveways, walkways, patios) on the property when determining the percentage of your site that is permeable. City sidewalks and curb-cuts are not included in this calculation

Benefit:

Having a site that has considerable pervious (permeable) surfaces is a benefit to storm water management as well as waterways and local aquifers. More resouces can be found on [EPA's Website](#).

Verification:

Provide documentation or calculations for this measure. A site inspection is required and must be part of the third-party field verification.

5.2.4

Accountability Form: **Landscape****Permeability of the total site is increased by XX%** 081114 BL

(<20% / <40% / <60%) 0 0 2/3/4 0 0

Description:

- If the site plan can demonstrate the overall reduction of existing hardscape either by the removal of hardscape, or by replacing it with a larger permeable area, then this credit can be achieved
- The site plan must show area of increased permeability and area calculations, as well as the strategies pursued
- Only stones and rocks 1/2" in diameter or greater will qualify for the replacement of walkways, or filler between pavers and be dust free
- An example of increasing permeability on the site is a 3'x3' area of concrete replaced with four 1'x1' concrete pavers, leaving 5 sq. ft. of area for plantings, mulch or grass.
- Another example would be replacing a concrete or asphalt driveway with porous asphalt or concrete and a properly designed drainage system that keeps 90% of the water on site in a typical rainfall event. (Use 1/2" rainfall event for your calculations).

Exceptions

Stone fines between pavers (such as granite, concrete dust, class-5 aggregate, or similar) are not considered acceptable permeable materials.

Benefit:

Increasing a site's permeability (reducing hardscape and increasing absorption) is a benefit to storm water management as well as waterways and local aquifers. Pair this credit with 4A-3 by having a high percentage of permeability and also reducing the amount of existing hardscape is of great benefit to the greater community.

Considerations

If you have a soil type that resists taking additional water (clay) you will need to install a proper drainage system to move the water into the ground fast enough to avoid losing the water to runoff. A permeable system that cannot drain will clog and may impact the durability of the installed material.

Verification:

Provide documentation or calculations for this measure.

5.2.5

Accountability Form: **Landscape****Keep excavated soils on site.** 010214 BL

1 0 2 0 0

Description:

- Protect removed topsoil from erosion by wind or rain with tarps or other suitable material.
- Clearly mark protected topsoil areas and communicate protection measures to all subcontractors.
- Show area on site plan that designates topsoil areas to be protected throughout all construction activities.
- Stockpiled soil must remain within 1/2 mile of the site during construction.
- Provide photograph of protected soils.

Benefit:

Keeping excavated soils on site reduces the amount of transportation needed to bring new soil to the job site when backfill is needed, thus reducing the amount of embodied energy of the overall project. Native soil will reduce the introduction of undesirable plant species and other pests. Amend soils as necessary to improve soil quality.

Verification:

Verifier visually confirms and photographs this measure.



5.3 Planting/Trees

5.3.1



Natural features on site (trees, prairie and wet lands, tundra and ecosystems) are protected during construction, regardless of project type or scope. 081114 MF

0 0 2 0 0

Description:

- Document protection measures on Erosion Control Plan
- Photograph site during construction
- Trees designated for protection during construction (typically those with a diameter at breast height exceeding 2") should be fenced at drip line (to include area extending in all directions from trunk) with firmly set-in fence posts (minimum 2x2 lumber)
- If you must drive equipment over sensitive areas such as tree roots, spreading 8" of wood chips down first will keep the soil from compacting and minimize any potential stress to the tree.
- If utilities must pass through a tree root zone, they are to be tunneled or hand dug

Benefit:

Soil compaction around tree roots can contribute to a tree's slow demise. Reduce the possibility of soil compaction by protecting the unseen tree roots. Cutting tree roots can lead to a weakened tree making it susceptible to structure damage either during high winds or under extreme branch loads. Site protection of small and interior projects is commonly overlooked. However, deliveries, vehicles, and foot traffic can impact natural site features regardless of project size.

Verification:

Visually inspect and photograph implementation of this measure.

5.3.2

Accountability Form: **Landscape**



50% or more of the lot contains plants or trees other than turf 010214 BL

0 0 2 0 0

Description:

Site plan illustrates planted areas and calculations show that 50% or more is planted with material other than lawn.

Benefit:

Lawn mowing contributes to the use of fossil fuels (electric and gas). Even if a manual mower is used, what we think of as traditional lawn (lush and green all summer long) requires a considerable amount of resources to be maintained. Introducing a wild flower mix, or other native plants contributes to the health of local ecosystems.

Verification:

Visually inspect and photograph implementation of this measure.

5.3.3Accountability Form: **General Contractor****No Heritage trees removed** 010214 BL

0 0 2 0 0

Description:

A heritage tree must be notated on the site or landscape plan, and field verified by a third-party reviewer.

Exceptions

Diseased trees or trees that can inflict potential damage to the home due to proximity, age, or other irreversible conditions. A written statement from a licensed arborist is required, and a replacement tree (one that can become a heritage tree) must be planted.

Benefit:

A Heritage tree has any or all of the following features:

- Diameter of at least 18" measured at 54" high (roughly chest height)
- Special site location
- Relation to a historical event
- Unusual species or exemplary form of native species
- A Heritage grove has any or all of the following features:
 - Mature and contains trees that are distinctive due to size, shape, species or age
 - Associated with a historical event
 - Relationship with a natural resource

(City Code Chapter 20.77.120 – Heritage Trees, Heritage Tree Nomination Packet, Urban Forestry Program, Vancouver)

Considerations

There may be instances when a heritage tree could be detrimental to a home, such as tree roots interfering with the sewer system, or significant branches touching the home. In these instances, it may be beneficial to consult with an arborist about significant pruning or full removal of a heritage tree.

Heritage trees are often quite large and may play an active role in shading the home. Removal of the tree may cause a previously cool home to become overly warm in the summer, and care should be taken to evaluate the conditions and consider possible solutions for the home.

Verification:

See accountability form.

5.3.4Accountability Form: **Landscape****New plantings are compatible with soil type** 010214 BL

0 0 2 0 2

Description:

Provide list of plantings used and show how they are compatible with soil type.

Benefit:

Soil compatibility will benefit the plantings' overall health, and minimize future replacement and water needs.

Resources

Consult the Extension Agency map at www.extension.u.edu/offices/

Verification:

Verifier visually confirms and photographs this measure.

5.3.5Accountability Form: **General Contractor****Live trees from site are replanted or donated** 010215 BL

0 0 2 0 0

Description:

Describe plan for each tree to be relocated or donated. List intended recipients of donations. Does not include invasive species.

Benefit:

Replanting trees on the site is most desirable, however, if this is not possible, donating the removed plants and trees keeps them from becoming landfill or mulch. Replanting landscape plants and trees does cause stress to the plants. Take extra care to minimize stress and provide ample initial water until re-established.

Considerations

Ornamental and native plants should also be considered for relocation or donation.

Verification:

Provide documentation or calculations for this measure.

5.3.6Accountability Form: **Landscape****Plantings. (Choose Selection)** 011115 ms

0 0 2/1/3 0 0

(At least one 1 or 4-5 shrubs per 500 SF of the building footprint / Above plantings are native species / Both measures were applied)

Description:

1. At least one tree/4-5 shrubs are planted per 500 sq. ft. of the building footprint, plus the disturbed construction area.

Area calculations must be shown on landscape plan. General contractor to sign-off on checklist after planting is complete

2. Above plantings are native species.

Provide list of plants used

Benefit:

1. At least one tree/4-5 shrubs are planted per 500 sq. ft. of the building footprint, plus the disturbed construction area.

Trees and shrubs help absorb carbon dioxide, a contributor to greenhouse gases. The disturbed construction area benefits from new plants or trees because they help hold soils together. Avoid planting trees directly over main city water, sewer and gas lines and a safe distance from structures, depending on average diameter (drip line) of the trees.

2. Above plantings are native species.

Trees are a natural air purifier and absorb carbon dioxide, a known greenhouse gas. Native trees are adapted to the area climate and will need less water over time.

Verification:

Project team to provide calculations.

Rater / Verifier visually confirm and photograph this measure on site.

5.3.7

Accountability Form: **Landscape**

Restore damaged ecosystem (I.e. restore existing prairie or wet lands, establish wildlife habitat, remove extensive invasive plant species, etc) 010215 BL

0 0 5 0 0

Description:

Wildlife habitats can be restored by planting native plants or by leaving tracts of land undisturbed and protected. Approval from National Wildlife Federation or local agency overseeing habitat establishment. Provide before and after photos, and list, detailing what was done.

Benefit:

Construction and overbuilding is one of the main contributors of ecosystem and habitat depletion. Habitat and ecosystem establishment provides resources for otherwise homeless animal, plant and insect species. Tax credits may be available in your area.

Verification:

Provide documentation or calculations for this measure.

5.3.8

Accountability Form: **Homeowner**

Participate in a wildlife conservation program 010215 BL

0 0 1 1 0

Description:

Program literature, receipt of contribution, other materials showing membership or donation to a non-profit, DNR, or conservation organization.

Benefit:

Construction and overbuilding is one of the main contributors of ecosystem and habitat depletion. Habitat and ecosystem establishment provides resources for otherwise homeless animal, plant and insect species. Tax credits may be available for membership in a program.

Resources

National Wildlife Federation provides a free and easy certification program. [Learn more.](#)

Verification:

Provide documentation or calculations for this measure.

5.3.9



Compost Bin Installed or Service Registration 010215 BL

Default Value 0 0 1 1 0

Description:

Show on Landscape Plan location of compost bin and type installed (e.g., home made, product literature). Provide photograph of compost bin. Exceptions - Sign up for a local or regional program offered through the market or governmental services and submit receipt of registration.

Benefit:

Compost bins are an excellent way to handle yard waste as well as provide an excellent source of nutrients for the garden. Read literature specifically geared for the type of compost bin installed on the site to get a good understanding of how a compost bin works and is maintained.

Considerations

Consider composting food scraps from the kitchen. See 9B-2 for more information.

Resources

www.eurekarecycling.org

Verification:

Homeowner visually confirms and photograph this measure.

5.3.10

Accountability Form: **Landscape**



Low-water/no-mow mix is used on 100% of turf areas 010215 BL

Default Value 0 0 0 0 2

Description:

Product label or literature of turf product used and landscape plan illustrates area for turf.

Benefit:

Lawns require significant amounts of water to remain green, and as a lawn grows, it needs to be mowed. By reducing the amount of water a type of turf requires, and by installing a no-mow mix, a lawn then requires much less embodied energy than its high-water, high-mow relative. Learn more at the [Michigan State University Extension](#) (applicable to Midwest).

Verification:

Visually inspect and photograph implementation of this measure.

5.3.11Accountability Form: **Homeowner****Edible landscape planting/food garden is installed** 010215 BL

Default Value 1 0 0 1 0

Description:

Landscape Plan illustrates area for food garden, chicken coop, animal pens and/or edible plants, and types of plants installed.

Benefit:

This credit is designed to encourage homeowners to grow and eat food grown on-site rather than food that has a high level of embodied energy, as well as the energy required to obtain the food through driving. Home gardens are a wonderful teaching tool for young and old alike. A heightened appreciation for growing food brings a better understanding to what it takes to fill a plate.

Considerations

Food gardens in the city need extra care. Keep them away from the road and the garage to avoid contaminating the plants. If you have rain barrels or other rainwater catchments remember that rainwater collected from an asphalt roof is not suitable for watering food gardens (water collected from steel, slate, wood, or clay tile roofs is OK to use).

Verification:

Verifier visually confirms and photographs this measure.

5.3.12Accountability Form: **Landscape****Design around or install deciduous trees on the south, east, and west sides of home** 010215 BL

2 0 0 0 0

Description:

Illustrate on the Landscape Plan the existing or future location of deciduous trees (a tree which loses its leaves in the winter months), the particular species, and the average height the tree will achieve.

Benefit:

The shade provided in the summer will reduce the cooling load placed the home's cooling system, while allowing for maximum sun exposure during the winter months reducing the load placed on the home's heating system. This is a classic passive solar strategy, one which requires minimal maintenance over the life of the home.

Considerations

Shade trees are so important that the city of Minneapolis estimates a savings of over 25 million dollars annually in cooling costs as a result of their urban forest.

Verification:

5.3.13	Accountability Form: Landscape					
Existing and new deciduous trees shade 50% of sidewalks, patio or drive within 5 years	010215 BL	0	0	2	0	0

Description:

Illustrate on the Landscape Plan the existing or future location of deciduous trees, the particular species, and the average height/size the tree will achieve in five (5) years (approximately). Provide calculations that show 50% shading

Benefit:

This works to reduce the "Heat Island" effect created by hardscapes, particularly in urban areas where much of the environment is pavement or roof area. Heat island effect is an artificially-induced increase in the temperature of an area due to surfaces absorbing sunlight and holding the energy as heat.

Verification:

Visually inspect and photograph implementation of this measure.

5.3.14	Accountability Form: Landscape					
All plantings and plant materials are kept at least " from house	010215 BL (18 inches / 24 Inches)	0	0	0	1/2	0

Description:

- Landscape Plan must show average size of plants and its minimum distance from the home
- Landscape Plan must show that soil protection is provided, and documentation of type of protection
- Must be 24" away from home at mature size
- No mulch may be laid as ground cover
- Provide photographs of installed strategies

Exceptions

Potted plants that can be easily relocated are allowed. Plantings that require no watering and thrive in rocky conditions, such as ice-plant, sedum, and some other succulents, are allowed in a limited number.

Benefit:

Plantings and mulch hold moisture in the soil and encourage active irrigation of the soil close to the foundation. Landscape plants too close to a home can allow for pest intrusion, stain on siding, and allow moisture and mold to penetrate siding materials. Soil protection is just as important to keep water splash and soil from staining the home. Rocks can work as soil protection.

Considerations

Water moves through rock faster than soil. If you do not have large overhangs on the home, you should make sure the soil is adequately pitched away from the home prior to installation of the rock.

Verification:

Verifier visually confirms and photographs this measure.



5.3.15

Accountability Form: **Landscape**



Design around or install coniferous trees on the north side of the home (must not block solar access of neighbors) 010215 BL
Default Value

2 0 0 0 0

Description:

Illustrate on the Landscape Plan the existing or future location of coniferous trees (a tree which keeps its needles throughout the year), the species, and the average size of the tree

Benefit:

Homes that have significant northern exposure can benefit from having a wind break on the north side of the home. Properly designed and maintained they can allow light to enter the home during all times of the year.

Considerations

Coniferous trees installed for this purpose must be of a variety that will grow tall enough to serve its purpose.

Verification:

5.3.16

Accountability Form: **Landscape**



Apply two inches of compost in the top 6 to 12 inches of soil in flower & vegetable garden beds 010215 BL
Default Value

0 0 1 0 0

Description:

This credit is for areas designated for gardening and plantings only. The compost must be tilled into the soil thoroughly to reduce plant burn

Benefit:

Verify that the plants can tolerate the type of compost used. It is encouraged to use locally made compost (from the back yard or a neighborhood pile).

Verification:

See accountability form.



5.3.17

Accountability Form: **Landscape**



Use slow-release organic fertilizers to establish vegetation 010215 BL

0 0 1 0 0

Description:

- This credit is for areas designated for gardening and plantings only
- The Landscape Plan must describe where the fertilizer shall be installed
- This credit is designed for new planting areas only

Benefit:

Rationale

If it Includes manure, describe on the Landscape Plan the type of manure used. No phosphorous fertilizers may be used.

Verification:

Provide documentation or calculations for this measure.

5.3.18

Accountability Form: **Landscape**



Use mulch ground from local tree trimming, on-site tree removal, or clean wood waste and gypsum

0 0 0 0 0

010215 BL

Default Value

Description:

This credit is for areas designated for gardening and plantings only. The Landscape Plan must describe where the fertilizer shall be installed. This credit is designed for new planting areas only

Benefit:

If it Includes manure, describe on the Landscape Plan the type of manure used. No phosphorous fertilizers may be used

Verification:

Verifier visually confirms and photographs this measure.

5.3.19



Structure located in fire-safe area, away from highly-flammable trees and plantings (for rural projects ONLY) 011115 ms

0 0 0 0 0

Description:

Significant trees are kept at a minimum of 50-100' clear of all structures. Show a perimeter of non-combustible material around structures such as gravel or dirt

Benefit:

This credit is designed for projects taking place in rural areas only. As the drought continues and forest fires become more common, it is increasingly important when choosing to build in wooded areas that we take the extra steps to ensure the long life of our homes and reduce the strain placed on our resources to protect them during a fire. Minimizing grasses near a house in fire-prone areas is an important strategy along with keeping small scrub trees that burn easily a safe distance from a house and out buildings.

Verification:

Verifier visually confirms and photographs this measure.

5.4 Irrigation

5.4.1

Accountability Form: **Landscape**



Develop landscape maintenance plan 010215 BL

0 0 1 0 2

Description:

- The landscape maintenance plan must be specific to the site and makes exclusive use of all-organic fertilizers
- The landscape maintenance plan can be noted on the Landscape Plan
- The maintenance plan must list watering, thinning, and winter bedding needs of the garden and plants
- The Landscape Plan must illustrate location of hose bibs (sill cocks) and when the water must be shut off inside the basement prior to the first seasonal freeze
- The Landscape Plan should take into account rain barrels or other rain harvesting catchments.

Benefit:

A landscape maintenance plan will help homeowners understand what is required for maintaining the life of the landscaping; this plan will help reduce watering needs as well as reduce the risk of over fertilizing.

Verification:

See accountability form.

Provide documentation or calculations for this measure.

5.4.2

Accountability Form: **Landscape**

Landscape system that requires no municipally-supplied water or well water for irrigation (food gardens exempt) 010215 BL

0 0 1 0 6

Description:

Provide photos of system.

Provide description of system installed on landscape plan explaining why municipally supplied well water will not be necessary for ongoing landscape maintenance.

Municipally supplied well water is acceptable for vegetable gardens, and at initial planting of other landscaping to get root systems established.

Benefit:

Rainwater catchment systems are effective ways to irrigate without using drinking (potable) water.

Considerations

If you have rain barrels or other rainwater catchments remember that rainwater collected from an asphalt roof is not suitable for watering food gardens.

Verification:

Verifier visually confirms and photographs this measure.

Provide documentation or calculations for this measure.



5.4.3

Accountability Form: **Landscape**



Irrigation plan restricts watering to after dusk and before dawn 010215 BL

Default Value 0 0 0 0 1

Description:

An irrigation system on a timer is required. Homeowner to sign-off on checklist that timer is set for nighttime hours only

Benefit:

Water evaporates fastest during the daytime, sometimes evaporating before the water reaches the plants. Watering during the day can lead to plant burn. A drip irrigation system can reduce the amount of water evaporation, delivering more water to the root system faster.

Considerations

Watering after dusk may not be healthy for the plants because if water sits on the plants leaves all night without drying it may lead to bacterial growth.

Verification:

See accountability form.

5.4.4

Accountability Form: **Landscape**



Native and drought-tolerant landscape plantings make up minimum of xx% of non-paved areas (excluding turf). (Need minimum of 20 square feet of native & drought tolerant to qualify). 010215
BL (40% / 60% / 90%)

0 0 0 0 2/4/6

Description:

No irrigation system may be installed in the native/drought tolerant landscape, or a temporary system installed to establish plants only and a system removal date must be illustrated on the Landscape Plan. Provide list of plants installed. Calculate square feet of non-paved, non-turf areas planted.

Benefit:

Drought tolerant plants incorporated with adaptable plants can withstand rainfall shortages and utilize less water for irrigation.

Verification:

See accountability form.

5.4.5 Accountability Form: **Landscape**



Irrigation system that zones turf and bedding areas separately 010215 BL

0 0 0 0 1

Description:

No irrigation may be provided to turf areas. Landscape Plan must illustrate location of irrigation heads or location of system (i.e., location of irrigation hose if a drip system is installed). General contractor to sign-off on checklist

Benefit:

Most turf mixes are designed to go dormant in dry summer months, usually to re-grow once moisture returns. Plants, on the other hand, may not be able to tolerate such a drought. Make sure irrigation heads are not aimed at sidewalks, buildings, or streets, causing runoff or damage of structures.

Verification:

See accountability form.

5.4.6 Accountability Form: **Landscape**



Hydro zoning 010215 BL

Default Value 0 0 0 0 3

Description:

Landscape Plan should illustrate types of plants grouped together based on watering requirements (i.e. low water plants in one area, higher water plants in another)

General contractor to sign-off on checklist

Benefit:

This is a landscaping practice that groups plants with similar water requirements together in an effort to conserve water.

May reduce the amount of irrigation required, either by reducing the number of irrigation heads, or by delivering less water to plants that need watering less than others.

Verification:

See accountability form.

5.4.7Accountability Form: **Landscape****Install greywater irrigation system** 010215 ms

0 0 0 0 7

Description:

Provide receipt or documentation of type of graywater system used and provide documentation from local municipality that a graywater irrigation system is an approved method of irrigating

Benefit:

Graywater systems have been established for many years in portions of the country that experience potable water shortages. By using wastewater from appliances, like washing machines, that is still safe for irrigation, we are able to conserve our fresh water resources. A graywater irrigation system shall be approved by local building and/or health departments, and, at a minimum, shall have a dedicated clothes washer box with 2" drain connected to a subterranean drain field. A separate clothes washer box shall be provided that connects to the sanitary drain system.

- If Minnesota project, see Minnesota Statute 115.59 for code required criteria.

- Documentation: Performance measure – indicates size of system is balanced with load and demand

- Do not use detergents or soaps which contain phosphorous

Resources

www.revisor.leg.state..us/bin/getpub.php?pubtype=STAT_CHAP_SEC&year=2006§ion=115.59

Verification:

Rater / Verifier confirm system is installed and photograph if possible.

5.4.8Accountability Form: **Landscape****Use irrigation specialist certified through EPA WaterSense program** 010915 ms

0 0 1 0 0

Description:

Provide copy of certification of specialist.

Benefit:

WaterSense was developed by the Environmental Protection Agency (EPA) to help homeowners reduce water consumption inside and outside. WaterSense Irrigation Specialists are certified through EPA for their knowledge of technology and landscaping to reduce water usage.

Resources

www.epa.gov/watersense/pp/lists/irr_partners.htm

Verification:

5.4.9

Accountability Form: **Landscape****Install drip irrigation system** 010915 ms

0 0 0 0 1

Description:

- A minimum of 80% of landscape planting beds must have a drip irrigation system to receive points
- Install a minimum of 2" of mulch over drip system to delay evaporation, and retain moisture levels
- Provide photographs
- Provide receipt

Benefit:

Drip irrigation systems deliver water closer to the root system, and reduces evaporation

Verification:

Provide documentation or calculations for this measure.

5.4.10

Accountability Form: **Landscape****Moisture / rain sensor added to any type of irrigation system** 011415 ms

0 0 0 0 2

Description:

- - A minimum of 80% of landscape planting beds must have a drip irrigation system to receive points
- - Install a minimum of 2" of mulch over drip system to delay evaporation, and retain moisture levels

Benefit:

Drip irrigation systems deliver water closer to the root system, and reduces evaporation

Verification:

Project team provide documentation or calculations for this measure.

Rater / verifier to visually confirm and photograph this measure.

5.4.11	Accountability Form: Landscape					
Electronic timer added to any type of irrigation system 011415 ms		0	0	0	0	2

Description:

Required:

- Provide product specifications document(s)

Benefit:

Electronic timer ensures watering is done on a limited and regular basis.

Verification:

Rater / verifier to visually confirm this measure and photograph.

5.5 Decks, Patios and Porches

5.5.1	Accountability Form: Landscape					
Use permeable paving for patios (80% minimum of total patio area) 010915		0	0	2	0	0

Description:

- Provide area calculations showing a minimum of 30% permeability for method of paving
- Provide material specifications of paver material if manufacturer touts a highly porous surface
- No stone dust or fines may be used for fill between pavers
- No class-5 aggregate may be used for finished patio or walkway surface (class-5 underlayment is OK)

Benefit:

Water has a greater opportunity for absorption if pavers achieve 30% permeability, storm water runoff is reduced.

Verification:

Rater / Verifier visually confirm this measure & take photo(s).

5.5.2

Accountability Form: **General Contractor**

Outdoor lumber used for landscaping made from wood treated with nontoxic preservatives, plastic/wood composites, or plastic (note: fasteners are product specific) 0 0 1 0 0
Default Value

Description:**Benefit:**

Less environmental impact.

Verification:

Project team to provide notes on plans and specifications.

Rater / Verifier visually confirm and photograph this measure on site.

5.5.3

Accountability Form: **General Contractor**

Wood use is kept at least 12 inches from soil 011115 ms 0 0 0 2 0

Description:

Exceptions:

- Deck, patio, or porch posts made of pressure treated wood that is rated for ground contact are allowed to have ground contact.
- Deck, patio, or porch posts made of rot resistant wood such as cedar are allowed within 12" from ground, if they are separated from concrete contact by minimum of 1/2" and separated from ground contact by minimum of 1-1/2"

Benefit:

Soil moisture, snow, and splashing can all lower the performance of wood, eventually leading to wood rot and shortening the life of the structure.

Verification:

Visually inspect and photograph the implementation of this measure.

5.5.4Accountability Form: **General Contractor****Use re-claimed material for deck or porch (80%)** 011115 ms

0 0 0 4 0

Description:

- - Describe where reclaimed material originates from
- - Verify that reclaimed material is appropriate for outdoor exposure
- - Explain species of reclaimed material, verify that the material is lead, CCA, and creosote-free

Benefit:

Using wood that had a previous purpose keeps it from ending its life in a landfill. Reclaimed material reduces the need for virgin product and the energy needed to grow, extract, manufacture, and transport it.

Verification:

Visually inspect and photograph the implementation of this measure.

5.5.5Accountability Form: **General Contractor****Decking is made from recycled content and has low-toxicity** 011115 ms

0 0 0 1 0

Description:

- - Must have a minimum of 40% recycled content (post-industrial/post-consumer),
- - Must be chlorine-free, a non CCA-pressure treated lumber, contain no creosote, and certified by manufacturer or Scientific Certification System
- - Deck ledger boards should attached to home with either minimum 3/8" spacers and full flashing shingle fashion from drainage plane to over framing or adhesive membrane strip taped to drainage plane running over ledger board and folded around joists over hanger with adhesive membrane cap patch over each joist.
- - Provide receipt and material specifications

Benefit:

- - Reducing the toxicity level of the materials chosen for a deck or porch floor reduces the exposure to the environment both on site and in it manufacturing process. It also reduces the exposure to humans and animals.
- - Proper deck ledger board installation and flashing reduces water infiltration and eventual rot associated with poor installation.

Verification:

Project team to provide specifications for materials used.

Rater / Verifier visually inspect and photograph the implementation of this measure.



5.5.6

Accountability Form: **General Contractor**



Wood to concrete connections prevent moisture wicking. (e.g. end grains have min. 3/8" air space. --AND-- side grains separated by 3/8" air space and/or flashing.) 011115 ms 0 0 0 1 0
 Default Value

Description:

- - Provide material specifications
- - Metal plate must be corrosion resistant
- - Provide photograph of connections

Benefit:

Concrete can wick moisture and in turn allow the wood to absorb it as well. By separating wood from the concrete with a metal plate, the ability for water to migrate is minimized.

Verification:

Verifier visually confirms and photographs this measure.

5.5.7

Accountability Form: **General Contractor**



Delete this measure. 011115 ms 0 0 0 1 0

Description:

Rater to verify installation

Benefit:

The ledger board-to-home connection has been a source of failure for many deck installations because they have failed to shed water away from the home but rather trap it behind the ledger board where it doesn't dry and can enter the home.

Failure at this connection area can be very costly to repair, and durability is best ensured by proper water management during construction

Verification:

Verifier visually confirms and photographs this measure.

5.6 Erosion Control

5.6.1

Accountability Form: **Landscape**



Turf is not installed on slopes exceeding 25% rise 011115 ms

0 0 1 0 0

Description:

Recommended

Illustrate on Erosion Control / Landscape Plan with alternate plantings or type of retaining used.

Exceptions

Standard turf alternatives such as buffalo grass and big blue-stem have deep root systems and can prove effective in moving water underground quickly. Written documentation from a landscape architect could allow for these turf-like plants to qualify for the credit.

Benefit:

Turf is not a successful means of controlling erosion, especially in flash flood or long rain periods as their root systems are shallow. Plants with deeper root systems and planted closer together tend to hold soil better. Retaining walls designed properly for the height and percentage of the slope, and with proper anchoring, is an effective method on slopes over 25%.

Verification:

Verifier visually confirms and photographs this measure.

5.6.2

Accountability Form: **Landscape**



Apply mulch to at least 3 inches of all planting beds (no cypress mulch allowed) 011115 ms

0 0 0 0 1

Description:

Mulch must be biodegradable to receive these points. Landscape Plan must illustrate areas to receive mulch, type of mulch, overall depth, and long-term plan for periodically reinstalling mulch.

Benefit:

Mulch must be reinstalled to its original depth every couple of years due to mulch erosion. A minimum of 3" is desirable for moisture retention in soil. Mulch is a successful way to trap moisture in the soil, even in times of drought.

Verification:

Rater / Verifier visually confirm and photograph this measure.

5.6.3

Accountability Form: **Landscape**



Use site material as mulch for erosion control on steep slopes 011115 ms

0 0 1 0 0

Description:

Illustrate on Erosion Control Plan which areas are to receive site material mulch. Lay mulch around storm drains and in locations where silt fences do not hold up.

Benefit:

Stumps and limbs that are not suitable for sawing, and cannot easily be re-purposed, can be chipped on-site. Consult with your local arborist before tree removal to determine the best course of action.

Construction debris that has not been painted or sealed can typically be mulched for use on-site.

Verification:

Rater / Verifier visually confirm and photograph this measure.

5.6.4

Accountability Form: **General Contractor**



Recycled materials used for silt fencing 011115 ms

0 0 0 1 0

Description:

Recycled silt fence must be able to be reused more than twice. Describe type of silt fence planned for reuse and method for storing it between job sites. General contractor sign-off on checklist.

Benefit:

Rather than sending the silt fence to the landfill after each job, consider bringing it to the next job site to reduce waste.

Verification:

Rater / Verifier visually confirm and photograph this measure.



5.6.5

Accountability Form: **Landscape**



Native landscaping is planted along 80% of shoreline 011115 ms

0 0 1 0 1

Description:

This credit is for properties with lake or river shore. The DNR or other governing agency must grant approval for shoreline planting strategy—provide documentation of approval.

Benefit:

Shoreline degradation is responsible in part to the reduction water quality. Recreational and other water vehicles contribute to shoreline degradation and planting the shoreline can help hold soft soils together.

Verification:

Project team to provide documentation or calculations for this measure.

Rater / Verifier visually confirm and photograph this measure.

5.6.6

Accountability Form: **Landscape**



Long-term erosion is reduced through terracing, retaining walls, landscaping, or other restabilization techniques 011115 ms

0 0 2 0 0

Description:

Landscape Plan must indicate elevation change in property and describe strategy to stabilize the soil. Provide photograph of installed measures.

Benefit:

Erosion from a yard negatively impacts the community around it through the loss of beneficial topsoil, potential increase in unwanted chemicals from lawns, and excess water and sediment entering storm sewers and waterways. The goal in storm water management is to keep rainwater on-site so that it soaks into the ground and contributes to the replenishment of the aquifers.

Verification:

Rater / Verifier visually confirm and photograph this measure on site.



5.7 Rainwater Harvest

5.7.1

Accountability Form: **General Contractor**



Roof water drainage system that captures xx% of roof area for irrigation use (storage capacity for 1/2" rain event & overflow to absorption area) Select one: 011015 BL (20% / 50% / 90%) 0 0 3/7/12 0 3/7/14

Description:

Provide photographs or receipts showing roof water drainage system for irrigation. Provide calculations that show the percentage of roof water that can be captured.

Benefit:

Storm water management practice, in which captured water is reused as irrigation. Utilize rain barrels at most of the downspouts, depending on roof area. Hoses can be attached to rain barrels for regular watering. Water catchment systems are similar to rain barrels but are on a much larger scale and require significant land area. These are more suited to rural or farm locations.

Considerations

If you have rain barrels or other rainwater catchments, remember that rainwater collected from an asphalt roof is not suitable for watering food gardens.

Verification:

Provide documentation or calculations for this measure.

Visually inspect and photograph implementation of this measure.

5.7.2

Accountability Form: **General Contractor**



Vegetated or green roof is pitched 011115 ms \ 0 0 0 1 0

Description:

A slope greater than a 6/12 pitch requires additional documentation to show its ability to retain the soil and plantings in a larger than normal rainfall event. Provide building plan and photograph of installed system.

Benefit:

A slope greater than a 2/12 pitch aids in moving bulk water away from the home.

Verification:

Rater / Verifier to visually confirm this measure and take photograph(s).

5.7.3Accountability Form: **General Contractor**

Vegetated or green roof system is installed on XX% of roof area. Select One: 010215 BL 2/3/4 0 1/2/3 1/2/3 0
(20% / 50% / 90%)

Description:

Building plan showing construction method, percentage of roof area covered, and type of vegetated roof system. Provide photograph of system

Benefit:

These installations slowly filter rainwater through roof plantings and reduce heat island effect by approximately 30%. Proper engineering of the roof system must occur in order to support additional weight of the vegetated roof. Consult a structural engineer prior to construction. Proper plantings make a vegetated roof successful. In some instances, irrigation systems are installed in order to keep plants viable.

Verification:

Visually inspect and photograph implementation of this measure.

5.7.4Accountability Form: **General Contractor**

Plant a rain garden (captures XX% of roof runoff for 1/2 " rain event) Select one: 011115 ms 0 0 2/3/5 0 0
(20% / 50% / 90%)

Description:

Landscape Plan must show area and size of rain garden. Calculations must show that rain garden will hold the quantity of roof run-off for no more than 24 hours.

Benefit:

Filters pollutants, generates bio systems and prevents flooding. Many resources are available to help design and size a rain garden in order for it to work properly during a heavy rain. A landscape architect or designer can provide proper documentation and design specifications for a rain garden.

Verification:

Rater / Verifier to visually inspect and photograph implementation of this measure.



5.7.5

Accountability Form: **Landscape**



Install French drains to manage rainwater and to keep storm water onsite 011115 ms

0 0 2 0 0

Description:

Calculate the amount of water the French drain will hold and describe water source and predicted water that will come from the source (roof, sidewalk, driveway).

Benefit:

Filters pollutants, generates bio systems and prevents flooding.

Verification:

Rater / Verifier to visually conconfirm this measure and take photograph(s).

5.8 Grading/Drainage

5.8.1

Accountability Form: **General Contractor**



Patio slabs, walks and driveway shall be sloped a minimum of 1/8" per foot away from house 011115 ms
Default Value

0 0 0 1 0

Description:

Site/Landscape Plan showing construction notes.

Benefit:

Keeping water moving away from a structure will help reduce water infiltration in a foundation.

Verification:

Verifier visually confirms and photographs this measure.



5.8.2 Accountability Form: **General Contractor**



Minimum of 50% (75% over 1 acre) of lot is protected from all grading and tree clearing 011115 ms 0 0 2 0 0
 Default Value

Description:

For lots larger than 1 acre, protect 75% of the area in order to receive these points. Indicate area under protection on site plan and describe strategy on to keep area protected from grading or tree removal during construction.

Benefit:

Preserves natural landscape features and mature plantings.

Verification:

Rater / Verifier to visually confirm this measure and take photograph(s).

5.8.3 Accountability Form: **General Contractor**



Retill top twelve inches of soil after construction 011115 ms 0 0 2 0 2

Description:

Indicate the strategy on landscape plan.

Benefit:

Construction activity can leave the soil compacted. Tilling the soil provides air to the soil as well as allows it to absorb water more efficiently. New plantings will have a better chance at being established and long-term water needs are less than if the soil is not tilled.

Verification:

Rater / Verifier to visually confirm this measure and take photograph(s).

5.8.4Accountability Form: **General Contractor****Bearing capacity and soil permeability of the site are tested** 011415 ms

0 0 1 1 0

Description:

- A certified soil testing agency must take soil samples or borings to determine soil bearing capacity.
- Submit report.

Benefit:

The bearing capacity of soil is an important consideration in construction projects. Temporary support structures such as formwork for foundations must have proper support during construction. Poor soil types, and low-bearing capacity can lead to structural failure over time. Many homes situated in abandoned lake beds may require the use of pilings or helical piers if a significant addition or new foundation is to be built.

Verification:

GreenStar admin. to review and approve documentation for this measure.

5.8.5Accountability Form: **General Contractor****Re-use all site topsoil, if site disturbance occurs** 011415 ms

0 0 1 0 0

Description:**Required:**

Points are only available if the topsoil is reused in its site of origin.

Recommended:

Include this measure as a requirement on the Landscape Plan and/or in the project specifications.

Benefit:

Keeping topsoil on-site reduces the amount of embodied energy needed to bring new soil to the site. Topsoil contains valuable nutrients and should be reused whenever possible. Soil from outside the site of origin can lead to transference of undesirable plant species and insects.

Verification:

Rater / Verifier visually confirm this measure was met and take photo(s).

5.8.6Accountability Form: **General Contractor**

Land is re-graded (or terraced) to slope away from house (min. 5% slope 10 feet away from foundation walls) (minimum 6" within first 10 feet) 011415 ms

0 0 0 1 0

Description:

Required:

- The slope must be designed to enable proper drainage.
- Where there are setbacks, limit the space to less than 10' and provide swales or drains designed to carry water from foundation.

Recommended:

- Include requirements of this measure on plans and/or specifications.

Benefit:

Proper drainage coupled with gutters and downspouts can help keep moisture and water out of basements and away from foundations. Over time, the grade may lessen, requiring the addition of new topsoil to help keep water away from foundations

Verification:

Rater / Verifier visually confirms and photographs this measure.

5.8.7Accountability Form: **General Contractor**

Drainage system at base of garage and driveway that captures 90% of run-off and keeps it on-site 011415 ms

011415 ms

0 0 2 0 0

Description:

- Verify with local municipality construction requirements for integrated floor drains in a garage.
- Illustrate on garage floor plan and on site plan location and slope of floor and driveway drains.
- Drains may NOT connect to the storm sewer system. Drainage system must be designed to retain the water from an average rainfall event of ½".

Benefit:

Runoff from garage floors and driveways can contain vehicle debris and other contaminants like oil, radiator coolant, and salt. Keeping the contaminants on-site will help reduce the ability for them to enter the sewer system. Some municipalities may have strict requirements for capturing garage runoff and how it is handled once it is captured.

Verification:

Rater / Verifier visually confirm and photograph this measure.

6. Improve Existing Floor, Wall, and Roof

6.1 Prerequisites

6.1.1	Accountability Form: General Contractor	Prerequisite					
All new connecting doors between living space and attached garage must be gasketed or made substantially air-tight with weather stripping and an automatic closer							
Remodel only - 011715 ms			Default Value				

Description:

- Notes on drawings and/or specifications indicating work to be done, or product to use.
- Post-installation photo—OR—rater verification

Benefit:

Garages contain many pollutants that should be kept out of the house. Doors that close automatically and are well sealed help reduce the amount of garage pollutants that migrate into the house.

Verification:

6.1.2	Accountability Form: Rater	Prerequisite					
Wall cavities exposed during removal of existing full window units must be insulated with foam (no fiberglass allowed for this application)							
Remodel only - 011715 ms			Default Value				

Description:

Seal the space between the framing for window or door (including attic access door) Rough openings and the installed units with low-expanding spray foam sealant, closed cell foam backer rod, spray applied insulation, or other suitable sealant.

Cellulose, fiberglass, or rock wool batt insulation is not acceptable as a sealant, but can be used as a backing for a sealant (such as caulk). Thresholds for exterior doors shall be sealed to the subfloor.

Rater sign off at Pre-drywall inspection.

Benefit:

When replacing an entire window unit with a new one, walls are often partially opened, which exposes wall areas that have little or no insulation. Since proper flashing is also required in 4D -PR3, this is a good opportunity to properly insulate these areas as well. Fiberglass insulation alone is not a good air barrier and is therefore not an acceptable solution.

Verification:

Verifier visually confirms and photographs this measure.

6.1.3Accountability Form: **Rater**

Prerequisite



Isolate attached garages: Install air barrier, seal common walls, ceiling and penetrations prior to insulating. Provide gasketed, self closing door to living spaces. Remodel only- 011715 ms



Default Value

Description:

1. Breezeway/mudroom required between the garage and the home. Provide airtight, self-closing doors between breezeway and home and between breezeway and garage. Hard surface flooring (i.e., no carpet) required in breezeway. Walk-off mat required in breezeway.

2. Install air barrier, seal common walls, ceiling and penetrations prior to insulating.

3. Install ENERGY STAR rated exhaust fan in garage.

Option 1: 25 CFM continuous operation.

Option 2: 100 CFM designed to run intermittently based on motion sensor.

Exceptions

Existing attached garages may remain. Homes with an attached garage that is converted to living space, may build a new attached garage provided it meets the requirements. Building a new detached garage also allowed.

Benefit:

Many of the compounds in and around garages are known carcinogens. Attached garages represent a major source of pollutants that can easily make their way into the house. The above measures help to minimize the risk as much as possible.

Tip: Consider building a detached garage to completely eliminate the risk of garage pollutants from entering the house.

Verification:

Verifier visually confirms and photographs this measure.

6.2 Improve Existing Foundations, Crawlspace, & Slabs

6.2.1

Accountability Form: **General Contractor**

Prerequisite



Install radon mitigation system if finishing an unfinished basement. Remodel only 011315 ms

Default Value



Description:

- Perform test after installation of system using qualified test kit. Both a 48-hour test and a 90-day test are acceptable.
- Levels must be below 4 picocuries.
- Supply homeowner with a copy of the test results.

Benefit:

Installing a radon system, regardless of level of picocuries, is critical to the long-term health of the occupants. Installing a radon system after a basement is finished is much more costly than installing one prior to finishing the space.

Resources

Protecting Your Home From Radon: A Step-By-Step Manual for Radon Reduction, Second Edition

Colorado Vintage Companies, Inc.

525 East Fountain Boulevard, Suite 201

Colorado Springs, CO 80903

Phone: (719) 632-1215 Fax: (719) 632-9607

www.coloradvintage.com

Verification:

Rater / Verifier to visually confirm this measure was installed & it is running.

6.2.2



Frame perimeter wall with steel studs Remodel only - 081414 MF

0 1 0 2 0

Description:

Notes on drawings and/or specifications describing work to be done and/or materials to use.

Pre-drywall photo of framing—OR—rater verification

Benefit:

If moisture and temperature conditions are ever right for mold growth, steel studs will not supply food source that mold needs like wood does. Steel studs typically have 25% of post-consumer recycled steel, and it is nearly infinitely recyclable again when it is removed from the house.

Verification:

Visually inspect and photograph implementation of this measure.

6.2.3



Document the condition of the air sealing, vapor retarder and insulation at rim joist. Improve any areas that do not have proper air seal, vapor retarder and/or min. R19 insulation as necessary. (Rim joist that do not need improvement also qualify). Remodel only - 081414 MF

4 2 0 1 0

Description:

Document existing rim joist conditions. (Note: This may already be happening as a part of measure 1B-1, if that was selected.) Improve existing conditions if necessary.

If rim joist area will eventually be covered with finish material, then pre-drywall photo—OR—rater verification

If rim joist area will be left open, then post-construction photo—OR—rater verification

Benefit:

Proper air sealing, vapor management and insulation contribute greatly to high energy efficiency, durability, and comfort

Verification:

Verifier visually confirms and photographs this measure.

6.2.4



Improvement to foundation wall insulation and air sealing. (Bulk water and water vapor must be addressed) Select all that apply: Remodel only - 081414 MF

(Air seal basement walls and insulate concrete walls / Use spray foam to air seal and insulate basement walls / Both options were applied)

Description:

Option 1: Air seal basement walls and insulate concrete walls to R-10 or better and framed walls to R-13 or better. If concrete wall is insulated, framed wall to inside of it can be without insulation.

Option 2: Use spray foam to air seal and insulate basement walls

Document conditions of existing foundation.

Note: This may already be happening as a result of measure 1B-1, if it was selected.)

1. Existing bulk water control system
2. Existing water vapor control system
3. Existing drying potential
4. Existing Insulation
5. Existing air barrier
6. Condition of studs, finish material, trim or any other part of an assembly that may be pre-existing.

If mold, moisture, or decay is discovered, determine cause if possible and eliminate it. Remove the damaged material and dispose of properly. Re-frame the section adding a capillary break and hold the studs a minimum 1" from the basement wall. If no framing exists follow steps for basement finishing that is explained in the prerequisites

Provide notes on plan and/or specifications indicating materials to be used and work to be done.

Perform construction work.

Pre-drywall photo—OR—rater verification

Benefit:

Making improvements to existing foundation walls can improve the energy efficiency, durability and comfort of a house. Many foundation walls in existing homes are not insulated on either the exterior or the interior. Obviously, adding a proper air seal and insulation system would help boost energy efficiency. Many other foundation walls in existing homes have been air sealed and insulated in a poor way, and this credit gives incentive to improve them as well.

Considerations

Extreme caution must be taken when making improvements to foundation walls.

Verification:

Verifier visually confirms and photographs this measure.



6.2.5



No carpet installed in basement

0 3 0 1 0

Description:

Benefit:

It can be safe to install carpet on a limited number of basement floor assemblies, but as a rule of thumb, it is better to just avoid it all together. This credit gives incentive to choose a different floor material other than carpet.

Considerations

Carpet can hold moisture, dust, allergens, and mold. Carpet is not a durable or long lasting material.

Verification:

Verifier visually confirms and photographs this measure.

6.2.6



Improvements to air barrier spans cantilever and any exposed edges of insulation of any cantilevered floor Remodel only - 081414 MF

2 0 0 0 0

Description:

Document conditions of existing air barrier and insulation at cantilever location. Provide notes on plan and/or specifications indicating materials to be used and work to be done. For floors with conditioned area over unconditioned open areas, air seal the floor joist cavity with sheet material or blocking and sealant above the top plate of the supporting wall and insulate to a minimum of R38, either with batt insulation between floor joists or with a combination of joist insulation and insulated sheathing on underside of floor joist.

Perform construction work.

Post-construction photo—OR—rater verification

Benefit:

Where cantilevering floor joist pass over the bearing wall below, they often do not have proper air sealing and insulation in the joist cavities.

Verification:

Verifier visually confirms and photographs this measure.



6.2.7



Use reclaimed materials on foundation improvements. (i.e. brick for exterior of foundation and block for foundation). Minimum 50% of all material used. Remodel only - 081414 MF

0 0 0 3 0

Description:

- Provide notes on plan and/or specifications indicating materials to be used and work to be done.
- Perform construction work.
- Post-construction photo—OR—rater verification

Benefit:

Reusing existing materials is a very material efficient approach to home construction and remodeling.

Considerations

Care must be taken to ensure that reclaimed materials are still structurally sound.

Verification:

Verifier visually confirms and photographs this measure.

6.2.8



Improve existing garage slab and slope garage floor toward main vehicle doorway, or integrated floor drains, minimum 1/8" per foot. If existing slab qualifies, credit is received. Remodel only - 081414 MF

0 0 0 1 0

Default Value

Description:

Garage floor plan must have construction notes stating slope and direction of drainage. Floor drains may not connect to the storm sewer system.

Rater verification

Benefit:

Improper drainage can lead to undesirable standing water inside the garage and potential rotting of wall studs.

Verification:

Verifier visually confirms and photographs this measure.



6.2.9

Accountability Form: **General Contractor**



Leave minimum 1 inch gap between wall framing and foundation wall Remodel only - 011315 ms

1 1 0 1 0

Description:

Notes on drawings and/or specifications describing work to be done.

Benefit:

Depending on the assembly you select for finishing the basement, this gap can serve different purposes. It may be used as an air gap to allow for air to circulate and help moisture evaporate. It may provide a thermal break and moisture break between masonry and framing materials.

Considerations

This should be coupled with a holistic approach to addressing bulk water and water vapor in the foundation wall assembly.

Verification:

Visually inspect and photograph implementation of this measure.

6.3 Improve existing unconditioned crawlspace

6.3.1



Install: 1. Air and vapor barrier under sheathing of floor above. 2. R-25 Insulation between joists. 3. Continuous R5 rigid insulation under joists. 4. weather-resistant sheathing (air sealing must include all plumbing, electrical, and HVAC penetrations plus any chases) Remodel only - 081414 MF

2 0 0 0 0

Description:

1. Air and vapor barrier under floor sheathing
2. R-25 Insulation between joists.
3. Continuous R5 rigid insulation under joists.
4. Weather-resistant sheathing as final protection layer (air sealing must include all plumbing electrical, and HVAC penetrations plus any chases)

Benefit:

Verification:

6.3.2



Openings between conditioned basement or crawlspace and unconditioned crawlspace are sealed with solid blocking and any remaining gaps are sealed with caulk or foam ---OR--- no such openings exist Remodel only - 081414 MF

2 0 0 0 0

Description:

Photo of sealed openings. Take photo once the openings are sealed, but before they become difficult to see. (i.e. before drywall)

If no such opening exist, note this in the Comments Colu of the checklist.

Benefit:

Verification:

Visually inspect and photograph implementation of this measure.

6.4 Condition an unconditioned crawlspace

6.4.1



Air seal crawlspace walls and insulate to R-10 or better without creating vapor trap. Note: If foundation cannot dry to exterior above grade through minimum of 16" of exposed foundation and/or rim joist area is not separated from foundation by a capillary break, then insulation and air seal must be vapor permeable. Install thermal barrier to protect insulation as required by code.

2 0 0 0 0

Remodel only - 081414 MF

Description:

Air seal crawl space walls and insulate to R-10 or better without creating vapor trap.

Note: If foundation cannot dry to exterior above grade through minimum of 16" of exposed foundation and/or rim joist area is not separated from foundation by a capillary break, then insulation and air seal must be vapor permeable. Install thermal barrier to protect insulation as required by code.

Benefit:

Conditioning an unconditioned crawl space can improve the energy efficiency, durability and comfort of a house. A (concrete) foundation wall that has a VAPOR TRAP is defined here as one that does not have adequate drying potential to either the interior or the exterior for the wall to substantially dry out if it gets wet. When insulating a basement foundation wall on the interior, the concern is that:

IF there is no capillary break that prevents moisture from migrating up into the rim joist area (highly unlikely that any such material exists in a home more than 10 years old),

IF the rim joist area does not have drying potential (very possible if the rim joist was air sealed and insulated to the interior and/or exterior),

THEN adding any material to the inside surface of the foundation wall that prevents drying to the interior, could dangerously increase the vapor drive within the foundation wall itself to push moisture up into the rim joist assembly and the wall above it. This could result in mold and durability problems in those assemblies above the foundation.

Since concrete wicks water very well, a capillary break between the top of the foundation wall and the rim joist / floor assembly, that is connected to an interior vapor retarder, would be the ideal material in the whole assembly to ensure moisture does not enter the wood assemblies above the foundation, from the foundation. Unfortunately, it is very difficult to install a capillary break on an existing house without lifting the whole house off of the foundation.

It should not be a problem to prevent crawl space walls from drying to the interior if the foundation has an opportunity to dry to the exterior above grade and/or the rim joist area is separated from the foundation by a Class 1 vapor barrier / capillary break. The reality is that even if a foundation cannot dry to the exterior below ground due to waterproofing or wet soil, moisture should be able to dry to the exterior between the top of the ground and the top of the foundation. This should prevent excessive moisture from migrating up into the wood rim joist area. On the other hand, if the rim joist area is protected by a class 2 (1 perm or less) or class 1 (0.1 perm or less) vapor retarder the rim joist area will also be protected regardless of the ability of the wall to dry to the interior or exterior.\

On older homes, it is unlikely that there will be a vapor barrier between the foundation and the rim joist area, but typically there is anywhere from 16" to 24" of exposed foundation between the top of the ground and the bottom of the rim joist, which allows them to dry to the exterior even if drying is not allowed to the interior.

If mold develops between the insulation and the foundation wall, the air and vapor barrier should prevent it from contaminating the indoor environment. Since spray foam eliminates any air space between the insulation and the foundation wall, it is particularly well suited to for this application. On the other hand it may be more difficult to apply a thermal barrier to spray foam without adding wall framing, as compared to foil faced insulation, which typically does not require any additional thermal barrier. Intumescent paint may be an option to protect closed cell spray foam in this situation, however it is usually expensive. Be sure to consult with a building code official for approval before using intumescent paint.



Verification:

Visually inspect and photograph implementation of this measure.

6.4.2



Use spray foam to air seal and insulate crawlspace walls. Note: If foundation cannot dry to exterior above grade through minimum of 16" of exposed foundation and/or rim joist area is not separated from foundation by a capillary break, then closed cell foam insulation CANNOT exceed the thickness that would reduce its vapor permeability to 1 perm or less. Remodel only - 081414 MF

2 0 0 0 0

Description:

Note: If foundation cannot dry to exterior above grade through minimum of 16" of exposed foundation and/or rim joist area is not separated from foundation by a capillary break, then closed cell foam insulation CANNOT exceed the thickness that would reduce its vapor permeability to 1 perm or less.

Benefit:

Conditioning an unconditioned crawl space can improve the energy efficiency, durability and comfort of a house. A (concrete) foundation wall that has a VAPOR TRAP is defined here as one that does not have adequate drying potential to either the interior or the exterior for the wall to substantially dry out if it gets wet. When insulating a basement foundation wall on the interior, the concern is that:

IF there is no capillary break that prevents moisture from migrating up into the rim joist area (highly unlikely that any such material exists in a home more than 10 years old),

IF the rim joist area does not have drying potential (very possible if the rim joist was air sealed and insulated to the interior and/or exterior),

THEN adding any material to the inside surface of the foundation wall that prevents drying to the interior, could dangerously increase the vapor drive within the foundation wall itself to push moisture up into the rim joist assembly and the wall above it. This could result in mold and durability problems in those assemblies above the foundation.

Since concrete wicks water very well, a capillary break between the top of the foundation wall and the rim joist / floor assembly, that is connected to an interior vapor retarder, would be the ideal material in the whole assembly to ensure moisture does not enter the wood assemblies above the foundation, from the foundation. Unfortunately, it is very difficult to install a capillary break on an existing house without lifting the whole house off of the foundation.

It should not be a problem to prevent crawl space walls from drying to the interior if the foundation has an opportunity to dry to the exterior above grade and/or the rim joist area is separated from the foundation by a Class 1 vapor barrier / capillary break. The reality is that even if a foundation cannot dry to the exterior below ground due to waterproofing or wet soil, moisture should be able to dry to the exterior between the top of the ground and the top of the foundation. This should prevent excessive moisture from migrating up into the wood rim joist area. On the other hand, if the rim joist area is protected by a class 2 (1 perm or less) or class 1 (0.1 perm or less) vapor retarder the rim joist area will also be protected regardless of the ability of the wall to dry to the interior or exterior.\

On older homes, it is unlikely that there will be a vapor barrier between the foundation and the rim joist area, but typically there is anywhere from 16" to 24" of exposed foundation between the top of the ground and the bottom of the rim joist, which allows them to dry to the exterior even if drying is not allowed to the interior.

If mold develops between the insulation and the foundation wall, the air and vapor barrier should prevent it from contaminating the indoor environment. Since spray foam eliminates any air space between the insulation and the foundation wall, it is particularly well suited to for this application. On the other hand it may be more difficult to apply a thermal barrier to spray foam without adding wall framing, as compared to foil faced insulation, which typically does not require any additional thermal barrier. Intumescent paint may be an option to protect closed cell spray foam in this situation, however it is usually expensive. Be sure to consult with a building code official for approval before using intumescent paint.

Verification:

Visually inspect and photograph implementation of this measure.

6.4.3



Install crawl space ventilation system. Crawl space is provided with conditioned supply air at a rate not less than 0.02 cfm per square foot of horizontal area. Appropriately sized exhaust opening to other interior space required to prevent over 3 pascals of pressurization. Remodel only - 081414 MF

0 0 0 1 0

Description:

Install crawl space ventilation system. Crawl space is provided with conditioned supply air at a rate not less than 0.02 cfm per square foot of horizontal area. Appropriately sized exhaust opening to other interior space is required to prevent over 3 pascals of pressurization.

Benefit:

It is appropriate to ventilate the crawl space intermittently with air from the forced air HVAC system OR by installing a dedicated fan that circulates air between the crawl space and the basement and/or the crawl space and the living space above. Fans are very efficient today and there would NOT be a significant energy penalty to have one running to improve the crawl space air quality.

It would not be advisable to allow crawl space air to mix with the basement or house air UNLESS the crawl space has a slab and/or vapor barrier on the floor along with sealed and insulated walls. A crawl space that is not sealed in this way would be too susceptible to producing mold, which could contaminate the air that the occupants would eventually breathe.

If it is too difficult to seal the crawl space floor and walls adequately to make the crawl space air suitable to mix with house air, an alternative approach is to install a crawl space depressurization system, which incorporates the crawl space ventilation into the exhaust side of the whole house fresh air ventilation system. It can consist of the following:

1. Install passive openings in the floor above the crawl space to allow air to move from the living space into the crawl space.
2. Install continuously running exhaust fan in the crawl space—OR—install continuously running ERV or HRV in the crawl space, which draws air from the crawl space and exhausts to the exterior.

Note: If installing an ERV or HRV, the fresh air supply cannot be allowed to empty into the crawl space.

By drawing air out of the crawl space, the crawl space undergoes continuous air exchange, which will prevent the build up of unhealthy gasses and moisture in the crawl space, yet crawl space air is never allowed to enter the living areas of the house.

Builders Guide To Cold Climates, by Lstiburek, describes this system well.

Verification:

Provide documentation or calculations for this measure.

6.4.4



Install hydronic heat supply to crawl space (i.e. fin tube, etc.) Remodel only - 081414 MF

0 0 0 1 0

Description:

Seal any openings and passive vents to exterior in crawl space. Install Class 2 Vapor Retarder (1 perm or less) on top crawl space floor surface (assumed to be sand, or gravel). Allow foundation wall to breathe to interior. Prevents bulk water, water vapor and other soil gasses from entering living space or interior finish systems.

Provides capillary break and drainage medium for water, water vapor and other gasses. A minimum 4" deep gravel bed shall be installed beneath all concrete floor slabs. If plastic vapor barrier is installed, plastic must be on top of gravel. Air seal all seams including the seam between the vapor barrier and the foundation. Mastic is required for sealing because tape will fail over time.

Benefit:

Verification:

Verifier visually confirms and photographs this measure.

6.5 Install or improve bulk water drain system.

6.5.1



Install exterior system such as waterproofing, drain board or sheeting, insulation, perimeter drain tile (or similar), etc. Remodel only - 081414 MF

5 1 0 5 0

Description:

Document conditions of existing bulk water drain system for foundation. Provide notes on plan and/or specifications indicating materials to be used and work to be done. Perform construction work.

Post-construction photo—OR—rater verification

Benefit:

The need for proper bulk water management cannot be emphasized enough.

Considerations

Major damage can occur if bulk water leaks into a basement.

Verification:

Verifier visually confirms and photographs this measure.

Visually inspect and photograph implementation of this measure.

6.5.2



Install interior sub-slab perimeter dain tile system with sealed sump basket & integrated dimpled drainage sheeting @ bottom of wall & floor slab edge. Air seal all edges & seams. Remodel only - 081414 MF

0 0 0 4 0

Description:

Document conditions of existing bulk water drain system for foundation.

Provide notes on plan and/or specifications indicating materials to be used and work to be done.

Perform construction work.

Post-construction photo—OR—rater verification

Benefit:

The need for proper bulk water management cannot be emphasized enough.

Verification:

Verifier visually confirms and photographs this measure.

6.5.3



Install interior dimpled drainage sheeting to top of exterior grade min. Air seal all edges & seams. Remodel only - 081414 MF

0 1 0 1 0

Description:

Document conditions of existing bulk water drain system for foundation.

Provide notes on plan and/or specifications indicating materials to be used and work to be done.

Perform construction work.

Post-construction photo—OR—rater verification

Benefit:

The need for proper bulk water management cannot be emphasized enough.

Regardless of what bulk water management system is installed on the exterior (usually none on older homes) installing one on the interior is a safe approach.

Verification:

Verifier visually confirms and photographs this measure.

6.5.4



Integrate soil gas (a.k.a. radon) vent pipe with interior sub-slab drain tile Remodel only - 081414 MF

0 1 0 1 0

Description:

Document conditions of existing bulk water drain system for foundation.

Provide notes on plan and/or specifications indicating materials to be used and work to be done.

Perform construction work.

Post-construction photo—OR—rater verification

Benefit:

Attaching the soil gas (a.k.a. radon) vent pipe to the sub-slab drain tile improves its effectiveness in removing radon and moisture.

Considerations

Major damage can occur if bulk water leaks into a basement.

Verification:

Verifier visually confirms and photographs this measure.

6.5.5



Install rigid insulation at slab edge & under slab where interior sub-slab drain tile was installed.

2 0 0 0 0

Remodel only - 081414 MF

Default Value

Description:

Document conditions of existing bulk water drain system for foundation.

Provide notes on plan and/or specifications indicating materials to be used and work to be done.

Perform construction work.

Post-construction photo—OR—rater verification

Benefit:

Concrete floor slabs lose a higher proportion of heat through their edges. When the slab edge is opened up to install a drain tile, it is also a great opportunity to install insulation at this part of the slab.

Verification:

Verifier visually confirms and photographs this measure.



6.6 Improve Exist'g AG Walls, Ceilings & Framed Flrs

6.6.1



If existing common wall between an attached garage and the home does not have finish material on it, finish material must be added and properly sealed at perimeter & penetrations. Remodel only - 081414 MF (PREREQ) Default Value

0 0 0 0 0

Description:

- Provide notes on plan or specifications stating work to be done.
- Perform air sealing work.
- Pre-wall finish photo

Benefit:

If a common wall between the garage and home was not previously sealed or covered the space is not code compliant, and must be brought up to minimum standards. For the project to be considered Green, additional measures (air sealing) must be taken.

Verification:

Visually inspect and photograph implementation of this measure.

6.6.2



Common walls and ceiling between an attached garage and living space are completely air sealed before insulation is installed. Existing detached garage qualifies. Remodel only - 081414 MF

1 2 0 0 0

Description:

Provide notes on plan or specifications stating work to be done. Seal all penetrations through drywall in attached garage. Block and seal band area between joists above interior garage partition walls.

Post-construction photo—OR—rater verification

Benefit:

Air sealing is an effective way to keeping pollutants from entering the house from the garage.

Verification:

6.6.3



Add insulation to closed wall cavities that have less than 1-1/2" of insulation. (minimum of 50% of uninsulated walls must be insulated to R-11 or better). Gasket and caulk joints. Blower door test with infrared scan to check for voids. Remodel only - 081414 MF

2 0 0 0 0

Description:

- Document existing conditions.
- Provide notes on plan and/or specifications indicating materials to be used and work to be done.
- Perform construction work.
- Results from post-construction Blower Door Test and infrared scan.

Benefit:

Good wall insulation improves energy efficiency, durability and comfort.

Verification:

Provide documentation or calculations for this measure.

6.6.4



Use foam to insulate uninsulated wall cavities where wall framing is not exposed (minimum of 50% of uninsulated walls must be insulated to R-11 or better). Blower door test with infrared scan to check for voids. Remodel only - 081414 MF

3 0 0 2 0

Description:

- Document existing conditions.
- Provide notes on plan and/or specifications indicating materials to be used and work to be done.
- Perform construction work.
- Results from post-construction Blower Door Test and infrared scan.

Benefit:

Good wall insulation improves energy efficiency, durability and comfort.

Verification:

Provide documentation or calculations for this measure.

6.6.5



Air seal and insulate all wall cavities where wall framing is exposed. (2x4 walls = min. R13) (2x6 walls = min R21) Remodel only - 081414 MF 3 0 0 0 0

Description:

Provide notes on plan and/or specifications indicating materials to be used and work to be done. Must include plate penetrations, sheathing seams and penetrations, and the gap between sheathing and plate (include condensation lines, electrical outlets and locations with broken or missing sheathing using sheathing and a proper sealant).

Pre-drywall photo—OR—rater verification

Benefit:

Good wall insulation improves energy efficiency, durability and comfort.

Verification:

Verifier visually confirms and photographs this measure.

6.6.6



Expose, air seal (including top and bottom plate), and insulate walls adjacent to shower/tub Remodel 1 1 0 1 0
only - 081414 MF Default Value

Description:

Provide notes on plan and/or specifications indicating materials to be used and work to be done.

Perform this measure when remodeling an existing bathroom, or installing a new bathroom in a room not previously used as a bathroom.

Air seal all holes in the floor assembly for plumbing wiring, ductwork and other purposes connecting conditioned and unconditioned (and exterior) areas.

- Insulate cold water pipes to moisture condensation. Avoid locating plumbing in exterior walls.
- Insulate all water pipes in climates and building conditions susceptible to freezing temperatures and Conditions. Avoid locating plumbing in exterior walls.
- Air seal penetrations for flues and other heat-producing items with noncombustible sheet materials and high temperature sealant.
- See Section 7, Water – Plumbing, Systems and Fixtures for additional plumbing pipe insulation requirements.
- Pre-drywall photo—OR—rater verification

Benefit:

Around tubs and showers, it is common to see gaps in insulation and air barriers.

Verification:

Verifier visually confirms and photographs this measure.

6.6.7



Penetrations through insulated ceilings are sealed Remodel only - 081414 MF

Default Value 1 0 0 0 0

Description:

All penetrations through insulated ceilings shall be sealed with a proper sealant including HVAC boots, bathroom fans, light fixtures, security, and audio speakers.

- Provide notes on plan and/or specifications indicating materials to be used and work to be done.
- Post-construction photo—OR—rater verification

Benefit:

These penetrations are also commonly known as Attic By-Passes.

Verification:

Verifier visually confirms and photographs this measure.

6.6.8



Improve existing walls between house & attached garage by sealing all seams, edges, & penetrations of the wall finish material from the garage side Remodel only - 081414 MF

1 1 0 0 0

Description:

- All edges and joints of the wall finish material must be sealed to obtain this credit. Thus if a ceiling exists in garage, sealant must be applied to the joint on the top-side of the ceiling finish material where it meets the wall top plate.
- Seal all penetrations (such as plumbing or electrical lines) in the connecting wall between an attached garage and house with caulk, spray foam, gasket or construction adhesive to prevent air movement.
- Walls with existing finish material on them can qualify without removing the finish material if photo documentation is provided to show that existing sealing is well done or to show newly added sealant.
- Walls that currently do not have finish material on them must have new finish material added AND that finish material must be sealed at the perimeter, penetrations, etc.
- Post-construction photo

Benefit:

Very important to keep garage pollutants out of the house.

Verification:

Visually inspect and photograph implementation of this measure.

6.6.9

Air seal and insulate floor above garage, ensuring there are no exposed edges Remodel only - 081414 MF 1 1 0 0 0

Description:

Provide notes on plan and/or specifications indicating materials to be used and work to be done.

Pre-drywall photo—OR—rater verification

Benefit:

Very important to keep garage pollutants out of the house.

Verification:

Verifier visually confirms and photographs this measure.

6.6.10

Air seal penetrations and joints in existing fireplace framing Remodel only - 081414 MF Default Value 1 1 0 0 0

Description:

- Identify and document existing air leaks with pre-construction blower door test with infrared scan (Note: This may already be happening as a result of measure 1B-1, if it was selected.)

- Perform air sealing work.

- Post-construction Photo—OR—rater verification

Benefit:

Gaps are common in the insulation and air seal at areas built-out for fireplaces.

Verification:

Verifier visually confirms and photographs this measure.

6.6.11 Accountability Form: **General Contractor**



Provide flashing at the bottom of all wall cladding. Includes weeps & weep screed for masonry veneer, stucco, thin stone veneer, etc. Remodel only - 011715 ms

0 0 0 2 0

Description:

Document existing conditions.

Provide notes on plan and/or specifications indicating materials to be used and work to be done.

Post-construction photo—OR—rater verification

Exceptions

If wall cladding is outside of exterior plane of foundation, and projects down minimum 1" from the top of the foundation, then project qualifies for this credit without flashing.

Benefit:

Flashing at the bottom of the wall cladding helps to prevent water from creeping into the wall assembly at that location.

Verification:

Verifier visually confirms and photographs this measure.

6.6.12 Accountability Form: **General Contractor**



Provide rodent and corrosion proof screens (e.g., copper or stainless steel mesh) for all openings that cannot be fully sealed and caulked (e.g., vents) Remodel only - 011715 ms

0 0 0 2 0

Description:

Document existing conditions.

Provide notes on plan and/or specifications indicating materials to be used and work to be done.

Post-construction photo—OR—rater verification

Benefit:

Certain openings on the exterior must remain to allow proper venting of wall assemblies, roof assemblies, mechanical systems, etc. Protecting these with screens is necessary to keep insects and rodents from compromising how these systems work.

Considerations

Special care must be taken to ensure that enough airflow still remains even with the screen in place. While screens are very important, they do actually reduce airflow a certain amount depending on their size and density. Be sure to comply with manufacturer instructions for mechanical equipment vents.

Verification:

Verifier visually confirms and photographs this measure.



6.6.13	Accountability Form: General Contractor					
Replace damaged exterior cladding (minimum 3 sides) with cladding with minimum 40 year warranty. Remodel only - 011715 es		1	0	0	1	0

Description:

- Document existing conditions
- Provide notes on Plan and/or specifications indicating materials to be used and work to be done.
- A minimum of three sides of exterior wall cladding shall have a 40-year manufacturer's warranty or be a durable natural material such as masonry stucco, stone, brick or most fiber cement siding.
- Warranty documentation must be provided to the homebuyer.
- Cultured stone does not qualify.
- Post-construction photo—OR—rater verification

Benefit:

If existing exterior cladding is in poor condition, it is best to replace it with a material that is very durable. The material warranty is a good indication of the durability of it, and longer warranties are encouraged.

Verification:

Verifier visually confirms and photographs this measure.

6.6.14	Accountability Form: Insulation Contractor					
Existing cavity insulation between studs in exterior walls is GREATER than R19 or it is brought up to this level. Remodel only - 011715 es	Default Value	2	0	0	0	0

Description:

- Document existing conditions.
- Provide notes on plan and/or specifications indicating materials to be used and work to be done.
- Pre-drywall photo—OR—rater verification

Benefit:

Having more than R19 in wall cavities improves energy efficiency, and comfort.

Verification:

Verifier visually confirms and photographs this measure.

6.6.15Accountability Form: **General Contractor****Install fiberglass-coated (paper-less) gypsum board** Remodel only - 011715 es

0 0 0 2 0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Manufacturer documentation of product specifications.

Pre-painting (or other surface coating)—OR—rater verification.

Benefit:

Fiberglass-faced gypsum board does not support mold growth like paper-faced gypsum board does. The paper that is used on most gypsum board is an excellent food source for mold when moisture and temperature Conditions are right. Eliminating that food source is one way to reduce the risk of mold growth in the home.

Considerations

Users should become familiar with fiberglass-faced gypsum board and use personal safety protecting when working with it. The texture is different from paper-faced gypsum board, which makes the finishing process different. Also, when cutting and installing small pieces of the coating can become airborne. This can irritate the eyes, skin and respiratory system if personal safety protection is not used.

Verification:

Verifier visually confirms and photographs this measure.

6.6.16	Accountability Form: General Contractor					
Install Magnesium Oxide board (a.k.a. MgO Board) Remodel only - 011715 es		0	1	0	3	0

Description:

- Notes on plans or specifications indicating material to be used and/or work to be done.
- Manufacturer documentation of product specifications.
- Photo before painting or other surface coating is applied

Benefit:

Magnesium is a mold inhibitor, and therefore magnesium board does not support mold growth like traditional paper-faced gypsum does. MgO is a type of sheathing board—sort of like drywall or cement board—but with much-improved characteristics such as fire resistance, weather-ability, strength, resistance to mold and mildew. The surface is smooth so traditional finishing methods are mostly the same. Concerns about delamination or small fibers becoming air borne do not exist as they do with some other fiber-cement and fiberglass gypsum products respectively. When and if MgO board is mined and produced locally, it may qualify for Resource Efficiency points.

Considerations

Currently most MgO board is manufactured in Asia and is imported to the U.S.

Verification:

Provide documentation or calculations for this measure.

6.6.17	Accountability Form: General Contractor					
Gypsum wallboard (GWB) is min. 1/2 inch from concrete slabs. (Applies to existing GWB on existing walls, or new GWB on existing walls.) Remodel only - 011715 es		0	0	0	1	0

Description:

- Notes on plans or specifications indicating material to be used and/or work to be done.
- Pre-base board installation photo—OR—rater verification
- The absence of GWB or smaller material in this condition does not allow access to this credit.

Benefit:

Preventing GWB from being in contact with concrete, helps eliminate any chance that it will wick up moisture from the concrete.

Verification:

Verifier visually confirms and photographs this measure.

6.6.18 Accountability Form: **General Contractor**     

Seal all wall gypsum wallboard penetrations in exterior walls using caulk, gaskets or appropriate connection with gypsum board. Remodel only - 011715 es

1 1 0 1 0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Post-sealing photo—OR—rater verification

Benefit:

Air sealing is very important to improving energy efficiency, durability, and comfort.

Verification:

Verifier visually confirms and photographs this measure.

6.6.19 Accountability Form: **General Contractor**     

Seal top plate to drywall with gasket or glue Remodel only - 011715 es

1 1 0 1 0

Description:

- Seal drywall to top plate on ceilings separating attic from conditioned space.
- Notes on plans or specifications indicating material to be used and/or work to be done.
- Mid-Installation photo—OR—rater verification

Benefit:

Air sealing is very important to improving energy efficiency, durability, and comfort.

Verification:

Verifier visually confirms and photographs this measure.

6.7 Walls w/advanced siding materials/techniques

6.7.1



Install continuous drainage plane fully sealed at all penetrations that directs water away from

home Remodel only - 081414 MF

0 0 0 1 0
Default Value

Description:

- Install continuous drainage plane fully sealed at all penetrations that directs water away from home.
- No cedar or similar siding in direct contact with fiberglass-type drainage plane. Install vertical "sleepers" or use drainage plane appropriate for wood siding.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

Verification:

Verifier visually confirms and photographs this measure.

6.7.2



Vented rain screen installed over sealed drain plane. Possible for all types of siding EXCEPT stucco. Properly installed new or existing stucco qualifies for this credit. Remodel only - 081414 MF

0 0 0 2 0

Description:

- For a minimum of 80% of exterior wall area, apply rain screen between sealed drainage plane and exterior cladding to allow water and moisture to escape, and have an air space between the exterior cladding and wall sheathing.
- Integrate the system with flashing. Also design and install to minimize moisture migration between the exterior cladding and the wall sheathing.
- Rain screen requires air vent at bottom and top.
- Pre-siding photo—OR—rater verification

Exceptions

This system should NOT be used with stucco siding.

Benefit:

A vented rain screen behind the siding helps improve the durability of the siding and the rest of the wall assembly. A vented rain screen is a very effective way to prevent bulk water from entering the wall assembly from the exterior, and it improves the wall's ability to dry to the exterior, when and if it does get wet somehow.

Stucco cannot be installed with the rain screen space behind it, as the stucco will just fill that space up during installation and water can drain through the stucco. However, stucco is a very durable siding material. If it is installed properly with a drainage plane system, as it should be, it is effectively very similar to the vented rain screen, and therefore also qualifies for this credit.

Considerations

Mixed cladding systems require that there be both flashing and venting at the transition if the lower system is stucco. Air vents are critical to the proper performance of this system. Subcontractor education and homeowner education to ensure that the vents are not filled is very important. Screens must be installed at all vent locations to reduce the opportunity for pest infiltration.

Verification:

Verifier visually confirms and photographs this measure.

6.7.3



Siding and trim are back-primed on all sides Remodel only - 081414 MF

Default Value 0 0 0 1 0

Description:

If manufacturer of siding or trim specifically prohibits back priming, then it should not be done.

Benefit:

Back-priming siding on all sides helps increase the life of the siding. It also helps prevent moisture from entering the siding material and causing finishes to blister off prematurely.

Verification:

Verifier visually confirms and photographs this measure.

6.7.4



Fiber-cement or wood composite siding installed (min. 50% of siding used) Remodel only - 081414 MF

0 0 0 1 0

Description:

Benefit:

Verification:

Provide documentation or calculations for this measure.

6.7.5



Steel siding with ENERGY STAR coating and long-life factory finish Remodel only - 081414 MF

0 0 0 1 0

Description:

Benefit:

Verification:

Provide documentation or calculations for this measure.

6.7.6

Exposed wood is kept at least 12 inches from soil Remodel only - 081414 MF

0 0 0 1 0

Description:

- Maintain 12" minimum space from bottom of wood or other absorptive material to grade.
- Document with photos of all sides of the house. Recommend showing 12" ruler in photo.

Benefit:

Keeping exposed wood and other materials that readily absorb water away from soil improves their durability its finishes. Reduces need for maintenance.

Verification:

Visually inspect and photograph implementation of this measure.

6.7.7

Use reclaimed brick (for exterior wall covering) and block (for foundation) Remodel only - 081414 MF

0 0 0 3 0

Description:**Benefit:**

Brick is a very durable product, and using reclaimed brick is great for the environment.

Verification:

Provide documentation or calculations for this measure.

6.7.8

Install traditional three-coat stucco Remodel only - 081414 MF

Default Value 0 0 0 2 0

Description:

Photo of lathe, photo of brown coat, photo of finished exterior.

Benefit:**Verification:**

Provide documentation or calculations for this measure.

6.8 Advanced Insulation Materials & Strategies

6.8.1

Accountability Form: **Insulation Contractor**



Insulation with min 20% recycled content is used for at least 50% of applications Remodel only - 0 0 1 1 0
011715 es

Description:

- Recycled content must be certified by Scientific Certification Systems (SCS) or the manufacturer. SCS is on the web at www.scs1.com.
- Provide manufacturer documentation regarding the specifications, recycled content, etc., of the insulation being installed.
- Provide FTC Fact Sheet for insulation material.
- Pre-drywall photo—OR—rater verification

Benefit:

Products that utilize reused, reclaimed or recycled raw materials instead of virgin raw materials are better for the environment and encouraged.

Verification:

Verifier visually confirms and photographs this measure.

6.8.2

Accountability Form: **Insulation Contractor**



"All-Natural" insulation, such as cotton batt, is used for at least 50% of applications Remodel only - 0 1 1 0 0
011715 es

Description:

- Recycled content must be certified by Scientific Certification Systems (SCS) or the manufacturer. SCS is on the web at www.scs1.com.
- Provide manufacturer documentation regarding the specifications, recycled content, etc., of the insulation being installed.
- Provide FTC Fact Sheet for insulation material.
- Pre-drywall photo—OR—rater verification

Benefit:

Products that utilize natural materials and are from a renewable plant source are better for the environment and encouraged.

Verification:

Verifier visually confirms and photographs this measure.

6.8.3Accountability Form: **Insulation Contractor****Spray foam insulation applied in stud cavities** Remodel only - 011715 es

Default Value 1 1 0 1 0

Description:

- Recycled content must be certified by Scientific Certification Systems (SCS) or the manufacturer. SCS is on the web at www.scs1.com.
- Provide manufacturer documentation regarding the specifications, recycled content, etc., of the insulation being installed.
- Provide FTC Fact Sheet for insulation material.
- Pre-drywall photo—OR—rater verification

Benefit:

Spray foam insulation applied in stud cavities provides and excellent air barrier, which boost energy efficiency and durability. It also improves indoor environmental quality compared to other insulation types.

Verification:

Verifier visually confirms and photographs this measure.

6.8.4Accountability Form: **Insulation Contractor****Spray applied wet cellulose insulation (proper drying required before installing wall finish and/or vapor barrier)** Remodel only - 011715 es

0 2 0 0 0

Description:

- Recycled content must be certified by Scientific Certification Systems (SCS) or the manufacturer. SCS is on the web at www.scs1.com.
- Provide manufacturer documentation regarding the specifications, recycled content, etc., of the insulation being installed.
- Provide FTC Fact Sheet for insulation material.
- Pre-drywall photo—OR—rater verification

Benefit:

Spray applied wet cellulose has similar benefits as spray foam insulation because it also creates and excellent air barrier. However, the fact that it introduces moisture into the wall assembly, it must be used with extreme caution. It should not be installed when the outside weather conditions are too cold to prevent adequate drying. Therefore, it can only realistically be installed in the summer months, but it must be allowed to completely dry before other parts of the wall assembly that could inhibit drying can be applied. Some wall finishes might also be damaged if they are installed over wet cellulose.

Due to this durability risk associated with applying wet cellulose insulation, a negative point is awarded to wet cellulose in the Resource Efficiency/Durability category.

Verification:

Verifier visually confirms and photographs this measure.

6.9 GWB W/preferred attributes is used (min.90% used)

6.9.1

Accountability Form: **General Contractor**



70% to 89% recycled paper (post consumer and/or post industrial qualifies). Remodel only - 011715 es 0 0 0 1 0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Manufacturer documentation of product specifications.

Photo before painting or other surface coating is applied—OR—rater verification

Benefit:

The gypsum that is commonly used in the production of gypsum wallboard (GWB or sheetrock) is a naturally occurring mineral. Synthetic gypsum is a by-product of power plants that burn coal. It is more Green to use synthetic gypsum to manufacture GWB than to extract virgin natural gypsum for this purpose.

Verification:

Verifier visually confirms and photographs this measure.

6.9.2

Accountability Form: **General Contractor**



90% to 100% recycled paper (post consumer and/or post industrial qualifies). Remodel only - 011715 es 0 0 0 2 0

Description:

- Notes on plans or specifications indicating material to be used and/or work to be done.

- Manufacturer documentation of product specifications.

- Photo before painting or other surface coating is applied—OR—rater verification

Benefit:

The gypsum that is commonly used in the production of gypsum wallboard (GWB or sheetrock) is a naturally occurring mineral. Synthetic gypsum is a by-product of power plants that burn coal. It is more Green to use synthetic gypsum to manufacture GWB than to extract virgin natural gypsum for this purpose.

Verification:

Verifier visually confirms and photographs this measure.

6.9.3Accountability Form: **General Contractor****8% to 19% recycled content in gypsum core.** Remodel only - 011715 es

0 0 0 1 0

Description:

- Notes on plans or specifications indicating material to be used and/or work to be done.
- Manufacturer documentation of product specifications.
- Photo before painting or other surface coating is applied—OR—rater verification

Benefit:

The gypsum that is commonly used in the production of gypsum wallboard (GWB or sheetrock) is a naturally occurring mineral. Synthetic gypsum is a by-product of power plants that burn coal. It is more Green to use synthetic gypsum to manufacture GWB than to extract virgin natural gypsum for this purpose.

Verification:

Verifier visually confirms and photographs this measure.

6.9.4Accountability Form: **General Contractor****20% or more recycled content in gypsum core.** Remodel only - 011715 es

0 0 0 2 0

Description:

- Notes on plans or specifications indicating material to be used and/or work to be done.
- Manufacturer documentation of product specifications.
- Photo before painting or other surface coating is applied—OR—rater verification

Benefit:

The gypsum that is commonly used in the production of gypsum wallboard (GWB or sheetrock) is a naturally occurring mineral. Synthetic gypsum is a by-product of power plants that burn coal. It is more Green to use synthetic gypsum to manufacture GWB than to extract virgin natural gypsum for this purpose.

Verification:

Verifier visually confirms and photographs this measure.

6.9.5Accountability Form: **General Contractor****50% to 89% synthetic Flue Gas Desulfurization (FGD) gypsum used in core.** Remodel only - 011715 es

0 0 0 3 0

Description:

- Notes on plans or specifications indicating material to be used and/or work to be done.
- Manufacturer documentation of product specifications.
- Photo before painting or other surface coating is applied—OR—rater verification

Benefit:

The gypsum that is commonly used in the production of gypsum wallboard (GWB or sheetrock) is a naturally occurring mineral. Synthetic gypsum is a by-product of power plants that burn coal. It is more Green to use synthetic gypsum to manufacture GWB than to extract virgin natural gypsum for this purpose.

Verification:

Verifier visually confirms and photographs this measure.

6.9.6Accountability Form: **General Contractor****90% to 100% synthetic Flue Gas Desulfurization (FGD) gypsum used in core.** Remodel only - 011715 es

0 0 0 4 0

Description:

- Notes on plans or specifications indicating material to be used and/or work to be done.
- Manufacturer documentation of product specifications.
- Photo before painting or other surface coating is applied—OR—rater verification

Benefit:

The gypsum that is commonly used in the production of gypsum wallboard (GWB or sheetrock) is a naturally occurring mineral. Synthetic gypsum is a by-product of power plants that burn coal. It is more Green to use synthetic gypsum to manufacture GWB than to extract virgin natural gypsum for this purpose.

Verification:

Verifier visually confirms and photographs this measure.

6.10 Improve Existing Windows, Skylights and Doors

6.10.1



20 year warranty on all insulated glazing, sash and frame for replacement windows and/or doors having a frame of wood or wood with cladding Remodel only - 081414 MF

0 0 0 2 0

Description:

Copy of warranty documentation.

Benefit:

Most window and door manufacturers currently only offer a 10-year warranty for the frame, and a 20-year warranty for the glazing and seals.

Some companies have started to increase this to 20 years for the whole unit. These longer warranties are encouraged.

Verification:

Provide documentation or calculations for this measure.

6.10.2Accountability Form: **General Contractor**

Replacement sash and units must meet energy code, be ENERGY STAR rated and be NFRC rated (existing window sashes are exempt) Remodel only - 011715 es

0 0 0 0 0

Default Value

Description:

Provide manufacturer documentation showing that the units meet the minimum standards of the energy code and ENERGY STAR rating.

Exceptions

- Existing windows that are not being replaced are exempt.
- Other exceptions may be made in special circumstances where changes to the home are controlled by the Historical Preservation Committee. Provide documentation to GreenStar to describe the circumstance to obtain GreenStar approval.

Benefit:

Even though the NFRC rating is already required by code in many states, this is often overlooked, and worth mentioning here.

Resources

If Minnesota project, see also existing Minnesota Residential Energy Code: See Minnesota Rules Chapter 1322

(www.revisor.gov/rules/?id=1322)

Verification:

Provide documentation or calculations for this measure.

6.10.3Accountability Form: **General Contractor**

Remove weight and fill weight cavity with foam insulation, when old double hung sash are replaced. (no fiberglass insulation allowed for this application) Remodel only - 011715 es Default Value

0 0 0 0 0

Description:

- Provide notes on plan or specifications stating addition of insulation and type
- Requires the removal of interior window trim.
- Seal the space between the framing for window or door rough openings and the installed units are sealed with low-expanding spray foam sealant, closed cell foam backer rod, spray applied insulation, or other suitable sealant and foam insulation combination.
- Cellulose, fiberglass or rock wool batt insulation is NOT acceptable as a sealant but can be used as a backing for a sealant (such as caulk).
- Photo of filled weight pocket before sash is re-installed—OR—rater verification

Benefit:

- Weight pockets are responsible for considerable air leakage and subsequent heat loss.
- Expanding foam insulation creates an excellent air barrier and insulator.
- Older windows were typically built into the wall framing without flashing, therefore, water can enter from the exterior. Additionally, no vapor barrier or retarder typically exists on the interior, allowing for significant moisture migration into the wall cavity. Best practice is to use an air sealant and high R-value insulator

Verification:

Verifier visually confirms and photographs this measure.

6.10.4Accountability Form: **General Contractor****Material type for replacement windows. Select only one:** 011715 es

0 0 0 3/2/2 0

(Replacement windows are wood / Replacement windows are fiberglass / Replacement windows are wood with metal clad exterior)

Description:

Provide receipt or manufacturer documentation from product.

Benefit:

The points for this credit are for Resource Efficiency/Durability. Different materials affect the durability of the windows and also require differing amounts of embodied energy for manufacture. Wood is a renewable resource with relatively low embodied energy, but it requires more maintenance over time.

Fiberglass is strong, will not corrode, and has expansion and contraction properties that are very similar to the glazing, which means the seals between the sash and the glass will most likely last longer. However, it does have a high amount of embodied energy.

Aluminum cladding on wood makes it more durable, and is an efficient use of the aluminum since it is a thin layer, but it does have a high amount of embodied energy and can corrode in some harsh environments.

Verification:

Provide documentation or calculations for this measure.

6.10.5Accountability Form: **General Contractor****Add exterior shading to existing windows on south and west side of home, such as awnings on south or west, vertical fins on west, etc.** 011715 es

2 0 0 0 0

Description:

- Documentation required showing projection size including depth of overhang, height of window and a diagram of sun angles for winter and summer.
- Roof overhangs also qualify if properly sized and documented.
- Proper sizing ensures effective use of materials and that strategies have been well considered.

Benefit:

Shading against summer sun on the south and west windows is most important since these are the times of the day in the summer when overheating is most prevalent. Vertical fin shading devices on the west are a more effective orientation to block the western summer sun than horizontal shades. Exterior shading is better than interior shades; by the time the sun hits an interior shade, some of the heat energy has already entered the house.

Resources

Pilkington Sun Angle Calculator

www.sbse.org/Resources/sac/PSAC_Manual.pdf**Verification:**

6.10.6	Accountability Form: General Contractor					
Install exterior solar shades on clear-glazed windows Remodel only - 011715 es		1	0	0	0	0

Description:

- Preconstruction photo of existing.
- Post construction photo of existing—OR—rater verification
- At a minimum, provide solar shade screening with a shading coefficient of 0.7 or greater on windows facing east and west. Shade screening shall be installed on exterior of window glazing (EC, 19.3)
- Remove or retract screens in winter for additional light and heat gain.

Benefit:

A solar path diagram would show that there are a lot of times during the day during the summer months when the sun is low in the eastern or western sky, and cannot be blocked by overhangs or other horizontal shading devices. Exterior solar shades on east and west facing windows helps to prevent overheating during these times.

Resources

Lighter colored screens have greater heat reflectance, where darker colors will have higher visibility from indoors.

Exterior solar shades save up to 60% of conditioning costs

Verification:

Verifier visually confirms and photographs this measure.

6.10.7	Accountability Form: General Contractor					
Install storm windows on double hung or fixed windows 011715 es		1	0	0	1	0

Description:

Notes on plan and/or specifications stating addition of storm windows

Post-construction photo—OR—rater verification

Benefit:

Storm windows help improve energy efficiency by creating a dead air space between them and the main window.

They improve durability by protecting the inner main window from rain, ice and snow.

Verification:

Verifier visually confirms and photographs this measure.

6.10.8 Accountability Form: **General Contractor**



Install, adjustable interior solar shades, or reflective blinds to min. 80% of al (existing and new) east, west, and south windows/skylights which have no exterior shading to block summer sun. 011715 es 1 0 0 0 0

Description:

Preconstruction photo of existing

Post construction photo of existing—OR—rater verification

Benefit:

Where exterior shades are not a good option, interior shades can help to block solar gain when it is not desirable.

Verification:

Verifier visually confirms and photographs this measure.

6.10.9 Accountability Form: **General Contractor**



Install low-e film on interior side of clear-glazed windows and skylights 011715 es 1 0 0 0 0

Description:

Before and after photo of areas where film was applied.

Benefit:

Adding low-e film to existing windows that have clear glazing achieves some of the improved performance that normally comes with replacing the whole sash or window unit, without the cost and embodied energy of replacing the whole window, door or skylight unit itself.

Low-e film is like a one-way filter that allows the sun's radiant energy to pass through the glass to enter the house, but it also helps to reflect radiant heat back into the house to help retain that heat.

Considerations

Coatings on the glass do affect the color slightly.

Verification:

Visually inspect and photograph implementation of this measure.



6.10.10

Accountability Form: **General Contractor**



Install storm doors Remodel only - 011715 es

1 0 0 1 0

Description:

Pre-construction photo of existing conditions to be improved

Post-construction photo—OR—rater verification

Benefit:

Storm doors help improve energy efficiency by creating a dead air space between them and the main door.

They also improve durability by helping to protect the inner door from the weather.

Verification:

Verifier visually confirms and photographs this measure.

6.10.11

Accountability Form: **General Contractor**



Connecting doors between living space and garage are improved with gaskets or made substantially air-tight with weather stripping, air sealing door sweep, thresholds, etc. Also, new automatic closer verified to be working or replaced. Remodel only - 011715 es

1 2 0 0 0

Description:

Pre-construction photo of existing conditions to be improved

Post-construction photo—OR—rater verification

Benefit:

Garages have a lot of pollutants that are best kept out of the house.

The door between the garage and the house plays an important role in this and should be kept closed and airtight as much as possible.

Verification:

Verifier visually confirms and photographs this measure.

**6.10.12**Accountability Form: **General Contractor****Install new weatherstrip AND thresholds or air sealing door sweeps on all existing entry doors**

1 0 0 0 0

Remodel only-011715 es

Description:

Pre-construction photo of existing conditions to be improved

1. Weather-stripping at sides and head is required.
2. Tightly sealing threshold—OR—tight fitting door sweep is required at the bottom of the door.
3. Post-construction photo—OR—rater verification

Benefit:

Properly fitting weather-stripping, thresholds and door sweeps all help prevent air leakage around entry doors. They should be maintained often.

Considerations

Houses with little air leakage are desirable, but require adequate fresh air ventilation

Verification:

Verifier visually confirms and photographs this measure.

6.10.13Accountability Form: **General Contractor****Home equipped with covered entry ways that extend three feet out from every exterior door.**

0 0 0 2/4 0

Existing covered entries also qualify. Select Only One: Remodel only- 011715 es

(1 entry / 2 or more entries)

Description:

Post-construction photo—OR—rater verification

Benefit:

Covers at entries improve durability of the entry door assemblies by protecting them from the weather.

Verification:

Verifier visually confirms and photographs this measure.

6.10.14Accountability Form: **General Contractor****Window unit air leakage rating < 0.30 cfm/sq ft** Remodel only - 011715 ms

2 0 0 0 0

Description:

Provide manufacturer documentation of air leakage (NFRC Label).

Benefit:

Preventing air leakage saves energy, improves durability, and improves comfort.

Considerations

A house that is very tight needs adequate fresh air supply for the health of the occupants. Usually this needs to be mechanically supplied.

Verification:

Project team provide documentation or calculations for this measure.

Rater / verifiers visually confirm windows were installed.

6.11 Improve double-hung window U-factor > 0.56. SELECT ONE

6.11.1

Accountability Form: **General Contractor**



Improve double hungs with pipe, foam and weather stripping method OR ploughed sashes with JAMB LINER. Without replacement of sash. (minimum 50% of windows on house) Remodel only - 2 0 0 2 0
011715 es

Description:

** Note: If no label on single pane glass, assume U value = 0.56 or greater. If no label on insulated glass assume U value = 0.40.

General Requirements

1. Select one of the window improvement options that matches the work being done on the project.
2. If window improvement strategies being used on the project are significantly different from any of the options, make a proposal using the Innovation Section of the checklist and contact GreenStar for assistance.
3. Make notes on plans and/or specifications describing the work to be done and materials to be used.
4. Provide post-construction photo—OR—rater verification

Requirements

1. Insert pipe into weight pocket to serve as a track for the weight to move in.
2. Air seal and insulate remaining space in weight pocket with foam insulation.
3. Air seal window sash with weather-stripping.

Benefit:

- Can significantly improve energy efficiency because of air sealing.
- Savings in energy efficiency will likely pay for the cost of the improvements.
- Can significantly improve indoor comfort levels because of air sealing, but not to the same comfort level of a new window.
- Least expensive option.
- Most resource efficient option. Preserves existing materials and avoids using a lot of embodied energy to make new windows.
- Most authentic in appearance

Considerations

- Not as comfortable as new windows
- More likely to attract condensation when the weather is very cold or if occupants require comfortable humidity levels.
- More maintenance costs than low-maintenance new window components.

Verification:

Visually inspect and photograph implementation of this measure.

6.11.2

Accountability Form: **General Contractor**

Improve double hungs with pipe, foam & weather stripping method. ⚡OR⚡ ploughed sashes with JAMB LINER. Without replacement of sash. (min. 90% of windows on house) Remodel only - 011715 es

4 0 0 4 0

Description:

** Note: If no label on single pane glass, assume U value = 0.56 or greater. If no label on insulated glass assume U value = 0.40.

General Requirements

1. Select one of the window improvement options that matches the work being done on the project.
2. If window improvement strategies being used on the project are significantly different from any of the options, make a proposal using the Innovation Section of the checklist and contact GreenStar for assistance.
3. Make notes on plans and/or specifications describing the work to be done and materials to be used.
4. Provide post-construction photo—OR—rater verification

Requirements

1. Insert pipe into weight pocket to serve as a track for the weight to move in.
2. Air seal and insulate remaining space in weight pocket with foam insulation.
3. Air seal window sash with weather-stripping.

Benefit:

- Can significantly improve energy efficiency because of air sealing. Savings in energy efficiency will likely pay for the cost of the improvements.
- Can significantly improve indoor comfort levels because of air sealing, but not to the same comfort level of a new window.
- Least expensive option.
- Most resource efficient option. Preserves existing materials and avoids using a lot of embodied energy to make new windows.
- Most authentic in appearance

Considerations

- Not as comfortable as new windows
- More likely to attract condensation when the weather is very cold or if occupants require comfortable humidity levels.
- More maintenance costs than low-maintenance new window components.

Verification:

Visually inspect and photograph implementation of this measure.

6.11.3Accountability Form: **General Contractor**

Improve double hungs with COMPRESSION TRACK method. With new sash & insulated glass. (min. 50% of windows on house) Remodel only - 011715 es 3 0 0 2 0
Default Value

Description:

General Requirements

1. Select one of the window improvement options that matches the work being done on the project.
2. If window improvement strategies being used on the project are significantly different from any of the options, make a proposal using the Innovation Section of the checklist and contact GreenStar for assistance.
3. Make notes on plans and/or specifications describing the work to be done and materials to be used.
4. Provide post-construction photo—OR—rater verification

Requirements

1. Remove and reuse or recycle existing sash.
2. Remove and reuse or recycle weights from weight pocket. Air seal and insulate weight pocket with spray or pour-type foam insulation.
3. Install compression track and new sash.

Benefit:

- Can significantly improve energy efficiency because of air sealing.
- Can significantly improve indoor comfort levels because of air sealing and increased U-factor.
- Can reduce maintenance costs over time, if low maintenance surfaces are chosen for sash.

Considerations

- Moderately expensive to buy new sash and for labor to air seal existing frame.
- Much higher amount of embodied energy than keeping existing windows.
- Window will typically NOT pay for itself with the money saved in energy efficiency.
- Typically less authentic in appearance than when original sash are preserved.

Verification:

Visually inspect and photograph implementation of this measure.

6.11.4Accountability Form: **General Contractor**

Improve double hungs with COMPRESSION TRACK method. With new sash & insulated glass. (min. 90% of windows on house) Remodel only - 011715 es

5 0 0 3 0

Description:

General Requirements

1. Select one of the window improvement options that matches the work being done on the project.
2. If window improvement strategies being used on the project are significantly different from any of the options, make a proposal using the Innovation Section of the checklist and contact GreenStar for assistance.
3. Make notes on plans and/or specifications describing the work to be done and materials to be used.
4. Provide post-construction photo—OR—rater verification

Requirements

1. Remove and reuse or recycle existing sash.
2. Remove and reuse or recycle weights from weight pocket. Air seal and insulate weight pocket with spray or pour-type foam insulation.
3. Install compression track and new sash.

Benefit:

- Can significantly improve energy efficiency because of air sealing.
- Can significantly improve indoor comfort levels because of air sealing and increased U-factor.
- Can reduce maintenance costs over time, if low maintenance surfaces are chosen for sash.

Considerations

- Moderately expensive to buy new sash and for labor to air seal existing frame.
- Much higher amount of embodied energy than keeping existing windows.
- Window will typically NOT pay for itself with the money saved in energy efficiency.
- Typically less authentic in appearance than when original sash are preserved.

Verification:

Visually inspect and photograph implementation of this measure.

6.11.5Accountability Form: **General Contractor**

Improve any window type with FULL FRAME insert replacement unit having U-factor of 0.32. (min. 50% of windows on house) Remodel only - 011715 es

3 0 0 2 0

Description:

General Requirements

1. Select one of the window improvement options that matches the work being done on the project.
2. If window improvement strategies being used on the project are significantly different from any of the options, make a proposal using the Innovation Section of the checklist and contact GreenStar for assistance.
3. Make notes on plans and/or specifications describing the work to be done and materials to be used.
4. Provide post-construction photo—OR—rater verification

Requirements

1. Remove and reuse or recycle existing sash.
2. Remove weights from weight pocket. Air seal and insulate weight pocket with spray or pour-type foam insulation.
3. Install new full frame insert replacement unit.

Benefit:

- Can significantly improve energy efficiency (mostly because of air sealing).
- Can significantly improve indoor comfort levels because of air sealing and increased U-factor.
- Can reduce maintenance costs over time, if low maintenance surfaces are chosen.

Considerations

- Typically very expensive.
- Much higher amount of embodied energy than keeping existing windows.
- Window will typically NOT pay for itself with the money saved in energy efficiency.

Verification:

Visually inspect and photograph implementation of this measure.

6.11.6Accountability Form: **General Contractor**

Improve any windowtype with FULL FRAME insert replacement unit having U-factor of 0.32. (min. 90% of windows on house) Remodel only - 011715 es

6 0 0 4 0

Description:

General Requirements

1. Select one of the window improvement options that matches the work being done on the project.
2. If window improvement strategies being used on the project are significantly different from any of the options, make a proposal using the Innovation Section of the checklist and contact GreenStar for assistance.
3. Make notes on plans and/or specifications describing the work to be done and materials to be used.
4. Provide post-construction photo—OR—rater verification

Requirements

1. Remove and reuse or recycle existing sash.
2. Remove weights from weight pocket. Air seal and insulate weight pocket with spray or pour-type foam insulation.
3. Install new full frame insert replacement unit.

Benefit:

- Can significantly improve energy efficiency (mostly because of air sealing).
- Can significantly improve indoor comfort levels because of air sealing and increased U-factor.
- Can reduce maintenance costs over time, if low maintenance surfaces are chosen.

Considerations

- Typically very expensive.
- Much higher amount of embodied energy than keeping existing windows.
- Window will typically NOT pay for itself with the money saved in energy efficiency.

Verification:

Visually inspect and photograph implementation of this measure.

6.11.7Accountability Form: **General Contractor**

Improve any window type with FULL FRAME insert replacement unit having U-factor of 0.29 to 0.31. (min. 50% of windows on house) Remodel only - 011715 es 4 0 0 2 0

Description:

General Requirements

1. Select one of the window improvement options that matches the work being done on the project.
2. If window improvement strategies being used on the project are significantly different from any of the options, make a proposal using the Innovation Section of the checklist and contact GreenStar for assistance.
3. Make notes on plans and/or specifications describing the work to be done and materials to be used.
4. Provide post-construction photo—OR—rater verification

Requirements

1. Remove and reuse or recycle existing sash.
2. Remove weights from weight pocket. Air seal and insulate weight pocket with spray or pour-type foam insulation.
3. Install new full frame insert replacement unit.

Benefit:

- Can significantly improve energy efficiency (mostly because of air sealing).
- Can significantly improve indoor comfort levels because of air sealing and increased U-factor.
- Can reduce maintenance costs over time, if low maintenance surfaces are chosen.

Considerations

- Typically very expensive.
- Much higher amount of embodied energy than keeping existing windows.
- Window will typically NOT pay for itself with the money saved in energy

Verification:

Visually inspect and photograph implementation of this measure.

6.11.8Accountability Form: **General Contractor**

Improve any windowtype with FULL FRAME insert replacement unit having U-factor of 0.29 to 0.31. (min. 90% of windows on house) Remodel only - 011715 es

8 0 0 4 0

Description:

General Requirements:

1. Select one of the window improvement options that matches the work being done on the project.
2. If window improvement strategies being used on the project are significantly different from any of the options, make a proposal using the Innovation Section of the checklist and contact GreenStar for assistance.
3. Make notes on plans and/or specifications describing the work to be done and materials to be used.
4. Provide post-construction photo—OR—rater verification

Requirements:

1. Remove and reuse or recycle existing sash.
2. Remove weights from weight pocket. Air seal and insulate weight pocket with spray or pour-type foam insulation.
3. Install new full frame insert replacement unit.

Benefit:

- Can significantly improve energy efficiency (mostly because of air sealing).
- Can significantly improve indoor comfort levels because of air sealing and increased U-factor.
- Can reduce maintenance costs over time, if low maintenance surfaces are chosen.

Considerations

- Typically very expensive.
- Much higher amount of embodied energy than keeping existing windows.
- Window will typically NOT pay for itself with the money saved in energy efficiency.

Verification:

6.11.9Accountability Form: **General Contractor**

Improve any window type with FULL FRAME insert replacement unit having U-factor of 0.25 to 0.29. (min. 50% of windows on house) Remodel only - 011715 es 5 0 0 2 0

Description:

General Requirements

1. Select one of the window improvement options that matches the work being done on the project.
2. If window improvement strategies being used on the project are significantly different from any of the options, make a proposal using the Innovation Section of the checklist and contact GreenStar for assistance.
3. Make notes on plans and/or specifications describing the work to be done and materials to be used.
4. Provide post-construction photo—OR—rater verification

Requirements

1. Remove and reuse or recycle existing sash.
2. Remove weights from weight pocket. Air seal and insulate weight pocket with spray or pour-type foam insulation.
3. Install new full frame insert replacement unit.

Benefit:

- Can significantly improve energy efficiency (mostly because of air sealing).
- Can significantly improve indoor comfort levels because of air sealing and increased U-factor.
- Can reduce maintenance costs over time, if low maintenance surfaces are chosen.

Considerations

- Typically very expensive.
- Much higher amount of embodied energy than keeping existing windows.
- Window will typically NOT pay for itself with the money saved in energy efficiency.

Verification:

Visually inspect and photograph implementation of this measure.

6.11.10Accountability Form: **General Contractor**

Improve any windowtype with FULL FRAME insert replacement unit having U-factor of 0.25 to 0.29. (min. 90% of windows on house) Remodel only - 011715 es

9 0 0 4 0

Description:

General Requirements

1. Select one of the window improvement options that matches the work being done on the project.
2. If window improvement strategies being used on the project are significantly different from any of the options, make a proposal using the Innovation Section of the checklist and contact GreenStar for assistance.
3. Make notes on plans and/or specifications describing the work to be done and materials to be used.
4. Provide post-construction photo—OR—rater verification

Requirements

1. Remove and reuse or recycle existing sash.
2. Remove weights from weight pocket. Air seal and insulate weight pocket with spray or pour-type foam insulation.
3. Install new full frame insert replacement unit.

Benefit:

- Can significantly improve energy efficiency (mostly because of air sealing).
- Can significantly improve indoor comfort levels because of air sealing and increased U-factor.
- Can reduce maintenance costs over time, if low maintenance surfaces are chosen.

Considerations

- Typically very expensive.
- Much higher amount of embodied energy than keeping existing windows.
- Window will typically NOT pay for itself with the money saved in energy efficiency.

Verification:

Visually inspect and photograph implementation of this measure.

6.11.11Accountability Form: **General Contractor**

Improve any window type with FULL FRAME insert replacement unit having U-factor of < 0.24. (min. 50% of windows on house) Remodel only - 011715 es

6 0 0 2 0

Description:

General Requirements

1. Select one of the window improvement options that matches the work being done on the project.
2. If window improvement strategies being used on the project are significantly different from any of the options, make a proposal using the Innovation Section of the checklist and contact GreenStar for assistance.
3. Make notes on plans and/or specifications describing the work to be done and materials to be used.
4. Provide post-construction photo—OR—rater verification

Requirements

1. Remove and reuse or recycle existing sash.
2. Remove weights from weight pocket. Air seal and insulate weight pocket with spray or pour-type foam insulation.
3. Install new full frame insert replacement unit.

Benefit:

- Can significantly improve energy efficiency (mostly because of air sealing).
- Can significantly improve indoor comfort levels because of air sealing and increased U-factor.
- Can reduce maintenance costs over time, if low maintenance surfaces are chosen.

Considerations

- Typically very expensive.
- Much higher amount of embodied energy than keeping existing windows.
- Window will typically NOT pay for itself with the money saved in energy efficiency.

Verification:

Visually inspect and photograph implementation of this measure.

6.11.12Accountability Form: **General Contractor**

Improve any window type with FULL FRAME insert replacement unit having U-factor of < 0.24. (min. 90% of windows on house) Remodel only - 011715 es

10 0 0 4 0

Description:

General Requirements

1. Select one of the window improvement options that matches the work being done on the project.
2. If window improvement strategies being used on the project are significantly different from any of the options, make a proposal using the Innovation Section of the checklist and contact GreenStar for assistance.
3. Make notes on plans and/or specifications describing the work to be done and materials to be used.
4. Provide post-construction photo—OR—rater verification

Requirements

1. Remove and reuse or recycle existing sash.
2. Remove weights from weight pocket. Air seal and insulate weight pocket with spray or pour-type foam insulation.
3. Install new full frame insert replacement unit.

Benefit:

- Can significantly improve energy efficiency (mostly because of air sealing).
- Can significantly improve indoor comfort levels because of air sealing and increased U-factor.
- Can reduce maintenance costs over time, if low maintenance surfaces are chosen.

Considerations

- Typically very expensive.
- Much higher amount of embodied energy than keeping existing windows.
- Window will typically NOT pay for itself with the money saved in energy efficiency.

Verification:



6.12 Doors betwn conditioned & unconditioned space

6.12.13

Accountability Form: **General Contractor**



Doors have these features At least 50%

0/1/0/0 0 1/0/0/0 0/0/2/2 0

(FSC Certified Wood / Fiberglass / Recycled Steel / Re-used or refurbished doors)

Description:

Benefit:

Wood has low embodied energy, a long life span and a respectable energy rating. FSC certified wood ensures a more sustianable managed forest.

Steel doors have an overall durability similar to wood. On one hand, steel typically needs less repainting or staining, but on the other hand it dents easily, which can result in an increased need for repainting or complete door replacement. Steel has a higher embodied energy than other doors.

Fiberglass is very durable, holds paint and stain well, and is not prone to denting like metal. Other benefits of fiberglass include its similar dimensional stability as the glazing itself, which means the glazing seals should last longer. The downside of fiberglass is its high-embodied energy.

Verification:

Inspect and verify installed doors.

6.12.14

Accountability Form: **General Contractor**



50% or more of glass doors have

1/2/1/2/3 0 0 0 0

(1/2 glass or less Uvalue .18 / 1/2 glass or less less than or equal to Uvalue .17 / 1/2 glass or more Uvalue .30 to .47 / 1/2 glass or more less than equal to Uvalue .30 / No glass in the door)

Description:

A low U-factor indicates better energy performance. U value is the inverse of R Value. Lower is better.

Benefit:

Verification:

Verify the U values of installed glass on doors

6.13 Improve Unfinished Attics That Remain Unfinished

6.13.1



Air seal all attic penetrations (all plumbing, electrical and HVAC penetrations plus any chases) and add continuous insulation on floor of attic to R-38 Remodel only- 081514 MF 4 1 0 1 0

Description:

* Note: Air sealing penetrations (plumbing chase, electrical penetrations) requires the use of caulk, can-type expanding foam, or spray foam. The insulation on the floor may be batt or other material. An insulated attic hatch shall be built to open the attic and form an airtight seal when closed. The attic hatch must accommodate the "hideaway stairs" (if one exists) and be insulated.

1. Provide notes on drawings and/or specifications showing insulation value.
2. Install new or extend existing attic vent chutes for anticipated insulation depth.
3. Attach insulation info card near attic access door, which lists:
 - Date insulation installed.
 - R-value per inch of insulation depth. Include the recommended installed depth and the expected settled depth for blown-in insulation types.
 - Target Total R-value installed.
4. Install insulation depth markers every 100 square feet to show actual depth of insulation installed.
5. Post-construction photo—OR—rater verification

Exceptions

Ceilings with unconditioned attic space above should have complete coverage of attic insulation equal to or greater than a WEIGHTED AVERAGE OF R-38. A maximum of 10% of ceiling area may be as low as R25 to accommodate elevated attic flooring for storage. Note: This means that if some areas are between R25 and R38, then other areas must be over R38 to make up for it.

Benefit:

- Insulation info card and depth markers are an excellent way to help installers know they are getting enough insulation depth throughout the attic.
- It helps code inspectors and homeowners easily understand what insulation type and R-value the design called.
- It helps monitor how much the insulation settles, which is common for blown-in insulation.

Considerations

Care must be taken to not block attic venting air spaces when installing insulation.

Verification:

Verifier visually confirms and photographs this measure.



6.13.2



Improve framing in attics being used as, or converted to unheated storage. Install extensions (i.e. 2X scrap framing, 1/2 I-Joist, etc.) on existing attic joists to increase space for R38 or greater attic insulation. Install new flooring or re-install existing flooring (preferred). Remodel only- 081514 MF 2 0 0 0 0

Description:

- Pre-construction photo of existing conditions to be improved.
- Perform work as described in credit description above.
- Post-construction photo—OR—rater verification.

Benefit:

Verification:

Verifier visually confirms and photographs this measure.

6.13.3



1. Inspect and document existing roof ventilation system. (possibly already done if measure 1A-1 was performed) 2. Design and specify venting improvements or conversion to non-vented system. (Projects not needing changes or improvements also qualify) Remodel only- 081514 MF 1 0 0 1 0

Description:

- Do documentation and design work as described in credit description above.
- Provide notes on drawings and/or specifications describing work to be done.
- Post-construction photo—OR—rater verification.

Benefit:

- If a vented roof is part of the overall design of the house, then it must be balanced and working properly.
- Most houses are designed to have a vented roof. Usually it is a passive system, but occasionally there is one that is mechanically vented. Regardless of the type, it is very common to find them not operating as they should. Many times the proper vent holes were not installed from the beginning. If they do exist, they have often become blocked over time from dust and dirt or carelessly installed insulation, etc.

- If roof ventilation is not working properly, the effects, include:

- Damage to the building structure

Water leaking through the ceiling of upper rooms

Wet attic insulation, which has very little R-value, and keeps the structure wet, which makes structural decay progress more rapidly.

Verification:

Provide documentation or calculations for this measure.

6.13.4



Implement design from . Install-new and/or improve-existing eave vents, vent chutes, roof vents, etc. ---OR--- Convert to non-vented. (Non-vented designs must be pre-approved by building code official.) Remodel only- 081514 MF

1 0 0 2 0

Description:

Post-construction photo—OR—rater verification

Benefit:

Verification:

Verifier visually confirms and photographs this measure.

6.14 Attic remaining unfinished w/ADVANCED INSULATION

6.14.1



Insulation with minimum 20% recycled content is used for at least 50% of applications. (based on R-value X Sq.Ft.) Remodel only- 081514 MF

0 0 0 1 0

Description:

When R-value gets above R60, there is typically very little increase in performance without significant cost and space requirements. Multiply R value X sq. ft.

Recycled content must be certified by Scientific Certification Systems (SCS) or the manufacturer. SCS is on the web at www.scs1.com

Manufacturer Specifications

Benefit:

Verification:

Provide documentation or calculations for this measure.



6.14.2



All-natural insulation, such as cotton batt, is used for at least 50% of applications. (Soy based foam insulation is not considered "all natural" and is not eligible for credit in this category) Remodel only- 081514 MF

0 2 0 0 0

Description:

When R-value gets above R60, there is typically very little increase in performance without significant cost and space requirements. Multiply R value X sq. ft.

Rater Sign Off

Benefit:

Verification:

Verifier visually confirms and photographs this measure.

6.14.3



Attic insulation total R44 to R49 (flat or vaulted) Remodel only- 081514 MF

3 0 0 0 0

Description:

When R-value gets above R60, there is typically very little increase in performance without significant cost and space requirements. Multiply R value X sq. ft.

Rater Sign Off

Benefit:

Verification:

Verifier visually confirms and photographs this measure.

6.14.4



Attic insulation total R50 or more (flat or vaulted) Remodel only- 081514 MF

6 0 0 0 0

Description:

When R-value gets above R60, there is typically very little increase in performance without significant cost and space requirements. Multiply R value X sq. ft.

Rater Sign Off

Benefit:

Verification:

Verifier visually confirms and photographs this measure.

6.14.5



Add 1" min. foil face polyisocyanurate insulation to sloped roof / ceiling for thermal break and vapor barrier Remodel only- 081514 MF 1 1 0 1 0

Description:

- When R-value gets above R60, there is typically very little increase in performance without significant cost and space requirements. Multiply R value X sq. ft.
- Manufacturer documentation to demonstrate insulation qualifies as Class 1 or Class 2 Vapor Retarder (1 perm or less).
- Insulation must be taped with the proper tape for the insulation type and sealed at edges to achieve vapor retarder rating.
- Rater Sign Off

Benefit:

Verification:

Verifier visually confirms and photographs this measure.

6.14.6



Add 2" (low perm rated) rigid insulation to interior of sloped roof / ceiling for thermal break and vapor barrier Remodel only- 081514 MF 2 1 0 1 0

Description:

- When R-value gets above R60, there is typically very little increase in performance without significant cost and space requirements. Multiply R value X sq. ft.
- Manufacturer documentation to demonstrate insulation qualifies as Class 1 or Class 2 Vapor Retarder (1 perm or less).
- Insulation must be taped with the proper tape for the insulation type and sealed at edges to achieve vapor retarder rating.
- Rater Sign Off

Benefit:

Verification:

Verifier visually confirms and photographs this measure.

6.14.7

Energy Heel: min. R38 to outside face of exterior walls Remodel only- 081514 MF

2 0 0 0 0

Description:

When R-value gets above R60, there is typically very little increase in performance without significant cost and space requirements. Multiply R value X sq. ft.

Rater Sign Off

Benefit:**Verification:**

Verifier visually confirms and photographs this measure.

6.14.8

Access openings to new attics and new knee wall areas are well insulated Horizontal Attic Access = R38 min & Vertical Knee Wall Access = R23 min. Remodel only- 081514 MF

1 0 0 0 0

Description:

When R-value gets above R60, there is typically very little increase in performance without significant cost and space requirements. Multiply R value X sq. ft.

Rater Sign Off

Benefit:**Verification:**

Verifier visually confirms and photographs this measure.

6.15 Attic remaining unfinished w/ADVANCED AIR SEALING

6.15.1



Seal all attic by-passes. (spot seal with foam or caulk --OR-- spray foam entire attic floor) Remodel only- 081514 MF

2 2 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Rater Sign Off

Benefit:

Improves energy efficiency and durability

Verification:

Verifier visually confirms and photographs this measure.

6.15.2



Access openings to existing attic and new knee wall areas are weatherstripped Remodel only - 081414 MF

1 0 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Rater Sign Off

Benefit:

Improves energy efficiency and durability

Verification:

Verifier visually confirms and photographs this measure.

6.15.3



Provide insulation wind baffle or other air barrier to block wind washing at all attic eave bays in roof assemblies with soffit vents Remodel only- 081514 MF

1 0 0 2 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Rater Sign Off

Benefit:

Improves energy efficiency and durability

Verification:

Verifier visually confirms and photographs this measure.

6.16 Finishing Unfinished Attics

6.16.1



No recessed light fixtures may be installed unless fully compliant with recessed lighting requirements in credit 3PR-7 Remodel only- 081514 MF (PREREQ)

0 0 0 0 0
Default Value

Description:

1. Notes on drawings and/or specifications indicating work to be done, or product to use.
2. Post-installation photo—OR—rater verification

Benefit:

Garages contain many pollutants that should be kept out of the house. Doors that close automatically and are well sealed help reduce the amount of garage pollutants that migrate into the house.

Verification:

Verifier visually confirms and photographs this measure.

6.16.2

Air seal all attic penetrations (at all plumbing, electrical and HVAC penetrations plus any chases, open wall cavities, dropped ceilings and soffits) Remodel only- 081514 MF

2 0 0 0 0

Description:

- Pre-construction photo of existing conditions to be improved.
- Notes on drawings and/or specifications indicating work to be done.
- Pre-drywall photo—OR—rater verification

Benefit:

Air leaks negatively affect energy efficiency, comfort and building durability.

Verification:

Verifier visually confirms and photographs this measure.

6.16.3



Seal EXISTING recessed light fixtures to drywall with gasket, caulk or foam and add air sealed foam box or dome at all locations where they penetrate into the unconditioned area of the attic Remodel only- 081514 MF

3 0 0 0 0

Description:

- Document existing recessed can lights that are in the insulated envelope.
- Cans must be inspected and documented as to whether they are Washington State Energy Code (WSEC) compliant, and if they are Insulation Contact (IC) rated.
- Must perform before and after blower door test and infrared thermal imaging of recessed cans that are in an insulated ceiling and document the results.
- Must inspect the cans from the attic-side (if possible) and document the results.
- Follow the instructions on the drawings below to air seal and insulate the recessed cans.
- Perform Blower Door Test and infrared thermal imaging after improvements are made to demonstrate the air sealing and insulating was done well.
- Post-construction photo—OR—rater verification

Exceptions

- Cans that are not accessible from the attic side may need to be removed and worked on from the finish side.
- Existing recessed cans that are in a very tight location, which does not allow for adequate insulation must at least be air sealed with foam box and insulated to greatest amount possible. If these cans can simply be removed, that is an even better solution.

Benefit:

IC-rated recessed light fixtures penetrating an insulated space are difficult to properly air seal and are not considered a sustainable building strategy.

Verification:

Verifier visually confirms and photographs this measure.

6.16.4



Air barrier on dropped ceiling/soffit is fully aligned with insulated framing and any gaps are fully sealed with caulk or foam or fire-rated sealant Remodel only - 081414 MF

1 0 0 1 0

Description:

- Notes on drawings and/or specifications indicating work to be done.
- Air barrier (and insulation) should typically be installed before dropped ceilings and soffits are constructed.
- Pre-drywall photo—OR—rater verification

Benefit:

Dropped ceilings and soffits are notorious places where the air barrier is interrupted. Alternately, if it does exist, it is often not in contact with the insulation, as it should be.

Verification:

Verifier visually confirms and photographs this measure.

6.16.5



Air barrier in staircase framing adjacent to exterior wall/attic is fully aligned with insulated framing and any gaps are fully sealed with caulk or foam Remodel only- 081514 MF

1 0 0 1 0

Description:

- Notes on drawings and/or specifications indicating work to be done.
- Air barrier (and insulation) should typically be installed before staircases are constructed adjacent to exterior walls.
- Pre-drywall photo—OR—rater verification

Exceptions

Sometimes if closed cell spray foam insulation is used, it is possible to obtain good thermal, air, and vapor barriers in place after the staircase framing is in place.

Benefit:

Dropped ceilings and soffits are notorious places where the air barrier is interrupted. Alternately, if it does exist, it is often not in contact with the insulation, as it should be.

Verification:

Verifier visually confirms and photographs this measure.

6.16.6



Improve weatherstripping and insulation at existing attic and knee wall access openings. Horizontal Attic Access = R38 min & Vertical Knee Wall Access = R23 min. (Also applies to new access openings being installed in existing attics or knee walls.) Remodel only -081814 MF

1 0 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done.

- Attic hatch, cover, or door is fully gasketed for an airtight fit.
- Insulation fits snugly and is located to create a continuous thermal barrier in the knee wall or attic ceiling when in place.
- Post-construction photo of access opening—OR—rater verification

Benefit:

Air sealing and insulating is extremely important for energy efficiency, durability, and comfort.

Considerations

Using fiberglass batts to insulate attic access openings can be problematic. The act of opening and closing the opening can cause small glass fibers to become airborne; these can be irritating and unhealthy.

Verification:

Verifier visually confirms and photographs this measure.

6.16.7

1. Inspect and document existing roof ventilation system. (possibly already done if measure 1B-1 was performed) 2. Design and specify venting improvements or conversion to non-vented system. (Projects not needing changes or improvements also qualify) Remodel only -081814 MF

1 0 0 1 0

Description:

Do documentation and design work as described in credit description above.

Provide notes on drawings and/or specifications describing work to be done.

Post-construction photo—OR—rater verification

Benefit:

If a vented roof is part of the overall design of the house, then it must be balanced and working properly.

Most houses are designed to have a vented roof. Usually it is a passive system, but occasionally there is one that is mechanically vented. Regardless of the type, it is very common to find them not operating as they should. Many times the proper vent holes were not installed from the beginning. If they do exist, they have often become blocked over time from dust and dirt, or carelessly installed insulation.

- If roof ventilation is not working properly, the effects include the following.

- Damage to the building structure

- Water leaking through the ceiling of upper rooms

- Wet attic insulation, which has very little R-value, and keeps the structure wet, which makes structural decay progress more rapidly.

Verification:

Verifier visually confirms and photographs this measure.

6.16.8Accountability Form: **General Contractor**

Install-new and/or improve-existing eave vents, vent chutes, roof vents, etc. ---OR--- Convert to non-vented. (Non-vented designs must be pre-approved by building code official.) Remodel only -011715 es

1 0 0 2 0

Description:

Do documentation and design work as described in credit description above.

Provide notes on drawings and/or specifications describing work to be done.

Post-construction photo—OR—rater verification

Benefit:**Verification:**

Verifier visually confirms and photographs this measure.

6.17 Air sealing & Insulation to unfinished knee-wall

6.17.1



Knee Walls = R-15 to R-21 & floors behind knee walls = R-38 to R-41 (assumes unconditioned knee wall area) - OR - Sloped ceiling behind knee walls R - 38 to R-41 (for an unvented attic assembly) (assumes residually conditioned knee wall area) Remodel only- 081514 MF

2 2 0 2 0

Description:

- Document existing insulation levels.
- Notes on drawings and/or specifications indicating work to be done.
- If insulating involves open walls or ceilings, then pre-drywall photo of areas insulated—OR—rater verification
- Post-construction photo of areas insulated—OR—rater verification

Benefit:

Important for energy efficiency, durability and comfort.

Two main approaches exist for air sealing and insulating the knee wall space.

1. Air seal and insulate the floor and wall of the knee wall area making the knee wall area unconditioned space
2. Air seal along the sloped ceiling (roof) of the knee wall area, which means it will receive some residual conditioning from the main living area. Sometimes this is preferred to allow the knee wall area to function as a more frequently used storage space. This might also be preferred if the knee wall space is already being used for storage, and already has flooring. It would potentially require more time and effort to remove the flooring, air seal/insulate the floor, and then replace the flooring than it would be to just insulate the ceiling.

Verification:

Verifier visually confirms and photographs this measure.

6.17.2



Knee Walls = R-22 to R-29 & floors behind knee walls = R-42 to R-49 (assumes unconditioned knee wall area) - OR - Sloped ceiling behind knee walls R - 42to R-49 (for an unvented attic assembly) (assumes residually conditioned knee wall area) Remodel only- 081514 MF

3 2 0 2 0

Description:

- Document existing insulation levels.
- Notes on drawings and/or specifications indicating work to be done.
- If insulating involves open walls or ceilings, then pre-drywall photo of areas insulated—OR—rater verification
- Post-construction photo of areas insulated—OR—rater verification

Benefit:

Important for energy efficiency, durability and comfort.

Two main approaches exist for air sealing and insulating the knee wall space.

1. Air seal and insulate the floor and wall of the knee wall area making the knee wall area unconditioned space
2. Air seal along the sloped ceiling (roof) of the knee wall area, which means it will receive some residual conditioning from the main living area. Sometimes this is preferred to allow the knee wall area to function as a more frequently used storage space. This might also be preferred if the knee wall space is already being used for storage, and already has flooring. It would potentially require more time and effort to remove the flooring, air seal/insulate the floor, and then replace the flooring than it would be to just insulate the ceiling.

Verification:

Verifier visually confirms and photographs this measure.

6.17.3



Knee Walls = R-30 & floors behind knee walls = R-50 (assumes unconditioned knee wall area) - OR - Sloped ceiling behind knee walls R - 50 (for an unvented attic assembly) (assumes residually conditioned knee wall area) Remodel only- 081514 MF

4 2 0 2 0

Description:

Document existing insulation levels.

Notes on drawings and/or specifications indicating work to be done.

If insulating involves open walls or ceilings, then pre-drywall photo of areas insulated—OR—rater verification

Post-construction photo of areas insulated—OR—rater verification

Benefit:

Important for energy efficiency, durability and comfort.

Two main approaches exist for air sealing and insulating the knee wall space.

1. Air seal and insulate the floor and wall of the knee wall area making the knee wall area unconditioned space
2. Air seal along the sloped ceiling (roof) of the knee wall area, which means it will receive some residual conditioning from the main living area. Sometimes this is preferred to allow the knee wall area to function as a more frequently used storage space. This might also be preferred if the knee wall space is already being used for storage, and already has flooring. It would potentially require more time and effort to remove the flooring, air seal/insulate the floor, and then replace the flooring than it would be to just insulate the ceiling.

Verification:

Verifier visually confirms and photographs this measure.

6.17.4



Use spray-foam to air seal and insulate knee walls & floor --OR-- sloped ceiling Remodel only- 081514 MF 1 1 0 1 0

Description:

- Document existing insulation levels.
- Notes on drawings and/or specifications indicating work to be done.
- If insulating involves open walls or ceilings, then pre-drywall photo of areas insulated—OR—rater verification
- Post-construction photo of areas insulated—OR—rater verification

Benefit:

Spray foam does a better job with air sealing, which improves energy efficiency and indoor environmental quality over other insulation systems.

Verification:

Verifier visually confirms and photographs this measure.

6.17.5



Air seal and insulate critical areas (R30 min.) (e.g. rim joist @ eave, joist cavity under knee wall & cavity @ rafter cavity @ top of knee wall) Remodel only- 081514 MF 6 2 0 2 0

Description:

- Document existing insulation levels.
- Notes on drawings and/or specifications indicating work to be done.
- If insulating involves open walls or ceilings, then pre-drywall photo of areas insulated—OR—rater verification
- Post-construction photo of areas insulated—OR—rater verification

Benefit:

Spray foam does a better job with air sealing, which improves energy efficiency and indoor environmental quality over other insulation systems.

Verification:

Verifier visually confirms and photographs this measure.

6.18 Unfinished vaulted & tray ceilings in living area

6.18.1



Improve unfinished vaulted and tray ceilings in living area. R25 to R37 Remodel only -081814 MF

2 0 0 0 0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Pre-drywall photo—OR—rater verification

Benefit:

- Existing homes frequently have low amounts of insulation at vaulted or tray ceilings. This credit gives incentive to improve the R-value in those areas.
- R25 assumes 3.5" rafter with R6 per inch closed cell spray foam plus R5 rigid (frequently allowed for remodels using hot roof application when finishing attic space. Typically homeowner must sign-off.
- Other combinations of insulation to achieve specified R-Values can also qualify.

Verification:

Verifier visually confirms and photographs this measure.

Provide documentation or calculations for this measure.

6.18.2



Improvements to unfinished vaulted and tray ceilings in living area. R38 to R42 Remodel only - 081814 MF 4 0 0 0 0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Pre-drywall photo—OR—rater verification

Benefit:

- Existing homes frequently have low amounts of insulation at vaulted or tray ceilings. This credit gives incentive to improve the R-value in those areas.

- R38 assumes 5.5" rafter with R6 per inch closed cell spray foam plus R5 rigid

- Other combinations of insulation to achieve specified R-Values can also qualify.

Verification:

Verifier visually confirms and photographs this measure.

Provide documentation or calculations for this measure.

6.18.3



Improvements to unfinished vaulted and tray ceilings in living area. R43 or better Remodel only -081814 MF 6 0 0 0 0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Pre-drywall photo—OR—rater verification

Benefit:

- Existing homes frequently have low amounts of insulation at vaulted or tray ceilings. This credit gives incentive to improve the R-value in those areas.

- R43 assumes 11-1/8" I-joint rafter with 7/8" air space + 1" (~R6) foil faced rigid, + 2" closed cell spray foam ~R12), + 8" high density fiberglass (R25)

- Other combinations of insulation to achieve specified R-Values can also qualify.

Verification:

Verifier visually confirms and photographs this measure.

Provide documentation or calculations for this measure.

6.18.4



Air seal and insulate sloped roof / tray ceiling with spray foam. Remodel only -081814 MF

1 1 0 1 0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Pre-drywall photo—OR—rater verification

Benefit:

Existing homes frequently have low amounts of insulation at vaulted or tray ceilings. This credit gives incentive to improve the R-value in those areas.

Spray foam does a better job with air sealing, which improves energy efficiency and indoor environmental quality over other insulation systems.

Verification:

Verifier visually confirms and photographs this measure.

Provide documentation or calculations for this measure.

6.18.5



Add 3/4" minimum foil face polyisocyanurate (or equivalent) insulation to existing sloped roof / ceiling for thermal break and vapor retarder (seal all seams with tape or equivalent) Remodel only -081814 MF

1 0 0 0 0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Pre-drywall photo—OR—rater verification

Benefit:

- Existing homes frequently have low amounts of insulation at vaulted or tray ceilings. This credit gives incentive to improve the R-value in those areas.

- Foil faced insulation is a Class 1 Vapor Retarder and applying rigid insulation over the face of the rafters helps prevent thermal bridging through the rafters. Foil must face heated surface of the room.

- Equivalent insulations should have a minimum Class 2 Vapor Retarder rating and similar R-value.

Verification:

Verifier visually confirms and photographs this measure.

Provide documentation or calculations for this measure.

6.18.6

Install radiant barrier with air space when improving existing finished sloped roof / ceiling system where R38 insulation is not achievable. Radiant barrier on attic floor does NOT qualify. Remodel only
-081814 MF

1 0 0 0 0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Pre-drywall photo—OR—rater verification

Benefit:

- Existing homes frequently have low amounts of insulation at vaulted or tray ceilings. This credit gives incentive to improve the R-value in those areas.

- Where R38 is not achievable, a properly installed radiant barrier on either the topside and/or the bottom side of the insulation can be beneficial.

- If planning to install a radiant barrier on both top and bottom sides of the insulation, special care must be taken to avoid a vapor trap between them. In this situation, the topside radiant barrier should be vapor permeable and the air space above it should be vented.

- Some of the best radiant barriers, such as aluminum foil are also Class 1 Vapor Retarders unless they are perforated (vapor impermeable).

Verification:

Verifier visually confirms and photographs this measure.

Provide documentation or calculations for this measure.



6.19 Improve Finished Attics & Roofs

6.19.1	Accountability Form: General Contractor					
No recessed light fixtures may be installed unless fully compliant with recessed lighting requirements in credit 3PR-7 Remodel only -011715 es		0	0	0	0	0
Default Value						

Description:

It is extremely difficult to properly air seal and insulate around a recessed light fixture.

- 1. Notes on drawings and/or specifications indicating work to be done, or product to use.
- 2. Post-installation photo—OR—rater verification

Benefit:

Garages contain many pollutants that should be kept out of the house. Doors that close automatically and are well sealed help reduce the amount of garage pollutants that migrate into the house.

Verification:

Verifier visually confirms and photographs this measure.

6.19.2	Accountability Form: Insulation Contractor					
Air seal all attic penetrations (at all plumbing, electrical and HVAC penetrations plus any chases, open wall cavities, dropped ceilings and soffits) Remodel only -011715 es		2	0	0	0	0

Description:

- Pre-construction photo of existing conditions to be improved.
- Notes on drawings and/or specifications indicating work to be done.
- Pre-drywall photo—OR—rater verification

Benefit:

Air leaks negatively affect energy efficiency, comfort, and building durability.

Verification:

Verifier visually confirms and photographs this measure.

6.19.3Accountability Form: **Insulation Contractor**

Seal recessed light fixtures to drywall with gasket, caulk or foam and add air sealed foam box or dome at all locations where they penetrate into the unconditioned area of the attic Remodel only
-011715 es

3 0 0 1 0

Description:

- Document existing recessed can lights that are in the insulated envelope.
- Cans must be inspected and documented as to whether they are Washington State Energy Code (WSEC) compliant, and if they are Insulation Contact (IC) rated.
- Must perform before and after Blower Door Test and infrared thermal imaging of recessed cans that are in an insulated ceiling and document the results.
- Must inspect the cans from the attic side (if possible) and document the results.
- Follow the instructions on the drawings below to air seal and insulate the recessed cans.
- Perform Blower Door Test and infrared thermal imaging after improvements are made to demonstrate the air sealing and insulating was done well.
- Post-construction photo—OR—rater verification

Exceptions

Cans that are not accessible from the attic side may need to be removed and worked on from the finish side.

Existing recessed cans that are in a very tight location, which does not allow for adequate insulation, must at least be air sealed with foam box and insulated to greatest amount possible. If these cans can simply be removed, that is an even better solution.

Benefit:

IC-rated recessed light fixtures penetrating an insulated space are difficult to properly air seal and are not considered a sustainable building strategy.

Verification:

Verifier visually confirms and photographs this measure.

6.19.4 Accountability Form: **Insulation Contractor**

Air barrier on dropped ceiling/soffit is fully aligned with insulated framing and any gaps are fully sealed with caulk or foam or fire-rated sealant Remodel only -011715 es 1 0 0 1 0

Description:

- Notes on drawings and/or specifications indicating work to be done.
- Air barrier (and insulation) should typically be installed before dropped ceilings and soffits are constructed.
- Pre-drywall photo—OR—rater verification

Benefit:

Dropped ceilings and soffits are notoriously places where the air barrier is interrupted. Alternately, if it does exist, it is often not in contact with the insulation, as it should be.

Verification:

Verifier visually confirms and photographs this measure.

6.19.5 Accountability Form: **Insulation Contractor**

Air barrier in staircase framing adjacent to exterior wall/attic is fully aligned with insulated framing and any gaps are fully sealed with caulk or foam Remodel only -011715 es 1 0 0 1 0

Description:

- Notes on drawings and/or specifications indicating work to be done.
- Air barrier (and insulation) should typically be installed before staircases are constructed adjacent to exterior walls.
- Pre-drywall photo—OR—rater verification

Exceptions

Sometimes if closed cell spray foam insulation is used, it is possible to obtain a good thermal, air, and vapor barrier in place after the stair case framing is in place.

Benefit:

Dropped ceilings and soffits are notoriously places where the air barrier is interrupted. Alternately, if it does exist, it is often not in contact with the insulation, as it should be.

Verification:

Verifier visually confirms and photographs this measure.

6.19.6Accountability Form: **Insulation Contractor**

Improve weatherstripping and insulation at existing attic and knee wall access openings. Horizontal Attic Access = R38 min & Vertical Knee Wall Access = R23 min. (Also applies to new access openings being installed in existing attics or knee walls.) Remodel only -011715 es

1 0 0 0 0

Description:

- Notes on drawings and/or specifications indicating work to be done.
- Attic hatch, cover, or door is fully gasketed for an airtight fit.
- Insulation fits snugly and is located to create a continuous thermal barrier in the knee wall or attic ceiling when in place.
- Post-construction photo of access opening—OR—rater verification

Benefit:

Air sealing and insulating is extremely important for energy efficiency, durability, and comfort.

Considerations

Using fiberglass batts to insulate attic access openings can be problematic. The act of opening and closing the opening can cause small glass fibers to become airborne. These can be irritating and unhealthy.

Verification:

Verifier visually confirms and photographs this measure.

6.19.7Accountability Form: **Building Architect / Designer**

1. Inspect and document existing roof ventilation system. (possibly already done if measure 1B-1 was performed) 2. Design and specify venting improvements or conversion to non-vented system. (Projects not needing changes or improvements also qualify) Remodel only -011715 AS

1 0 0 1 0

Description:

- Do documentation and design work as described in credit description above.
- Provide notes on drawings and/or specifications describing work to be done.
- Post-construction photo—OR—rater verification

Benefit:

If a vented roof is part of the overall design of the house, then it must be balanced and working properly. Most houses are designed to have a vented roof. Usually it is a passive system, but occasionally there is one that is mechanically vented. Regardless of the type, it is very common to find them not operating as they should. Many times the proper vent holes were not installed from the beginning. If they do exist, they have often become blocked over time from dust and dirt or carelessly installed insulation. If roof ventilation is not working properly, the effects include the following.

- Damage to the building structure
- Water leaking through the ceiling of upper rooms
- Wet attic insulation, which has very little R-value, and keeps the structure wet, which makes structural decay progress more rapidly.

Verification:

Verifier visually confirms and photographs this measure.

6.19.8Accountability Form: **General Contractor**

Implement design to Install-new and/or improve-existing eave vents, vent chutes, roof vents, etc. ---OR--- Convert to non-vented. (Non-vented designs must be pre-approved by building code official.)

1 0 0 2 0

Remodel only -011715 AS

Description:

- Do documentation and design work as described in credit description above.
- Provide notes on drawings and/or specifications describing work to be done.
- Post-construction photo—OR—rater verification

Benefit:

If a vented roof is part of the overall design of the house, then it must be balanced and working properly. Most houses are designed to have a vented roof. Usually it is a passive system, but occasionally there is one that is mechanically vented. Regardless of the type, it is very common to find them not operating as they should. Many times the proper vent holes were not installed from the beginning. If they do exist, they have often become blocked over time from dust and dirt or carelessly installed insulation.

If roof ventilation is not working properly, the effects include the following.

- Damage to the building structure
- Water leaking through the ceiling of upper rooms
- Wet attic insulation, which has very little R-value, and keeps the structure wet, which makes structural decay progress more rapidly.

Verification:

Verifier visually confirms and photographs this measure.

6.20 Air sealing/ insulation to vaulted & tray ceilings

6.20.1



Walls = R22 to R29 & Floors = R42 to R49 (assumes unconditioned knee wall area) --OR-- Sloped ceiling 3 2 0 2 0
= R42 to R49 (assumes residually conditioned knee wall area) Remodel only -081814 MF

Description:

- Document existing insulation levels.
- Notes on drawings and/or specifications indicating work to be done.
- If insulating involves open walls or ceilings, then pre-drywall photo of areas insulated—OR—rater verification
- Post-construction photo of areas insulated—OR—rater verification

Benefit:

Important for energy efficiency, durability, and comfort.

Two main approaches exist for air sealing and insulating the knee wall space.

1. Air seal and insulate the floor and wall of the knee wall area making the knee wall area unconditioned space
2. Air seal along the sloped ceiling (roof) of the knee wall area, which means it will receive some residual conditioning from the main living area. Sometimes this is preferred to allow the knee wall area to function as a more frequently used storage space. This might also be preferred if the knee wall space is already being used for storage and already has flooring. It would potentially require more time and effort to remove the flooring, air seal/insulate the floor, and then replace the flooring, than it would be to just insulate the ceiling.

Verification:

Verifier visually confirms and photographs this measure.

6.20.2Accountability Form: **Insulation Contractor**

Walls = R15 to R21 & Floors = R38 to R41 (assumes unconditioned knee wall area) --OR-- Sloped ceiling 2 2 0 2 0
= R38 to R41 (assumes residually conditioned knee wall area) Remodel only -011715 es

Description:

- Document existing insulation levels.
- Notes on drawings and/or specifications indicating work to be done.
- If insulating involves open walls or ceilings, then pre-drywall photo of areas insulated—OR—rater verification
- Post-construction photo of areas insulated—OR—rater verification

Benefit:

Important for energy efficiency, durability, and comfort.

Two main approaches exist for air sealing and insulating the knee wall space.

1. Air seal and insulate the floor and wall of the knee wall area making the knee wall area unconditioned space
2. Air seal along the sloped ceiling (roof) of the knee wall area, which means it will receive some residual conditioning from the main living area. Sometimes this is preferred to allow the knee wall area to function as a more frequently used storage space. This might also be preferred if the knee wall space is already being used for storage and already has flooring. It would potentially require more time and effort to remove the flooring, air seal/insulate the floor, and then replace the flooring, than it would be to just insulate the ceiling

Verification:

Verifier visually confirms and photographs this measure.

6.20.3Accountability Form: **Insulation Contractor**

Walls = R30 or more & Floors = R50 or more (assumes unconditioned knee wall area) --OR-- Sloped ceiling = R50 or more (assumes residually conditioned knee wall area) Remodel only -011715 es

4 2 0 2 0

Description:

- Document existing insulation levels.
- Notes on drawings and/or specifications indicating work to be done.
- If insulating involves open walls or ceilings, then pre-drywall photo of areas insulated—OR—rater verification
- Post-construction photo of areas insulated—OR—rater verification

Benefit:

Important for energy efficiency, durability, and comfort.

Two main approaches exist for air sealing and insulating the knee wall space.

1. Air seal and insulate the floor and wall of the knee wall area making the knee wall area unconditioned space
2. Air seal along the sloped ceiling (roof) of the knee wall area, which means it will receive some residual conditioning from the main living area. Sometimes this is preferred to allow the knee wall area to function as a more frequently used storage space. This might also be preferred if the knee wall space is already being used for storage and already has flooring. It would potentially require more time and effort to remove the flooring, air seal/insulate the floor, and then replace the flooring, than it would be to just insulate the ceiling.

Verification:

Verifier visually confirms and photographs this measure.

6.20.4 Accountability Form: **Insulation Contractor**     

Use spray-foam to air seal and insulate knee walls & floor --OR-- sloped ceiling Remodel only - 011715 1 1 0 0 0
es

Description:

- Document existing insulation levels.
- Notes on drawings and/or specifications indicating work to be done.
- If insulating involves open walls or ceilings, then pre-drywall photo of areas insulated—OR—rater verification
- Post-construction photo of areas insulated—OR—rater verification

Benefit:

Spray foam does a better job with air sealing, which improves energy efficiency and indoor environmental quality over other insulation systems.

Verification:

Verifier visually confirms and photographs this measure.

6.20.5 Accountability Form: **Insulation Contractor**     

Air seal and insulate critical areas (R30 min.) (e.g. rim joist @ eave, joist cavity under knee wall & cavity @ rafter cavity @ top of knee wall) Remodel only -011715 es 6 2 0 2 0

Description:

- Pre-construction photo of areas needing improvement. Notes on drawings and/or specifications describing improvements to be done
- If insulating involves open walls or ceilings, then pre-drywall photo of areas insulated—OR—rater verification
- The rim joist at the eave and the rafter cavity at the top of the knee wall need to be air sealed and insulated regardless of the approach taken to improve the knee wall area.
- The joist cavity under the knee wall only needs to be addressed if the Floor and Wall approach is chosen.
- Post-construction photo of areas insulated—OR—rater verification
- Sheathing or blocking must extend down between the flat ceiling joists to seal the floor joist cavities. Sheathing on air impermeable insulation is not required unless mandated by fire code.

Benefit:

Important for energy efficiency, durability, and comfort.

Verification:

Verifier visually confirms and photographs this measure.

6.21 Improve vaulted & tray ceilings in living area

6.21.1	Accountability Form: Insulation Contractor					
Improvements to finished vaulted and tray ceilings in living area. R25 to R37	Remodel only -011715 es	2	0	0	0	0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Pre-drywall photo—OR—rater verification

Benefit:

- Existing homes frequently have low amounts of insulation at vaulted or tray ceilings. This credit gives incentive to improve the R-value in those areas.
- R25 assumes 3.5" rafter with R6 per inch closed cell spray foam plus R5 rigid (frequently allowed for remodels using hot roof application when finishing attic space. Typically homeowner must sign-off. Other combinations of insulation to achieve specified R-Values can also qualify.

Verification:

Verifier visually confirms and photographs this measure.

6.21.2	Accountability Form: Insulation Contractor					
Improvements to finished vaulted and tray ceilings in living area. R38 to R42	Remodel only -011715 es	4	0	0	0	0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Pre-drywall photo—OR—rater verification

Benefit:

- Existing homes frequently have low amounts of insulation at vaulted or tray ceilings. This credit gives incentive to improve the R-value in those areas.
- R38 assumes 5.5" rafter with R6 per inch closed cell spray foam plus R5 rigid.
- Other combinations of insulation to achieve specified R-Values can also qualify.

Verification:

Verifier visually confirms and photographs this measure.

6.21.3 Accountability Form: **Insulation Contractor**



Improvements to finished vaulted and tray ceilings in living area. R43 or better Remodel only -011715 6 0 0 0 0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Pre-drywall photo—OR—rater verification

Benefit:

- Existing homes frequently have low amounts of insulation at vaulted or tray ceilings. This credit gives incentive to improve the R-value in those areas.
- R43 assumes 11-1/8" I-joint rafter with 7/8" air space + 1" (~R6) foil faced rigid, + 2" closed cell spray foam ~R12), + 8" high density fiberglass (R25)
- Other combinations of insulation to achieve specified R-Values can also qualify.

Verification:

Verifier visually confirms and photographs this measure.

6.21.4 Remodel only -081814 MF



Air seal and insulate sloped roof / tray ceiling with spray foam. 1 1 0 0 0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Pre-drywall photo—OR—rater verification

Benefit:

- Existing homes frequently have low amounts of insulation at vaulted or tray ceilings. This credit gives incentive to improve the R-value in those areas.
- Spray foam does a better job with air sealing, which improves energy efficiency and indoor environmental quality over other insulation systems.

Verification:

Verifier visually confirms and photographs this measure.

6.21.5 Accountability Form: **Insulation Contractor**



Add 3/4" minimum foil face polyisocyanurate (or equivalent) insulation to existing sloped roof / ceiling for thermal break and vapor retarder (seal all seams with tape or equivalent) Remodel only
-011715 es 1 0 0 0 0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Pre-drywall photo—OR—rater verification

Benefit:

- Existing homes frequently have low amounts of insulation at vaulted or tray ceilings. This credit gives incentive to improve the R-value in those areas.
- Foil faced insulation is a Class 1 Vapor Retarder and applying rigid insulation over the face of the rafters helps prevent thermal bridging through the rafters. Foil must face heated side of the room.
- Equivalent insulations should have a minimum Class 2 Vapor Retarder rating and similar R-value.

Verification:

Verifier visually confirms and photographs this measure.

6.22 Roof Imprvd w/Advcd Roofing Mats & Techs

6.22.1 Accountability Form: **Roofing Contractor**



Self sealing bituminous membrane at valleys & penetrations (code required at eaves) Remodel only
-011715 AS 0 0 0 1 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Self-adhesive bituminous membrane is an excellent water barrier, which can seal around fasteners that puncture it. It is an upgrade from the more common 30# building paper. Always assume that water and moisture will get past the primary roofing material as some point, therefore, a good drainage plane is important.

Verification:

Verifier visually confirms and photographs this measure.

6.22.2	Accountability Form: Roofing Contractor					
Self sealing bituminous membrane over entire roof deck Remodel only -011715 AS		0	0	0	2	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Self-adhesive bituminous membrane is an excellent water barrier, which can seal around fasteners that puncture it. It is an upgrade from the more common 30# building paper. Always assume that water and moisture will get past the primary roofing material as some point, therefore, a good drainage plane is important.

Verification:

Verifier visually confirms and photographs this measure.

6.22.3	Accountability Form: Roofing Contractor					
Metal drip edge at all roof edges & "W" shaped valley flashing at valleys Remodel only -011715 AS		0	0	0	1	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Metal drip edge

- Helps ensure that water drips clear of the roof rather than running down the face of the roof fascia and trim.
- Drainage plane above shall direct water flow onto and not behind flashing.

Verification:

Verifier visually confirms and photographs this measure.

6.22.4	Accountability Form: Roofing Contractor					
Metal "W" shaped valley flashing at valleys Remodel only -011715 AS		0	0	0	1	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Metal "W" shaped valley flashing is more durable than just weaving shingles down the valley. Also, the ridge in the middle helps ensure that water from one side of the valley does not cross the valley and go up under the roofing on the opposing side.

Verification:

Verifier visually confirms and photographs this measure.

6.22.5	Accountability Form: Roofing Contractor					
Minimum 40 year roofing material. (min 90% of roof area) Remodel only -011715 AS		0	0	0	1	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Longer warranties and longer life expectancy implies greater durability.

Verification:

Verifier visually confirms and photographs this measure.



6.22.6	Accountability Form: Roofing Contractor					
Minimum 50 year roofing material. (min 90% of roof area) Remodel only -011715 AS		0	0	0	3	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Longer warranties and longer life expectancy implies greater durability.

Verification:

Verifier visually confirms and photographs this measure.

6.22.7	Accountability Form: Roofing Contractor					
Lifetime roofing material (including: slate, metal, concrete, clay, etc.) (min 90% of roof area) Remodel only -011715 AS		0	0	0	5	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Longer warranties and longer life expectancy implies greater durability.

Verification:

Verifier visually confirms and photographs this measure.



6.22.8

Accountability Form: **Roofing Contractor**



Roofing material with ENERGY STAR Cool Roof certification. (90% min. of roof area) Remodel only
-011715 AS

1 0 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Roofing that has the ENERGY STAR Cool Roof certification will stay cooler, and therefore contribute less to summer cooling requirements in the house. This effect is more pronounced in warmer climates where lower insulation R-values are common, but it still has a slight benefit in cold climates.

Verification:

Verifier visually confirms and photographs this measure.

7. New Floor, Wall, and Roof

7.1 Prerequisites

7.1.4

Accountability Form: **Building Architect / Designer**

Prerequisite



All new attached garages must be built with Breezeway / Mudroom and other measures to minimize the potential for garage pollution to enter the house. 011715 AS

Default Value



Description:

1. Breezeway/mudroom required between the garage and the home. Provide airtight, self-closing doors between breezeway and home and between breezeway and garage. Hard surface flooring (i.e., no carpet) required in breezeway. Walk-off mat required in breezeway.

2. Install air barrier, seal common walls, ceiling and penetrations prior to insulating.

3. Install ENERGY STAR rated exhaust fan in garage.

Option 1: 25 CFM continuous operation.

Option 2: 100 CFM designed to run intermittently based on motion sensor.

Exceptions

Existing attached garages may remain. Homes with an attached garage that is converted to living space, may build a new attached garage provided it meets the requirements. Building a new detached garage also allowed.

Benefit:

Many of the compounds in and around garages are known carcinogens.

Attached garages represent a major source of pollutants that can easily make their way into the house. The above measures help to minimize the risk as much as possible.

Tip: Consider building a detached garage to completely eliminate the risk of garage pollutants from entering the house.

Verification:

7.1.11Accountability Form: **General Contractor**

Prerequisite


Install wind wash barrier over exterior sheathing (shingle fashion) integrate window and door flashing 011715 AS

Default Value

**Description:**

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo-OR-rater sign-off.

Benefit:

Most siding materials cannot prevent 100% of bulk water from getting behind it. A properly installed wind wash barrier is necessary to keep this water from penetrating further into the wall assembly.

Considerations

A wind wash barrier usually needs to be vapor permeable to allow the wall to dry to the exterior, when moisture does manage to get in.

With some advanced wall assemblies the wind wash barrier needs to be a Class 1 or 2 vapor retarder.

Care must be taken to fully understand the building science associated with the wall assembly being used.

Verification:

Verifier visually confirms and photographs this measure.



7.2 New Foundations, Crawlspace, & Slabs

7.2.0

Accountability Form: **General Contractor**



Install soil gas (a.k.a. radon) mitigation system in new basement space (crawlspaces exempt) 011715 0 0 0 0 0
 AS (PREREQ) Default Value

Description:

- Install perforated drain tile under slab or localized pocket filled with granular material.
- Install solid 4" ABS vent pipe from foundation drain tile or localized pocket of granular fill through roof. Do not install vent pipe within exterior walls of the house. Install plumbing penetration boot on roof to prevent water leakage at roof penetration.
- All pipe connections and penetrations through the basement slab to be airtight.
- Test lowest inhabitable area of house for radon at the beginning of occupancy using qualified test kit. Both a 48-hour test and a 90-day test are acceptable. Levels must be below 4 picocuries.
- If dangerous levels of radon are present (more than 4 picocuries per liter), install continuously operating, in-line fan in vent pipe.
- Retest
- If dangerous levels of radon still exist, contact radon mitigation specialist.
- Supply homeowner with a copy of the test results.

Benefit:

Opportunities to stop radon gas from entering the living space or future living space must be taken to ensure the health of occupants. Installing a soil gas vent system, regardless of radon levels, is inexpensive when working within a new space. Radon levels can fluctuate greatly over the life of the home. In addition to mitigating radon risks, soil gas vents also help reduce sub-slab moisture levels, which contributes to a healthier basement environment as well

Verification:

7.2.2

Accountability Form: **General Contractor**



Remember basement risk assessment and Calcium Chloride Test before finishing basement. 011715 0 0 0 0 0
 AS (PREREQ) Default Value

Description:

1. Document bulk water intrusion risk, indicate any protection being planned.
2. Document proposed drying mechanism for walls and floor.
3. Perform Calcium Chloride Measured Vapor Emission Rate (MVER) test on floor –
ASTM F 1869-04. (See also Exceptions Below)
 - Perform a minimum of three (3) tests for the first 1,000 square feet and an additional test for every 1,000 square feet beyond.
 - Test results must be 3 lbs. or less of moisture per 1,000 square feet of area in 24 hours.
 - Install a barrier membrane if more than 3 lbs.
 - Installation specifications for the flooring being installed will have different moisture (MVER) tolerances.

Exceptions

- Calcium Chloride Test is NOT required for GreenStar when new slab is being installed AND new slab has proper vapor retarder installed below it.

Note: If finish material is being added to a new slab, the Calcium Chloride Test MAY still be required by the manufacturer of the finish material. Verify with manufacturer & installer.

Benefit:

Insulating and/or finishing a basement are heavily debated issues from the Green building perspective. It is very risky if the intention is to finish the basement as living space, if AT LEAST one of the following systems does NOT exist:

1. Exterior bulk water management system consisting of foundation waterproofing and footing drain tile —OR— exterior drainage plane and drain tile.
2. Interior bulk water management system consisting of drainage plane on wall, which allows drainage into drain tile with filter fabric under slab, sump pump, and sub-slab soil gas ventilation system.

On the positive side, it is very Green to improve the energy efficiency of this area of the house that is typically not very well insulated or airtight. Also, finishing a basement falls into the Green strategy of increasing living space in a house without increasing the footprint or volume of the house.

The potentially negative side of finishing a basement has to do with the potentially harmful indoor environmental situation that can arise if bulk water and water vapor are not managed well with regard to how the floor, wall, and ceiling assemblies are designed, and the properties of the materials used in them.

If these issues seemed challenging on above-grade walls, basements take this challenge to an even a greater level. They should be addressed with great care, and consulting with a knowledgeable professional is highly recommended!

The following are some assumptions about basements that should always be addressed when insulating or finishing a basement.

- Bulk water will make its way through the wall at some point in the life of the foundation. A good exterior bulk water management system can make this less likely, but if the inside is being finished, designing the inside of the wall to accommodate bulk water if and when it ever does is the prudently safe approach to take.
- Moisture levels can fluctuate greatly. The MVER test is a good way to determine if the slab is dry at a particular time, but that could change if a proper bulk water management system is not in place and weather is rainy for a period of time. Also, it may appear as though no bulk water ever comes through the walls, but that could also change if there is a water leak such as a garden hose left running near the foundation and saturates the outside of the foundation in a way that had not happened prior.
- Radon levels can fluctuate over time as well. Cracks in the floor slab or foundation wall that are common over time, can let more radon in. Also radon seepage through the soil under or to the side of the foundation can change as well.
- Taking care to understand the risks of finishing a basement cannot be emphasized enough.

Resources

- See Basement Risk Assessment Worksheet in Checklist or from GreenStar.
- Hiring a Rater to perform this assessment may be a good idea if others on the design team are not qualified to perform this assessment.
- TBD (perhaps add some drawings of recommended foundation wall sections as described above.)

Verification:

7.2.3Accountability Form: **HVAC****New Crawl spaces shall be conditioned (raised pier foundation with no foundation walls are exempt)**

0 0 0 0 0

011715 AS (PREREQ)

Default Value

Description:

Crawl space is provided with supply air at a rate no less than 0.02 cfm per square foot of horizontal area and equal size exhaust opening to the conditioned space.

Air seal and insulate crawl space walls, and insulate rim joists to code (minimum requirement – see additional credits for beyond-code insulation and air sealing).

Benefit:

- A conditioned crawl space has the following benefits.
- Reduced risk of mold since it stays drier
- Allows for air supply and return ducts to be free of insulation.
- Mechanical and electrical systems and the building structure itself are easier to maintain and modify in the future when the crawl space is conditioned.
- It increases the comfort of the room above,
- EEBA Water Management Guide and EEBA Climate Specific Builder's Guide for crawl spaces.

Resources

EEBA Water Management Guide and EEBA Climate Specific Builder's Guide for crawl spaces.

Verification:

Visually inspect and photograph implementation of this measure.

7.2.4Accountability Form: **General Contractor****Properly install class 1 or 2 vapor retarder on top of basement and/or crawl space soil or gravel.**

0 0 0 0 0

011715 AS (PREREQ)

Default Value

Description:

- Install vapor barrier and seal to foundation wall and penetrations
- 100% coverage is mandatory.

Benefit:

Prevents bulk water, water vapor and other soil gasses from entering living space or interior finish systems. It prevents moisture and soil gasses from leaking into basement or crawl space through slab.

Verification:

Visually inspect and photograph implementation of this measure.

7.2.5Accountability Form: **General Contractor**

Install 4" bed of 3/4" diameter or greater clean or washed gravel on top of basement and/or crawlspace soil before any other flooring work is done. 011715 AS

0 1 0 1 0

Description:

A minimum 4" deep gravel bed shall be installed beneath all concrete floor slabs. If plastic vapor barrier is installed, plastic must be on top of gravel. Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Provides capillary break and drainage medium for water, water vapor, and other gasses.

Considerations

No sand allowed

Only if existing soil is not free-draining or gravel.

Verification:

Verifier visually confirms and photographs this measure.

7.2.6Accountability Form: **General Contractor**

Recycled concrete, asphalt or glass for base or fill 011715 AS

0 0 2 2 0

Description:

- Verify the aggregate size is appropriate for the intended use.

- Verify with structural engineer before using any reused materials in poured concrete that has critical structural functions including foundation walls and footings.

- Notes on drawings and/or specifications indicating product to be used.

- Invoice—OR—letter indicating type and source of recycled material

Benefit:

Efficient reuse of materials that are commonly put in landfill

Verification:

Provide documentation or calculations for this measure.

7.2.8Accountability Form: **Insulation Contractor**



Insulation for NEW SLAB FLOORS. Select from drop down list 011715 AS

2/4/6 0 0 0 0

(1. R-5 rigid insulation at basement floating floor slab. / 2. R-10 rigid insulation at basement slab or on-grade floating floor slab. / 3. R-15 rigid insulation at basement OR on grade floating floor slab.)

Description:

1. R-5 rigid insulation at edge and under entire basement floating floor slab. (assumes NO in-floor radiant heat).
 - No In-floor heat. Minimal rigid insulation being added for moderate energy efficiency and increased comfort.
2. R-10 rigid insulation at slab edge and under entire basement slab or on-grade floating floor slab.
 - Floor with or without in-floor heat. If high thermal mass floor is beneficial (i.e., floor is to be heated continuously during heating season and fast temperature response time is not necessary) then insulate only 8' width under slab at perimeter.
3. R-15 rigid insulation at edge and under entire basement OR on grade floating floor slab. (suitable for in-floor radiant heat)
 - Floor with or without in-floor heat. If high thermal mass floor is beneficial (i.e., floor is to be heated continuously during heating season and fast temperature response time is not necessary) then insulate only 8' width under slab at perimeter.

Requirements

- Insulate slab to as indicated with rigid insulation by a code-approved assembly including a minimum continuous 6 mil poly sheeting between insulation and slab.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Exceptions

- If closed cell spray foam is used, 6 mil poly can be omitted.
- For ICF foundations, additional slab edge insulation can be adjusted according to the R-value of the ICF wall insulation for total slab edge R-value. Normal under-slab insulation still applicable as specified in credit language above.

Benefit:

- Insulating the slab conserves energy for heating and gives greater thermal comfort under foot.
- Slabs lose energy primarily as a result of heat conducted outward and through the perimeter of the slab, rather than evenly downward through the slab.
- Insulating the edge and perimeter of the slab is almost always an effective measure and very cost effective strategy.
- Insulating under the middle area of the slab is also helpful, but in some instances it may be better to leave it out.

Examples

If the slab is going to be heated continuously throughout the heating season, leaving the insulation out of the center area of the slab allows the ground under the slab to act as greater thermal mass and actually improve the overall system performance.

If the slab is going to be heated intermittently (e.g., cabin) then full insulation is better, and in fact, at some point, if the heating is very intermittent, a high mass in-floor system is a poor choice all together.

The best overall slab insulation strategy that is used is somewhat dependent on the overall house design and heating strategy.

Verification:

Visually inspect and photograph implementation of this measure.

7.2.9

Accountability Form: **Insulation Contractor**

**Exterior foundation insulation. Select one.** 011715 AS

2/4/6 1/2/2 0 0 0

(1. R-15 continuous exterior foundation insulation. / 2. R-20 continuous exterior foundation insulation. / 3. R-25 continuous exterior foundation insulation.)

Description:

1. R-15 continuous exterior foundation insulation. Top of foundation to top of footing or frost depth, which ever is greater.
2. R-20 continuous exterior foundation insulation. Top of foundation to top of footing or frost depth, which ever is greater.
3. R-25 continuous exterior foundation insulation. Top of foundation to top of footing or frost depth, which ever is greater.

- Notes on drawings and/or specifications indicating work to be done or product to use.

- Post-installation photo—OR—rater verification

Exceptions

If closed cell spray foam is used, 6 mil poly can be omitted.

Benefit:

Reduces the potential for heat loss, condensation and corresponding growth of mold, and increases the livability of below-grade rooms.

Helps protect below grade waterproofing.

Insulating the exterior of the foundation is typically thought to be the best way to insulate a foundation wall.

Verification:

Visually inspect and photograph implementation of this measure.

7.2.10Accountability Form: **Masonry Contractor**

Take measures to minimize and control cracking in interior concrete slabs. Install reinforcing AND provide control joints at proper locations. 011715 AS

0 0 0 1 0

Description:

- Install reinforcing as stated in credit language above. Some acceptable types include Welded Wire Fabric (WWF), rebar, and fiber reinforced concrete.
- Install control joints at proper locations.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

Helps improve durability of other materials installed on top of the concrete.

Resources

- Control joint layout guide. See also:
- www.concretenetwork.com/concrete/slabs/controljoints.htm
- Be active in deciding where control joints will be placed.
- Control joints are planned for cracks, which allow for movements caused by temperature changes and drying shrinkage. In other words, if the concrete does crack, you'll want to play an active role in deciding where it will crack and that it will crack in a straight line instead of randomly.
- Space joints properly. Space joints (in feet) no more than 2-3 times the slab thickness (in inches). A 4" slab should have joints 8-12' apart.
- Cut joints. Grooving tools cut joints in fresh concrete. Saw cutting cuts joints as soon as the concrete is hard enough that the edges abutting the cut do not chip from the saw blade.
- Cut joints deep enough. Cut joints 25% of the depth of the slab. A 4" thick slab should have joints 1" deep.
- Cut joints soon enough. In hot weather, concrete might crack if joints are not cut within 6-12 hours after finishing concrete. In this condition, if you don't want to use a grooving tool to cut joints, there are early-entry dry-cut lightweight saws that can be used almost immediately after finishing. These saws cut 1" to 3" deep, depending on the model.
- Place joints under walls or other areas where they will not be seen.

Verification:

Verifier visually confirms and photographs this measure.

7.2.11Accountability Form: **Masonry Contractor****Fly Ash used in concrete. (percent substitution by weight) Select one:** 011715 AS

1/2 1 0 1/2 0

(25% to 39% / 40% or more)

Description:

- Replace a minimum of 25% of the Portland cement in all concrete used for footings, foundation and basement walls, and slabs with fly ash or slag.
- CMU manufactured with fly ash may also qualify if percentage is met.
- Verify with structural engineer to determine that the amount of fly ash specified for the concrete is acceptable for the intended use and required strength.
- Notes on drawings and/or specifications indicating fly ash to be used.
- Documentation from concrete manufacturer Indicating fly ash content.

Benefit:

- Efficient use of by-product primarily produced by burning coal.
- Fly ash strengthens concrete
- Fly ash also increases the R-value of concrete.

Considerations

Fly ash can prolong the curing time of concrete, but this can be partially offset by the fact that lesser amounts of water can be used since it also improves the workability of the concrete. Different classes of fly ash are produced from burning different types of coal. Class C and Class F are common, but Class C is more likely to be available in Minnesota.

Depending on the type of fly ash used, where concrete will be exposed to freeze-thaw cycles, fly ash concentration may be limited to 56% or less and/or air entrainment chemicals may need to be increased since fly ash partially negates the effectiveness of them. In certain applications, Class C fly ash can replace up to 100% of cement in concrete.

Resources

Environmental Building News, The Fly Ash Revolution: Making Better Concrete with Less Cement

Verification:

Provide documentation or calculations for this measure.

7.2.12Accountability Form: **Masonry Contractor****Low toxicity form release agents used on concrete form work** 011715 AS

0 1 0 0 0

Description:

Notes on drawings and/or specifications indicating product to be used.

Manufacturer specifications for form release agent

Benefit:

Better for workers and less likely to harm indoor environmental quality.

Resources

Typically water-based and/or soy-derived formulations qualify.

Verification:

Provide documentation or calculations for this measure.

7.2.13Accountability Form: **Masonry Contractor****Reusable footing and foundation forms are used** 011715 AS

0 0 0 1 0

Description:

Notes on drawings and/or specifications indicating forms to be used.

Photo of forms being used—OR—rater verification

Benefit:

Reusing foundation forms again and again keeps regularly used materials out of the landfills. Use aluminum, steel, or other durable foundation forms

Verification:

Visually inspect and photograph implementation of this measure.



7.2.14

Accountability Form: **Masonry Contractor**



Install 4" min. perforated foundation drain w/ 3/4" gravel and filter fabric at outside perimeter of new footings. (top of tile below bottom of interior slab floor) 011715 AS

0 1 0 1 0

Description:

- Drain to daylight or interior sump pump.
- Top of tile to be below bottom of basement slab.
- Surround pipe with minimum 6" of 3/4" washed or clean gravel that is fully wrapped with geo-textile fabric. All drain lines shall be connected and exited downhill from the foundation—OR—drain into sealed sump basket with pump
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

Removes bulk water and helps remove water vapor and soil gases if attached to soil gas vent pipe.

Considerations

Rigid drain systems are preferred over compressible foundation drains, as the long-term quality of the compressible drains is unknown, especially after backfill has been installed. If draining to daylight, a proper screen or cap must be installed at end of pipe to prevent rodents from entering drainpipe.

Verification:

Visually inspect and photograph implementation of this measure.

7.2.15Accountability Form: **Masonry Contractor**

Install 4" min. perforated foundation drain w/ 3/4" gravel and filter fabric at inside perimeter of new footings. 011715 AS 0 1 0 1 0

Description:

- Drain to interior sump pump.
- Top of tile to be below bottom of basement slab. Pipe shall be surrounded with minimum 6" of 3/4" washed or clean gravel that is fully wrapped with geo-textile fabric.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

Removes bulk water and helps remove water vapor and soil gases if attached to vent pipe.

Considerations

Rigid drain systems are preferred over compressible foundation drains, as the long-term quality of the compressible drains is unknown, especially after backfill has been installed.

Verification:

Verifier visually confirms and photographs this measure.

7.2.16Accountability Form: **Masonry Contractor**

Install frost protected shallow foundation. (cannot be used in connection with other types of foundations. See Also IRC Code R403.3) 011715 AS

0 0 0 3 0

Description:

- Design addition using frost protected shallow foundation system.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification
- Must tie into home with a type of footing.

Benefit:

Less excavating and material for foundation

Considerations

- For connection to structures with pre-existing frost protected shallow foundation only.
- Cannot be connected to any other type of footing.

Resources

International Residential Code (IRC)

Frost Protected Shallow Foundation Design Specifications:

www.buildingfoundation.u.edu/MHFAfrostFoundation.htm

Verification:

Verifier visually confirms and photographs this measure.

7.2.17Accountability Form: **Masonry Contractor**

Provide capillary breaks. 1. between top of footings and bottom of foundation wall. 2. below slabs. 3. where cementitious products connect to framing material (i.e. garage floors, stoops, and porches) 0 0 0 1 0

011815 ms

Description:

- Install a capillary break between concrete foundation wall and sill plate. Only membranes that are Class 1 or 2 Vapor Retarders are acceptable.
- Sill gaskets (a.k.a. sill sealers) separating wall sill plates from concrete must be the full width of the wall sill plate.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

- Cementitious products like concrete and masonry are like a sponge. They will absorb and wick water internally due to capillary action. This means water can move up a concrete structure against the force of gravity.
- Capillary movement of water through footings and up the foundation wall is commonly overlooked.

Verification:

Verifier visually confirms and photographs this measure.

7.2.18Accountability Form: **Masonry Contractor**

Foundation built with insulated concrete forms (ICF) or Insulated concrete "T" Mass or equivalent system with a minimum of R14 011815 ms 3 2 0 1 0

Description:

- Must provide insulation for a minimum 90% of foundation or exterior walls.
- Walls shall be installed according to manufacturer's specifications.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

- Insulated concrete forms allow for continuous insulation inside as well as outside the building envelope for the excellent insulating effect.

Considerations

If Thermo Mass T-Mass walls are used as the finish surface, Resource Efficiency points may be granted through the Innovation Section

Verification:

Verifier visually confirms and photographs this measure.

7.2.19Accountability Form: **Masonry Contractor****Insulated pre-cast concrete foundation system is used w/ min. R-10 Insulation.** 011815 ms

2 1 0 1 0

Description:

- Must provide insulation for a minimum 90% of foundation or exterior walls.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

Resource efficient and durable foundation system.
Often times a gravel-only footing can be used with this system.

Verification:

Verifier visually confirms and photographs this measure.

7.2.20Accountability Form: **Masonry Contractor****Foundation walls are solid concrete -- OR -- CMU wall with top course of filled cores, solid block or bond beam.** 011815 ms

0 0 0 1 0

Description:

- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

Basically this credit is to give incentive to NOT leave CMU cores open at the top.
Open CMU cores can contribute to problems with high moisture content in the rim joist assembly above them

Verification:

Verifier visually confirms and photographs this measure.

7.2.21Accountability Form: **Masonry Contractor****Use reclaimed material for foundation. i.e. reclaimed CMU. Select One:** 011815 ms

0 0 0 2/3/4 0

(30% to 49% / 50% to 89% / 90% or more)

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Invoice—OR—letter indicating source of reclaimed product.

Benefit:

Use of reclaimed materials always contributes to a very efficient use of materials overall.

Considerations

Care must be taken to ensure that reclaimed materials are still structurally sound.

Verification:

Provide documentation or calculations for this measure.

7.2.22Accountability Form: **Masonry Contractor****Water based waterproofing system** 011815 ms

0 0 0 1 0

Description:

- Install waterproofing on exterior of foundation continuous from top of grade to bottom of footing.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

Water based products typically have less harmful effects on the environment in their life cycle than asphalt based products.

Verification:

Verifier visually confirms and photographs this measure.

7.2.23Accountability Form: **Masonry Contractor**

Install material which protects waterproof membrane and functions as a hydrostatic pressure release. (I.e. dimpled polyethelene, poroused fibergalss board) 011815 ms

0 0 0 2 0

Description:

- Must be used with an exterior perforated footing drain tile.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

- Protects waterproof membrane from becoming damaged.
- Allows water to run off the surface of foundation without penetrating the waterproof membrane
- The hydrostatic pressure release material usually has a texture to it which allows gravity to pull bulk water down to foundation drain before it has a chance to build up pressure against the water proof membrane.
- Dimpled sheeting is considered a hydrostatic pressure release.

Resources

- Dimpled sheeting qualifies.
- Some thick fiberglass boards qualify and are designed to also provide added insulation value.
- Rigid insulation does NOT qualify unless specifically designed for this purpose.

Verification:

Verifier visually confirms and photographs this measure.

7.2.24	Accountability Form: General Contractor					
Foundation walls not covered with masonry veneer cladding are capped with sun interrupted termite sheet metal, plastic or equivalent termite shield that extends a minimum of 1/2 inch beyond the interior and exterior sides of the wall, before installation 011815 ms	0	0	0	1	0	

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Largely due to recent winters being fairly mild, termites appear to be migrating north into the southern areas of cold climates.

Verification:

Verifier visually confirms and photographs this measure.

7.2.25	Accountability Form: General Contractor					
Install vapor impermeable, dimpled sheet continuous from under slab to top of interior foundation wall. Seal all edges. 011815 ms	0	0	0	2	0	

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

- Extra protection against bulk water leaks in the foundation, in the event that the exterior waterproofing fails. Even when exterior waterproofing exists, additional protection on the interior against bulk water leaks can be money well spent.
- Serves as an interior vapor barrier, while maintaining an air space at the surface of the interior of the foundation wall, which allows the foundation wall to dry to the interior when it does get wet.
- Combining this system with an interior foundation drain and a soil gas vent is highly recommended. This combination of systems increases their effectiveness and helps to lower short-term and long-term levels of moisture and other harmful soil gasses.

Verification:

Verifier visually confirms and photographs this measure.

7.2.26Accountability Form: **Insulation Contractor****Air seal and insulate foundation to R-15 or better on interior.** 011815 ms

1 0 0 0 0

Description:

- Air sealing must include gaps and penetrations in the rim joists, and penetrations through walls.
- Air seal on interior of foundation wall must be made continuous with capillary break at top of foundation wall.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

Contributes to a more energy efficient house.

Considerations

Be careful not to design and install an assembly that drives moisture up into the rim joist assembly area.

Verification:

Verifier visually confirms and photographs this measure.

7.2.27Accountability Form: **Insulation Contractor****Use spray foam to air seal and insulate interior foundation walls and rim joists.** 011815 AS

1 0 0 1 0

Description:

Note: If foundation cannot dry to exterior above grade through minimum of 16" of exposed foundation and/or rim joist area is not separated from foundation by a capillary break, then closed cell foam insulation CANNOT exceed the thickness that would reduce its vapor permeability to 1 perm or less.

- Air seal all seams including the seam between the vapor barrier and the foundation. Mastic is recommended for sealing because tape will fail over time.

- Notes on drawings and/or specifications indicating work to be done or product to use.

- Post-installation photo—OR—rater verification

Benefit:

Rim joists are commonly under-insulated, so by properly insulating the rim joists the insulation value of the wall system greatly increases. Spray foam helps fill small gaps not normally sealed by fiberglass batt insulation.

Considerations

Be careful not to design and install an assembly that drives moisture up into the rim joist assembly area.

Verification:

Verifier visually confirms and photographs this measure.

7.2.28Accountability Form: **General Contractor****Use steel studs to furr out new foundation walls for basement finishing.** 011815 AS

0 1 0 2 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

If moisture and temperature conditions are ever right for mold growth, steel studs will not supply food source that mold needs like wood does.

Steel studs typically are made from post-consumer recycled steel, and it is nearly infinitely recyclable when it is removed from the house.

Verification:

Verifier visually confirms and photographs this measure.

7.2.29	Accountability Form: Masonry Contractor					
Slope garage slab toward main vehicle entry door. (minimum 1/8" per foot)	011815 AS	0	0	0	1	0

Description:

- Garage floor plan must have construction notes stating slope and direction of drainage
- Floor drains may not connect to the storm sewer system
- Rater verification

Benefit:

Improper drainage can lead to undesirable standing water inside the garage and potential rotting of wall studs.

Verification:

Verifier visually confirms and photographs this measure.

7.3 New Ext Walls AG, FramedFlrs, Part' Walls&Ceilings

7.3.0	Accountability Form: General Contractor					
Use of reclaimed (a.k.a. re-used) Beams & Headers	011815 AS (50% to 69% / 70% to 89% / 90% or more)	0	0	1/2/2	2/3/4	0

Description:

- Notes on drawings and/or specifications indicating work to be done or product to use.
- Invoice—OR—letter indicating source and/or purchase of product.

Benefit:

Use of reclaimed materials contributes to a very efficient use of materials overall.

Considerations

Care must be taken to ensure that reclaimed materials are still structurally sound.

Verification:

Provide documentation or calculations for this measure.

7.3.2Accountability Form: **General Contractor**

Use of reclaimed (a.k.a. re-used) Floor Joists 011815 AS (50% to 69% / 70% to 89% / 90% or more) 0 0 1/2/2 2/3/4 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Invoice—OR—letter indicating source and/or purchase of product.

Benefit:

Use of reclaimed materials contributes to a very efficient use of materials overall.

Considerations

Care must be taken to ensure that reclaimed materials are still structurally sound.

Verification:

Provide documentation or calculations for this measure.

7.3.3Accountability Form: **General Contractor**

Use of reclaimed (a.k.a. re-used) subfloors 011815 AS (50% to 69% / 70% to 89% / 90% or more) 0 0 1/2/2 2/3/4 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Invoice—OR—letter indicating source and/or purchase of product.

Benefit:

Use of reclaimed materials contributes to a very efficient use of materials overall.

Considerations

Care must be taken to ensure that reclaimed materials are still structurally sound.

Verification:

Provide documentation or calculations for this measure.

7.3.4Accountability Form: **General Contractor****Use of reclaimed (a.k.a. re-used) wall framing materials** 011815 AS

0 0 1/1/2/2 2/3/4/5 0

(30% to 49% / 50% to 69% / 70% to 89% / 90% or more)

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Invoice—OR—letter indicating source and/or purchase of product.

Benefit:

Use of reclaimed materials contributes to a very efficient use of materials overall.

Considerations

Care must be taken to ensure that reclaimed materials are still structurally sound.

Verification:

Provide documentation or calculations for this measure.

7.3.5Accountability Form: **General Contractor****Use of reclaimed (a.k.a. re-used) Vaulted Roof / Ceiling Framing** 011815 AS (50% to 89% / 90% or more)

0 0 1/2 2/3 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Invoice—OR—letter indicating source and/or purchase of product.

Benefit:

Use of reclaimed materials contributes to a very efficient use of materials overall.

Considerations

Care must be taken to ensure that reclaimed materials are still structurally sound.

Verification:

Provide documentation or calculations for this measure.

7.3.6

Accountability Form: **General Contractor**

Engineered wood, steel or trusses used. (Steel required to have min. 30% recycled content to qualify) 0 0 0 1/2 0
Beams & Headers in walls & floors 011815 AS (60% to 89% / 90% or more)

Description:

- Qualifying materials generally included anything that is not solid sawn wood, such as LVL, I-Joist, PSL, Timber Strand, finger jointed, floor truss, steel studs with minimum 25% recycled content, and others to be determined.
- If steel studs are used in the heated envelope, continuous R10 rigid insulation must be installed to the outside of them to prevent thermal bridging.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-Installation photo—OR—rater verification

Benefit:

Engineer products use wood more efficiently.

Given the limited availability of large, old growth trees today, it is also difficult to get solid sawn structural members that are as dimensionally stable and resist warping as much as engineered products.

Steel studs typically are made from 25% post-consumer recycled steel, and it is nearly infinitely recyclable when it is removed from the house.

Considerations

Steel joists and heavy structural components have less recycled content, but are more stable than other building materials

Verification:

Verifier visually confirms and photographs this measure.

7.3.7Accountability Form: **General Contractor**

Engineered wood, steel or trusses used. (Steel required to have min. 30% recycled content to qualify). Floor Joists 011815 AS (60% to 89% / 90% or more)

0 0 0 1/2 0

Description:

- Qualifying materials generally included anything that is not solid sawn wood, such as LVL, I-Joist, PSL, Timber Strand, finger jointed, floor truss, steel studs with minimum 25% recycled content, and others to be determined.

- If steel studs are used in the heated envelope, continuous R10 rigid insulation must be installed to the outside of them to prevent thermal bridging.

- Notes on drawings and/or specifications indicating work to be done or product to use.

- Post-Installation photo—OR—rater verification

Benefit:

Engineer products use wood more efficiently. Given the limited availability of large, old growth trees today, it is also difficult to get solid sawn structural members that are as dimensionally stable and resist warping as much as engineered products.

Steel studs typically are made from 25% post-consumer recycled steel, and it is nearly infinitely recyclable when it is removed from the house.

Considerations

Steel joists and heavy structural components have less recycled content, but are more stable than other building materials

Verification:

Verifier visually confirms and photographs this measure.

7.3.8

Accountability Form: **General Contractor**

Engineered wood, steel or trusses used. (Steel required to have min. 30% recycled content to qualify) Wall Framing 011815 AS (30% to 49% / 50% to 89% / 90% or more)

0 0 0 2/3/4 0

Description:

- Qualifying materials generally included anything that is not solid sawn wood, such as LVL, I-Joist, PSL, Timber Strand, finger jointed, floor truss, steel studs with minimum 25% recycled content, and others to be determined.

- If steel studs are used in the heated envelope, continuous R10 rigid insulation must be installed to the outside of them to prevent thermal bridging.

- Notes on drawings and/or specifications indicating work to be done or product to use.

- Post-Installation photo—OR—rater verification

Benefit:

Engineer products use wood more efficiently. Given the limited availability of large, old growth trees today, it is also difficult to get solid sawn structural members that are as dimensionally stable and resist warping as much as engineered products.

Steel studs typically are made from 25% post-consumer recycled steel, and it is nearly infinitely recyclable when it is removed from the house.

Considerations

Steel joists and heavy structural components have less recycled content, but are more stable than other building materials

Verification:

Verifier visually confirms and photographs this measure.

7.3.9

Accountability Form: **General Contractor**

Subfloor with no added urea-formaldehyde (min. 90% of all new subfloor) 011815 AS

0 1 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Manufacturer Documentation of product specifications.

Benefit:

Urea-formaldehyde is a known carcinogen, and has been a common ingredient in the glues used in engineered building materials.

Phenyl-formaldehyde is a component naturally found in wood products and is different from urea-formaldehyde.

Verification:

Provide documentation or calculations for this measure.

7.3.10	Accountability Form: General Contractor					
Plywood or OSB with no added urea-formaldehyde. (min. 90% of sheathing) 011815 AS		0	0	2	0	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Manufacturer Documentation of product specifications.

Benefit:

Urea-formaldehyde is a known carcinogen, and has been a common ingredient in the glues used in engineered building materials.

Phenyl-formaldehyde is a component naturally found in wood products and is different from urea-formaldehyde.

Verification:

Provide documentation or calculations for this measure.

7.3.11	Accountability Form: General Contractor					
Install Fiberglass coated gypsum board for exterior wall sheathing. (min. 90% of sheathing) 011815 AS		0	1	0	2	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Manufacturer Documentation of product specifications.

Benefit:

Urea-formaldehyde is a known carcinogen, and has been a common ingredient in the glues used in engineered building materials.

Phenyl-formaldehyde is a component naturally found in wood products and is different from urea-formaldehyde.

Verification:

Provide documentation or calculations for this measure.

7.3.12 Accountability Form: **General Contractor**     

Install Magnesium board for exterior wall sheathing (a.k.a. MgO) (min. 90% of all new wall sheathing) 011815 AS

0 1 0 3 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Manufacturer Documentation of product specifications.

Benefit:

Urea-formaldehyde is a known carcinogen, and has been a common ingredient in the glues used in engineered building materials.

Phenyl-formaldehyde is a component naturally found in wood products and is different from urea-formaldehyde.

Verification:

Provide documentation or calculations for this measure.

7.3.13 Accountability Form: **General Contractor**     

Certification of structural wood products. Plywood, OSB or other sheathing is FSC certified. 011815 AS (50% to 89% / 90% or more)

0 0 1/2 1/2 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Invoice and Forest Stewardship Council Certification documentation

Benefit:

Forest Stewardship Council certification ensures that the lumber is coming from a well-managed forest.

FSC has paved the way for Forest Stewardship Council certification of wood products and other certification programs are moving toward equally good standards.

Verification:

Provide documentation or calculations for this measure.

Verifier visually confirms and photographs this measure.



7.3.14

Accountability Form: **General Contractor**



Certification of structural wood products. Framing Lumber is FSC certified. 011815 AS
(50% to 89% / 90% or more)

0 0 1/2 1/2 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Invoice and Forest Stewardship Council Certification documentation

Benefit:

Forest Stewardship Council certification ensures that the lumber is coming from a well-managed forest.

FSC has paved the way for Forest Stewardship Council certification of wood products and other certification programs are moving toward equally good standards.

Verification:

Provide documentation or calculations for this measure.

Verifier visually confirms and photographs this measure.

7.3.15Accountability Form: **General Contractor**

Local Sourcing of structural products. Plywood, OSB or other sheathing is local. 011815 AS 0 0 0/1 2/3 0
(50% to 89% / 90% or more)

Description:

- LOCALLY SOURCED materials are those that are extracted, harvested, or salvaged/recovered AND produced within 500 miles of the project.
- In this program, 90% of the material(s) in a product must be locally sourced to receive credit. If the product has multiple materials, the source for all of the materials must be documented.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification
- Invoice and/or other documentation indicating source

Benefit:

The goal in returning to locally sourced and produced products is to reduce energy used in transportation as well as to stimulate local economies and jobs.

Local materials may have the added advantage of being exclusive to a region thus providing the opportunity for unique or one of a kind design

Verification:

Verifier visually confirms and photographs this measure.

7.3.16Accountability Form: **General Contractor**

Local Sourcing of structural products. Framing Lumber is local. 011815 AS (50% to 89% / 90% or more) 0 0 0/1 2/3 0

Description:

- LOCALLY SOURCED materials are those that are extracted, harvested, or salvaged/recovered AND produced within 500 miles of the project.
- In this program, 90% of the material(s) in a product must be locally sourced to receive credit. If the product has multiple materials, the source for all of the materials must be documented.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification
- Invoice and/or other documentation indicating source

Benefit:

The goal in returning to locally sourced and produced products is to reduce energy used in transportation as well as to stimulate local economies and jobs.

Local materials may have the added advantage of being exclusive to a region thus providing the opportunity for unique or one of a kind design.

Verification:

Verifier visually confirms and photographs this measure.

7.3.17 Accountability Form: **General Contractor**

Panelized construction systems are used. Wood framed panels (min. 80% of interior walls) 011815 AS 0 0 0 2 0

Description:

Must be installed according to manufacturer's specifications.

Panel plan from panel manufacturer

Post-installation photo—OR—rater verification

Benefit:

Panelized construction eliminates waste not only on the construction site but in the factory as well, where walls can be carefully planned.

SIPs are even more resource efficient and energy efficient than wood framed panel systems.

Resources

Structural Insulated Panel Association, www.sips.org

Verification:

Verifier visually confirms and photographs this measure.

7.3.18 Accountability Form: **General Contractor**

Panelized construction systems are used. Wood framed panels (min. 80% of exterior walls) 011815 AS 0 1 0 2 0

Description:

Must be installed according to manufacturer's specifications.

Panel plan from panel manufacturer

Post-installation photo—OR—rater verification

Benefit:

Panelized construction eliminates waste not only on the construction site but in the factory as well, where walls can be carefully planned.

SIPs are even more resource efficient and energy efficient than wood framed panel systems.

Resources

Structural Insulated Panel Association, www.sips.org

Verification:

Verifier visually confirms and photographs this measure.

7.3.19Accountability Form: **General Contractor****Panelized construction systems are used. Structural Insulated Panels (SIP) (min. 80% exterior walls)**

1 0 0 2 1

011815 AS

Description:

Must be installed according to manufacturer's specifications.

Panel plan from panel manufacturer

Post-installation photo—OR—rater verification

Benefit:

Panelized construction eliminates waste not only on the construction site but in the factory as well, where walls can be carefully planned.

SIPs are even more resource efficient and energy efficient than wood framed panel systems.

Resources

Structural Insulated Panel Association, www.sips.org

Verification:

Verifier visually confirms and photographs this measure.

7.3.20Accountability Form: **General Contractor**

Panelized construction systems are used. Structural Insulated Panels (SIP) (min. 80% roofs) 011815 AS

1 0 0 2 1

Description:

Must be installed according to manufacturer's specifications.

Panel plan from panel manufacturer

Post-installation photo—OR—rater verification

Benefit:

Panelized construction eliminates waste not only on the construction site but in the factory as well, where walls can be carefully planned.

SIPs are even more resource efficient and energy efficient than wood framed panel systems.

Resources

Structural Insulated Panel Association, www.sips.org

Verification:

Verifier visually confirms and photographs this measure.

7.3.21Accountability Form: **Masonry Contractor**
Insulated Concrete Forms (ICF) or Insulated Concrete "T" Mass walls are used above grade. 011815 AS 3 3 0 3 0
Description:

- Must provide insulation for a minimum 90% of foundation or exterior walls.
- Walls shall be installed according to manufacturer's specifications.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

Insulated concrete forms allow for continuous insulation inside as well as outside the building envelope for the excellent insulating effect.

T-Mass walls are similar, but have the insulation sandwiched between two layers of concrete, which gives the possibility of the concrete serving as the exterior and interior finish. Concrete interior wall finish could be used as thermal mass to help maintain interior temperature and humidity.

Verification:

Verifier visually confirms and photographs this measure.

7.4 Advanced Framing Techniques for wall construction

7.4.0

Accountability Form: **Framing Contractor**



19.2" or 24" o.c. framing 011815 AS

2 0 0 2 0

Description:

- Window framing shall be laid out to eliminate jack studs as it helps eliminate extra framing required. Header hangers or other support as required by code shall be used.
- The intersecting corner of two insulated walls shall be framed such that insulation is continuous in the external wall (corners with unnecessary 2x4s are not permitted). A "California corner" and two-stud corner with drywall clips are methods of achieving this.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

- Advanced Framing Techniques help reduce material usage, construction waste and help increase energy efficiency by reducing the number of studs in a wall
- Sizing and centering windows and doors within a stud bay whenever possible.
- Frame rough openings WITHOUT extra jack studs.
- By aligning upper floor joists or roof trusses on the studs below, only a single top plate is needed. Review construction techniques and have structural engineer approve method and framing layout prior to construction.
- Two-stud corners. Allows for extra insulation in the corners, and also increases the R-value of the wall construction.
- This credit is designed to reward significant changes in the methods used to frame. While developing a baseline for how much framing is required to obtain this credit is difficult, the expectation is that the technique is applied to all framing components and framing comprises a more than token portion of the project. (Framing a 2'x3' closet would not qualify for OVE if framing is 24" o.c.)

Verification:

Verifier visually confirms and photographs this measure.

7.4.2Accountability Form: **Framing Contractor****2 stud corners with drywall clips** 011815 AS

1 0 0 1 0

Description:

- Window framing shall be laid out to eliminate jack studs as it helps eliminate extra framing required. Header hangers or other support as required by code shall be used.
- The intersecting corner of two insulated walls shall be framed such that insulation is continuous in the external wall (corners with unnecessary 2x4s are not permitted). A "California corner" and two-stud corner with drywall clips are methods of achieving this.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

- Advanced Framing Techniques help reduce material usage, construction waste and help increase energy efficiency by reducing the number of studs in a wall
- Sizing and centering windows and doors within a stud bay whenever possible.
- Frame rough openings WITHOUT extra jack studs.
- By aligning upper floor joists or roof trusses on the studs below, only a single top plate is needed. - Review construction techniques and have structural engineer approve method and framing layout prior to construction.
- Two-stud corners. Allows for extra insulation in the corners, and also increases the R-value of the wall construction.
- This credit is designed to reward significant changes in the methods used to frame. While developing a baseline for how much framing is required to obtain this credit is difficult, the expectation is that the technique is applied to all framing components and framing comprises a more than token portion of the project. (Framing a 2'x3' closet would not qualify for OVE if framing is 24" o.c.)

Verification:

Verifier visually confirms and photographs this measure.

7.4.3

Accountability Form: **Framing Contractor**



Single top plate 011815 AS

0 0 0 1 0

Description:

- Window framing shall be laid out to eliminate jack studs as it helps eliminate extra framing required. Header hangers or other support as required by code shall be used.
- The intersecting corner of two insulated walls shall be framed such that insulation is continuous in the external wall (corners with unnecessary 2x4s are not permitted). A "California corner" and two-stud corner with drywall clips are methods of achieving this.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

- Advanced Framing Techniques help reduce material usage, construction waste and help increase energy efficiency by reducing the number of studs in a wall
- Sizing and centering windows and doors within a stud bay whenever possible.
- Frame rough openings WITHOUT extra jack studs.
- By aligning upper floor joists or roof trusses on the studs below, only a single top plate is needed. Review construction techniques and have structural engineer approve method and framing layout prior to construction.
- Two-stud corners. Allows for extra insulation in the corners, and also increases the R-value of the wall construction.
- This credit is designed to reward significant changes in the methods used to frame. While developing a baseline for how much framing is required to obtain this credit is difficult, the expectation is that the technique is applied to all framing components and framing comprises a more than token portion of the project. (Framing a 2'x3' closet would not qualify for OVE if framing is 24" o.c.)

Verification:

Verifier visually confirms and photographs this measure.

7.4.4Accountability Form: **General Contractor****Door & Window headers sized for load** 011815 AS

0 0 0 1 0

Description:

- Window framing shall be laid out to eliminate jack studs as it helps eliminate extra framing required. Header hangers or other support as required by code shall be used.
- The intersecting corner of two insulated walls shall be framed such that insulation is continuous in the external wall (corners with unnecessary 2x4s are not permitted). A "California corner" and two-stud corner with drywall clips are methods of achieving this.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

- Advanced Framing Techniques help reduce material usage, construction waste and help increase energy efficiency by reducing the number of studs in a wall
- Sizing and centering windows and doors within a stud bay whenever possible.
- Frame rough openings WITHOUT extra jack studs.
- By aligning upper floor joists or roof trusses on the studs below, only a single top plate is needed. Review construction techniques and have structural engineer approve method and framing layout prior to construction.
- Two-stud corners. Allows for extra insulation in the corners, and also increases the R-value of the wall construction.
- This credit is designed to reward significant changes in the methods used to frame. While developing a baseline for how much framing is required to obtain this credit is difficult, the expectation is that the technique is applied to all framing components and framing comprises a more than token portion of the project. (Framing a 2'x3' closet would not qualify for OVE if framing is 24" o.c.)

Verification:

Verifier visually confirms and photographs this measure.

7.4.5Accountability Form: **Framing Contractor****Jack studs eliminated. (header hanger used) 011815 AS**

1 0 0 1 0

Description:

- Window framing shall be laid out to eliminate jack studs as it helps eliminate extra framing required. Header hangers or other support as required by code shall be used.
- The intersecting corner of two insulated walls shall be framed such that insulation is continuous in the external wall (corners with unnecessary 2x4s are not permitted). A "California corner" and two-stud corner with drywall clips are methods of achieving this.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

- Advanced Framing Techniques help reduce material usage, construction waste and help increase energy efficiency by reducing the number of studs in a wall
- Sizing and centering windows and doors within a stud bay whenever possible.
- Frame rough openings WITHOUT extra jack studs.
- By aligning upper floor joists or roof trusses on the studs below, only a single top plate is needed. Review construction techniques and have structural engineer approve method and framing layout prior to construction.
- Two-stud corners. Allows for extra insulation in the corners, and also increases the R-value of the wall construction.
- This credit is designed to reward significant changes in the methods used to frame. While developing a baseline for how much framing is required to obtain this credit is difficult, the expectation is that the technique is applied to all framing components and framing comprises a more than token portion of the project. (Framing a 2'x3' closet would not qualify for OVE if framing is 24" o.c.)

Verification:

Verifier visually confirms and photographs this measure.

7.4.6Accountability Form: **Framing Contractor****Insulated T-wall framing used at intersection of interior and exterior walls** 011815 AS

1 0 0 0 0

Description:

- Window framing shall be laid out to eliminate jack studs as it helps eliminate extra framing required. Header hangers or other support as required by code shall be used.
- The intersecting corner of two insulated walls shall be framed such that insulation is continuous in the external wall (corners with unnecessary 2x4s are not permitted). A "California corner" and two-stud corner with drywall clips are methods of achieving this.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Benefit:

- Advanced Framing Techniques help reduce material usage, construction waste and help increase energy efficiency by reducing the number of studs in a wall
- Sizing and centering windows and doors within a stud bay whenever possible.
- Frame rough openings WITHOUT extra jack studs.
- By aligning upper floor joists or roof trusses on the studs below, only a single top plate is needed. - Review construction techniques and have structural engineer approve method and framing layout prior to construction.
- Two-stud corners. Allows for extra insulation in the corners, and also increases the R-value of the wall construction.
- This credit is designed to reward significant changes in the methods used to frame. While developing a baseline for how much framing is required to obtain this credit is difficult, the expectation is that the technique is applied to all framing components and framing comprises a more than token portion of the project. (Framing a 2'x3' closet would not qualify for OVE if framing is 24" o.c.)

Verification:

Verifier visually confirms and photographs this measure.

7.5 Advanced insulation materials & techniques used

7.5.0

Accountability Form: **Insulation Contractor**



Insulation with minimum 20% recycled content is used for at least 50% of applications. (based on R-value x Sq.Ft.) 011815 AS Default Value

0 0 0 1 0

Description:

- Recycled content must be certified by Scientific Certification Systems (SCS) or the manufacturer. SCS is on the web at www.scs1.com
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification
- Manufacturer documentation

Benefit:

Improves energy efficiency

Verification:

Verifier visually confirms and photographs this measure.

7.5.2

Accountability Form: **Insulation Contractor**



All-natural insulation, such as cotton batt, is used for at least 50% of applications. (Soy based foam insulation is not considered "all natural" and is not eligible for credit in this category) 011815 AS

0 2 0 0 0

Description:

- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification
- Manufacturer documentation

Benefit:

Improves energy efficiency

Verification:

Verifier visually confirms and photographs this measure.

7.5.3Accountability Form: **Insulation Contractor****Spray foam insulation applied in new studs** 011815 AS

1 1 0 1 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Manufacturer documentation

Benefit:

Improves energy efficiency

Verification:

Verifier visually confirms and photographs this measure.

7.5.4Accountability Form: **Insulation Contractor****Spray applied wet cellulose insulation (proper drying required before installing wall finish and/or vapor barrier)** 011815 AS

0 2 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Manufacturer documentation

Benefit:

Improves energy efficiency

Verification:

Verifier visually confirms and photographs this measure.

7.5.5Accountability Form: **Building Architect / Designer****Weighted R-value of wall assemblies** 011815 AS

2/3/4/5 0 0 0 0

(R20 to R21 / R22 to R25 / R26 to R30 / R31 or greater)

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Manufacturer documentation

Benefit:

Improves energy efficiency

Verification:

Verifier visually confirms and photographs this measure.

7.5.6Accountability Form: **Insulation Contractor****Rim joist connecting two conditioned floors are insulated to greater than R-23** 011815 AS

1 0 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Manufacturer documentation

Benefit:

Improves energy efficiency

Verification:

Verifier visually confirms and photographs this measure.

7.5.7Accountability Form: **Insulation Contractor****Floor over unheated space air sealed and insulated to minimum R38** 011815 AS

2 0 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Manufacturer documentation

Benefit:

Improves energy efficiency

Verification:

Verifier visually confirms and photographs this measure.

7.5.8Accountability Form: **Framing Contractor****Insulated headers (minimum of 80% of new headers)** 011815 AS

1 0 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Manufacturer documentation

Benefit:

Improves energy efficiency

Verification:

Verifier visually confirms and photographs this measure.

7.6 Advanced air sealing techniques used on new walls.

7.6.0

Accountability Form: **Framing Contractor**



Bottom plates of exterior walls sealed to floor or foundation with a proper sealant 011815 AS

1 0 0 0 0

Description:

Bottom plates of exterior walls sealed to floor or foundation with a proper sealant.

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification.

Benefit:

Improves energy efficiency and durability

Verification:

See accountability form.

7.6.2

Accountability Form: **Framing Contractor**



Seams and penetrations in rim joist between conditioned floors are sealed 011815 AS

1 0 0 1 0

Description:

Air seal penetrations and joints in fireplace framing.

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification.

Benefit:

Improves energy efficiency and durability

Verification:

Verifier visually confirms and photographs this measure.

7.6.3Accountability Form: **Framing Contractor****Seal rim joists at all locations and connection with attic at exterior walls** 011815 AS

1 0 0 0 0

Description:

Seal rim joists at all locations and connection with attic at exterior walls

Need Picture or graphic.

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification.

Benefit:

Improves energy efficiency and durability.

Verification:

Verifier visually confirms and photographs this measure.

7.6.4Accountability Form: **Framing Contractor****Air seal penetrations and joints in fireplace framing** 011815 AS

1 1 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification.

Benefit:

Improves energy efficiency and durability

Verification:

Verifier visually confirms and photographs this measure.

7.6.5Accountability Form: **Framing Contractor****Cantilevered floor sealed above supporting wall** 011815 AS

1 0 0 1 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification.

Benefit:

Improves energy efficiency and durability

Verification:

Verifier visually confirms and photographs this measure.

7.6.6Accountability Form: **Framing Contractor****Stud cavities shall be blocked at locations of varying ceiling height, such as in common walls between adjacent rooms** 011815 AS

1 0 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification.

Benefit:

Improves energy efficiency and durability

Verification:

Verifier visually confirms and photographs this measure.

7.6.7Accountability Form: **General Contractor**

Seal all gypsum or magnesium board penetrations in exterior walls using caulk, gaskets or appropriate connection with gypsum board 011815 AS

1 1 0 1 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification.

Benefit:

Improves energy efficiency and durability

Verification:

Verifier visually confirms and photographs this measure.

7.6.8Accountability Form: **General Contractor**

Seal drywall at top plate, bottom plate and penetrations with gasket, sealant or glue 011815 AS

1 1 0 1 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification.

Benefit:

Improves energy efficiency and durability

Verification:

Verifier visually confirms and photographs this measure.

See accountability form.



7.7 Advanced siding matrls & techniques on new walls

7.7.0

Accountability Form: **General Contractor**



Install continuous drainage plane fully sealed at all penetrations that directs water away from home 011815 AS

0 0 0 1 0

Description:

Install continuous drainage plane fully sealed at all penetrations that directs water away from home.

No cedar or similar siding in direct contact with fiberglass-type drainage plane. Install vertical "sleepers" or use drainage plane appropriate for wood siding.

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Verification:

Verifier visually confirms and photographs this measure.

7.7.2

Accountability Form: **General Contractor**

Vented rain screen installed over sealed drain plane. Possible for all types of siding EXCEPT stucco. Properly installed new or existing stucco qualifies for this credit. 011815 AS

0 0 0 1 0

Description:

For a minimum of 80% of exterior wall area, apply rain screen between sealed drainage plane and exterior cladding to allow water and moisture to escape, and have an air space between the exterior cladding and wall sheathing.

Integrate the system with flashing. Also design and install to minimize moisture migration between the exterior cladding and the wall sheathing.

Rain screen requires air vent at bottom and top.

Pre-siding photo—OR—rater verification

Exceptions

This system should NOT be used with stucco siding.

Benefit:

A vented rain screen behind the siding helps improve the durability of the siding and the rest of the wall assembly. A vented rain screen is a very effective way to prevent bulk water from entering the wall assembly from the exterior, and it improves the wall's ability to dry to the exterior, when and if it does get wet somehow.

Stucco cannot be installed with the rain screen space behind it, as the stucco will just fill that space up during installation and water can drain through the stucco.

However, stucco is a very durable siding material. If it is installed properly with a drainage plane system, as it should be, it is effectively very similar to the vented rain screen, and therefore also qualifies for this credit.

Considerations

Mixed cladding systems require that there be both flashing and venting at the transition if the lower system is stucco

Air vents are critical to the proper performance of this system. Subcontractor education and homeowner education to ensure that the vents are not filled is very important.

Screens must be installed at all vent locations to reduce the opportunity for pest infiltration.

Verification:

Verifier visually confirms and photographs this measure.

7.7.3	Accountability Form: General Contractor					
Siding and trim are back-primed on all sides 011815 AS		0	0	0	1	0

Description:

If manufacturer of siding or trim specifically prohibits back priming, then it should not be done.

Benefit:**Verification:**

7.7.4	Accountability Form: General Contractor					
Fiber-cement or wood composite siding installed (min. 50% of siding used) 011815 AS		0	0	0	1	0

Description:**Benefit:****Verification:**

Provide documentation or calculations for this measure.

7.7.5	Accountability Form: General Contractor					
Steel siding with ENERGY STAR coating and long-life factory finish 011815 AS		0	0	0	1	0

Description:**Benefit:****Verification:**

Provide documentation or calculations for this measure.

7.7.6	Accountability Form: Building Architect / Designer					
Exposed wood or other absorptive material is kept at least 12 inches from soil 011815 AS		0	0	0	1	0

Description:

Maintain 12" minimum space from bottom of wood or other absorptive material to grade.

Document with photos of all sides of the house. Recommend showing 12" ruler in photo.

Benefit:

Keeping exposed wood and other materials that readily absorb water away from soil improves their durability its finishes. Reduces need for maintenance.

Verification:

Verifier visually confirms and photographs this measure.

7.7.7Accountability Form: **Masonry Contractor****Use reclaimed brick (for exterior wall covering) and block (for foundation)** 011815 AS

0 0 0 3 0

Description:**Benefit:****Verification:**

Provide documentation or calculations for this measure.

7.7.8Accountability Form: **General Contractor****Install traditional three-coat stucco** 011815 AS

0 0 0 2 0

Description:

Photo of lathe, photo of brown coat, photo of finished exterior

Benefit:

Stucco has been used as an exterior cladding material in cold climates for over 90 years and has proven its durability and climate appropriateness.

Considerations

Acrylic stucco does not qualify for this credit due to concerns about its performance and impact on the home as a system

Verification:

Provide documentation or calculations for this measure.

7.8 Interior wall finish materials

7.8.0

Accountability Form: **General Contractor**



Magnesium Oxide (a.k.a. MgO) board installed for interior wall and/or ceiling material. (min. 90% of all new walls and ceilings) 011815 AS

0 1 0 3 0

Description:

Notes on plans or specifications indicating material to be used and/or work to be done.

Manufacturer documentation of product specifications.

Photo before painting or other surface coating is applied

Benefit:

Magnesium is a mold inhibitor, and therefore magnesium board does not support mold growth like traditional paper-faced gypsum does. MgO is a type of sheathing board—sort of like drywall or cement board—but with much-improved characteristics such as fire resistance, weather-ability, strength, resistance to mold and mildew

The surface is smooth so traditional finishing methods are mostly the same. Concerns about delamination or small fibers becoming air borne do not exist as they do with some other fiber-cement and fiberglass gypsum products respectively. When and if MgO board is mined and produced locally, it may qualify for Resource Efficiency points.

Considerations

Currently most MgO board is manufactured in Asia and is imported to the U.S.

Verification:

Verifier visually confirms and photographs this measure.

Provide documentation or calculations for this measure.

7.8.2

Accountability Form: **General Contractor**



Install plaster and lathe for interior wall and/or ceiling material. (min. 90% of all new walls and ceilings) 011815 AS

1 2 1 2 0

Description:

Create detailed specifications that identify preferred wall/ceiling treatment by area.

Review with installers prior to installation.

Benefit:

Verification:

Verifier visually confirms and photographs this measure.

Provide documentation or calculations for this measure.

7.8.3	Accountability Form: General Contractor					
Recycled content in gypsum core 011815 AS	(8% to 19% / 20% or more)	0	0	0	1/2	0

Description:**Benefit:****Verification:**

Provide documentation or calculations for this measure.

7.8.4	Accountability Form: General Contractor					
Synthetic Flue Gas Desulfurization (FGD) 011815 AS	(50% to 89% / 90% or more)	0	0	0	3/4	0

Description:**Benefit:****Verification:**

Provide documentation or calculations for this measure.

7.8.5	Accountability Form: General Contractor					
Interior wall finish is min. 1/2 inch from concrete slabs. 011815 AS		0	0	0	1	0

Description:

- Notes on plans or specifications indicating material to be used and/or work to be done
- Pre-base board installation photo-OR-rater sign off
- The absence of GWB or similar material in this condition does not allow access to this c

Benefit:

Preventing GWB from being in contact with concrete, helps eliminate any chance that it will wick up moisture from the concrete.

Verification:



7.9 New Windows, Skylights & Doors

7.9.0

Accountability Form: **General Contractor**



New and Replacement units must meet energy code (existing windows are exempt) 011815 AS (PREREQ) 0 0 0 0 0
Default Value

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Manufacturer documentation

Exceptions

Existing windows are exempt.

Benefit:

Energy code is often overlooked in remodeling. Even though this measure is already required by the Minnesota State Energy Code, it is worth reminding program participants.

Resources

Existing Minnesota Residential Energy Code, see Minnesota Rules Chapter 1322

www.revisor.gov/rules/?id=1322

Verification:

Provide documentation or calculations for this measure.

7.9.2

Accountability Form: **General Contractor**



Windows must be ENERGY STAR and National Fenestration Rating Council (NFRC) labeled (existing window sash are exempt) 011815 AS (PREREQ) 0 0 0 0 0
Default Value

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Provide window manufacturer documentation.

Exceptions

Existing windows are exempt.

Benefit:

These are product quality assurance programs that set a good standard for factory-built windows.

Verification:

Provide documentation or calculations for this measure.

7.9.3Accountability Form: **General Contractor**

Flash windows and exterior doors with pan, side and head flashing 011815 AS (PREREQ) Default Value 0 0 0 0 0

Description:

All windows and exterior doors are to have a water resistant flashing (metal, plastic, or window manufacturer approved alternative material) installed on the side and base of window and door rough openings a maximum of 6" above the top of the window or door to direct water leaks out of the framing.

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Extremely important strategy to keep bulk water from leaking into the walls.

Considerations

Careful attention must be paid to getting all of this flashing installed properly, or leaks will occur.

Verification:

Verifier visually confirms and photographs this measure.

7.9.4Accountability Form: **General Contractor**

Air seal around outside of window and door units with low expansion foam insulation. 011815 AS (PREREQ) Default Value 0 0 0 0 0

Description:

- Seal the space between the framing for window or door (including attic access) Rough openings and the installed units with low-expanding spray foam sealant, closed cell foam backer rod, spray applied insulation, or other suitable sealant.

- Cellulose, fiberglass, or rock wool batt insulation is not acceptable as a sealant but can be used as a backing for a sealant (such as caulk). Thresholds for exterior doors shall be sealed to the subfloor.

- Notes on drawings and/or specifications indicating work to be done or product to use.

- Post-installation photo—OR—rater verification

Benefit:

Traditionally this has been a difficult area to air seal and insulate, but low-expansion foam sealants have made it much easier.

Verification:

Verifier visually confirms and photographs this measure.

7.9.5Accountability Form: **General Contractor**

New connecting doors between living space and garage are self closing and 0.30cfm/sq.ft. air leakage rating. 011815 AS (PREREQ) 0 0 0 0 0
 Default Value

Description:

Specifications of door for leakage rating.

Photograph of self-closing mechanism on door before project completion.

Photograph showing tight-fitting weather stripping & threshold of door when in closed position

Benefit:

Garages have a lot of pollutants that are best kept out of the house.

The door between the garage and the house plays an important role in this and should be kept closed and airtight as much as possible.

Verification:

Verifier visually confirms and photographs this measure.

7.9.6Accountability Form: **General Contractor**

West facing glazing less than 2% of floor area. (total of new and existing windows) 011815 AS 1 0 0 0 0

Description:

Provide calculations

Benefit:

West facing windows have high solar gain

Verification:

Provide documentation or calculations for this measure.

7.9.7Accountability Form: **General Contractor****East facing glazing less than 3% of floor area. (total of new and existing windows)** 011815 AS

1 0 0 0 0

Description:

Provide calculations

Benefit:

East facing windows have lower solar gain than west windows, but contribute to significant solar heat gain in the summer months

Verification:

Provide documentation or calculations for this measure.

7.9.8Accountability Form: **General Contractor****Install Energy Star light tubes to bring light to interior areas that receive limited daylight** 011815 AS

1 1 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-construction photo—OR—rater verification

Benefit:

Install them in areas such as hallways or interior bathrooms with no windows

Reduces the need for electric lighting, and are more energy efficient skylights

Verification:

Provide documentation or calculations for this measure.

7.9.9Accountability Form: **General Contractor**

Install, adjustable interior solar shades, or reflective blinds to min. 80% of all (existing and new) east, west, and south windows/skylights which have no exterior shading to block summer sun.

1 0 0 0 0

011815 AS

Description:

Preconstruction photo of existing

Post construction photo of existing—OR—rater verification

Benefit:

Where exterior shades are not a good option, interior shades can help to block solar gain when it is not desirable.

Verification:

Verifier visually confirms and photographs this measure.

7.9.10Accountability Form: **General Contractor**

New cover on a new entry. Must extend three feet out from new entry. 011815 AS

0 0 0 2/4 0

(1 new entry / 2 or more new entries)

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-construction photo—OR—rater verification

Benefit:

Covers at entries improve durability of the entry door assemblies by protecting them from the weather.

Verification:

Verifier visually confirms and photographs this measure.

7.9.11	Accountability Form: General Contractor					
Door(s) with 1/2 glass or less. (min. 90% of all doors of this type) 011815 AS (U-factor is 0.18 to 0.20 / U-factor is 0.17 or less / U-factor is 0.31 to 0.47. / U-factor is 0.30 or less)		1/2/1/2	0	0	0	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use

Provide manufacturer documentation

Benefit:

Low U-factor doors are for energy performance characteristics of new doors.

A low U-factor indicates better energy performance.

Verification:

Provide documentation or calculations for this measure.

7.9.12	Accountability Form: General Contractor					
Door(s) are wood. 011815 AS		0	0	0	3	0

Description:**Benefit:****Verification:**

Provide documentation or calculations for this measure.

7.9.13	Accountability Form: General Contractor					
Door(s) have metal outer skin. (i.e. aluminum or steel) 011815 AS		0	0	0	2	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use

Provide manufacturer documentation

Benefit:

Wood has low embodied energy, a long life span and a respectable energy rating.

Steel doors have an overall durability similar to wood. On one hand, steel typically needs less repainting or staining, but on the other hand it dents easily, which can result in an increased need for repainting or complete door replacement. Steel has a higher embodied energy than other doors.

Fiberglass is very durable, holds paint and stain well, and is not prone to denting like metal. Other benefits of fiberglass include its similar dimensional stability as the glazing itself, which means the glazing seals should last longer. The downside of fiberglass is its high-embodied energy.

Verification:

Provide documentation or calculations for this measure.

7.9.14	Accountability Form: General Contractor					
Door(s) have fiberglass outer skin. 011815 AS		0	0	0	2	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use

Provide manufacturer documentation

Benefit:

Wood has low embodied energy, a long life span and a respectable energy rating.

Steel doors have an overall durability similar to wood. On one hand, steel typically needs less repainting or staining, but on the other hand it dents easily, which can result in an increased need for repainting or complete door replacement. Steel has a higher embodied energy than other doors.

Fiberglass is very durable, holds paint and stain well, and is not prone to denting like metal. Other benefits of fiberglass include its similar dimensional stability as the glazing itself, which means the glazing seals should last longer. The downside of fiberglass is its high-embodied energy.

Verification:

Provide documentation or calculations for this measure.

7.9.15	Accountability Form: General Contractor					
Wood used in door(s) (if any) is FSC certified (90% of doors containing wood) 011815 AS		0	0	0	1	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use

Provide manufacturer documentation

Benefit:

Forest Stewardship Council certification ensures that the wood is coming from a well-managed forest.

Verification:

Provide documentation or calculations for this measure.

7.9.16	Accountability Form: General Contractor					
Install storm door at all entries. (sliding doors exempt) 011815 AS		1	0	0	1	0

Description:

Notes on plan and/or specifications stating addition of storm doors Post-construction photo-OR-rater sign off

Benefit:

Storm doors help improve energy efficiency by creating a dead air space between them and the main door. This decreases heat loss or gain through the doorway, and decreases air infiltration.

They improve durability by protecting the inner main door from rain, ice, and snow.

Verification:

Verifier visually confirms and photographs this measure.



7.9.17

Accountability Form: **General Contractor**



20 year warranty on all doors with wood frame. (warranty must apply to glazing, sash and frame.
011815 AS

0 0 0 2 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use Provide manufacturer documentation

Benefit:

Most window and door manufacturers currently only offer a 10-year warranty for the frame, and a 20-year warranty for the glazing and seals. Some companies have started to increase this to 20 years for the whole unit. These longer warranties are encouraged.

Verification:

Provide documentation or calculations for this measure.

7.10 New windows and/or skylights:(min. 90% of units)

7.10.0

Accountability Form: **General Contractor**



Windows and/or skylights have a U-factor of: (at least 90% of units) 011815 AS
(.32 / .29 to .31 / .25 to .28 / .24 or less)

3/3/4/5 0 0 0 0

Description:

Provide manufacturer documentation

Benefit:

These are for energy performance characteristics of new windows. A low U-factor indicates better energy performance

Verification:

Provide documentation or calculations for this measure.



7.10.2 Accountability Form: **General Contractor**



Windows are wood 011815 AS

0 0 0 3 0

Description:

Provide manufacturer documentation

Benefit:

Wood windows are for durability characteristics of new windows. Wood exterior windows require more maintenance over time, but have low embodied energy, and are valued by society over the other types of windows.

Verification:

Provide documentation or calculations for this measure.

7.10.3 Accountability Form: **General Contractor**



Windows and/or skylights are fiberglass 011815 AS

0 0 0 2 0

Description:

Provide manufacturer documentation

Benefit:

Fiber glass windows are for durability characteristics of new windows. Wood exterior windows require more maintenance over time, but have low embodied energy, and are valued by society over the other types of windows.

Verification:

Provide documentation or calculations for this measure.

7.10.4 Accountability Form: **General Contractor**



Windows and/or skylights are wood-with metal clad exterior 011815 AS

0 0 0 2 0

Description:

Provide manufacturer documentation

Benefit:

Wood with metal-clad windows are for durability characteristics of new windows. Wood exterior windows require more maintenance over time, but have low embodied energy, and are valued by society over the other types of windows.

Verification:

Provide documentation or calculations for this measure.

7.10.5	Accountability Form: General Contractor					
Window and/or skylight air leakage rating < 0.30 cfm/s.f. 011815 AS		2	0	0	0	0

Description:

Provide manufacturer documentation

Benefit:

Windows that leak less air are more energy efficient and more durable.

Verification:

Provide documentation or calculations for this measure.

7.10.6	Accountability Form: General Contractor					
East/west facing windows and/or skylights have SHGC &#8804; 0.35 011815 AS		1	0	0	0	0

Description:

Provide manufacturer documentation

Benefit:

A high SHGC is desirable for southern windows in cold northern climates during the day to capture heat from the sun. Northern glass is like a one way mirror in that it has a high SHGC (.60 or more) on one side, allowing heat to enter, and a low SHGC (.30) on the other side keeping heat in at night

A solar path diagram for northern latitudes shows that there are a lot of times during the day during the summer months when the sun is low in the eastern or western sky, and cannot be blocked by overhangs or other horizontal shading devices.

A low SHGC on east and west facing windows helps to prevent overheating during these times.

During the winter months when we would want to allow the sun to penetrate into the building, the sun never gets to a position that is low in the eastern or western sky, Thus east and west windows are of little value for solar gain during these months. On the other hand, in the summer, when we want to prevent heat gain, the sun does get low in the eastern and western sky. Therefore the low SHGC of eastern and western windows help keep the house cool in the summer, and is NOT a liability in the winter.

Verification:

Provide documentation or calculations for this measure.

7.10.7	Accountability Form: General Contractor					
Install Northern Glass on Southern exposures 011815 AS		2	0	0	0	0

Description:

Provide manufacturer documentation

Benefit:

A high SHGC is desirable for southern windows in cold northern climates during the day to capture heat from the sun. Northern glass is like a one way mirror in that it has a high SHGC (.60 or more) on one side, allowing heat to enter, and a low SHGC (.30) on the other side keeping heat in at night

A solar path diagram for northern latitudes shows that there are a lot of times during the day during the summer months when the sun is low in the eastern or western sky, and cannot be blocked by overhangs or other horizontal shading devices.

A low SHGC on east and west facing windows helps to prevent overheating during these times.

During the winter months when we would want to allow the sun to penetrate into the building, the sun never gets to a position that is low in the eastern or western sky, Thus east and west windows are of little value for solar gain during these months. On the other hand, in the summer, when we want to prevent heat gain, the sun does get low in the eastern and western sky. Therefore the low SHGC of eastern and western windows help keep the house cool in the summer, and is NOT a liability in the winter.

Verification:

Provide documentation or calculations for this measure.

7.10.8	Accountability Form: General Contractor					
Add exterior shading to new windows on south and west side of home, such as awnings on south or west, vertical fins on west, etc. 011815 AS		2	0	0	0	0

Description:

- Documentation required showing projection size including depth of overhang, height of window and a diagram of sun angles for winter and summer
- Roof overhangs also qualify if properly sized and documented
- Proper sizing ensures effective use of materials and that strategies have been well considered
- Notes on drawings and/or specifications indicating work to be done or product to use
- Provide manufacturer documentation

Benefit:**Verification:**

Properly sized exterior shading helps reduce heat gain during the months when it is not desired.

Resources

Pilkington Sun Angle Calculator at www.sbse.org/resources/sac/PSAC_Manual.pdf

7.10.9	Accountability Form: General Contractor					
Install storm windows on double hung or fixed windows 011815 AS		1	0	0	1	0

Description:

Notes on plan and/or specifications stating addition of storm windows

Post-construction photo-OR-rater sign off

Benefit:

Storm windows help improve energy efficiency by creating a dead air space between them and the main window; this reduces heat loss or gain, and they reduced infiltration.

They improve durability by protecting the inner main window from rain, ice and snow.

Some storm windows also have Low E (or other) coatings on the glass, which also help improve energy efficiency.

Verification:

Verifier visually confirms and photographs this measure.

7.10.10	Accountability Form: General Contractor					
Wood used in window construction (if any) is FSC certified 011815 AS		0	0	0	1	0

Description:

Provide manufacturer documentation

Benefit:

Forest Stewardship Council certification ensures that the wood is coming from a well-managed forest.

Verification:

Provide documentation or calculations for this measure.

7.10.11Accountability Form: **General Contractor**

20 year warranty on windows with wood frame. (Warranty must apply to glazing, sash and frame) (min. 90% of new units) 011815 AS

0 0 0 1 0

Description:

Provide manufacturer documentation

Benefit:

Most window and door manufacturers currently only offer a 10-year warranty for the frame, and a 20-year warranty for the glazing and seals. Some companies have started to increase this to 20 years for the whole unit. These longer warranties are encouraged.

Verification:

Provide documentation or calculations for this measure.

7.11 New Attics & Roof Additions

7.11.0Accountability Form: **General Contractor**

No recessed light fixtures in finished attic space, or recessed light fixture housing from a conditioned space protruding into an unconditioned attic space, unless installations can be met based on diagram. 011815 AS (PREREQ)

0 0 0 0 0

Default Value

Description:

Rater will verify installation

Benefit:

It is extremely difficult to properly air seal and insulate around a recessed light fixture

Keep installation of any recessed light fixtures to a minimum, and use them only where necessary (not just for effect), such as low ceiling areas, areas with low clearances, or where the installation of a more effective light fixture is not possible.

Look for recessed light fixtures that are compact fluorescent-compatible.

Verification:

Verifier visually confirms and photographs this measure.

7.11.2	Accountability Form: Insulation Contractor					
Provide attic information card 011815 AS (PREREQ)	Default Value	0	0	0	0	0

Description:

A signed and dated insulation receipt attic card must be attached to the framing near the access opening, and clearly visible. The attic card must identify the type of insulation installed, the manufacturer, the installer, the R-value per inch, the designed settled thickness, the square footage of attic coverage area, and the number of bags installed.

Include a copy of FTC Fact Sheet stating R-value.

Benefit:

Ensures accurate information is used regarding performance of insulation products.

Resources

The correct R-value for reflective insulation or any other type of insulation can be found on the manufacturer's FTC Fact Sheet, which is required to be available to all customers by the Federal Trade Commission R-Value Rule. Call the Energy Information Center at (651) 926-5120 or 1 (800) 657-3710

Verification:

Verifier visually confirms and photographs this measure.

Provide documentation or calculations for this measure.

7.11.3	Accountability Form: Insulation Contractor					
If batt insulation is used to insulate knee walls, an attic-side air barrier is required. 011815 AS (PREREQ)	Default Value	0	0	0	0	0

Description:

- Notes on drawings and/or specifications indicating work to be done or product to use.
- Vapor permeable air barriers such as a wind-wash barrier or sheetrock qualify. Craft-faced batts also qualify if craft-face installed to the attic side.
- Post-Installation photo—OR—rater verification

Benefit:

Improves energy efficiency. In knee wall locations, batt insulation is commonly installed with its attic side exposed. This allows attic air to circulate freely in and out of the batt insulation, which significantly reduces its insulating value.

Considerations

Care must be taken to not create a double vapor barrier when attempting to install the attic-side air barrier.

Verification:

Verifier visually confirms and photographs this measure.



7.11.4

Accountability Form: **General Contractor**



Step flashing & kick-out flashing required at all roof / sidewall locations 011815 AS (PREREQ)

0 0 0 0 0

Default Value

Description:

- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-Installation photo—OR—rater verification

Benefit:

Prevents water intrusion problems

Resources

Kick-out flashing location

Verification:

Verifier visually confirms and photographs this measure.

7.11.5

Accountability Form: **General Contractor**



Use of Reclaimed (a.k.a. re-used) & Recycled Roof Materials: Roof Beams & Headers 011815 AS

0 0 1/1/2 2/3/4 0

(50% to 69% / 70% to 89% / 90% or more)

Description:

- Notes on drawings and/or specifications indicating work to be done or product to use.
- Invoice—OR—letter indicating source and/or purchase of product.

Benefit:

Use of reclaimed materials contributes to a very efficient use of materials overall.

Considerations

Care must be taken to ensure that reclaimed materials are still structurally sound.

Verification:

Provide documentation or calculations for this measure.

7.11.6	Accountability Form: General Contractor					
Use of Reclaimed (a.k.a. re-used) & Recycled Roof Materials: Rafters or Trusses 011815 AS (50% to 69% / 70% to 89% / 90% or more)		0	0	1/1/2	2/3/4	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Invoice—OR—letter indicating source and/or purchase of product.

Benefit:

Use of reclaimed materials contributes to a very efficient use of materials overall.

Considerations

Care must be taken to ensure that reclaimed materials are still structurally sound.

Verification:

Provide documentation or calculations for this measure.

7.11.7	Accountability Form: General Contractor					
Use of Reclaimed (a.k.a. re-used) & Recycled Roof Materials: Roof Sheathing 011815 AS (50% to 69% / 70% to 89% / 90% or more)		0	0	1/1/2	2/3/4	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Invoice—OR—letter indicating source and/or purchase of product.

Benefit:

Use of reclaimed materials contributes to a very efficient use of materials overall.

Considerations

Care must be taken to ensure that reclaimed materials are still structurally sound.

Verification:

Provide documentation or calculations for this measure.

7.11.8Accountability Form: **Roofing Contractor****Install recycled content roofing material. (min 25% recycled content)** 011815 AS

0 0 1 1 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Invoice—OR—letter indicating source and/or purchase of product.

Benefit:

Use of reclaimed materials contributes to a very efficient use of materials overall.

Considerations

Care must be taken to ensure that reclaimed materials are still structurally sound.

Verification:

Provide documentation or calculations for this measure.

7.11.9

Accountability Form: **General Contractor**

Engineered wood, steel or trusses used (Steel required to have min. 30% recycled content to qualify) 0 0 0 1 0
: Roof Beams & Headers 011815 AS 50% to 89%

Description:

- Qualifying materials generally included anything that is not solid sawn wood, such as: LVL, I-Joist, PSL, Timber Strand, finger jointed, floor truss, steel with minimum 30% recycled content, and others to be determined.
- If steel rafters are used in the heated envelope, continuous R10 rigid insulation must be installed to the outside of them to prevent thermal bridging.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-Installation photo—OR—rater verification

Benefit:

Engineer products use wood more efficiently. Given the limited availability of large, old growth trees today, it is also difficult to get solid sawn structural members that are as dimensionally stable and resist warping as much as engineered products. Steel studs typically are made from post-consumer recycled steel, and it is nearly infinitely recyclable when it is removed from the house.

Considerations

If installing continuous rigid insulation on the exterior of steel rafters, care must be taken in designing the rest of the roof assembly to not create a double vapor barrier situation.

Verification:

Provide documentation or calculations for this measure.

7.11.10Accountability Form: **General Contractor**

Engineered wood, steel or trusses used (Steel required to have min. 30% recycled content to qualify) 0 0 0 1/2 0
: Roof Beams & Headers 011815 AS (50% to 89% / 90% or more)

Description:

- Qualifying materials generally included anything that is not solid sawn wood, such as: LVL, I-Joist, PSL, Timber Strand, finger jointed, floor truss, steel with minimum 30% recycled content, and others to be determined.
- If steel rafters are used in the heated envelope, continuous R10 rigid insulation must be installed to the outside of them to prevent thermal bridging.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-Installation photo—OR—rater verification

Benefit:

Engineer products use wood more efficiently. Given the limited availability of large, old growth trees today, it is also difficult to get solid sawn structural members that are as dimensionally stable and resist warping as much as engineered products. Steel studs typically are made from post-consumer recycled steel, and it is nearly infinitely recyclable when it is removed from the house.

Considerations

If installing continuous rigid insulation on the exterior of steel rafters, care must be taken in designing the rest of the roof assembly to not create a double vapor barrier situation.

Verification:

Provide documentation or calculations for this measure.



7.11.11

Accountability Form: **General Contractor**



Engineered wood, steel or trusses used. (Steel required to have min. 30% recycled content to qualify) 0 0 0 1/2 0
:Roof Framing (roof trusses qualify) 011815 AS (50% to 89% / 90% or more)

Description:

- Qualifying materials generally included anything that is not solid sawn wood, such as: LVL, I-Joist, PSL, Timber Strand, finger jointed, floor truss, steel with minimum 30% recycled content, and others to be determined.
- If steel rafters are used in the heated envelope, continuous R10 rigid insulation must be installed to the outside of them to prevent thermal bridging.
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-Installation photo—OR—rater verification

Benefit:

Engineer products use wood more efficiently. Given the limited availability of large, old growth trees today, it is also difficult to get solid sawn structural members that are as dimensionally stable and resist warping as much as engineered products. Steel studs typically are made from post-consumer recycled steel, and it is nearly infinitely recyclable when it is removed from the house.

Considerations

If installing continuous rigid insulation on the exterior of steel rafters, care must be taken in designing the rest of the roof assembly to not create a double vapor barrier situation.

Verification:

Provide documentation or calculations for this measure.

7.11.12

Accountability Form: **General Contractor**



Roof Sheathing with no added urea-formaldehyde 011815 AS 0 0 2 0 0

Description:

- Notes on drawings and/or specifications indicating work to be done or product to use.
- Manufacturer documentation of product specifications.

Benefit:

Urea-formaldehyde is a known carcinogen, and has been a common ingredient in the glues used in engineered building materials. Phenol-formaldehyde is a component found naturally in wood products and is different from urea-formaldehyde.

Verification:

Provide documentation or calculations for this measure.

7.11.13Accountability Form: **General Contractor****Certification of structural wood products. Roof sheathing is FSC certified.** 011815 AS

0 0 1/2 1/2 0

(50% to 89% / 90% or more)

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Invoice and Forest Stewardship Council documentation

Benefit:

Forest Stewardship Council certification ensures that the lumber is coming from a well-managed forest.

FSC has paved the way for Forest Stewardship Council certification for wood products, and other forest certification programs are moving toward equally good standards.

Verification:

Provide documentation or calculations for this measure.

7.11.14Accountability Form: **General Contractor****Certification of structural wood products. Roof Framing Lumber is FSC certified.** 011815 AS

0 0 1/2 1/2 0

(50% to 89% / 90% or more)

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Invoice and Forest Stewardship Council documentation

Benefit:

Forest Stewardship Council certification ensures that the lumber is coming from a well-managed forest.

FSC has paved the way for Forest Stewardship Council certification for wood products, and other forest certification programs are moving toward equally good standards.

Verification:

Provide documentation or calculations for this measure.

7.11.15Accountability Form: **General Contractor****Local Sourcing of structural wood products. Plywood, OSB or other sheathing.** 011815 AS

0 0 0/1 2/3 0

(50% to 89% / 90% or more)

Description:

- LOCALLY SOURCED materials are those that are extracted, harvested, or salvaged/recovered AND produced within 500 miles of the project.

- In this program, 90% of the material(s) in a product must be locally sourced to receive credit. If the product has multiple materials, the source for all the materials must be documented.

- Notes on drawings and/or specifications indicating work to be done or product to use.

- Post-installation photo—OR—rater verification

- Invoice and/or other documentation indicating source

Benefit:

The goal in returning to locally sourced and produced products is to reduce energy used in transportation as well as to stimulate local economies and jobs.

Local materials may have the added advantage of being exclusive to a region thus providing the opportunity for unique or one of a kind design.

Verification:

Provide documentation or calculations for this measure.

Verifier visually confirms and photographs this measure.

7.11.16Accountability Form: **General Contractor****Local Sourcing of structural wood products. Plywood, OSB or other sheathing. Framing Lumber.**

0 0 0/1 2/3 0

011815 AS

(50% to 89% / 90% or more)

Description:

- LOCALLY SOURCED materials are those that are extracted, harvested, or salvaged/recovered AND produced within 500 miles of the project.

- In this program, 90% of the material(s) in a product must be locally sourced to receive credit. If the product has multiple materials, the source for all the materials must be documented.

- Notes on drawings and/or specifications indicating work to be done or product to use.

- Post-installation photo—OR—rater verification

- Invoice and/or other documentation indicating source

Benefit:

The goal in returning to locally sourced and produced products is to reduce energy used in transportation as well as to stimulate local economies and jobs. Local materials may have the added advantage of being exclusive to a region thus providing the opportunity for unique or one of a kind design

Verification:

Provide documentation or calculations for this measure.

Verifier visually confirms and photographs this measure.

7.11.17Accountability Form: **General Contractor****Structural Insulated Panels (SIP) are used (min. R38) (min. 80% of sq. ft. of roofs)** 011815 AS

2 0 0 2 0

Description:

Must be installed according to manufacturer's specifications.

Panel plan from panel manufacturer

Post-installation photo—OR—rater verification

Benefit:

Panelized construction eliminates waste not only on the construction site, but in the factory as well, where framing layouts can be carefully planned.

SIPs are even more resource efficient and energy efficient than wood framed panel systems.

Resources

Structural Insulated Panel Association, www.sips.org

Verification:

Verifier visually confirms and photographs this measure.

7.11.18Accountability Form: **Framing Contractor****19.2" or 24" o.c. roof framing** 011815 AS

1 0 0 1 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Advanced Framing Techniques help reduce material usage, construction waste, and help increase energy efficiency by reducing the amount of framing in a roof.

Size and center skylights in rafter bays whenever possible.

Frame rough openings WITHOUT extra jack studs.

By aligning roof framing on the studs below, only a single top plate is needed. Review construction techniques and have structural engineer approve method and framing layout prior to construction.

This credit is designed to reward significant changes in the methods used to frame. While developing a baseline for how much framing is required to obtain this credit is difficult, the expectation is that the technique is applied to all framing components and framing comprises a more than token portion of the project (i.e., framing a 2'x3' closet would not qualify for OVE if framing is 24" o.c).

Verification:

Verifier visually confirms and photographs this measure.



7.11.19

Accountability Form: **Framing Contractor**



Rafters align with wall framing below 011815 AS

0 0 0 1 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Advanced Framing Techniques help reduce material usage, construction waste, and help increase energy efficiency by reducing the amount of framing in a roof.

Size and center skylights in rafter bays whenever possible.

Frame rough openings WITHOUT extra jack studs.

By aligning roof framing on the studs below, only a single top plate is needed. Review construction techniques and have structural engineer approve method and framing layout prior to construction.

This credit is designed to reward significant changes in the methods used to frame. While developing a baseline for how much framing is required to obtain this credit is difficult, the expectation is that the technique is applied to all framing components and framing comprises a more than token portion of the project (i.e., framing a 2'x3' closet would not qualify for OVE if framing is 24" o.c).

Verification:

Verifier visually confirms and photographs this measure.

7.11.20

Accountability Form: **Framing Contractor**



Roof Overhang. Select one: 011815 AS

(16" to 23" / 24" to 31" / 32" or more) 1/1/2 0 0 1/2/3 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Water intrusion is a major durability concern. Getting water away from the foundation in the first place is a good strategy. In many instances, neighboring homes are close together. In this situation, provide a drainage swail (low area) to collect water and bring it beyond the front or back of any house.

Considerations

See Section 2 – Site and Landscape for Green strategies that help ensure the water is captured for irrigation or allowed to re-absorb into the ground to recharge the aquifer.

Verification:

Verifier visually confirms and photographs this measure.

7.11.21Accountability Form: **General Contractor**

Install roof gutters to discharge water 5' away from any foundation or, in limited spaces, deposit into underground pipe that carries water min. 10 feet from foundation 011815 AS

0 0 0 4 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Water intrusion is a major durability concern.

Getting water away from the foundation in the first place is a good strategy. In many instances, neighboring homes are close together. In this situation, provide a drainage swail (low area) to collect water and bring it beyond the front or back of any house

Considerations

See the Site and Landscape Section for Green strategies that help ensure the water is captured for irrigation or allowed to re-absorb into the ground to recharge the aquifer.

Verification:

Verifier visually confirms and photographs this measure.

7.11.22Accountability Form: **Building Architect / Designer**

Design and specify balanced roof ventilation system. (Non-vented "Hot" roofs also qualify if drawings are included to show critical details. i.e. @ roof / wall intersections.) 011815 AS

1 0 0 1 0

Description:

Do design work as described in credit description above.

Provide notes on drawings and/or specifications describing work to be done.

Post-construction photo—OR—rater verification

Benefit:

If a vented roof is part of the overall design of the house, then it must be balanced and working properly.

Most houses are designed to have a vented roof. Usually it is a passive system, but occasionally mechanically venting them can be an effective strategy. Regardless of the type, it is very common to find them not operating as they should. Many times the proper vent holes were not installed from the beginning. If they do exist, they have often become blocked over time from dust and dirt or carelessly installed insulation, etc.

If roof ventilation is not working properly, the effects, include:

- o Damage to the building structure
- o Water leaking through the ceiling of upper rooms
- o Wet attic insulation, which has very little R-value, and keeps the structure wet, making structural decay progress more rapidly.

Verification:

Verifier visually confirms and photographs this measure.

7.11.23Accountability Form: **General Contractor**

Install-new eave vents, vent chutes, roof vents, etc ---OR--- Implement non-vented strategy. (Non-vented designs must be pre-approved by building code official.) 011815 AS

1 0 0 2 0

Description:

Perform work described in design/specification portion of credit 4E-13.

Post-construction photo—OR—rater verification

Benefit:**Verification:**

Verifier visually confirms and photographs this measure.

7.11.24Accountability Form: **General Contractor****Wood framed panels are used (min. 80% of sq. ft. of roofs)** 011915 AS

0 0 0 2 0

Description:

Must be installed according to manufacturer's specifications.

Panel plan from panel manufacturer

Post-installation photo—OR—rater verification

Benefit:

Panelized construction eliminates waste not only on the construction site, but in the factory as well, where framing layouts can be carefully planned. SIPs are even more resource efficient and energy efficient than wood framed panel systems.

Resources

Structural Insulated Panel Association, www.sips.org

Verification:

Verifier visually confirms and photographs this measure.



7.12 New attic built w/Advanced Insulation mat & technq

7.12.0	Accountability Form: Insulation Contractor					
Insulation with minimum 20% recycled content is used for at least 50% of applications (based on R-value x Sq.Ft.) 011815 AS		0	0	0	1	0

Description:

When R-value gets above R60, there is typically very little increase in performance without significant cost and space requirements. Recycled content must be certified by Scientific Certification Systems (SCS) or the manufacturer. SCS is on the web at www.scs1.com
 Manufacturer Specifications

Benefit:

Advanced Framing Techniques help reduce material usage, construction waste, and help increase energy efficiency by reducing the amount of framing in a roof.

Size and center skylights in rafter bays whenever possible.

Frame rough openings WITHOUT extra jack studs.

By aligning roof framing on the studs below, only a single top plate is needed. Review construction techniques and have structural engineer approve method and framing layout prior to construction.

This credit is designed to reward significant changes in the methods used to frame. While developing a baseline for how much framing is required to obtain this credit is difficult, the expectation is that the technique is applied to all framing components and framing comprises a more than token portion of the project (i.e., framing a 2'x3' closet would not qualify for OVE if framing is 24" o.c).

Verification:

Verifier visually confirms and photographs this measure.

7.12.2	Accountability Form: Insulation Contractor					
All-natural insulation, such as cotton batt, is used for at least 50% of applications. (Soy based foam insulation is not considered "all natural" and is not eligible for credit in this category) 011815 AS		0	2	0	0	0
	Default Value					

Description:

Rater Sign Off

Benefit:

Verification:

Verifier visually confirms and photographs this measure.

7.12.3 Accountability Form: **Insulation Contractor**     

Attic insulation total (flat or vaulted) 011815 AS (R44 to R49 / R50 or more) 3/6 0 0 0 0

Description:

Rater Sign Off

Benefit:**Verification:**

Verifier visually confirms and photographs this measure.

7.12.4 Accountability Form: **Insulation Contractor**     

Add 1" min. foil face polyisocyanurate insulation to sloped roof / ceiling for thermal break and vapor barrier 011815 AS 1 1 0 1 0

Description:

Manufacturer documentation to demonstrate insulation qualifies as Class 1 or Class 2 Vapor Retarder (1 perm or less).

Insulation must be taped with the proper tape for the insulation type and sealed at edges to achieve vapor retarder rating.

Rater Sign Off

Benefit:**Verification:**

Verifier visually confirms and photographs this measure.

Provide documentation or calculations for this measure.

7.12.5 Accountability Form: **Insulation Contractor**     

Add 2" (low perm rated) rigid insulation to interior of sloped roof / ceiling for thermal break and vapor barrier 011815 AS 0 1 1 2 0

Description:

Manufacturer documentation to demonstrate insulation qualifies as Class 1 or Class 2 Vapor Retarder (1 perm or less).

Insulation must be taped with the proper tape for the insulation type and sealed at edges to achieve vapor retarder rating.

Rater Sign Off

Benefit:**Verification:**

Verifier visually confirms and photographs this measure.

Provide documentation or calculations for this measure.



7.12.6 Accountability Form: **Insulation Contractor**     

Energy Heel: min. R38 to outside face of exterior walls 011815 AS 2 0 0 0 0

Description:

Rater Sign Off

Benefit:

Verification:

Verifier visually confirms and photographs this measure.

7.12.7 Accountability Form: **General Contractor**     

Access openings to new attics and new knee wall areas are well insulated 011815 AS 1/2 0 0 0 0

(Horizontal Attic Access = R38 min & Vertical Knee Wall Access = R23 min. / Horizontal Attic Access = R49 min & Vertical Knee Wall Access = R30 min.)

Description:

Rater Sign Off

Benefit:

Verification:

Verifier visually confirms and photographs this measure.

7.13 New Roof Built w/ Advanced air sealing techniques.

7.13.0 Accountability Form: **Insulation Contractor**     

Seal all attic by-passes (spot seal with foam or caulk --OR-- spray foam entire attic floor) 011815 AS 2 2 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Rater Sign Off

Benefit:

Improves energy efficiency and durability

Verification:

Verifier visually confirms and photographs this measure.

7.13.2	Accountability Form: General Contractor					
Access openings to new attics and new knee wall areas are weatherstripped 011815 AS		1	0	0	0	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Rater Sign Off

Benefit:

Improves energy efficiency and durability

Verification:

Verifier visually confirms and photographs this measure.

7.13.3	Accountability Form: Insulation Contractor					
Provide insulation wind baffle or other air barrier to block wind washing at all attic eave bays in roof assemblies with soffit vents 011815 AS		1	0	0	2	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Benefit:

Improves energy efficiency and durability

Verification:

Verifier visually confirms and photographs this measure.

7.14 New Roof Built w/ Advanced Mats & Techniques

7.14.0	Accountability Form: Roofing Contractor					
Self sealing bituminous membrane at valleys & penetrations (code required at eaves) 011815 AS	0	0	0	1	0	

Description:

Post-installation photo

Benefit:

Self-adhesive bituminous membrane is an excellent water barrier, which can seal around fasteners that puncture it. It is an upgrade from the more common 30# building paper. Always assume that water and moisture will get past the primary roofing material as some point, therefore, a good drainage plane is important.

Verification:

Visually inspect and photograph implementation of this measure.

7.14.2	Accountability Form: Roofing Contractor					
Self sealing bituminous membrane over entire roof deck 011815 AS	0	0	0	2	0	

Description:

Post-installation photo

Benefit:

Self-adhesive bituminous membrane is an excellent water barrier, which can seal around fasteners that puncture it. It is an upgrade from the more common 30# building paper. Always assume that water and moisture will get past the primary roofing material as some point, therefore, a good drainage plane is important.

Verification:

Visually inspect and photograph implementation of this measure.

7.14.3	Accountability Form: Roofing Contractor					
Metal drip edge at all roof edges & "W" shaped valley flashing at valleys 011815 AS		0	0	0	1	0

Description:

Post-installation photo

Benefit:

- Helps ensure that water drips clear of the roof rather than running down the face of the roof fascia and trim.
- Drainage plane above shall direct water flow onto and not behind flashing.
- At roof/sidewall locations, the intersecting wall siding shall terminate a minimum of 2" above roof.

Verification:

Visually inspect and photograph implementation of this measure.

7.14.4	Accountability Form: Roofing Contractor					
Metal "W" shaped valley flashing at valleys 011815 AS		0	0	0	1	0

Description:

Post-installation photo

Benefit:

Metal "W" shaped valley flashing is more durable than just weaving shingles down the valley. Also, the ridge in the middle helps ensure that water from one side of the valley does not cross the valley and go up under the roofing on the opposing side.

Verification:

Visually inspect and photograph implementation of this measure.

7.14.5

Accountability Form: **Roofing Contractor**



Roofing Materials Warranties (min 90% of roof area) 011815 AS
(Minimum 40 years / Minimum 50 years / Lifetime roofing material (including: slate, metal, concrete, clay, etc.))

0 0 0 1/3/5 0

Description:

Post-installation photo

Benefit:

. Longer warranties and longer life expectancy implies greater durability.

Verification:

Visually inspect and photograph implementation of this measure.

8. Mechanical

8.1 Prerequisites

8.1.0

Accountability Form: **HVAC**

Prerequisite



All flex duct pulled tight-no pinches 011915 AS

Default Value



Description:

Any flexible ducting must have smooth, even lines, angles must not exceed 90 degrees (no “U” shapes) and must minimize duct runs. There must be no pinching or bunching (extra material), or areas where the airflow is restricted.

Provide photographs showing flexible ducting

Benefit:

Flexible duct that is pulled tight permits maximum airflow. Pinched ducts restrict airflow and reduce the efficiency of mechanical equipment.

Considerations

- Restricted airflow can reduce the efficiency of equipment.
- Pinched or excessive duct runs can collect dust and particulates, blocking airflow.
- Dryer vents with flexible ducting are NOT recommended – they can be a fire hazard.

Verification:

Visually inspect and photograph implementation of this measure.

8.1.0Accountability Form: **HVAC**

Prerequisite


No new unvented combustion units, with the exception of kitchen-type cooking devices with exhaust ventilation 011815 AS

Default Value

**Description:**

- Combustion units including dryers, furnaces, and water heaters must vent directly from the unit through sealed and continuous ducting to the exterior of the home.
- The ducting must be rigid type, not flexible ducting
- The ducting must not have kinks or angles greater than 90 degrees
- A Worst Case Combustion Spillage Test is recommended if atmospheric combustion equipment exists in the home

Exceptions

- Gas cook tops or ranges that have ventilation (vent hood or downdraft) to the exterior are exempt
- Propane heaters which are properly connected and checked for leakage are exempt

Benefit:

Combustion equipment can emit moisture, carbon dioxide, carbon monoxide, and toxins into the air. It is unhealthy, at best and dangerous at worst to contain these elements within the house.

Considerations

Flexible ducting on dryers should not be used. Lint can accumulate along the length of the ducting and can be a fire hazard. If the furnace and water heater vent through a chimney flue, make sure there are proper dampers and screening at the exit point. Check regularly the condition of the chimney to make sure animal nests are not blocking the exhaust, and that the chimney is not crushed.

Adequate make-up air may not be present to make operation of a gas dryer, gas range, water heater, and furnace safe. Whenever air leaves the home, new air must be brought in to replace it. If this volume of air is not adequate, it can cause these appliances and equipment to backdraft carbon monoxide.

Operating a propane heater in a home can be dangerous. Improper operation, leaks, and faulty valves can have fatal consequences. Make sure carbon monoxide detectors are operating properly, and consider having a mechanical contractor test for leaks and overall operation.

Resources

Contact a local energy rater for performing a Worst Case Combustion Spillage Test.

Verification:

See accountability form.

8.1.2Accountability Form: **HVAC**

Prerequisite



All new ductwork in unconditioned space insulated. (attics = R-30 min.) (walls = R10 min.) 011915 AS (PREREQ) Default Value

**Description:**

Ducting in unconditioned space must be insulated using either formaldehyde-free batt insulation or two-part spray applied insulation to achieve R-values indicated above. Also, the building cavity carrying the ductwork can be insulated to qualify.

Benefit:

Cold and hot air from the unconditioned space can enter the home through the ductwork. The closer in temperature the ductwork is to the conditioned part of the house, the less likely it is to transfer heat or cold to the space.

Verification:

Verifier visually confirms and photographs this measure.

8.1.2Accountability Form: **HVAC**

Prerequisite



No equipment is permitted that intentionally produces ozone as a product rather than as an incidental by-product 011815 AS Default Value

**Description:**

Equipment labels or other, which describe the equipment as ozone generators in the form of air cleaners and other ozone generating devices.

Exceptions

Normal equipment use such as air conditioners and aerosols, which do not use CFC (chlorofluorocarbons), are allowed. CFC use has been phased out and replaced with HCFCs. HCFCs are also ozone depleting, and are discouraged. Look for new equipment that does not use CFCs or HCFCs. There are alternates such as hydrocarbon-based coolants.

Benefit:

When ozone is breathed, it can damage the lungs and is a known asthma trigger. Incidental by-product is the greater effect on the environment of using these products.

Considerations

Be aware of terminology like "energized oxygen" or "pure air" as they are indicators that the product may produce ozone

Resources

For more information about ozone producing equipment, visit www.epa.gov/iaq/pubs/ozonegen.html

Verification:

See accountability form.

8.1.3Accountability Form: **HVAC**

Prerequisite



No air handlers or conditioning equipment shall be placed in unconditioned spaces (e.g., garage) (condensers located outside is o.k.) 011815 AS

Default Value

**Description:**

- Equipment must be placed in a room within the insulated building envelope
- Air handlers and other conditioning equipment must be in a location which is readily accessible for maintenance and cleaning

Exceptions

Un-insulated basements where heating ducts and pipes are contained are acceptable. If air handlers and conditioning equipment are to be located in an attic space, the attic envelope must be insulated, creating a conditioned space. A crawl space must be treated as conditioned (insulation and air must be exchanged between the basement and crawl space, or home and crawl space) in order for equipment to be located in this area.

Benefit:

Air handlers or conditioning equipment that is placed in unconditioned space is far less energy efficient

Air handlers and conditioning equipment must work harder to heat or cool the air and will reduce the lifespan of the equipment

Considerations

Garages and unconditioned attics are especially problematic for air handlers and conditioning equipment because they can pick up dirt, dust, and pollution from car exhaust and carry it through the home.

Resources

The following document has extensive information about air handling equipment and ideal locations for this equipment throughout the home, www.eere.energy.gov/buildings/info/documents/pdfs/air_dist_sys_design-0782.pdf

Verification:

See accountability form.

8.1.3Accountability Form: **HVAC**

Prerequisite

**No building cavities can be used as ductwork. (i.e. no panning of joist or wall cavities for duct supply or return)** 011915 AS (PREREQ)

Default Value

Description:

New ducts are not to utilize the building envelope in lieu of sheet metal or flexible ducts. This includes NOT “panning” joists and wall cavity spaces between studs (see OPR-7 for requirements, rationale and resources)

All new cold air returns must be ducted

Benefit:

It may seem desirable at first to avoid the time and expense of installing rigid ducting, especially if the home already uses the wall and floor cavities as ductwork, however, it should never be considered because of the greater risks. Building cavities are never sealed well enough to serve as a ducting. If existing joist and wall spaces are used as air distribution supplies and returns, strongly consider installing rigid ducting. Kitchen and bath exhaust fans should never use wall and floor cavities as ducting without the use of sheet metal or pre-formed ducts.

Considerations

When return air moves through building cavities, it can pick up impurities and redistribute them throughout the house. There is a high risk of introducing moisture into building cavities when they are used as ducts.

Resources

www.homeenergy.com/archive/hem.dis.anl.gov/eehem/93/930920.html

Verification:

Verifier visually confirms and photographs this measure.

8.1.4Accountability Form: **General Contractor**

Prerequisite

**Ducts must be protected until construction (including floor finishing) is completed (protect returns, intakes & air handling equipment)** 011815 AS

Default Value

**Description:**

Supply and return duct outlets and inlets shall be covered to stop construction trash and dust from contaminating new duct system. Open ductwork must be sealed and protected with a continuous plastic covering and sealed with duct tape strong enough to keep openings sealed during construction. Avoid operating equipment during construction, as this draws contaminants into the system. Use a temporary source of heat during construction

Benefit:

Contaminants can enter the air through ducts and cause respiratory illnesses and diseases. Once ducts are full of contaminants, it is difficult to remove airborne pollutants, and dust and particles lining the ducts. Some ducts, such as flexible ducting, are difficult, if not impossible to clean. It is far easier to prevent contaminants from entering a system than it is to remove them once they are in the ductwork

Considerations

Some ducts, such as flexible ducts, or ducts with long runs, are difficult to clean once contaminants are present. Flexible ducts are easily punctured and must be cleaned with extreme caution.

Be careful how duct tape is affixed to walls and floors as it may make removal difficult, and damage surfaces.

Resources

Visit the U.S. Environmental Protection Agency website at www.epa.gov/iaq/pubs/airduct.html

Verification:

Homeowner visually confirms this measure.

8.1.5Accountability Form: **HVAC**

Prerequisite

**All new ductwork must be sealed** 011815 AS

Default Value

**Description:**

Use water-based mastic or metal tape, which is specifically intended for duct sealing. Duct Tape is NOT acceptable, as it is not long lasting.

Seal all connections between ducts and connections at vents and registers.

New cold air returns are also required to be sealed.

Benefit:

- Sealing ductwork is important for the following reasons:

- Comfort: Sealing and insulating ducts can help with common comfort problems, such as rooms that are too hot in the summer or too cold in the winter.

- Health: Sealing ducts can help improve indoor air quality by reducing the risks of pollutants entering ducts and circulating through your home. Fumes from household and garden chemicals, insulation particles, and dust can enter your duct system through leaks and can aggravate existing asthma and allergy problems.

- Safety: During normal operation, gas appliances such as water heaters, clothes dryers, and furnaces release combustion gases, like carbon monoxide, through their ventilation systems. Leaking ductwork in your heating and cooling system may cause backdrafting, where these gases are drawn into the living space, rather than expelled to the outdoors. Sealing leaks can minimize this risk.

- Save money: Leaky ducts can reduce heating and cooling system efficiency by as much as 20 percent. Duct sealing and insulating increases efficiency, lowers your energy bills, and can often pay for itself in energy savings. Plus, if you're planning to install new heating and cooling equipment, know that a well designed and sealed duct system may allow you to downsize to a smaller, less costly heating and cooling system.

- Protect the environment: Energy generation is one of the largest contributors to greenhouse gases. By sealing your ducts and reducing the amount of energy necessary to comfortably heat or cool your home, you can reduce the amount of air pollution generated.

Considerations

A poorly functioning, or poorly sized furnace for new duct runs can lead to inefficient operation, or worse, health issues. Have a mechanical contractor review the size of the furnace to verify that it is adequate for the number of duct runs (new and existing), and that it is functioning properly.

Resources

www.energystar.gov

www.energystar.gov/index.cfm?c=home_improvement.hm_improvement_ducts

Verification:

Visually inspect and photograph implementation of this measure.

8.1.6Accountability Form: **HVAC**

Prerequisite



New ducting MAY NOT use building cavities as part of air supply or return system. 011815 AS
Default Value

**Description:**

New ducts are not to utilize the building envelope in lieu of sheet metal or flexible ducts. This includes NOT “panning” joists and wall cavity spaces between studs.

All new cold air returns must be ducted

Benefit:

It may seem desirable at first to avoid the time and expense of installing rigid ducting, especially if the home already uses the wall and floor cavities as ductwork, however, it should never be considered because of the greater risks. Building cavities are never sealed well enough to serve as a ducting. If existing joist and wall spaces are used as air distribution supplies and returns, strongly consider installing rigid ducting.

Kitchen and bath exhaust fans should never use wall and floor cavities as ducting without the use of sheet metal or pre-formed ducts.

Considerations

When return air moves through building cavities, it can pick up impurities and redistribute them throughout the house.

There is a high risk of introducing moisture into building cavities when they are used as ducts.

Resources

www.homeenergy.com/archive/hem.dis.anl.gov/eehem/93/930920.html

Verification:

Visually inspect and photograph implementation of this measure.

8.1.7Accountability Form: **HVAC**

Prerequisite

**All New bath fan ducting that is in unheated space shall be insulated to min R8** 011815 AS

Default Value

**Description:**

Bath fan ducting must be insulated using either formaldehyde-free batt insulation or two-part spray applied insulation to achieve R-8. Also, the building cavity carrying the ductwork can also be insulated using rigid insulation to R-8 at all exterior walls and seams taped or sealed closed.

Benefit:

Insulating ductwork that carries very moist air helps prevent condensation from occurring inside the duct during cold times of the year.

Energy loss through ductwork can occur when passing through unconditioned space. Insulating all ductwork in unconditioned spaces is very important, especially ductwork that may not be sealed as well, like bath fan ductwork.

Considerations

Condensation that freezes on un-insulated ducts eventually melts and becomes moisture or water inside the joist space or wall cavity leading to mold problems.

Oftentimes, water leaking through a bath fan is not a roof leak, but rather condensation leaking through the fan. It can diminish the lifespan of the fan, as well as present a fire hazard.

Resources

Visit www.energytrust.org/TA/hes/weatherization/attic.html

Verification:

Visually inspect and photograph implementation of this measure.

8.1.8Accountability Form: **HVAC**

Prerequisite

**All new cooling and heating equipment must be installed with a programmable thermostat****--AND-- it must be programmed** 011815 AS

Default Value

**Description:**

A receipt, specification page, or photograph of the programmable thermostat

Educate homeowner on how to properly set the thermostat—most homeowners do not know how to properly set a programmable thermostat, rendering the energy saving potential useless.

Make sure the thermostat has an ENERGY STAR label.

Benefit:

A programmable thermostat saves energy when programmed properly to set back temperatures during sleeping and while away during the day.

In winter months, set away or sleeping temperatures cooler than desired when present. In summer months set the away temperatures warmer than desired when present.

Considerations

Most homeowners do not know how to properly set a programmable thermostat, rendering the energy saving potential useless.

Resources

<http://www.energystar.gov>

Verification:

See accountability form.

8.1.9Accountability Form: **HVAC**

Prerequisite



No new air handling equipment shall be installed in a garage. If existing, it must be in a room sealed off from automobile emissions, and with fresh air supply as required by mechanical equipment within. 011815 AS



Default Value

Description:

A visual inspection is required to verify that no air handling equipment, or return air is provided in the garage.

Exceptions

If existing equipment HVAC equipment is in the garage, an insulated sealed room with a sealed door must be built around it to overcome the below risks.

Benefit:

Since the garage is outside of the conditioned envelope of the house, HVAC systems that are in the garage run less efficiently.

Equipment and return air provided in the garage can pick up contaminants and distribute them throughout the home

Considerations

When air handling equipment is in the garage there is great risk of garage toxins getting into the air distribution system and spreading throughout the house.

Resources

Home Ventilating Institute, www.hvi.org

Verification:

See accountability form.

8.1.10Accountability Form: **HVAC**

Prerequisite



All clothes dryers must vent to the outside. Any new venting being added must be smooth, rigid duct, and must terminate at least 10 feet from any air intakes and any air conditioning compressor. (Some condensing ventless dryers exempt) 011815 AS



Default Value

Description:

- Dryers must vent directly from the unit through sealed and continuous ducting to the exterior of the home
- The ducting must be rigid type, not flexible ducting
- The ducting must not have kinks or angles greater than 90 degrees
- A Worst Case Combustion Spillage Test is recommended if atmospheric combustion equipment exists in the home.

Benefit:

Venting dryer exhaust inside the house can be very harmful. It is not a healthy way to add humidity to the house if the occupants determine they need added humidity. Dryer exhaust air contains too much moisture and pollutants such as fabric lint, carbon monoxide (gas dryers), and detergent chemicals that were not fully rinsed off of the clothes. Minimize the number of turns a duct must take before exiting the home. Every turn a duct makes reduces airflow, which would cause the dryer to work inefficiently.

If the dryer exhaust is too close to another air intake there is a risk that the hot moist air from the dryer will go into those intakes which are intended to be pulling in clean ambient outside air. Also, hot, moist dryer exhaust air will cause air conditioning compressors to work inefficiently.

Note: All dryer vents should be cleaned bi-annually to prevent lint build-up.

Considerations

All dryer ducts collect lint. Ducts must be cleaned bi-annually to prevent fires. Non-rigid ducts including flexible metal and expandable plastic ducts can collect more lint, and can be punctured when cleaning.

Air is drawn out of the house through the dryer when running. Have a mechanical contractor or home energy rater verify with a Worst Case Combustion Spillage Test that adequate make-up air is provided elsewhere in the home. Make sure the exhaust end of the duct, where it exits the home, is properly screened and protected from animal nests, rodent intrusion, and water infiltration.

Resources

The Appliance411 website has helpful information about maintenance as well as diagrams for proper ducting of dryers, www.appliance411.com/faq/dryer-vent-length.shtml

Verification:

Visually inspect and photograph implementation of this measure.

8.2 Ventilation and Fresh Air for Occupants

8.2.0

Accountability Form: **HVAC**



Design and install a whole house fresh air ventilation system in accordance with local code, (or ASHRAE 62.2 if not local code exists) For remodel project only. Remodel Only 011815 AS

0 3 0 0 0

Description:

Submit calculations and specifications of ventilation equipment being installed.

Benefit:

important element in a systems approach to Green building. Hence, regardless of whether the whole house ventilation system is required by code, to be fair to all remodel projects, GreenStar will award points equally for such a system in any remodel project.

Whole house ventilation systems include balanced systems, energy recovery ventilation, and heat recovery ventilation. All have their pros and cons, therefore consult with a mechanical contractor or engineer on the best system for a home.

Considerations

Unbalanced systems, unlike ERVs or HRVs, do not temper the air before it enters the home requiring more energy to heat and cool the new air.

Check local code requirements to see if an alternate fresh air supply calculation from ASHRAE 62.2 is required.

Resources

Minnesota Rules, Chapter 1322 Residential Energy Code.

Visit www.eere.gov for more information about whole house ventilation systems

Verification:

8.2.2

Accountability Form: **HVAC**



If no air exhaust already exists, install air exhaust system in any bathroom, kitchen or laundry room. Must install ENERGY STAR equipment, 1 Sone, proper CFM & smooth rigid duct. (If kitchen, then > 1 Sone is acceptable.) (Also applies to new homes) 011815 AS

0 1/2/3/3 0 1/2/3/4 0

(1 Room / 2 Rooms / 3 or more rooms / 4 or more rooms)



Description:

- Every bathroom and kitchen must be equipped with an air exhaust system. Other rooms that have the potential for high moisture levels or VOC levels, based on how they are used, should also have an air exhaust system.

- Typical air exhaust systems include the following.

- Exhaust fan, which exhausts to the exterior.

- System in which the exhaust duct is incorporated into a central heat recovery ventilator and fresh air supply.

Any exhaust system that is installed must exhaust air to the outdoors with a smooth rigid duct for optimal efficiency. Non-smooth ducts restrict airflow.

- For kitchens:

- 100 cfm minimum is recommended.

- Range hoods are most common and typically most effective, however standard bathroom exhaust fans can also be used effectively when a range hood may be difficult to install.

- Kitchen fans 75 cfm or smaller can be no louder than 2.0 sones and move a minimum of 1.4 cfm/watt. Fans 76 cfm or larger must be no louder than 1.5 sones and move a minimum of 2.8 cfm/watt. (EC, 41.1)

- Intentional make-up air system is required for any kitchen exhaust fan that exceeds 150 cfm.

- Check the fan specifications to be sure it is wired properly and rated for installation in the location you intend to put it.

- Look for a fan with the highest CFM/watt rating.

Benefit:

When moisture levels in the home are too high it degrades finishes and building materials. It also creates a condition that is conducive to mold growth, which can be a serious health hazard.

Considerations

A Worst Case Combustion Spillage Test is recommended if there are atmospherically venting appliances or appliances with a constant pilot such as an antique stove in the home. This test ensures that any combustion equipment or appliances are not backdrafting into the home when bath and kitchen vents are turned on. Combustion spillage can leak contaminants into the home, including carbon monoxide.

Resources

ENERGY STAR, www.ENERGY STAR.gov/index.cfm?c=vent_fans.pr_vent_fans

Toolbase, www.toolbase.org

Verification:

See accountability form.



8.2.3

Accountability Form: HVAC



If any non-ENERGY STAR rated fan already exists, in any bathroom, kitchen or laundry room, it can be replaced with ENERGY STAR fan, ≤ 1 Sone. Proper CFM & smooth rigid duct required. (If kitchen, then > 1 Sone is acceptable.) 011815 AS

1/2/3 0 0 1/2/3 1/2/3

(1 Room / 2 Rooms / 3 or more rooms)

Description:

Provide a fan with the highest CFM/watt rating.

Benefit:

Non-ENERGY STAR-rated fans typically use a lot of electricity relative to how much air they move. Replacing them with an ENERGY STAR-rated fan will save energy, and will have a net cost savings and a net benefit to the environment in the long run.

Considerations

Even though a fan may be operating properly, a noisy fan may not be used as much as a low noise (low sone) fan.

The embodied energy of replacing an operable bath fan is far outweighed by the energy savings of a new ENERGY STAR fan.

Resources

ENERGY STAR, www.ENERGY STAR.gov/index.cfm?c=vent_fans.pr_vent_fans

Energy Federation Incorporated, www.efi.org

Verification:

See accountability form.

8.2.4Accountability Form: **Electrical Contractor**

Install automatic controls on any exhaust fan in any bathroom or laundry room. 011815 AS 0 1/2/3/4 0 1/2/3/4 0
 (1 Room / 2 Rooms / 3 Rooms / 4 or more rooms)

Description:

Various automatic controls, including consolidating the fan and light switch, manual timers, programmable timers, motion sensors, and dehumidistats are all available to help ensure exhaust fans are run optimally.

Benefit:

Typically, if the fan is on its own switch it is not convenient for the occupants of the house to turn the fan on and off at times that contribute to optimal indoor air quality. A good rule of thumb is for fans to at least be run when the room is occupied, and typically they should run for an extended period of time after the occupant has left the room. To choose the best controls to work in concert with the other ventilation systems in your house it may be advisable to consult with a knowledgeable professional.

Considerations

Make sure the most appropriate automatic control is added to the fan and light switch. Different types may be frustrating based on the occupant's use of the space. Consult with an electrician as to the most appropriate controls for the home and occupant

Resources

ENERGY STAR: www.ENERGY STAR.gov/index.cfm?c=vent_fans.pr_vent_fans

Energy Federation Incorporated: www.efi.org

Verification:

See accountability form.

8.2.6

Accountability Form: HVAC



Install garage exhaust fan that is ENERGY STAR rated and runs continuously at min. 25 CFM. OR If it has intermittent operation, (i.e. controlled by a motion sensor or programmable timer), 100 CFM is required (attached garage only). 011815 AS

1 2 0 0 0

Description:

A Minimum of 100 sq. in. of net free vent area is required for every 100 sq. ft. of floor area in the storage room. No combustion or HVAC equipment shall be in the garage.

Exceptions

An optional, but recommended practice is to store products that are highly poisonous and/or high VOC and/or combustible in a locked storage room, which is adequately vented directly to the outdoors.

Benefit:

Providing continuous fresh air to an attached garage can minimize the amount of contaminants entering the home. Instead of drawing air from the garage into the home through leaks, cracks, or doors, the air is instead drawn out

Verification:

Provide documentation or calculations for this measure.



8.2.7

Accountability Form: HVAC



Check air filter hardware for tightness and correct if leaks are detected 011815 AS

0 0 1 0 0

Description:

Any and all air filters in the air distribution system need to be seated tightly so that no air leaks past them or out of the system at that location.

Benefit:

Air filter locations on air handlers are notorious for leakage.

If the air filter hardware is not airtight, the air filter will not be able to clean the air effectively, and the whole system will not run as efficiently as it should.

Considerations

No air filter assembly can be entirely airtight, but improving the airtightness can help a system run more efficiently as well as keep particulates out of the filtering system.

Anytime changes are made to the mechanical system (except for changing a filter), a mechanical contractor should be consulted to make sure no hazards are being introduced.

Resources

www.ashrae.org

www.epa.gov/iaq/schooldesign/hvac.html

Verification:

Verifier visually confirms and photographs this measure.

8.2.8Accountability Form: **HVAC**

High efficiency whole house fan installed with R-42 minimum insulated cover (open windows and/or doors to prevent backdrafting). 011815 AS 2 0 0 0 0

Description:

- Attic ventilation must provide at least one square foot of net free vent area per 750 cfm of fan airflow (CFM = Whole House Fan ACM Capacity x Volume of House).
- Whole house fan shall be installed with an insulated cover. A cover shall be constructed to air seal and insulate whole house fan.
- Homeowner shall be instructed to remove cover before operating the fan and replace cover during seasons when not in use.
- Instructions for whole house fan must be included in the Homeowner User's Manual.

Benefit:

A high efficiency whole house fan can be used to draw a lot of air through the house using the windows and doors as air inlets.

During the cooling season, it can often be used at night to bring in cool air and cool the house down for less cost than running the air conditioner.

Considerations

Whole house fans can potentially cause dangerous backdrafting of atmospherically vented combustion appliances. It is very important for windows and/or doors to be open when running such a fan to prevent this.

Insulation that is loose, such as cellulose or blown fiberglass can become disturbed during generation of fan or in removal of fan cover. Care should be taken in instructing the owner o the need to restore insulation as needed.

Resources

Energy Federation Incorporated: www.efi.org

Verification:

Verifier visually confirms and photographs this measure.

8.2.9Accountability Form: **HVAC****Heat recovery ventilator (HRV) installed** 011815 AS

2 1 0 1 0

Description:

An HRV uses the air that is being exhausted to either pre-heat or pre-cool the incoming fresh air.

Benefit:

A heat recovery ventilator (HRV) can save energy and heating costs by pre-heating or pre-cooling incoming fresh air with warm or cool air, which is being exhausted. An HRV can help lower humidity in the home during the winter months.

Considerations

An HRV does not transfer any of the humidity back into or out of the home. An HRV can dry a house more than may be comfortable, possibly requiring the addition of a humidification system.

Resources

Energy Federation Incorporated, www.efi.org

Verification:

Provide documentation or calculations for this measure.

8.2.10Accountability Form: **HVAC****Energy recovery ventilator (ERV) installed** 011815 AS

3 2 0 1 0

Description:

An ERV is very similar to an HRV, however, in addition to the transfer of some of the heated or cooled air from the outgoing air to the incoming air, some of the humidity is also transferred.

Benefit:

An energy recovery ventilator (ERV) can save energy and heating costs by pre-heating or pre-cooling incoming fresh air with warm or cool air, which is being exhausted. An ERV can also help balance humidification to the home in the winter.

Considerations

Not all ERVs are rated for the extremely cold weather, so special attention should be given to this issue.

Resources

Energy Federation Incorporated, www.efi.org

Verification:

Provide documentation or calculations for this measure.

8.2.11Accountability Form: **HVAC**

All outdoor air intakes for ventilation located at least 10' away from air exhaust outlets and areas where vehicles may be idling. 011815 AS

4 2 0 0 0

Description:

Field verification is required.

Benefit:

Drawing air into the home from a location near where air is exhausted from the home can bring unwanted moisture, odors, and fumes along with it. Placing intakes a minimum of 10' from exhaust air (including potential car exhaust) helps keep incoming air cleaner.

Considerations

Carbon monoxide could be one of the most harmful of all possible contaminants drawn into the home if air intakes are located too close to exhaust or locations where cars may be idling.

Resources

www.carbonmonoxidekills.com

Verification:

Verifier visually confirms and photographs this measure.

Visually inspect and photograph implementation of this measure.

8.2.12Accountability Form: **HVAC****Install higher MERV rated Filter** Or equivalent

(MERV 8 / MERV 10+) 0 2/3 0 0 0

Description:

- . Use HEPA or better-performing air filter with MERV rating 8 or more (e.g. greater than 1" thick pleated filters preferred)
- Air filters/air cleaner with minimum of 30% dust spot efficiency (e.g., pleated filters, MERV rating of 12 or higher).
- Ozone generators are not permissible as air cleaners.
- Filter, 2" pleated or better.
- Install a clean filter, with the direction of the airflow clearly noted, a minimum of every three (3) months.

Exceptions

May be able to use MPR rating

http://en.wikipedia.org/wiki/Microparticle_performance_rating

Benefit:

A large media filter is useful if a furnace is older or not an efficient model. It will capture dust, dust mites, and other large particulate matter.

Considerations

Have furnace maintained on an annual basis. Verify with the HVAC contractor performing the maintenance to make sure a large media filter is appropriate for the particular furnace, and for its proper installation.

Older furnaces can lose significant efficiency and airflow if a HEPA or better performing air filter (with an MERV of 8 or higher) is used.

Resources

www.ashrae.org

Verification:

Rater visually confirms this is installed.

8.2.15Accountability Form: **Plumbing Contractor****Install sub-slab soil gas / moisture vent system passive or active** 011915 AS

0 8 1 0 0

Description:

If test indicates greater than 4 picocuries per liter radon concentration, remodeler must follow EPA guidelines to reduce radon levels.

If radon levels are less than 4 picocuries, this type of a system is recommended because a) radon levels often change over time, and b) the vent helps keep basements dry, which is usually one of the largest problems with utilizing basement space.

Benefit:

GreenStar steps:

- Determine U.S. EPA radon area by consulting U.S. EPA Radon Zone Maps <http://www.epa.gov/radon/zonemap.html>
- Install Radon-resisted features (active or passive sub-slab depressurization system) in all homes in U.S. EPA radon Zone 1 and 2 radon areas*

* Provide owners of homes in U.S. EPA Zone 1 and Zone 2 radon areas with two (2) radon test kits designed for 49-hour exposures, including instructions for use and guidance for follow-up actions to testing results

Resources

www.epa.gov/radon/pubs/citguide.html

Verification:

Visually inspect and photograph implementation of this measure.

8.3 Moisture and Relative Humidity

8.3.0

Accountability Form: **HVAC**



Install temperature and humidity sensors and record indoor/outdoor data for two weeks minimum prior to and one year after project work. 011915 AS

0 3 0 1 0

Description:

Indoor and outdoor RH and temperature levels measured on all levels of the home, every 12 hours for two (2) weeks to establish a pattern of humidity levels.

Benefit:

Individual humidity level measurements do not give an adequate indication of the humidity situation in a home. Much more data is necessary to gain an understanding of how the levels may change over time. This data is essential to remain aware of humidity levels throughout the occupancy of the house and to know if corrective action is necessary at any given time.

People that are more aware of the RH levels of their home tend to be better at managing the indoor environmental quality.

Resources

Contact the mechanical contractor involved with the project

Verification:

See attached "Temperature and Relative Humidity Tracking Table 5B -- 1"

8.3.2

Accountability Form: HVAC



Installation of new (or replacement of old) dehumidifier with ENERGY STAR rated dehumidifier equipped with humidity sensor. (Portable, Stand-alone & HVAC integrated qualify) 011915 AS

0 2 0 1 0

Description:

Install stand-alone dehumidifier with humidity sensor in areas of the house that are most susceptible to high humidity levels—AND/OR—install system integrated dehumidification system into forced air system.

Homeowner must sign-off to indicate that they have received education for dehumidification system.

Benefit:

Overall dehumidifiers are a great feature to have in a house. The net benefit to IEQ and RE (improved home durability) outweigh the negative effect of the energy they consume. Negative 1 pt. in EE is due to the fact that dehumidifiers require a fair amount of energy to operate. In addition to the energy they consume, they exhaust warm air inside the house, which can cause the A/C system to run a bit longer as well, if there is an A/C system in the house. Given the risks associated with high humidity levels in the home, installing a dehumidifier in the most susceptible areas of the house (e.g., basement) typically adds extra protection against unsafe high humidity levels.

Considerations

The risks associated with dehumidifying the air TOO much are minimal and typically adding a de-humidification system that is ready to run if and when the need arises, is encouraged.

Resources

www.ENERGY STAR.org

Verification:

Provide documentation or calculations for this measure.

8.4 Ducting/Air Distribution Strategies

8.4.4

Accountability Form: **HVAC**



Perform duct blaster test for AIR LEAKAGE TO THE OUTSIDE. 011915 AS

2/4/6 1 0 0 0

(Air leakage < 8% of air handler flow / Air leakage < 5% of air handler flow / Air leakage < 3% of air handler flow)

Description:

- Refer to the Residential Energy Services Network (RESNET) "2006 Mortgage Industry National Home Energy Rating Systems Standards" and the "RESNET Formal Interpretation 2006-002" for testing procedures."
- A duct blaster test must be performed by energy rater and energy rater document must be provided. Note exceptions below.
- This test can be performed at the end of construction, however it is recommended that it be performed before wall finishes are installed. Results are typically better since it is easier to seal off the ducts where they terminate at this stage of construction.

Exceptions

- Companies that perform aerosol duct sealing should contact GreenStar if they wish to become qualified to provide duct leakage testing and documentation.
- They will need to demonstrate that their testing equipment meets GreenStar Quality Standards and that they fully understand the testing procedures adopted by GreenStar.
- Periodic spot checking of their testing results may be done by GreenStar to verify the quality of their testing.

Benefit:

Leaky ducts reduce the efficiency of mechanical equipment. Sealing leaky ducts with butyl tape (not Duct Tape) can increase efficiency. Acceptable Tape is UL 181 listed. Sealing leaky ducts can reduce airborne contaminants from infiltrating the ductwork and into the air.

Considerations

If asbestos are present, blower door test should not be performed when there is risk of asbestos becoming airborne and infiltrating into the house.

Resources

www.natresnet.org/standards/mortgage/RESNET_Mortgage_Industry_National_HERS_Standards.pdf

www.natresnet.org/standards/mortgage/interpretations/duct_test.pdf

www.southface.org/web/Resourcesandservices/publications/factsheets/22blowdoor.pdf

www.builditgreenutility.org for asbestos information

Verification:

Verifier visually confirms and photographs this measure.

8.4.5Accountability Form: **HVAC**

Properly designed ductless HVAC system installed in home. Ducted bath fan, kitchen hood and make-up air allowed. 011915 AS

0 2 0 2 0

Description:

Ductless mini-split heat pump systems also qualify for these points.

Exceptions

Bath fans, kitchen hoods, and make-up air always require ducts.

Benefit:

In some situations with small homes it is possible to have a centrally located furnace that requires no ducts. Ductless systems allow for easier zoning of areas, floors, or rooms of home, so better energy efficiency is achieved.

Considerations

This credit is not meant to encourage the installation of fireplaces or space heaters.

Resources

www.efi.org

Verification:

Verifier visually confirms and photographs this measure.

8.4.6Accountability Form: **HVAC**

Seal existing HVAC cabinet seams, and all seams of plenums and duct-work with mastic. Install gaskets on cabinet doors if possible. 011915 AS

5 2 0 0 0

Description:

- Provide evidence that the HVAC cabinet seams have been sealed
- Provide evidence that the HVAC cabinet seams warranted sealing, and that they were not pre-sealed by the manufacturer

Exceptions

Some cabinet doors cannot be gasketed

Benefit:

- Sealing HVAC cabinets reduces air and contaminant infiltration or ex-filtration
- Sealing HVAC cabinets with new gaskets can improve efficiency

Considerations

Make sure the furnace is evaluated beforehand and qualifies to be sealed. A Worst Case Combustion Spillage Test should be performed to make sure no potential issues are involved with gasketing the cabinet seams

Resources

www.energystar.gov

Verification:

Verifier visually confirms and photographs this measure.

8.4.7Accountability Form: **HVAC**

Rooms and zones have balanced air flow. +/- 3 pascals relative to the outdoors or adjacent rooms caused by any single or combination of fans or blowers. 011915 AS

1 1 0 0 0

Description:

- Any closed room, except those listed, without a return air duct must have the door undercut 1"
- Net free opening size must be a minimum of 1 square inch per CFM of supply (include free area undercut below door as part of the area).

Exceptions

Bathrooms, kitchens, closets, pantries, and laundry rooms.

Rooms with louvered doors, or without doors, are exempt

Benefit:

The lack of appropriate return air to a furnace diminishes the efficiency and effectiveness of a furnace.

Considerations

Future homeowners and future remodelers must be alerted that the doors have been undercut. Any remodeling where doors are replaced can affect the efficiency of the HVAC system.

Consider marking the underside of the door indicating that there was an intentional undercut for ventilation efficiency.

Verification:

Verifier visually confirms and photographs this measure.

8.4.8

Accountability Form: HVAC


Installation of depressurization protection (make-up) air intake (with or without damper) in homes that have no air intake. 011915 AS

0 1 0 0 0

Description:

Provide fresh air intake near gas furnace and gas water heater sized appropriately for the amount of fresh air required for equipment without depressurizing home. Fresh air intake must return upward in a "J" shape a minimum of 6" to prevent cold air from spilling into basement.

Fresh air intake may or may not have damper

Benefit:

This passive air intake is often called a "make-up" air supply. It helps prevent backdrafting by preventing depressurization and by allowing fresh air to enter the house when the house starts to undergo a negative pressure due to atmospherically venting appliances, the running of exhaust fans, or both.

By preventing the possibility of serious depressurization in the house, make-up air systems also help reduce the chances of soil gases like radon from being pulled into the home.

A properly wired electronically controlled damper can improve overall energy efficiency of the house by not allowing excessive air into the house when it is not needed, preventing backdrafting (e.g., damper closed when atmospherically venting appliances AND exhaust fans of 125 cfm or more are not running).

Considerations

It is recommended that this credit be combined with a Worst Case Combustion Spillage Test conducted by a GreenStar approved rater or mechanical contractor. In some cases, even a fresh air intake may not keep atmospherically appliances from backdrafting into home. Sometimes a larger air intake is required, and in some cases an active (motorized) make-up air is required.

Verification:

Visually inspect and photograph implementation of this measure.

8.4.9Accountability Form: **HVAC**

Replace OLD passive make-up air intake with NEW intake which contains a motorized damper. Damper must be electronically connected to largest exhaust fan in house. 011915 AS Default Value

0 2 0 0 0

Description:

A new intake with an electronically controlled damper must be installed.

Benefit:

A properly wired electronically controlled damper can improve overall energy efficiency of the house by not allowing excessive air into the house when it is not needed, preventing backdrafting (e.g., damper closed when atmospherically venting appliances AND exhaust fans of 125 cfm or more are not running)

Considerations

Verify that the duct and electronic damper are operating properly by having a mechanical contractor run diagnostics to verify the amount of airflow entering the home when the furnace is activated. Failure for the electronic damper to activate can draw air from non-fresh air sources and pose a health risk.

Verification:

Visually inspect and photograph implementation of this measure.

8.4.10Accountability Form: **HVAC**

Replace OLD passive make-up air intake with NEW intake which contains a motorized damper. Damper must be electronically connected to largest exhaust fan in house. 011915 AS

0 2 0 0 0

Description:

A new intake with an electronically controlled damper must be installed.

Benefit:

A properly wired electronically controlled damper can improve overall energy efficiency of the house by not allowing excessive air into the house when it is not needed, preventing backdrafting (e.g., damper closed when atmospherically venting appliances AND exhaust fans of 125 cfm or more are not running)

Considerations

Verify that the duct and electronic damper are operating properly by having a mechanical contractor run diagnostics to verify the amount of airflow entering the home when the furnace is activated. Failure for the electronic damper to activate can draw air from non-fresh air sources and pose a health risk.

Verification:

Visually inspect and photograph implementation of this measure.

8.4.11	Accountability Form: HVAC					
Insulate a minimum of 3' of piping exiting the boiler 011915 AS		1	0	0	0	0

Description:

- Use tubular style insulation (tape insulation also allowed), including elbows and turns
- All seams must be taped with a length of duct tape, no gaps.

Exceptions

Insulate using tubular style insulation to the wall if less than 3'

Benefit:

Heat losses from the boiler can be as much as 35% of the energy for output of the boiler when pipes are un-insulated.

Install insulation on supply lines, cutting notches in insulation at elbows for a tight fit.

Verification:

Visually inspect and photograph implementation of this measure.

8.4.12	Accountability Form: HVAC					
No radiator pipes located through an unconditioned space (i.e. unconditioned crawlspace, attic, or garage) 011915 AS		1	0	0	0	0

Description:

- Use tubular style insulation (tape insulation also allowed), including elbows and turns
- All seams must be taped with a length of duct tape, no gaps.

Benefit:

Insulate using tubular style insulation to the wall if less than 3'

Rationale

Heat losses from the boiler can be as much as 35% of the energy for output of the boiler when pipes are un-insulated.

Install insulation on supply lines, cutting notches in insulation at elbows for a tight fit.

Verification:

See accountability form.



8.4.16

Accountability Form: **HVAC**



Inspect and clean air-handling equipment before installing diffusers, grilles, and before making system operational. 011915 AS

0 1 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done

Post cleaning photo-OR-rater sign-off

Benefit:

This measure improves indoor environmental quality.

Verification:

See accountability form.

8.4.17Accountability Form: **HVAC****Perform duct blaster test for TOTAL DUCT LEAKAGE.** 011915 AS

2/4/6 1 0 0 0

(Air leakage < 35% of air handler flow / Air leakage < 25% of air handler flow / Air leakage < 15% of air handler flow)

Description:

- Refer to the Residential Energy Services Network (RESNET) "2006 Mortgage Industry National Home Energy Rating Systems Standards" and the "RESNET Formal Interpretation 2006-002" for testing procedures."

- A duct blaster test must be performed by energy rater and energy rater document must be provided. Note exception below.

- This test can be performed at the end of construction, however it is recommended that it be performed before wall finishes are installed. Results are typically better since it is easier to seal off the ducts where they terminate at this stage of construction.

Exceptions

- Companies that perform aerosol duct sealing should contact GreenStar if they wish to become qualified to provide duct leakage testing and documentation.

- They will need to demonstrate that their testing equipment meets GreenStar Quality Standards and that they fully understand the testing procedures adopted by GreenStar.

- Periodic spot checking of their testing results may be done by GreenStar to verify the quality of their testing.

Benefit:

Leaky ducts reduce the efficiency of mechanical equipment. Sealing leaky ducts with butyl tape (not Duct Tape) can increase efficiency. Acceptable Tape is UL 181 listed. Sealing leaky ducts can reduce airborne contaminants from infiltrating the ductwork and into the air.

Considerations

If asbestos are present, blower door test should not be performed when there is risk of asbestos becoming airborne and infiltrating into the house.

Resources

www.natresnet.org/standards/mortgage/RESNET_Mortgage_Industry_National_HERS_Standards.pdf

www.natresnet.org/standards/mortgage/interpretations/duct_test.pdf

www.southface.org/web/Resourcesandservices/publications/factsheets/22blowdoor.pdf

www.builditgreenutility.org for asbestos information

Verification:

Verifier visually confirms and photographs this measure.

8.5 Ductwork

8.5.0

Accountability Form: **HVAC**



All newly added ductwork kept in conditioned space and interior walls. Ductwork allowed in vaulted ceiling provided it stays on the conditioned side and the minimum R-values are still met 011915 AS 2 0 0 0 0

Description:

No new ducts are allowed in exterior walls. If perimeter ventilation is desired, terminate ducts at the floor or ceiling before reaching the wall.

Create a conditioned wall, ceiling, or floor chaise so ductwork is in insulated cavity.

Benefit:

When ductwork is kept inside the insulated envelope, the HVAC system operates much more efficiently since there is less lost during heating and cooling. Furthermore, what is lost from the mechanical system is still captured within the house.

Verification:

Verifier visually confirms and photographs this measure.

8.5.2

Accountability Form: **HVAC**



Design appropriate duct system using ACCA Manual D. 011915 AS 2 0 0 0 0

Description:

- Multiple return ducts or transfer grills.
- Each bedroom shall have a dedicated return duct, or for homes with no return ducts located in bedrooms, all supply air shall have a direct path back to a return grille even when doors are closed. This path shall be through transfer grills.
- Houses with undercut doors to bedrooms do not qualify for these points.
- Provide manual D to GreenStar at plan review.

Benefit:

When ducts are sized appropriately for a home, the mechanical systems operate at their optimum performance standards. When Manual D calculations are combined with additional ACCA calculations such as Manual J and Manual S, the mechanical systems work together to their ideal specifications. Appropriately sized ducts reduce energy consumption as right amounts of air (whether heating or cooling) are moved through them.

Resources

www.energy.ca.gov/efficiency/qualityhomes/procedures.html

Verification:

8.5.3Accountability Form: **HVAC****All supply duct take-offs spaced 6" apart minimum** 011915 AS

1 0 0 0 0

Description:

- All supply duct take-offs shall be spaced at least 6" apart from each other with no duct take-offs originating from the cap of the supply plenum.
- No duct take-offs within 6" of supply plenum cap
- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification

Exceptions

Junction boxes with 4 take-offs or less are excluded.

Benefit:

Improves system efficiency.

When duct take-offs are closer less than 6" apart, there is typically inadequate air flow into each of them.

Verification:**8.5.4**Accountability Form: **HVAC****All ductwork is rigid (no flex duct used anywhere)** 011915 AS

1 0 0 0 0

Description:

For this elective credit, all new ductwork shall be made of rigid duct materials (i.e. sheet metal, duct board, etc.).

Rater sign off at pre-drywall inspection

Benefit:

Rigid ductwork allows better air flow.

Considerations

- Restricted airflow can reduce the efficiency of equipment.
- Pinched or excessively long duct runs can collect dust and particulates, blocking airflow.
- Dryer vents with flexible ducting are NOT recommended – they can be a fire hazard.

Verification:

Verifier visually confirms and photographs this measure.

8.5.5Accountability Form: **HVAC**

Upgrade existing duct system by replacing with rigid ductwork and sealing with mastic, aerosol duct sealant or equivalent 011915 AS 4 4 0 2 0

Description:

No Duct Tape or similar to be used as a sealant.

New ducts must be rigid, no flex, with all connections and joints sealed with mastic or aerosol duct sealant.

Benefit:

- Rigid, sealed ducts perform better and are easier to maintenance long-term compared to flexible ducts or “panned” joists.
- Rigid ducts hold up better to cleaning methods
- Sealing rigid ducts prevents air leakage and heightens efficiency of mechanical units.

Considerations

If installing new rigid ducts requires the demolition of nearly all interior wall surfaces, and demolition was not anticipated, the benefits of new ducts needs to be weighed against the drawbacks of demolition waste, repair, and finishing of the home.

Verification:

Visually inspect and photograph implementation of this measure.

8.5.6Accountability Form: **HVAC**

Existing duct trunk lines in un-conditioned space insulated 011915 AS (R10 / R30) 2/4 1 0 0 0

Description:

Existing ducting in unconditioned space must be insulated using either formaldehyde-free batt insulation or two-part spray applied insulation to achieve R-10. Also, the building cavity carrying the ductwork can also be insulated using rigid insulation to R-10 at all walls and seams taped or sealed closed.

Benefit:

Energy loss through ductwork can occur when passing through unconditioned space. Insulating all ductwork in unconditioned space is very important.

If existing ductwork is uninsulated and unsealed in unconditioned space, significant energy, moisture and particulate transfer may occur.

Verification:

Verifier visually confirms and photographs this measure.

8.5.7Accountability Form: **HVAC****Furnace located to minimize length of duct runs** 011915 AS

2 0 0 1 0

Description:

Home plan with diagram and measurements showing furnace location and its optimal location for minimizing duct runs.

Benefit:

A centralized furnace to minimize duct runs can save energy as the ideal temperature can be reached evenly throughout the house. Paired with a zoned heating system, a centralized location can reduce heating bills.

Considerations

Locating a new furnace or relocating an existing furnace can be a considerable expense depending on the amount of ductwork, wiring, make-up air, and other air handling equipment that is connected to the furnace.

If a furnace is located on the main living level, a central location may not be feasible.

If a finished basement is desired in the future, homeowner education may be needed to explain the importance of a centrally located mechanical room.

Verification:**8.5.8**Accountability Form: **HVAC****Boiler located to minimize length of supply lines.** 011915 AS

2 1 0 0 0

Description:

Home plan with diagram and measurements showing furnace location and its optimal location for minimizing duct runs.

Benefit:

A centralized furnace to minimize duct runs can save energy as the ideal temperature can be reached evenly throughout the house. Paired with a zoned heating system, a centralized location can reduce heating bills.

Considerations

Locating a new furnace or relocating an existing furnace can be a considerable expense depending on the amount of ductwork, wiring, make-up air, and other air handling equipment that is connected to the furnace.

If a furnace is located on the main living level, a central location may not be feasible.

If a finished basement is desired in the future, homeowner education may be needed to explain the importance of a centrally located mechanical room.

Verification:

8.5.9 Accountability Form: **HVAC**

Seal all New Ductwork with Mastic 011915 AS Default Value 0 0 0 0 0

Description:

Benefit:

Verification:

Visually inspect and photograph implementation of this measure.

8.5.10 Accountability Form: **HVAC**

Coordinate ductwork and framing 011915 AS 2 1 0 0 0

Description:

Rater sign-off or submit photo's of ductwork at all critical intersections between ductwork and framing/structure.

Benefit:

It is rare that the flow of duct work through a home is considered in the framing plan. When they are considered together, however, heating and cooling efficiencies are improved when elbows and duct length is minimized through preplanning.

Verification:

Verifier visually confirms and photographs this measure.

8.5.11 Accountability Form: **General Contractor**

Protect all duct registers / returns with solid material during construction Default Value 0 1 0 0 0

Description:

Protect all forced air ductwork registers with solid material to prevent construction debris, dirt, and dust from entering the system. Floor covers must be rigid enough to support construction activity. In addition, a temporary filter must be installed on the cold air return grille to keep debris from entering the ducting system.

Benefit:

Improve the air quality and long term durability of the duct system as well as the air handler, filter, and furnace / heat pump warranty by preventing construction debris, dirt, and dust from entering the system.

Verification:

EA Rater to visually inspect for solid coverings on all floor registers and returns. Wire mesh and other protective coverings that allow air movement through the floor registers do not meet the intent of this measure as they will still allow dust and other fine particles to accumulate in the system.

8.6 Heating and Cooling Equipment

8.6.0

Accountability Form: **HVAC**

Prerequisite



No direct expansion systems allowed 011915 AS (PREREQ)

Default Value



Description:

Benefit:

Excessive uses of copper piping

Concerns about long-term durability and ground water contamination.

Verification:

See accountability form.

8.6.2

Accountability Form: **HVAC**

Prerequisite



Condensation must drain into drain system not under slab 011915 AS (PREREQ)



Description:

Drain pans shall be sloped, corrosion resistant (e.g., stainless or plastic) with drains at the low point. Condensate lines shall be drained to drainage system, not just deposited under slab.

Benefit:

Almost all A/C equipment will have condensation emitting from them (as well as water heaters). Providing a reasonable way for the water to be moved away from the equipment eliminates corrosion possibilities, deterioration of the equipment, and keeps the possibility of stagnant water at bay.

Considerations

Draining equipment under the slab, or not providing a disaster pan at all, can both add moisture to the slab, floor, or be a potential flooding issue.

Verification:

Visually inspect and photograph implementation of this measure.

8.6.3

Accountability Form: HVAC



Design and install heating a cooling equipment according to manual J calculations. 011915 AS

3 0 0 2 0

Description:

Provide ACCA Manual J calculations with the checklist. HVAC contractor should be qualified to produce these calculations.

Benefit:

- The ACCA Manual J appropriately sizes heating and cooling equipment based on a home’s heating and cooling need, or load.
- The Manual J takes into account the following items.
- The local climate
- Size, shape, and orientation of the house
- Insulation levels
- Window area, location, and type
- Air infiltration rates
- The number and ages of occupants
- Occupant comfort preferences
- The types and efficiencies of lights and major home appliances (which give off heat). (www.eere.energy.gov)

Considerations

Most heating and cooling contractors do not size equipment properly, often over sizing equipment “to be safe”. Instead, oversized equipment does not run efficiently, cost more money, and can over heat or cool a home.

Oversized air conditioners may not cool a home properly because they do not sense the need to run long enough due to their size.

Verification:

8.6.4

Accountability Form: HVAC



Heating & Cooling Equipment Efficiency. At the end of the project ALL heating and cooling equipment must meet or exceed one of these categories to get credit. 011915 AS

(Heating meets ENERGY STAR (> 8.2HSPF, > 90 AFUE Furnace, > 85 AFUE Boiler) / Heating is better than ENERGY STAR (> 8.6HSPF, > 92 AFUE Furnace, > 87 AFUE Boiler) / "Substantially better than ENERGY STAR (>9.0HSPF, > 94 AFUE Furnace, > 90 AFUE Boiler.) / Cooling meets ENERGY STAR (> 15 SEER,) / Cooling is better than ENERGY STAR (> 16 SEER) / Cooling is substantially better than ENERGY STAR (> 17 SEER.)

5/10/15/3/7/11 0 0 0 0

Description:

- If an air source heat pump is installed, it shall have an outdoor thermostat installed according to manufacturer's specifications that restricts electric resistance heating when outdoor air temperatures are above 40°F (EC, 21.3).
- All new heating and cooling equipment must be installed with a programmable thermostat equipped with "fan on" override capability.
- Heating and cooling systems must be designed using ACCA Manual J.
- All new heating and cooling equipment must have an efficiency rating as determined by the Air Conditioning and Refrigeration Institute (ARI), www.ari.org.

Replacement of power vented mechanical equipment at 85% efficiency or greater for alternate systems must be reviewed by GreenStar administration to determine if credit will be awarded. There must be enough of an increase in performance to warrant changing out existing equipment.

Benefit:

The efficiencies of different heating and cooling equipment are not all described using the same unit system (e.g., SEER, AFUE, EER). Also, the overall efficiency of a system cannot be judged by the unit value alone. Hence the above table helps categorize the different systems in a more even way despite these differences.

Note: The efficiency threshold for boilers is lower than it is for furnaces. This is due to the fact that boilers are a more efficient system for distributing heat.

Existing boilers at 85% or better and furnaces at 89% or better are not worth replacing with new equipment due to the limited opportunity for increased performance and all of the embodied energy that it would take to replace it.

Verification:

Provide documentation or calculations for this measure.



8.6.5

Accountability Form: **HVAC**



Install ground source heat pump 011915 AS

10 0 5 2 0

Description:

- Notes on drawings and/or specifications indicating work to be done or product to use.
- Post-installation photo—OR—rater verification
- This credit may be taken in addition to the efficiency rating of the system

Benefit:

Renewable source of heat and cool

Very energy efficient

Considerations

Soil conditions must be right

Verification:

Verifier visually confirms and photographs this measure.

Provide documentation or calculations for this measure.

8.6.6Accountability Form: **HVAC****Install multiple zones in home to improve energy efficiency.** 011915 AS

4 2 0 0 0

Description:

- A minimum of each level of the house is on a separate zone
- High and low use rooms are zoned separately
- Bedrooms are zoned separately from the rest of the home
- Additions and spaces built into the current home are zoned separately

Exceptions

Existing radiator systems can be expensive and difficult to re-zone. Direct-install on the unit dial style controls will be accepted with homeowner education on operation

Benefit:

Being able to control the amount of heat in each room is an ideal way to control over heating some rooms, and under heating others. This strategy helps control heating costs, as less heat is needed to warm the home to desired temperatures.

Considerations

This strategy must be performed by a professional HVAC contractor who will help determine the right number of zones and right number of rooms to zone.

Resources

www.eere.energy.gov

Verification:

Verifier visually confirms and photographs this measure.

Provide documentation or calculations for this measure.

8.6.7Accountability Form: **HVAC**

Install hydronic in-floor heating system connected to heat source that has at least 80% AFUE boiler. Connecting to ground source heat pump or hot water solar systems also qualify. 011915 AS

4 2 0 2 0

Description:

Hydronic in-floor heating system must be installed in a minimum of 200 sq. ft. or two rooms.

It can be installed in conjunction with another heat source, such as forced air heat.

Exceptions

Less than 200 sq. ft. or two rooms can be installed if in conjunction with a hot water boiler heat system (radiators or baseboard) in the rest of the home.

Benefit:

Hydronic, in-floor heat is a superior heating system to forced air for a number of reasons. The heat is radiant and at the floor level, close to the occupants, which typically results in greater comfort and less energy use since occupants are comfortable at a lower air temperature. It is much quieter than a forced air system. It requires much less space than a forced air system.

Considerations

It is not recommended that hydronic in-floor heat be installed under carpet or other surfaces, which require glues containing urea-formaldehyde. Hydronic in-floor heat is best suited under concrete or tile as a finished surface.

Hardwood nailed into floors can be installed over hydronic in-floor heat when using a track system such as quick-trax, or structural track systems like warmboard. Care should be taken when selecting the wood species as the heat tends to shrink the wood in the winter, and woods that undergo bigger expansions and contraction rates may expose seams in the winter. Additionally, avoid mixing wood species that have different rates at expansion and contraction in the same installation pattern.

A hydronic in-floor heat system should be installed in conjunction to a mechanical air distribution system, and to make sure adequate air intakes can provide fresh air to the home.

Verification:

Verifier visually confirms and photographs this measure.

8.6.8Accountability Form: **HVAC****Furnace is equipped with an electronically commutated fan motor (ECMs) -- (variable speed motor)**

1 0 0 0 0

011915 AS

Description:

Documentation provided showing either the purchase or installation of variable speed motor

Exceptions

If the furnace is already equipped with a variable speed system, this credit will also count.

Benefit:

ECM motors are more energy efficient than others.

Verification:

Provide documentation or calculations for this measure.

8.6.9Accountability Form: **HVAC****Air conditioner refrigerant is HCFC alternative** 011915 AS

0 0 3 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Less degradation of the upper atmosphere

Verification:

Provide documentation or calculations for this measure.

8.6.10 Accountability Form: **HVAC**     

Verify proper refrigerant charge by HVAC contractor 011915 AS 1 0 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Post-installation photo—OR—rater verification

Benefit:

Improved system performance

Verification:

8.6.11 Accountability Form: **HVAC**     

Measured airflow of new equipment within 10% of manufacturer's specifications 011915 AS 2 0 0 0 0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Airflow test results—OR—rater verification

Benefit:

This shows that new equipment is running within a tolerable variance from manufacturer's specifications and is running efficiently.

Verification:

Verifier visually confirms and photographs this measure.

8.6.12	Accountability Form: HVAC					
Establish interruptible service for air conditioner with electric service 011915 AS		0	0	2	0	0

Description:

As stated above

Submit documentation

Benefit:

Allow electric utility to run more efficiently, which contributes to less global pollution.

Resources

U.S. EPA www.epa.gov/cleanenergy/basic-information.html

Verification:

Visually inspect and photograph implementation of this measure.

8.6.13	Accountability Form: HVAC					
Replace old steam boiler with a high efficiency hot water boiler 011915 AS		2	0	0	0	0

Description:

Notes on drawings and/or specifications indicating work to be done or product to use.

Airflow test results—OR—rater verification

Benefit:

More energy efficient

Verification:

See accountability form.

8.6.14Accountability Form: **HVAC****Install an aquastat control (for hot water boilers only)** 011915 AS

2 0 0 0 0

Description:

A modulating aquastat must be installed by a licensed professional.

Benefit:

A modulating aquastat, also called an outdoor reset, senses outdoor temperatures and adjusts the hot water temperature accordingly. The units can save up to 10% of fuel costs, and cost several hundred dollars.

A cheaper alternative is to manually adjust the aquastat yourself, turning it down to around 120°F during the milder heating season. Consult your owner's manual or a service technician to locate the aquastat.

Resources

www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12550

Verification:

Provide documentation or calculations for this measure.

8.6.15Accountability Form: **HVAC****Install a Time-Delay Relay (for hot water boilers only)** 011915 AS

2 0 0 0 0

Description:**Benefit:**

A time delay relay is a way to squeeze the most heat out of your system without running the boiler. When the thermostat clicks on, the relay causes the boiler to circulate hot water through the system without turning on the boiler. After a set time, the boiler will fire up. A time delay relay costs about \$100 and can cut your fuel costs up to 10%.

Resources

www.eere.energy.gov/consumer/your_home/space_heating_cooling/index.cfm/mytopic=12550

Verification:

Provide documentation or calculations for this measure.

8.7 Miscellaneous Mechanical

8.7.0	Accountability Form: General Contractor	<i>Prerequisite</i>					
New Site-built wood burning fireplaces must have gasketed doors, outside combustion air supply, and a means of sealing the flue to minimize interior air (heat) loss when not in operation.							
011915 AS (PREREQ)			Default Value				

Description:

Benefit:

Verification:

Visually inspect and photograph implementation of this measure.

8.7.2	Accountability Form: General Contractor	<i>Prerequisite</i>					
New Factory-built wood burning fireplaces must meet certification requirements of UL 127 and be EPA Certified (or meet requirements for sale under IPA's voluntary Clean-Burning Fireplace Program).							
011915 AS (PREREQ)			Default Value				

Description:

Benefit:

Verification:

Provide documentation or calculations for this measure.

8.7.3	Accountability Form: General Contractor	<i>Prerequisite</i>					
New Wood stove and fireplace inserts must be EPA certified and meet certification requirements of UL 1482, Section 3.8.							
011915 AS (PREREQ)							

Description:

Must install cold-climate combustion ventilation kit.

Post-installation photo-OR-rater sign-off.

Benefit:

This measure increases energy efficiency.

This measure prevents interior conditioned air from being used for combustion.

Verification:

Provide documentation or calculations for this measure.



8.7.4 Accountability Form: **General Contractor** Prerequisite     

New Pellet (biomass/agrafuel) stoves and furnaces must meet the requirements of ASTM E1509 or are EPA Certified. 011915 AS (PREREQ)     
Default Value

Description:

Benefit:

Verification:

Provide documentation or calculations for this measure.

8.7.5 Accountability Form: **General Contractor** Prerequisite     

New Masonry heaters must meet the definition of ASTM e1602 and the IBC 2112.1 011915 AS (PREREQ)     
Default Value

Description:

Benefit:

Verification:

Provide documentation or calculations for this measure.

8.7.6 Accountability Form: **General Contractor**     

No decorative fireplace or stove of any kind exists at the end of the project. (applies to wood, gas, electric & biomass, etc.) 011915 AS 2 2 0 2 0

Description:

As stated above.

Benefit:

While decorative fireplaces and stoves can contribute a lot to the aesthetics and charm of a home, they typically worsen the overall environmental footprint of it. Therefore credit is given to homes that have found design solutions that do NOT include them. Typically, at best, decorative fireplaces and stoves are an accessory heat source and do not provide heat as efficiently as the primary heating system in the house. At worst, they can be a significant source of heat loss, both during use and when not in use.

Stone or brick chimney stacks can fail over time due to bulk water, moisture, nests, or leaves. If other mechanicals use the same chimney for ventilation, the same failures can plague the mechanicals as well, causing them to backdraft carbon monoxide.

Verification:

See accountability form.

8.7.7Accountability Form: **Plumbing Contractor****Install a central vacuum system that is vented to the exterior** 011915 AS

0 2 0 0 0

Description:

This type of vacuum system does not blow dust and impurities into the air inside the house like most other vacuums.

Benefit:

Central vacuum systems use low-voltage electricity and provide more cleaning flexibility. Some systems even have ports, which allow sweeping dirt and dust in high traffic areas directly into the vacuum system.

Considerations

Traditional central vacuum systems are installed using PVC, a dangerous and harmful plastic. Make sure the system is installed using plastic piping other than PVC, such as HPBE, ABS, or similar. Make sure piping is well sealed. If the pipes are not sealed with adhesive, there is a potential for dust and other contaminants to exit the system and enter the wall cavities. The canister, which collects the vacuumed particles must be changed on a regular basis. Ensure make-up air requirements are met.

Verification:

Visually inspect and photograph implementation of this measure.



9. Electrical

9.1 Prerequisites

9.1.0	Accountability Form: General Contractor	Prerequisite					
New appliances must meet or exceed ENERGY STAR requirements 011915 AS (PREREQ)							
Default Value							

Description:

Provide a receipt of purchase.

Present copy of energy label from appliance. Keep original label on appliance or in homeowner’s manual

Benefit:

ENERGY STAR is a program developed by the Environmental Protection Agency to recognize appliances that use 10-50% less energy and water than standard models.

Resources

ENERGY STAR.gov/index.cfm?c=appliances.pr_appliances

Verification:

Provide documentation or calculations for this measure.

9.2 Appliances

9.2.0	Accountability Form: Building Architect / Designer					
Document energy consumption and age of all existing major appliances 011915 AS			1	0	0	0

Description:

Use the website below and the model numbers of your appliances to find energy consumption information on existing appliances.

Benefit:

When you know how much energy your appliances are using compared to today’s efficiency standards you will be able to make informed decisions about whether to replace the appliances with more energy efficient models.

Verification:

9.2.2	Accountability Form: General Contractor					
Refrigerator - ENERGY STAR rated and/or Install Super Efficient Home Appliances 011915 AS (Replace existing older than 1993 (ENERGY STAR rated required) / Install Super Efficient Home Appliances - CEE Tier One / Install Super Efficient Home Appliances - CEE Tier Two / Install Super Efficient Home Appliances - CEE Tier Three)			6/2/3/4	0	1	0



Description:

- List the replacement appliance, its model number, and year made
- Provide receipt from new appliance of ENERGY STAR label
- List the new appliance, its model number, efficiency information, and year made.
- Provide receipt
- Refrigerators must be a minimum of 20% more efficient than federal standard
- Dishwashers must have maximum annual energy usage ≤ 339 kWh/year and Energy Factor (EF) ≥ 0.65
- Clothes Washers must have Modified Energy Factor (MEF) ≥ 1.8 and Water Factor (WF) ≤ 7.5
- Room air conditioners:
 - $< 8,000$ Btu/h = 11.2 EER
 - 8,000-13,999 Btu/h = 11.3 EER
 - 14,000-19,999 Btu/h = 11.2 EER
 - $\geq 20,000$ Btu/h = 9.8 EER
- Some credits may not apply if the home is fully converted to photovoltaic or wind power systems. Credits not available can be applied for in the innovation section.

Benefit:

- Appliances produced after 1993 have gone through significant design changes that have allowed for improvements in energy efficiency ratings and cost savings during operation.
- Super Efficient Home Appliances (SEHA) is a national program to promote energy and water efficient appliances by the Consortium for Energy Efficiency. The program is a complement to ENERGY STAR and seeks to encourage the use of the super efficient appliances when possible. The program provides specifications for super efficient refrigerators, room air conditioners, dishwashers, and clothes washers, but not other types of appliances. Although all SEHA products are efficient, the tiers are structured so that the more efficient products are located in the higher tiers. Tier 3 contains the most efficient models.

Resources

www.cee1.com

www.cee1.org/resid/seha/dishw/dw-prod.pdf for a list of qualifying dishwashers

www.cee1.org/resid/seha/rwsh/rwsh-prod.pdf for a list of qualifying clothes washers

www.cee1.org/resid/seha/rm-ac/rm-ac_specs.pdf qualifying information for room air conditioners (see www.energystar.gov website for manufacturer information)

www.cee1.org/resid/seha/refrig/refrig-spec.pdf qualifying information for refrigerators (see www.energystar.gov website for manufacturer information)



Verification:

Provide documentation or calculations for this measure.

9.2.3

Accountability Form: **General Contractor**



Room Air Conditioner - ENERGY STAR rated and/or Install Super Efficient Home Appliances 011915 2/1/2 0 0 0 0
AS

(Replace existing appliances older than 1993 (ENERGY STAR rated required) / Install Super Efficient Home Appliances - CEE Tier One / Install Super Efficient Home Appliances - CEE Tier Two)

Description:

- List the replacement appliance, its model number, and year made
- Provide receipt from new appliance of ENERGY STAR label
- List the new appliance, its model number, efficiency information, and year made.
- Provide receipt
- Refrigerators must be a minimum of 20% more efficient than federal standard
- Dishwashers must have maximum annual energy usage ≤ 339 kWh/year and Energy Factor (EF) ≥ 0.65
- Clothes Washers must have Modified Energy Factor (MEF) ≥ 1.8 and Water Factor (WF) ≤ 7.5
- Room air conditioners:
 - $< 8,000$ Btu/h = 11.2 EER
 - 8,000-13,999 Btu/h = 11.3 EER
 - 14,000-19,999 Btu/h = 11.2 EER
 - $\geq 20,000$ Btu/h = 9.8 EER
- Some credits may not apply if the home is fully converted to photovoltaic or wind power systems. Credits not available can be applied for in the innovation section.



Benefit:

- Appliances produced after 1993 have gone through significant design changes that have allowed for improvements in energy efficiency ratings and cost savings during operation.

- Super Efficient Home Appliances (SEHA) is a national program to promote energy and water efficient appliances by the Consortium for Energy Efficiency. The program is a complement to ENERGY STAR and seeks to encourage the use of the super efficient appliances when possible. The program provides specifications for super efficient refrigerators, room air conditioners, dishwashers, and clothes washers, but not other types of appliances. Although all SEHA products are efficient, the tiers are structured so that the more efficient products are located in the higher tiers. Tier 3 contains the most efficient models.

Resources

www.cee1.com

www.cee1.org/resid/seha/dishw/dw-prod.pdf for a list of qualifying dishwashers

www.cee1.org/resid/seha/rwsh/rwsh-prod.pdf for a list of qualifying clothes washers

www.cee1.org/resid/seha/rm-ac/rm-ac_specs.pdf qualifying information for room air conditioners (see www.energystar.gov website for manufacturer information)

www.cee1.org/resid/seha/refrig/refrig-spec.pdf qualifying information for refrigerators (see www.energystar.gov website for manufacturer information)

Verification:

Provide documentation or calculations for this measure.

9.2.4

Accountability Form: **General Contractor**



Dishwasher - ENERGY STAR rated and/or Install Super Efficient Home Appliances 011915 AS
(Replace existing older than 1993 (ENERGY STAR rated required) / Install Super Efficient Home Appliances - CEE Tier One / Install Super Efficient Home Appliances - CEE Tier Two)

2/1/2 0 0 0 2/1/2



Description:

- List the replacement appliance, its model number, and year made
- Provide receipt from new appliance of ENERGY STAR label
- List the new appliance, its model number, efficiency information, and year made.
- Provide receipt
- Refrigerators must be a minimum of 20% more efficient than federal standard
- Dishwashers must have maximum annual energy usage ≤ 339 kWh/year and Energy Factor (EF) ≥ 0.65
- Clothes Washers must have Modified Energy Factor (MEF) ≥ 1.8 and Water Factor (WF) ≤ 7.5
- Room air conditioners:
 - $< 8,000$ Btu/h = 11.2 EER
 - 8,000-13,999 Btu/h = 11.3 EER
 - 14,000-19,999 Btu/h = 11.2 EER
 - $\geq 20,000$ Btu/h = 9.8 EER
- Some credits may not apply if the home is fully converted to photovoltaic or wind power systems. Credits not available can be applied for in the innovation section.

Benefit:

- Appliances produced after 1993 have gone through significant design changes that have allowed for improvements in energy efficiency ratings and cost savings during operation.
- Super Efficient Home Appliances (SEHA) is a national program to promote energy and water efficient appliances by the Consortium for Energy Efficiency. The program is a complement to ENERGY STAR and seeks to encourage the use of the super efficient appliances when possible. The program provides specifications for super efficient refrigerators, room air conditioners, dishwashers, and clothes washers, but not other types of appliances. Although all SEHA products are efficient, the tiers are structured so that the more efficient products are located in the higher tiers. Tier 3 contains the most efficient models.

Resources

www.cee1.com

www.cee1.org/resid/seha/dishw/dw-prod.pdf for a list of qualifying dishwashers

www.cee1.org/resid/seha/rwsh/rwsh-prod.pdf for a list of qualifying clothes washers

www.cee1.org/resid/seha/rm-ac/rm-ac_specs.pdf qualifying information for room air conditioners (see www.energystar.gov website for manufacturer information)

www.cee1.org/resid/seha/refrig/refrig-spec.pdf qualifying information for refrigerators (see www.energystar.gov website for manufacturer information)

Verification:

Provide documentation or calculations for this measure.

9.2.5

Accountability Form: **General Contractor**

Clothes washer - ENERGY STAR rated and/or Install Super Efficient Home Appliances 011915 4/1/2/3 0 0 0 4/1/2/3 AS

(Replace existing appliances older than 1993 (ENERGY STAR rated required) / Install Super Efficient Home Appliances - CEE Tier One / Install Super Efficient Home Appliances - CEE Tier Two / Install Super Efficient Home Appliances - CEE Tier Three)

Description:

- List the replacement appliance, its model number, and year made
- Provide receipt from new appliance of ENERGY STAR label
- List the new appliance, its model number, efficiency information, and year made.
- Provide receipt
- Refrigerators must be a minimum of 20% more efficient than federal standard
- Dishwashers must have maximum annual energy usage ≤ 339 kWh/year and Energy Factor (EF) ≥ 0.65
- Clothes Washers must have Modified Energy Factor (MEF) ≥ 1.8 and Water Factor (WF) ≤ 7.5
- Room air conditioners:
 - $< 8,000$ Btu/h = 11.2 EER
 - 8,000-13,999 Btu/h = 11.3 EER
 - 14,000-19,999 Btu/h = 11.2 EER
 - $\geq 20,000$ Btu/h = 9.8 EER
- Some credits may not apply if the home is fully converted to photovoltaic or wind power systems. Credits not available can be applied for in the innovation section.



Benefit:

- Appliances produced after 1993 have gone through significant design changes that have allowed for improvements in energy efficiency ratings and cost savings during operation.

- Super Efficient Home Appliances (SEHA) is a national program to promote energy and water efficient appliances by the Consortium for Energy Efficiency. The program is a complement to ENERGY STAR and seeks to encourage the use of the super efficient appliances when possible. The program provides specifications for super efficient refrigerators, room air conditioners, dishwashers, and clothes washers, but not other types of appliances. Although all SEHA products are efficient, the tiers are structured so that the more efficient products are located in the higher tiers. Tier 3 contains the most efficient models.

Resources

www.cee1.com

www.cee1.org/resid/seha/dishw/dw-prod.pdf for a list of qualifying dishwashers

www.cee1.org/resid/seha/rwsh/rwsh-prod.pdf for a list of qualifying clothes washers

www.cee1.org/resid/seha/rm-ac/rm-ac_specs.pdf qualifying information for room air conditioners (see www.energystar.gov website for manufacturer information)

www.cee1.org/resid/seha/refrig/refrig-spec.pdf qualifying information for refrigerators (see www.energystar.gov website for manufacturer information)

Verification:

Provide documentation or calculations for this measure.

9.2.6

Accountability Form: **Homeowner**



Install and outdoor clothesline 011915 AS

1 0 0 0 0

Description:

Document clothesline installation with a photograph

Benefit:

Clotheslines are an example of a Green strategy that is not a new concept or technology. They work efficiently through the use of sun and wind energy to dry.

Considerations

Make sure all clotheslines are installed outside. Drying on an indoor clothesline can lead to excess moisture in the home and compromise durability.

Verification:

Visually inspect and photograph implementation of this measure.

9.2.8Accountability Form: **General Contractor****Install induction cook top** 011915 AS

3 1 0 0 0

Description:

List the name of the appliance and its model number

Provide receipt

Benefit:

An induction cook top is powered by a small amount of electricity that produces a magnetic field. When the magnetic field is activated in the presence of certain metal pots and pans, the energy created is transferred into the cookware. This energy is converted into heat that is transferred to the food for cooking. Heat is only produced in the cookware reacting to the magnet but not the induction surface, so the cook top stays cool.

In order for an induction cook top to work, the cookware must be steel or cast iron (a magnet must stick to it)

With an induction cook top there is significantly less wasted energy than an electric cook top, while avoiding the indoor environmental concerns associated with natural gas.

Verification:

Provide documentation or calculations for this measure.

9.2.9Accountability Form: **General Contractor****Energy Efficient Dryer Installed**

(Energy Star Dryer / Heat pump / Condensing) 1/2/2 0/0/1 0 0 0

Description:

Energy efficient electric dryers save energy. Consider pairing with high spin washer to reduce water need and drying times.

Benefit:

Consider also heat pump dryers or condensing dryers which can eliminate further air penetrations in the home. Electric dryers use less energy than gas dryers.

Verification:

Rater to verify installation and then submit receipts.

9.2.10Accountability Form: **Homeowner****Number of energy consuming electrical appliances is 5** 011915 AS

1 0 0 0 0

Description:

- Energy consuming appliances for these credits are related to the kitchen and laundry. Do not include home heating and cooling appliances.
- This credit refers to electric appliances. DO NOT count gas appliances in total.
- An electric range counts as two appliances (cook top and oven). A double oven and a microwave oven combination unit also count as two appliances.
- Typical appliances are the refrigerator, cook top, oven or range, dishwasher, microwave, clothes washer, and clothes dryer. The easiest way to qualify for this credit is to install a gas cook top and dryer, and to not install additional appliances.
- List all appliances in the home and note whether they are gas or electric.

Benefit:

The purpose of this credit is to limit the number of energy consuming appliances and to reduce the use of unnecessary second and third refrigerators, warming drawers, ice makers, wine chillers, etc.

Even products that are not in use, or "turned off," are using energy in stand-by mode or to power a clock or microcomputer. This "phantom load" can be a significant source of wasted energy.

Verification:

Provide documentation or calculations for this measure.

**9.2.11**Accountability Form: **Homeowner****Number of energy consuming electrical appliances is 4 or less** 011915 AS

2 0 0 0 0

Description:

Energy consuming appliances for these credits are related to the kitchen and laundry. Do not include home heating and cooling appliances.

This credit refers to electric appliances. DO NOT count gas appliances in total.

An electric range counts as two appliances (cook top and oven). A double oven and a microwave oven combination unit also count as two appliances.

Typical appliances are the refrigerator, cook top, oven or range, dishwasher, microwave, clothes washer, and clothes dryer. The easiest way to qualify for this credit is to install a gas cook top and dryer, and to not install additional appliances.

List all appliances in the home and note whether they are gas or electric.

Benefit:

The purpose of this credit is to limit the number of energy consuming appliances and to reduce the use of unnecessary second and third refrigerators, warming drawers, ice makers, wine chillers, etc.

Even products that are not in use, or "turned off," are using energy in stand-by mode or to power a clock, remote or microcomputer. This "phantom load" or "ghosting" can be a significant source of wasted energy.

Verification:

Provide documentation or calculations for this measure.

9.2.12	Accountability Form: Electrical Contractor					
Provide switched outlets to dedicated media centers and home offices 011915 AS		1	0	1	0	0

Description:

To save energy, a switch for the circuit of media components and office equipment should be installed to eliminate the unnecessary use of electricity.

Use power strips on all electronics with the exception of systems that would cause phone service loss if turned off.

Although it doesn't qualify for this credit, it may be possible to disable clocks on electronic devices. Consult the owner's manual or manufacturer's website.

Benefit:

Even products that are not in use, or "turned off," are using energy in stand-by mode or to power a clock, remote or microcomputer. This "phantom load" or "ghosting" can be a significant source of wasted energy

Resources

aceee.org/consumerguide/electronics.htm

Verification:

See accountability form.

9.2.13	Accountability Form: Electrical Contractor					
Install whole house surge protection 011915 AS		0	0	0	2	0

Description:

List the type of surge protector and manufacturer information such as model number

Benefit:

A whole house surge protection system should be installed to avoid the unnecessary damage to sensitive electrical equipment from external sources. The whole house system surge protector is a first line of defense against electrical spikes, surges, and other disturbances, particular due to lightning. Sensitive electronics, like media components and computer equipment, should be protected by point-specific surge protectors.

Considerations

Convenience devices like TIVO and automatic timers are disabled when power to the room is off.

Verification:

See accountability form.

9.3 Fans, Fixtures and Lights

9.3.2

Accountability Form: **Homeowner**



Lighting in medium/low-use rooms are 100% LED or CFL

(50% / 90%) 1/2 0 0 0 0

Description:

Bedrooms, offices, non living basements must be all CFLs and/or LEDs. LEDs are ideal.

Benefit:

ENERGY STAR qualified lighting uses about 75% less energy and produces 75% less heat than standard models.

Verification:

Rater to verify installation visually.

9.3.3

Accountability Form: **Homeowner**



Outdoor lighting is energy efficient

(50% / 90%) 1/2 0 0 0 0

Description:

Benefit:

Ensure lights are not causing light pollution. Consider keeping lights off at night which can be more safe than providing light at night. Also review the dark sky initiative.

Verification:

Rater to verify visual installation.



9.3.10

Accountability Form: **Homeowner**



Install high efficient lighting in high use rooms 011915 AS
(50% CFL / 50% LED / 100% LED / 100 CFL)

5/5/10/10 0/1/2/0 0 0/1/1/0 0

Description:

Consider using all LED lighting as LEDs tend to be more efficient, last longer, can be american made and can have a better health rating because of lack of mercury exposure and lighting that may be better for our circadian system. LEDs now come with guaranteed warranties as well.

[Learn more about health benefit potential of LEDs here](#)

Benefit:

LED, or light emitting diode fixtures use significantly less electricity than incandescent lighting without the need for mercury ballast like a CFL. LED lighting products last longer than CFL, with some bulbs lasting 60,000 hours. LED's will improve your energy score as well.

Verification:

Rater to verify installation.

9.3.11

Accountability Form: **Electrical Contractor**



Install LED light fixtures in 90% of high use rooms 011915 AS

7 0 0 2 0

Description:

Provide a schedule of all lighting used, indicate LED fixtures, and calculate percentage of LED bulbs compared to total bulbs.

Exceptions

Rope lights are counted as 1 bulb for every 3' of length.

Benefit:

LED, or light emitting diode fixtures use significantly less electricity than incandescent lighting without the need for mercury ballast like a CFL. LED lighting products last longer than CFL, with some bulbs lasting 60,000 hours.

Considerations

LED lighting is more directional than incandescent lighting and works well for task lighting.

Verification:

9.3.12	Accountability Form: Electrical Contractor					
Limit total indoor lighting to less than 0.5 watts per square foot 011915 AS		10	0	3	2	0

Description:

Calculation of total watts per square foot is based on the rated wattage of each fixture, not the bulb that is used to light the fixture
 Square foot calculation requires inclusion of all light fixtures, both permanent and removable

Benefit:

It is possible to achieve a variety of lighting goals (e.g., task, general, focused) with a minimal amount of wattage per square foot when you combine CFL, halogen, and LED.

LED and Halogen provide light that is more directed which makes them good choices for task lighting.

CFL lighting is more diffused making it work well for ambient, or general, lighting

Verification:

Provide documentation or calculations for this measure.

9.3.13	Accountability Form: Electrical Contractor					
Install dimmers on all lights in high-use rooms where compact fluorescent lights are not installed 011915 AS		2	0	0	0	0

Description:

Provide an electrical plan that indicates dimmer switches.

High use rooms include the kitchen, dining room, living room, family room, bathroom(s), hall(s), and stairway(s)

Benefit:

Dimmers provide variable control over lighting level and reduce energy use by reducing the wattage. Dimmers are available in magnetic and electronic varieties for different types of fixtures and should be installed in accordance with the fixture specifications. Two different types of dimmers exist—those controlled by the occupant and those that sense the quantity of available light and adjust accordingly. Fluorescent light fixtures require special ballasts.

Considerations

Make sure to turn have a switch in the "off" position before installing a dimmable CFL. Dimmable CFL bulbs require full power to light. Turn on light at full power and then dim to required amount of light.

Resources

www.energyfederation.org/consumer/default.php/cPath/2050_25_44_169

Verification:

Provide documentation or calculations for this measure.

9.3.14Accountability Form: **Electrical Contractor**

Install dimmers on all lights in medium/low-use rooms where compact fluorescents lights are not installed 011915 AS

1 0 0 0 0

Description:

Provide an electrical plan that indicates dimmer switches.

Medium/low use rooms include bedroom(s), den, office, basement, laundry room, garage, closet(s), and all other rooms.

Benefit:

High use rooms include the kitchen, dining room, living room, family room, bathroom(s), hall(s), and stairway(s). Dimmers provide variable control over lighting level and reduce energy use by reducing the wattage. Dimmers are available in magnetic and electronic varieties for different types of fixtures and should be installed in accordance with the fixture specifications. Two different types of dimmers exist—those controlled by the occupant and those that sense the quantity of available light and adjust accordingly. Fluorescent light fixtures require special ballasts.

Considerations

Make sure to turn have a switch in the “off” position before installing a dimmable CFL. Dimmable CFL bulbs require full power to light. Turn on light at full power and then dim to required amount of light.

Resources

www.energyfederation.org/consumer/default.php/cPath/2050_25_44_169

Verification:

Provide documentation or calculations for this measure.

9.3.15	Accountability Form: Electrical Contractor					
Install automatic indoor lighting controls in all high-use rooms 011915 AS		2	0	0	0	0

Description:

- High use rooms include the kitchen, dining room, living room, family room, bathroom(s), hall(s), and stairway(s).
- Automatic indoor lighting controls include timers and occupant sensors.
- Provide detailed lighting plan

Benefit:

- These controls reduce unnecessary energy use from light fixtures being left on.
- Timers are also used on indoor lights to provide the appearance that people are home, but do not require that the lights be permanently left on.
- Occupant-sensors ensure that lights are only when people are in the room.

Verification:

Provide documentation or calculations for this measure.

9.3.16	Accountability Form: Electrical Contractor					
Install automatic indoor lighting controls in all medium/low-use rooms 011915 AS		1	0	0	0	0

Description:

Medium/low use rooms include bedroom(s), den, office, basement, laundry room, garage, closet(s), and all other rooms

Automatic indoor lighting controls include timers and occupant sensors.

Provide detailed lighting plan

Benefit:

These controls reduce unnecessary energy use from light fixtures being left on. Timers are also used on indoor lights to provide the appearance that people are home, but do not require that the lights be permanently left on. Occupant-sensors ensure that lights are only when people are in the room.

Considerations

An additional option for closets is to use jamb switches that turn the light on when the door is opened and off when the door is closed. Jamb switches would not be recommended for walk in closet where the door could be closed while someone is inside the closet or the door may be frequently left open.

Verification:

Provide documentation or calculations for this measure.

9.3.17	Accountability Form: Electrical Contractor					
No recessed light fixtures installed in any part of the house 011915 AS		6	0	0	3	0

Description:

Provide detailed electrical plan and photos.

Rater verification

Benefit:

Recessed light fixtures create opportunities for airflow to pass between conditioned space and unconditioned space as well as into the building envelope between floors. Since air can carry moisture, it is not wise to create opportunities that introduce air/moisture to the building envelope. Trapped moisture can increase the potential for damage to the structure. There are many ways to add light to a space that don't require recessed fixtures. Look for cable lighting, track and bendable track lighting, as well as ceiling lights and wall sconces. Can lights are inefficient at providing light for a room requiring a significantly larger watt per square foot load.

Considerations

Be sure that any electrical penetrations to the building envelope are sealed to prevent airflow.

Verification:

See accountability form.

9.3.18	Accountability Form: Electrical Contractor					
No recessed light fixtures added in insulated ceilings 011915 AS		3	0	0	3	0

Description:

Provide detailed electrical plan and photos.

Exceptions

Recessed light fixtures installed in insulation used for sound control between floors are acceptable as long as they are properly rated for contact with insulation.

The third-party verifier will need to inspect installation.

Benefit:

Recessed light fixtures installed in insulation that is part of the thermal barrier are not advised because they penetrate the building envelope, are difficult to seal and insulate properly frequently causing air and moisture transfer between conditioned and unconditioned spaces, reducing the efficiency of the building and increasing the potential for damage to the structure.

Can lights are inefficient at providing light for a room requiring a significantly larger watt per square foot load.

Verification:

See accountability form.

9.3.19	Accountability Form: Electrical Contractor					
Existing recessed light fixtures that penetrate the building envelope removed and none added (minimum 80% light fixtures) 011915 AS		5	0	0	4	0

Description:

When removing recessed light fixtures that penetrate the building envelope it is critical that the air and moisture barriers be repaired, and insulation is maintained.

Provide detailed electrical plan.

Benefit:

Recessed light fixtures installed in insulation that is part of the thermal barrier are not advised because they penetrate the building envelope and frequently cause air and moisture transfer between conditioned and unconditioned spaces, reducing the efficiency of the building and increasing the potential for damage to the structure.

Verification:

See accountability form.

9.3.20	Accountability Form: Electrical Contractor					
Install new ENERGY STAR ceiling fans or replace old ceiling fans with ENERGY STAR fans 011915 AS (1 Room / 2 Rooms / 3 Rooms / 4 Rooms / 5 or more rooms)	1/2/3/4/5	0	0	0	0	0

Description:

Each fan should be installed in the center of the room

Exceptions

Existing fans do not need to be relocated if not in the center of the room

Benefit:

- Non-ENERGY STAR-rated fans typically use a lot of electricity relative to how much air they move. Replacing them with ENERGY STAR-rated fans will save energy, and have a net cost savings and a net benefit to the environment in the long run.
- Ceiling fans help people feel more comfortable through evaporative cooling.
- They are also important for drawing warm air from the ceiling to the lower areas of a room during cold months and removing warm air from the lower portion of a room during warm months.

Resources

www.energystar.gov/index.cfm?c=ceiling_fans.pr_ceiling_fans

Verification:

See accountability form.

9.3.21	Accountability Form: Electrical Contractor					
Solar powered walkway or outdoor lighting (min. 6 fixtures) 011915 AS		1	0	0	0	0

Description:

Provide detailed outdoor lighting plan

Benefit:

Solar powered fixtures convert sunlight into electricity and store it in batteries for use at night. The solar unit can be integrated into the unit or a separately located panel.

Considerations

Consideration should be given to locating the solar units in areas where they will receive sunlight.

Verification:

Visually inspect and photograph implementation of this measure.

9.3.22	Accountability Form: Electrical Contractor					
Install automatic outdoor lighting controls or photocells/timers 011915 AS		1	0	0	0	0

Description:

Provide detailed outdoor lighting plan

Automatic outdoor lighting controls include motion sensors and photocells/timers

Benefit:

The use of lighting controls reduces energy consumption by making sure lights are not left on while they are not needed during the daylight hours.

Verification:

Provide documentation or calculations for this measure.

9.3.23	Accountability Form: Electrical Contractor					
Reduce light pollution by shielding fixtures and /or directing light downward 011915 AS		0	0	2	0	0

Description:

Provide detailed outdoor lighting plan

Benefit:

Unshielded exterior fixtures contribute to light pollution by illuminating upward and outward, in addition to the area that needs to be lit. The negative impacts of light pollution include glare (which can obstruct vision), lighting of neighboring properties, and contributing to urban/suburban sky brightness. In addition to the negative impacts, the upward and outward light emitted wastes energy.

Resources

www.darksky.org

Verification:

Visually inspect and photograph implementation of this measure.

9.3.24	Accountability Form: Electrical Contractor					
Limit outdoor lighting to total maximum of 100 watts 011915 AS		2	0	0	0	0

Description:

Parking area lighting shall be high-pressure sodium or equivalent high efficiency. A lighting schedule showing total wattage used is required along with general contractor sign-off on checklist. Lighting is rated by the maximum wattage listed on the fixture, not by the bulbs that are used.

Benefit:

While outdoor lighting can be important for safety, it can also contribute to light pollution. The negative impacts of light pollution include glare (which can obstruct vision), lighting of neighboring properties, and contributing to urban/suburban sky brightness.

Verification:

9.4 Wiring

9.4.0

Accountability Form: **Electrical Contractor**



Remove all knob and tube wiring from home 011915 AS

0 10 0 0 0

Description:

By code, knob and tube wiring must be removed in the areas impacted by remodeling when more than 60% is exposed as a result of the remodel. Removing the knob and tube wiring in the remodeled areas only does not qualify for this credit. To qualify, the remaining knob and tube wiring must also be removed from the home.

Removing all of the knob and tube wiring during a whole house remodel will qualify, even though the work is required by code.

Knob and tube wiring that is disconnected and abandoned also qualifies.

Benefit:

Knob and tube wiring should be replaced and/or abandoned wherever found because it poses risk for fire and safety as well as significant magnetic and electric field exposure.

Knob and tube wiring is significantly less safe than modern wiring.

Verification:

See accountability form.

9.4.2

Accountability Form: **Electrical Contractor**



Ceiling fan pre-wires provided in habitable rooms (min 2 pre-wires not including bedrooms) 011915 AS

1 0 0 0 0

Description:

Provide detailed electrical plan.

Benefit:

Providing for future addition of a ceiling fan will prevent unnecessary remodeling when a ceiling fan is needed. Ceiling fans help people feel more comfortable through evaporative cooling. They are also important for pushing warm air from the ceiling to the lower areas of a room during cold months and removing warm air from the lower portion of a room during warm months.

Resources

www.energystar.gov/index.cfm?c=ceiling_fans.pr_ceiling_fans

Verification:

See accountability form.

9.5 Electrical Systems

9.5.0

Accountability Form: **Electrical Contractor**



Homeowner signs up for 100% wind power from local electric utility (if available) 011915 AS

5 0 0 0 0

Description:

Contact local utility to find out how to sign up for wind power.

Provide receipt of commitment from the power company to show the amount of wind power purchased per month.

Benefit:

When a homeowner signs up for wind power it means they are contributing to the research, development and installation of wind power, a clean form of electricity. It does not mean that 100% of the energy going to the home is from wind. Their monthly contribution is important to creating more wind-based electricity in the state.

Check with the local utility to determine the cost of investing in wind power research and development. Often times wind power is purchased in 100 kWh increments.

Verification:

Provide documentation or calculations for this measure.

9.5.2

Accountability Form: **Electrical Contractor**



Photovoltaic ready home: Install wiring conduit for future PV installation & provide a minimum 200 s.f. within 15° of south with a roof angle of 30°-50°. 011915 AS

5 0 0 0 0

Description:

- Provide detailed electrical plan.
- Describe proposed photovoltaic system and electric generation goals.
- Cap conduit at each end and Label "Solar Ready" at each end.

Benefit:

Providing for the future addition of a photovoltaic (PV) system will prevent unnecessary remodeling when a PV system is installed.

Verification:

9.5.3Accountability Form: **Electrical Contractor**

Solar electric photovoltaic system installed 011915 AS (One kilowatt / Two kilowatts or greater) 10/15 0 0 0 0

Description:

Provide detailed system plan and expected energy generation goals including site assessment

Use licensed electrician who has experience with photovoltaic (PV) installations.

Benefit:

Solar electricity requires an upfront commitment to a higher equipment cost—creating electricity through PV is an investment. Once the equipment costs are paid off, the energy from the sun will be free over the life of the system. A PV system will not have the same issues associated with fossil fuel based power—rising costs and limited supply

Considerations

Because of the high cost associated with PV, it is important to have an assessment of the solar access and hours of sunlight before to determine if PV is the right choice. There are many energy upgrades that can be done for the same cost as PV. It would be wise to investigate the options to create a tighter building envelope and reduced energy loads before investing in PV

Resources

www.ases.org

www1.eere.energy.gov/consumer/tips/renewable_energy.html

Verification:

Provide documentation or calculations for this measure.

9.5.4

Accountability Form: **Electrical Contractor**

On-site wind turbine system installed. 011915 AS (5 kilowatts to 9 kilowatts / 10 kilowatts or greater) 10/15 0 0 0 0

Description:

Provide detailed system plan and expected energy generation goals including site assessment

Use licensed electrician who has experience with wind turbine system installations.

Benefit:

Conversion of wind into a power source creates minimal negative environmental effects compared to other sources of power. Once the equipment costs are paid off, the energy from the wind will be free over the life of the system. A wind system will not have the same issues associated with fossil fuel based power—rising costs and limited supply

Considerations

Because of the high cost associated with wind systems, it is important to have an assessment of the amount of wind and predictability at the site to determine if it is the right choice.

There are many energy upgrades that can be done for the same cost as wind energy. It would be wise to investigate the options to create a tighter building envelope and reduced energy loads before investing in wind.

Verification:

Provide documentation or calculations for this measure.

9.5.5

Accountability Form: **Electrical Contractor**

No electric in-floor heating 011915 es 1 0 0 0 0

Description:

Provide detailed electric plan.

Benefit:

Electric in-floor heating systems are not efficient systems for heating a room compared to other systems. While a heated floor offers comfort, electric in-floor systems generally have a much shorter lifespan than the floor systems they heat. This often requires immature replacement of the floor in order to replace the heated floor system.

Considerations

If the room to be remodeled is known for being cold, an energy audit using a Blower Door Test and infrared scan may help to identify areas for air sealing and insulation that could improve comfort without the need for supplemental heat. If you do install an electrical heating system you can improve the energy usage by setting the cables in 1-3" of tile base (sand and mortar mix). Extra care should be taken in basement applications, as heat from the cables will conduct heat through the entire concrete slab further reducing efficiency. Installation of a thermal break is critical.

Verification:

See accountability form.

10. Water - Plumbing, Systems & Fixtures

10.1 Prerequisites

10.1.0	Accountability Form: Plumbing Contractor	<i>Prerequisite</i>					
All newly installed plumbing fixtures and appliances Meet or exceed the 2005 National Energy Policy Act (NEPA) standards for water usage. 011915 AS		Default Value					

Description:

Provide receipts and manufacturer's specifications.

Benefit:

The NEPA was enacted in 2005 as a means to educate the public on energy and water issues, and to enforce conservation measures on a national level. Required by law.

Resources

<http://www.epa.gov/watersense/docs/matrix508.pdf>

National Energy Policy Act of 2005 -

http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_public_laws&docid=f:publ058.109.pdf

Verification:

Provide documentation or calculations for this measure.

10.1.2	Accountability Form: Plumbing Contractor	<i>Prerequisite</i>					
No new supplies or drains in exterior walls		Default Value					

Description:

No new supplies or drains in exterior walls because it's cold outside and they can freeze. It only takes tiny gap in the air seal or insulation to freeze a pipe.

Benefit:

Verification:

Rater to inspect before drywall is up and verify.

10.2 Equipment

10.2.3	Accountability Form: Plumbing Contractor					
Install sump pump cover that is air tight & mechanically attached with full gasket seal. 011915 es		0	1	0	0	0

Description:

Provide photograph of sump pump

Benefit:

Installing a sealed sump pump cover can help reduce the chance of radon and other soil gases from entering the house through the sump basket. However, this seal should not be seen as a substitute for proper testing and installation of a radon mitigation system.

Considerations

Check with county agencies to determine the methodology to turn the sump pump system into an active soil gas/radon mitigation system. An active system serves as an energy efficient dehumidifier, and its expense may be offset by a drier basement in the summer.

Resources

www.epa.gov/radon

Verification:

Visually inspect and photograph implementation of this measure.

10.2.5	Accountability Form: Plumbing Contractor					
Install a heat trap or demand valve on water heater 011915 AS		1	0	0	0	0

Description:

Replace or install new water heater.

- A water heater with a tank is to be installed so that overflow or leaks are captured by drains. (EC, 39.10)
- Tank type water heaters will be ENERGY STAR certified
- Provide receipt of product purchase, model number, or ENERGY STAR label for tank type.

Exceptions

Homes that install an alternate energy source are encouraged to use appliances that consume electricity and can take the same points as a natural gas unit.



Benefit:

- Sealed combustion water heaters with direct venting ensure that the carbon monoxide, a byproduct of the combustion process used to heat the water, is vented out of the home and not drawn back in. Sealed combustion and direct venting is particularly important with tightly built (energy efficient) homes because the carbon monoxide could easily reach unsafe levels.
- A tankless water heater heats water only when there is a demand. It eliminates the loss of energy through heat loss while the water is stored in a tank. A tankless water heater/demand system can have 45-60% energy savings over the minimum standard water heater. It is important to correctly size the tankless water heater for the house to ensure it can generate sufficient hot water to meet demand, even when there are multiple simultaneous uses (e.g., running the washer and shower simultaneously). Tankless water heaters are also available for point of use applications, like hot water at the kitchen sink. The point of use tankless water heaters do not count for this credit, unless they fully replace a standard storage tank water heater, but can increase homeowner satisfaction and reduce wasted water by shortening the time between turning the water on and receiving hot water.
- The water heater's efficiency is measured as an energy factor (EF), which is shown on the label of the heater. The higher number indicates a more energy efficient unit.
- A heat trap can either be a loop in the plumbing or a special valve that prevents convection. New storage tank water heaters may have heat trap valves already installed. Heat traps stop the outflow of hot water from the water heater.
- A recirculation pump pulls hot water from the heater and sends the cooled water back to the water heater to be reheated. The recirculation pump can be activated by either thermostat, timer, or manually. The thermostat and timer help ensure that hot water is always available quickly. The manual switch requires less energy because the pump is not activated when hot water is not needed. On longer plumbing runs the recirculation pump greatly reduces the amount of water used before the hot water reaches the point-of-use, reducing the water wasted while waiting for it to warm up.
- A Drain Water Heat Recovery (DHR) unit captures the heat from wastewater leaving the home and transfers it into the cold water entering the water heater. By boosting the temperature of the cold water entering the water heater, the water heater doesn't have to use as much energy to heat the water in the tank.
- A power vented water heater, while relying on room air for combustion, has an exhaust system that is vented out the side of the house rather than a chimney.
- Electricity in Minnesota and much of the Midwest is dirty power with 63% produced through burning coal and a 70% loss of source energy during the process of electricity generation and transmission to the site. The efficiency of the unit is negated by the impact of the energy source on the environment.

Resources

www.state..us//externalDocs/Commerce/Water_Heaters_110802042613_WaterHeaters.pdf

www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13040

Verification:

Provide documentation or calculations for this measure.

10.2.6

Accountability Form: **Plumbing Contractor**



Install a hot water demand re-circulation pump for homes with hot water runs of greater than 100'
011915 AS

0 0 0 0 3



Description:

Replace or install new water heater.

- A water heater with a tank is to be installed so that overflow or leaks are captured by drains. (EC, 39.10)
- Tank type water heaters will be ENERGY STAR certified
- Provide receipt of product purchase, model number, or ENERGY STAR label for tank type.

Exceptions

Homes that install an alternate energy source are encouraged to use appliances that consume electricity and can take the same points as a natural gas unit.

Benefit:

- Sealed combustion water heaters with direct venting ensure that the carbon monoxide, a byproduct of the combustion process used to heat the water, is vented out of the home and not drawn back in. Sealed combustion and direct venting is particularly important with tightly built (energy efficient) homes because the carbon monoxide could easily reach unsafe levels.
- A tankless water heater heats water only when there is a demand. It eliminates the loss of energy through heat loss while the water is stored in a tank. A tankless water heater/demand system can have 45-60% energy savings over the minimum standard water heater. It is important to correctly size the tankless water heater for the house to ensure it can generate sufficient hot water to meet demand, even when there are multiple simultaneous uses (e.g., running the washer and shower simultaneously). Tankless water heaters are also available for point of use applications, like hot water at the kitchen sink. The point of use tankless water heaters do not count for this credit, unless they fully replace a standard storage tank water heater, but can increase homeowner satisfaction and reduce wasted water by shortening the time between turning the water on and receiving hot water.
- The water heater's efficiency is measured as an energy factor (EF), which is shown on the label of the heater. The higher number indicates a more energy efficient unit.
- A heat trap can either be a loop in the plumbing or a special valve that prevents convection. New storage tank water heaters may have heat trap valves already installed. Heat traps stop the outflow of hot water from the water heater.
- A recirculation pump pulls hot water from the heater and sends the cooled water back to the water heater to be reheated. The recirculation pump can be activated by either thermostat, timer, or manually. The thermostat and timer help ensure that hot water is always available quickly. The manual switch requires less energy because the pump is not activated when hot water is not needed. On longer plumbing runs the recirculation pump greatly reduces the amount of water used before the hot water reaches the point-of-use, reducing the water wasted while waiting for it to warm up.
- A Drain Water Heat Recovery (DHR) unit captures the heat from wastewater leaving the home and transfers it into the cold water entering the water heater. By boosting the temperature of the cold water entering the water heater, the water heater doesn't have to use as much energy to heat the water in the tank.
- A power vented water heater, while relying on room air for combustion, has an exhaust system that is vented out the side of the house rather than a chimney.
- Electricity in Minnesota and much of the Midwest is dirty power with 63% produced through burning coal and a 70% loss of source energy during the process of electricity generation and transmission to the site. The efficiency of the unit is negated by the impact of the energy source on the environment.

Resources

www.state..us//externalDocs/Commerce/Water_Heaters_110802042613_WaterHeaters.pdf

www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13040



Verification:

Provide documentation or calculations for this measure.

10.2.8

Accountability Form: **Plumbing Contractor**



Install a drain water heat recovery unit (DHR) 011915 AS

2 0 0 0 0

Description:

Replace or install new water heater.

- A water heater with a tank is to be installed so that overflow or leaks are captured by drains. (EC, 39.10)
- Tank type water heaters will be ENERGY STAR certified
- Provide receipt of product purchase, model number, or ENERGY STAR label for tank type.

Exceptions

Homes that install an alternate energy source are encouraged to use appliances that consume electricity and can take the same points as a natural gas unit.



Benefit:

- Sealed combustion water heaters with direct venting ensure that the carbon monoxide, a byproduct of the combustion process used to heat the water, is vented out of the home and not drawn back in. Sealed combustion and direct venting is particularly important with tightly built (energy efficient) homes because the carbon monoxide could easily reach unsafe levels.
- A tankless water heater heats water only when there is a demand. It eliminates the loss of energy through heat loss while the water is stored in a tank. A tankless water heater/demand system can have 45-60% energy savings over the minimum standard water heater. It is important to correctly size the tankless water heater for the house to ensure it can generate sufficient hot water to meet demand, even when there are multiple simultaneous uses (e.g., running the washer and shower simultaneously). Tankless water heaters are also available for point of use applications, like hot water at the kitchen sink. The point of use tankless water heaters do not count for this credit, unless they fully replace a standard storage tank water heater, but can increase homeowner satisfaction and reduce wasted water by shortening the time between turning the water on and receiving hot water.
- The water heater's efficiency is measured as an energy factor (EF), which is shown on the label of the heater. The higher number indicates a more energy efficient unit.
- A heat trap can either be a loop in the plumbing or a special valve that prevents convection. New storage tank water heaters may have heat trap valves already installed. Heat traps stop the outflow of hot water from the water heater.
- A recirculation pump pulls hot water from the heater and sends the cooled water back to the water heater to be reheated. The recirculation pump can be activated by either thermostat, timer, or manually. The thermostat and timer help ensure that hot water is always available quickly. The manual switch requires less energy because the pump is not activated when hot water is not needed. On longer plumbing runs the recirculation pump greatly reduces the amount of water used before the hot water reaches the point-of-use, reducing the water wasted while waiting for it to warm up.
- A Drain Water Heat Recovery (DHR) unit captures the heat from wastewater leaving the home and transfers it into the cold water entering the water heater. By boosting the temperature of the cold water entering the water heater, the water heater doesn't have to use as much energy to heat the water in the tank.
- A power vented water heater, while relying on room air for combustion, has an exhaust system that is vented out the side of the house rather than a chimney.
- Electricity in Minnesota and much of the Midwest is dirty power with 63% produced through burning coal and a 70% loss of source energy during the process of electricity generation and transmission to the site. The efficiency of the unit is negated by the impact of the energy source on the environment.

Resources

www.state..us//externalDocs/Commerce/Water_Heaters_110802042613_WaterHeaters.pdf

www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13040

Verification:

Visually inspect and photograph implementation of this measure.



10.2.9

Accountability Form: **Plumbing Contractor**



Install timer on any tank water heater 011915 AS

1 0 0 0 0

Description:

Provide receipt for purchase and installation or photo.

Benefit:

Water heater timer saves energy by turning off the water heater at night, when demand for hot water is low. Having the utility company install a control device that turns off an electric water heater during peak demand periods will also qualify for this credit. Typically the utility does not shut off the water heater long enough for the occupants to experience a loss in hot water.

Verification:

Provide documentation or calculations for this measure.

10.2.11

Accountability Form: **Plumbing Contractor**



Install an improved efficient and sealed water heater

0/1/1/2/3/3 0/3/3/1/1/3 0 0 0/0/0/1/0/1

(Default Value / Condensing Sealed Tank / Tankless / Hybrid on demand / Heat Pump / Point source tankless)

Description:

A more energy efficient and sealed combustion or power vented water heater will save energy, water and reduce potential health issues in the home.

Closed combustion tank water heater is the conventional upgrade, consider sizing needs based on family size.

Tankless on demand water heaters can use a lot more energy and water depending on family size and attention to shower run times. Can be costly to clean and maintain

On demand hybrids have the best of both worlds between tank condensing and on demand. Maintaining can be as costly as tankless and piping retrofit may cost more.

Point source water heaters that are electric and 99% efficient deliver water only when and where it is needed. If one fails you can still have hot water in other areas of the home.

Benefit:

Natural drafting water heaters can be a health and moisture issue while also being energy inefficient. A water heater update does not save much energy in grand scheme of improvements.

Verification:

Verify to ensure correct specified water heater is installed and set to appropriate temp settings.

10.3 Fixtures

10.3.0

Accountability Form: **Plumbing Contractor**



Install NSF certified water filters on drinking water sources 011915 es

0 1 0 0 0

Description:

To qualify, a point-of-use system must be plumbed in through the main faucet or a separate auxiliary faucet next to the main faucet. Pour through, faucet mounted, and countertop filter systems do not qualify.

A receipt will be required for documentation.

Benefit:

The National Sanitation Foundation verifies the claims of manufacturers and ensures products conform to strict standards (www.nsf.org). The NSF certification provides third-party assurance that the product reduces the contaminants as claimed by the manufacturer. In order to earn certification for reduction of a contaminant the tested product must be able to reduce a specific amount that contaminant. Even with certification it is important that proper maintenance and filter changing are performed to ensure continued performance.

Resources

www.nsf.org/consumer/drinking_water/dw_treatment.asp?program=WaterTre#technologies

Verification:

Provide documentation or calculations for this measure.

**10.3.2**Accountability Form: **Plumbing Contractor****Install NSF certified whole house water filter** 011915 es

0 2 0 0 0

Description:

Provide a receipt of purchase and installation.

Benefit:

The National Sanitation Foundation verifies the claims of manufacturers and ensures products conform to strict standards (www.nsf.org). The NSF certification provides third party assurance that the product reduces the contaminants as claimed by the manufacturer. In order to earn certification for reduction of a contaminant the tested product must be able to reduce a specific amount that contaminant. Even with certification it is important that proper maintenance and filter changing are performed to ensure continued performance. A point of entry, or whole house, system is installed where the water enters the house, typically at the meter. All of the water used in the house is filtered making point-of-use filters unnecessary. An adsorption system, typical carbon filter, reverse osmosis system (explained further in 6AS-4), ultraviolet disinfecting system, or distiller system qualifies for this credit.

Considerations

Pour through, faucet mounted, and countertop filter system do not qualify.

If a reverse osmosis system is used (see 7A-6), a loss of a point in the water conservation category will occur due to the water wasted by using this system.

Resources

Resources

www.nsf.org/consumer/drinking_water/dw_treatment.asp?program=WaterTre#technologies

Verification:

Provide documentation or calculations for this measure.

10.3.3Accountability Form: **Plumbing Contractor****Install an NSF certified reverse osmosis filter on all drinking water source** 011915 es

0 3 0 0 0

Description:

Provide a receipt of purchase and installation.

This credit cannot be taken with the "Install NSF certified whole house water filter" credit.

Benefit:

Reverse osmosis systems remove contaminant in water by using high pressure to force the water through a semi-permeable membrane that filters the water. A reverse osmosis system can filter out smaller particles than other types of filtering systems

Considerations

The downside of the reverse osmosis filtering process is that large amounts of water are wasted. For every gallon of filtered water approximately 4-10 gallons are wasted.

Verification:

Provide documentation or calculations for this measure.

10.3.4Accountability Form: **Plumbing Contractor****Install chlorine filters on shower heads or whole house chlorine filter** 011915 es

0 1 0 0 0

Description:

Provide receipt and manufacturer's specifications

Benefit:

Chlorine is used to eliminate microorganism from the water supply to reduce waterborne illnesses. However, chlorine may have adverse health effects ranging from cancer, asthma, and heart disease, to dry skin and hair.

Verification:

Provide documentation or calculations for this measure.



10.3.5

Accountability Form: **Plumbing Contractor**



Limit shower heads to one per shower 011915 es

0 0 0 0 2

Description:

Provide a photograph of each bathtub and shower as proof that only one showerhead has been installed.

Benefit:

Each showerhead that is added increases the loss of water as well as energy needed to heat the water.

Verification:

Visually inspect and photograph implementation of this measure.

10.3.6

Accountability Form: **Plumbing Contractor**



Average installed efficient flow rates of all shower heads

(2 GPM / 1.5 GPM / 1 GPM) 0/0/1 0 0 0 2/4/6

Description:

Low flow rate shower heads conserve water, energy and nowadays are just as comfortable.

Benefit:

As the flow rate decreases, so does the amount of water loss. Decreasing flow rate from 2.5 gpm to 2.0 gpm saves 20% on water usage.

Considerations

It is important to that note insulating pipes and locating the hot water heater to deliver hot water more efficiently to all spaces is important as the flow rate decreases. If these items are not addressed, the occupant may be waiting a long time for hot water to reach the faucet.

If long plumbing runs are an issue, see 5B-2f about re-circulating pump.

Verification:

Rater to visually verify these shower heads are installed and average the flow rates and round down.

10.3.9 Accountability Form: **Plumbing Contractor**     

Seal around tub and shower traps in basement or other slab set drain locations using a plastic box as a form 011915 es 0 1 0 0 0

Description:

Plumbing penetrations shall be blocked with sheeting and sealed at edges with proper sealant. Rockwool or similar product does not qualify.

Run the roughed-in plumbing in a plastic box that is cast into the slab. Remove the top of the box, leaving the rest in place. Seal around the pipes as they pass through the box perimeter.

A photograph of each trap is required.

Benefit:

Penetrations in the slab provide potential Radon release into the home.

Drains that leak into the slab may not be visible until considerable saturation of the slab has occurred creating potentially changing Conditions due to high moisture content.

Verification:

Visually inspect and photograph implementation of this measure.

10.3.11 Accountability Form: **Plumbing Contractor**     

Average installed efficient flush rates of all toilets (1.6 GPF / 1.2 GPF / 1.1 GPF / .8 GPF) 0 0 0 0 3/6/7/8

Description:

Water efficient toilets reduce water usage and function just as well as high flush toilets. Consider pressure assisted or vacuum assisted toilets. While dual flush toilets save water they can tend to cause confusion or be flushed wrong. They may also fail quicker than single flush.

Considerations

Average all toilet GPF together to get final score. Average the high and low flush rate of dual flush toilets to get average. Look for watersense certified toilets. Also consider plumbing based on lower flow rates.

Benefit:

Saving water in the home can also reduce processing and storm water.

Verification:

Rater to visually verify and document average toilet flow rates.

10.3.15Accountability Form: **Plumbing Contractor****Install composting toilet(s)** (25% of toilets / 50% of Toilets / 75% of Toilets / 100% of Toilets) 0 0 1/1/2/3 0 5/8/10/12**Description:**

Confirm with local code officials that a composting toilet can be installed.

Benefit:

A composting toilet provides a container for the decomposition of the waste by biological organisms that breakdown waste into usable compost. By using a composting toilet human waste does not enter the sewer system. Composting saves water, processing energy and allows you to have nutrients to improve soils and gardens.

Resources

http://en.wikipedia.org/wiki/Composting_toilet

Verification:

Rater to verify toilet(s) are installed and functional

10.3.16Accountability Form: **Plumbing Contractor****Average GPM on all aerators are low flow** (2.2 GPM / 1.5 GPM / 1 GPM / .5) 0/0/0/1 0 0 0 1/2/3/4**Description:**

Average of all aerator flow raters except kitchen sink(s). Consider watersense certified aerators and sinks.

Benefit:

As the public gains a greater awareness for the need for water conservation, plumbing manufacturers have begun to provide products to meet the demand. If you are not able to locate a faucet with the desired flow rating, an aerator can be installed on most fixtures to reduce flow. Look for aerators at a plumbing distributor or hardware store. Lower flow feels just conventional but longer plumber runs can cause wait times for hot water.

Resources

www.epa.gov/watersense/pp/bathroom_faucets.htm

Verification:

Provide documentation or calculations for this measure.

10.3.20Accountability Form: **Plumbing Contractor**

Shut off valve, motion sensor, or pedal activated faucet to enable intermittent on/off operation (kitchen or lavatory) 011915 es

0 0 0 0 2

Description:

Provide receipt and manufacturer's specifications

Benefit:

As the public gains a greater awareness for the need for water conservation, plumbing manufacturers have begun to provide products to meet the demand. It is convenient when cleaning in a kitchen or brushing teeth in a bathroom to keep the water running, but the practice is wasteful. Products exist that are helpful for the user while promoting water conservation. Combining low-flow faucets with motion sensors will make it difficult to get warm water from the fixture unless it is on a recirculation loop.

Considerations

Motion sensors that are wired or require a battery must deduct one energy point from their total. Motion sensors that have a self charging battery are exempt.

Resources

www.epa.gov/watersense/pp/bathroom_faucets.htm

Verification:

Provide documentation or calculations for this measure.

10.4 Piping

10.4.0	Accountability Form: Plumbing Contractor					
Use copper alternative (PEX) when adding new or replacing existing water supply pipes 011915 es		0	1	1	1	0

Description:

Provide receipt and manufacturer specifications.

Provide photo at pre-drywall

Benefit:

PEX is cross-linked polyethylene flexible tubing that is resistant to extreme temperatures and well suited for interior hot and cold plumbing lines. Because it is flexible it can reduce the number of connections required, which reduces the chances of leaks and reduces installation labor. It is scale resistant, chlorine resistant, and does not develop pinhole leaks, which are drawbacks of copper. Copper is a semi-precious metal that produces significant environmental degradation and uses large amounts of water and energy during mining and processing.

Resources

www.buildinggreen.com/auth/productsByCsiSection.cfm?SubBuilderCategoryID=3300

www.ppfahome.org/pex/faqpex.html

Verification:

Visually inspect and photograph implementation of this measure.

10.4.2	Accountability Form: Plumbing Contractor					
Replace galvanized water lines 011915 es		0	3	0	0	0

Description:

Provide photographs of existing water pipes to be removed --AND-- newly installed water pipes

Benefit:

- As a galvanized water line ages, minerals in water begin to build up in the line. This build up does not affect water quality, but affects the ability of the pipe to deliver water efficiently, and possibly lead to a clog.
- Galvanized lines were common in the building industry 100 years ago.
- As galvanized pipes age they begin to rot, raising the possibility of leaks which can impact the durability of the home.

Verification:

Visually inspect and photograph implementation of this measure.

10.4.3	Accountability Form: Plumbing Contractor					
Install circulation loop within 10' of each fixture (except utility sink) 011915 es		0	0	0	0	2

Description:

A photograph of the installed loop will be required for documentation.

Benefit:

This recirculation pump will minimize wait time for hot water, thereby reducing waste. Remote switches to activate the system shall be installed on intermediate fixtures between the pump and water heater.

Verification:

Visually inspect and photograph implementation of this measure.

10.4.4	Accountability Form: Plumbing Contractor					
Install water heater jacket on hot water heater (min. R8) 011915 es		1	0	0	0	0

Description:

A photograph of the installation will be required for documentation as well as a description of the water jacket and its insulation value.

Benefit:

A hot water heater needs a jacket if the exterior of the tank is warm to the touch. A water heater jacket will reduce the stand-by heat loss of the water in the storage tank and help save money. Check with your utility company to see if they offer rebates or sell them for reduced cost.

Verification:

Visually inspect and photograph implementation of this measure.

10.4.5	Accountability Form: Plumbing Contractor					
Install water heater pipe insulation for first 20' of pipe 011915 es		1	0	0	0	0

Description:

Provide receipt and manufacturer's specifications

Benefit:

Insulating hot water pipes will reduce the heat loss of the water in the lines and the wait time for hot water, which will reduce the amount of water wasted while waiting for hot water. Because the pipes are able to maintain a higher temperature it may also be possible to lower the temperature settings of the water heater, further reducing energy use.

Resources

eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13060

Verification:

Visually inspect and photograph implementation of this measure.

10.4.6	Accountability Form: Plumbing Contractor					
Insulate all hot water lines to minimum R-4 011915 es		2	0	0	0	0

Description:

A photograph of the installation will be required for documentation

Benefit:

Insulating hot water pipes will reduce the heat loss of the water in the lines. It will reduce the wait time for hot water, which will reduce the amount of water wasted while waiting for hot water. Because the pipes are able to maintain a higher temperature it may also be possible to lower the temperature settings of the water heater, further reducing energy use. It is easy to insulate the pipes during construction when they are exposed.

Resources

www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=13070

Verification:

Visually inspect and photograph implementation of this measure.

10.4.7	Accountability Form: Plumbing Contractor					
Centralize water heater, place as equidistant from fixtures as possible 011915 es		2	0	0	0	1

Description:

Indicate the plumbing runs on construction plans and show length of water runs.

Benefit:

A central location will minimize the overall amount of piping. The central location will reduce the overall wait times for hot water, which will reduce the amount of water wasted while waiting for hot water. This is both an energy and water saving technique.

Verification:

10.4.8	Accountability Form: Plumbing Contractor					
Install central manifold for distribution with minimum R-4 on all hot water lines 011915 es		2	0	0	0	1

Description:

A manifold distribution system is to be installed so that each plumbing fixture in the house has a dedicated water line back to the manifold.

Provide photographs to show connection of fixtures to manifold

Benefit:

This design approach minimizes the diameter of the water pipes and reduces the amount of water wasted while waiting for hot water to reach the fixture.

Verification:

Visually inspect and photograph implementation of this measure.

10.4.9	Accountability Form: Plumbing Contractor					
Perform a water leak test and remediate leaks discovered 011915 es		0	0	0	0	1

Description:

Provide a written description of where the leaks were found and what was done to correct the problem.

Benefit:

Leaks, even when small, are a large source of wasted water over time. It is estimated that leaks account for 1/10 of household water consumption. Leaks can cause substantial damage to the house and can provide the conditions for mold growth.

Resources

www.savingwater.org/docs/leaks.pdf

Verification:

Provide documentation or calculations for this measure.

10.4.10	Accountability Form: Plumbing Contractor					
Install whole house fire suppression system 011915 es		0	2	2	5	0

Description:

Provide product specifications and receipt for system

Provide photo at completion

Benefit:

Not only does a fire suppression system reduce the damage caused by a fire and resultant property losses, it helps to save lives and reduce injury. The installation of a fire suppression system may result in reduced insurance rates.

Resources

www.usfa.dhs.gov/citizens/all_citizens/home_fire_prev/sprinklers/

Verification:

Provide documentation or calculations for this measure.

Visually inspect and photograph implementation of this measure.

10.5 Water Systems

10.5.0

Accountability Form: **Plumbing Contractor**



Install a greywater collection system that annually captures and reuses a minimum of 50% of home's greywater 011915 es

0 0 2 0 10

Description:

Provide receipt and manufacturer's specifications

Benefit:

Graywater is all wastewater not contaminated by human/toilet waste or food waste from garbage disposals. It includes water draining from showers, sinks, and clothes washers. After being filtered the graywater is used for landscape irrigation or flushing the toilet.

Consideration

Review local plumbing codes and discuss with code officials before designing the system. Wastewater from toilets and garbage disposals is called blackwater and must be treated separately from graywater. Blackwater contains higher levels of nitrogen, pathogens, and other contaminants, and takes longer to decompose, than graywater. However, blackwater can also be handled without entering the sewer or septic system. Limiting water use for landscape irrigation may be a more practical alternative to a graywater system and may result in a similar number of points (see Section 2 – Outdoor and Site)

Verification:

Provide documentation or calculations for this measure.

10.5.2	Accountability Form: Plumbing Contractor					
Install solar domestic water heating system (min. 50% of water heating load) 011915 es		7	0	0	0	0

Description:

Integrate solar water heating system needs into design of project

Provide receipt for system

Benefit:

Solar water heating systems use collector plates typically mounted on the roof to preheat water. The preheated water is either stored in its own tank before it enters a conventional water heater or the storage tank and water heater are combined in one unit. Due to freezing temperatures in cold climates, an indirect circulation system should be used where a non-freezing liquid is circulated through the collector plates and then through a heat exchanger that transfers the energy to the water.

Resources

www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=12850

Verification:

Provide documentation or calculations for this measure.

10.5.3	Accountability Form: Plumbing Contractor					
Install heat-pump system that is combined with water heating system 011915 es		2	0	0	0	0

Description:**Exceptions**

The homeowner or general contractor can verify on-site that this measure is installed.

Benefit:

A heat pump water heater system removes heat from the environment and transfers it into the water. The heat can come from the room (ambient), exhaust, or outdoor air. In cold climates it is more typical to use an exhaust system. In addition, a super-heater can be installed with the air conditioner to capture the heat generated while cooling the house as the source for the heat pump.

Verification:

See accountability form.

10.5.4Accountability Form: **Plumbing Contractor**

Provide south roof area for future domestic solar hot water heating system (min. 30 sf within 15° of South with a roof angle of 30°-50°) and plumbing rough-in for solar water heating system 011915 2 0 0 0 0

Description:

The homeowner or general contractor can verify on-site if plumbing rough-ins are installed.

Benefit:

Solar water heating systems use collector plates typically mounted on the roof to preheat water. The preheated water is either stored in its own tank before it enters a conventional water heater, or the storage tank and water heater are combined in one unit plates and then through a heat exchanger that transfers the energy to the water.

The preheated water is either stored in its own tank before it enters a conventional water heater, or the storage tank and water heater are combined in one unit. Due to freezing temperatures in cold climates, an indirect circulation system should be used where a non-freezing liquid is circulated through the collector plates and then through a heat exchanger that transfers the energy to the water.

Even if you are not installing the system now, planning for future possible installation will prevent the need for extensive remodeling in the future.

Verification:

10.5.5Accountability Form: **Plumbing Contractor****No PVC piping for drains, wastes and vents** 011915 es

0 2 0 0 0

Description:

Discuss plumbing options with subcontractor during the design phase to determine best materials your project.

Provide photographs of drain lines, wastes, vents

Benefit:

There is growing concern regarding the health impact of polyvinyl chloride due to the negative environmental impacts of PVC production and dioxin emissions, chemical additives that can leach into the water, or those that off gas into the home environment. The adhesive used with PVC is high in emissions and can negatively impact the health of the workers

Considerations

The discussion over which piping material is best for drains and the environment is filled with controversy. There is no easy way to compare the benefits of each material (durability, ease of use, product cost) to the negative impacts (pollution created during production, energy and water conservation, long-term durability). While PVC has a high durability potential, the pollution created during production and installation as well as the toxicity of the material if it burns makes its use controversial.

Resources

The homeowner or general contractor can verify on-site if plumbing rough-ins are installed.

California Pipe Study

Verification:

See accountability form.

10.5.6Accountability Form: **Plumbing Contractor****No garbage disposal** 011915 es

1 0 0 0 1

Description:

Homeowner is required to sign checklist.

Benefit:

Plumbing systems should not include a garbage disposal. Food waste requires a large amount of energy to treat in order to produce potable water. Composting of food wastes is recommended in place of a garbage disposal

Considerations

Consider supplying the homeowner with a compost bin for outdoor use and a decorative container to hold compostable materials in the kitchen.

Resources

www.greeninstitute.org

Verification:

Homeowner visually confirms this measure.

See accountability form.

11. Finish Materials & Coatings

11.1 Prerequisites

11.1.0	Accountability Form: General Contractor	Prerequisite					
During the period between finishing and occupancy, ventilate the building with outside air at the highest rate the ventilation system can produce (minimum of 48 hours)							
Default Value							

Description:

Discuss requirement with the homeowner during the design stage to educate them on its importance to their health and the program.

Create detailed specification of prerequisite and review with HVAC contractor.

General contractor and homeowner will initial checklist

Benefit:

Many products will release VOCs (volatile organic compounds)* within a short period of installation. Ventilating the home before occupancy will reduce the risk of exposure to these compounds, which is particularly important for those compounds that may result in allergic or asthmatic reactions such as formaldehyde, chlorine, and ammonia.

Considerations

Although a very good way to improve indoor air quality, the chemicals removed from the home can have a negative impact on the outdoor environment. It is wise to choose materials low in VOC to begin with.

Resources

www.healthhouse.org/iaq/HomeAirPollutants.pdf

Verification:

See accountability form.

11.1.2 Accountability Form: **Interior Designer** Prerequisite     

Suspended/Acoustical ceilings are made with recycled materials (at least 60% - recycled content may include slag wool, other mineral wools, cellulose and recycled ceiling tiles - non fiberglass)     
Default Value

Description:

Create detailed specifications that identify preferred ceiling material.

Provide receipt and material specifications

Benefit:

Recycled content material puts less demand on the need for raw material.

Slag wool is made from a waste product of steel production. Cellulose fiber is made from recycled newspaper.

Resources

www.buildinggreen.com/auth/productsByCsiSection.cfm?SubBuilderCategoryID=1959

Verification:

Provide documentation or calculations for this measure.

11.1.3 Accountability Form: **General Contractor** Prerequisite     

No paper-coated drywall in shower or tub surround or other moisture-rich area Only on remodeled or new bathrooms     
Default Value

Description:

Create detailed specifications that identify wall treatment.

Review with installers prior to installation.

Exceptions

Sealed and tiled shower and tub surround.

www.iso.org (ISO 14040/14044)

Benefit:

Wet or moist paper can provide a food source for mold. This requirement addresses all paper-covered gypsum board including green board.

Verification:

Visually inspect and photograph implementation of this measure.

11.1.4 Accountability Form: **Painting / Finishing Contractor**

Prerequisite



No vinyl wall coverings allowed in moisture-rich areas Such as bathrooms, kitchens, laundry rooms
Default Value



Description:

Provide receipt and material specifications

Benefit:

The lack of breathability of vinyl wall coverings can allow moisture to be trapped behind the material and provide a favorable habitat for mold growth.

Verification:

See accountability form.

11.1.5 Accountability Form: **Painting / Finishing Contractor**

Prerequisite



All new carpet must be CRI Green Label Plus or third-party certified as low-emitting.



Description:

Learn more about CRI labeled rugs and carpets <http://www.carpet-rug.org/CRI-Testing-Programs/Green-Label-Plus.aspx>

Wool carpet may also apply.

Benefit:

According to the carpeting industry, carpet makes up 70% of the flooring materials sold in America. By installing a carpet that is certified as low emitting, it ensures that the product begins its life in the home contributing to better indoor air quality than other carpet choices

Considerations

New carpet may start out its life as low emitting, but over time it can become a product that promotes poor indoor air quality. Carpet can collect moisture and bulk water and support the growth of mold. The fibers can trap dust mites and dander, which can irritate asthma and allergy sufferers. It is imperative that carpet is installed in the correct applications and homeowners understand their role in how to care for carpet.

Resources

See Definition of Terms at the beginning of Section 8 for more information

Verification:

Provide documentation or calculations for this measure.

11.2 Wall and Ceiling Surface Materials & Coatings

11.2.0Accountability Form: **Painting / Finishing Contractor****Primer is low or no voc** 90% of project

(No Voc / Very Low Voc / Low Voc) 0 6/4/2 0 0 0

Description:

- No VOC primer is \leq 5 g/l
- Very Low VOC primer is \leq 5 g/l
- Low VOC primer is \leq 150 g/L
- Specify dry mix clay or plaster instead of a premixed material.
- Document the square feet of low/no VOC material and the total square feet of project.
- Provide receipts and material specifications

Benefit:

The intent of this credit is to promote the use of low/no-emitting paints and natural clay and plaster for their low impact on air quality and Resources. Clay is a readily available, abundant material that has been used for thousands of years as a surfacing material. Look for clay that uses natural clay and pigments along with natural mold-inhibiting ingredients like borax.

VOC (volatile organic compound) is a common term that quantifies how much molecular off gassing, or emissions, come from a product. VOCs are what we breathe as a result of a material being in our presence. VOCs are usually listed in grams/liter (g/l)—especially primers, paints, stains, finishes, and glues/adhesives. VOC quantity only tells how much emissions are measured from a product, but not what types of chemicals are being released. It is important to read labels or call a manufacturer's technical services help line if you want to know the chemical make-up, especially if chemical sensitivity is a concern.

LOW EMITTING PRODUCTS are designed to be free of or lower in chemical compounds (natural or synthetic), which are released into the air that can negatively impact health and indoor air quality. Many of these compounds including formaldehyde, chlorine, and ammonia can negatively impact health, and their use should be reduced or avoided. They have been linked to increase in allergies, asthma, headaches, and chemical sensitivities. Some products, like formaldehyde, are also linked to cancer.

The following websites are helpful for defining thresholds for VOC content:

- www.greenseal.org
- www.chps.net/manual/lem_table.htm#gypsum
- www.aqmd.gov/rules/download.html (choose item XI, choose rules 1101-1196, choose r1168 pdf)

Considerations

Different chemical additives are being included in plaster to extend the working time of the material and to make them more flexible over time. These chemicals may emit VOCs* that are harmful to the installers and the occupants. Even no VOC paints have VOCs and someone with chemical sensitivities could still feel the negative health effects.



Verification:

Rater to inspect primer used on site and review and submit receipts and/or documentation.

11.2.7

Accountability Form: **Painting / Finishing Contractor**



Install tile or stone for all shower or tub surrounds 011915 es

0 2 0 0 0

Description:

Provide photographs of all shower and tub installations.

Rater will verify installations.

Benefit:

Tile or stone installed correctly in a shower or tub surround provides long-term durability and protection from mold.

Considerations

Additional points for additional Green attributes for tile can be found in the charts in credits 8A - 5 and 8A - 6. When accessing points in these credits, it will be important to consider the quantity of tile and how it contributes to square foot requirements for those credits.

Verification:

Visually inspect and photograph implementation of this measure.

11.3 Wall & Ceiling decorative covering attributes

11.3.0	Accountability Form: Painting / Finishing Contractor					
Location of materials		1/3/2/2	0	0/1/0/0	0/0/1/0	0
(90 % Regionally Sourced / 90% Locally Sourced / 50% Locally Sourced / 50% Regionally Sourced)						

Description:

Regionally SOURCED materials are those that are extracted, harvested, or salvaged/recovered AND produced within 500 miles of the project. LOCALLY SOURCED materials are those that are extracted, harvested, or salvaged/recovered AND produced within 100 miles of the project. In this program, 90% of the material(s) in a product must be locally or regionally sourced to receive credit. If the product has multiple materials, the source for all of the materials must be documented.

Considerations

Every product and project location is very unique. If a certain product falls out of the boundary line but is closer than other products of the same type it still may be considered. Please submit a waiver for consideration.

Benefit:

The goal in returning to locally sourced and produced products is to reduce energy used in transportation as well as to stimulate local economies and jobs. Local businesses tend to support the community more than non-local companies. [Learn more about the impact of local business.](#) Local materials may have the added advantage of being exclusive to a region thus providing the opportunity for unique or one of a kind design.

Verification:

Provide documentation or calculations for this measure detailing where the product was mined, manufactured and distributed.

11.3.2	Accountability Form: Painting / Finishing Contractor					
Contains minimum of recycled content type	(25% Postconsumer / 50% Preconsumer / Post Industrial)	0	0	0	2	0

Description:

Post-consumer material means the original product was used as intended by a consumer, and at the end of its life the product was reused in the production of a new product (e.g., glass from beverage bottles can be used in place of crushed stone aggregate to make concrete countertops). Post-consumer recycling is the most-preferred type of recycling since the product was actually used as intended and the material recaptured for use as raw material.

Post-industrial or pre-consumer material means the original product or raw material never made it to its intended end use. Instead, the material is sent back into the production line to make more of the same product, or it is used as a raw material to manufacture a different product.

Benefit:

Re using materials reduces waste and energy to create new products.

Verification:

Provide documentation of the product.

11.3.4

Accountability Form: **Painting / Finishing Contractor****Low emitting or no-added-formaldehyde (NAF or NAUF)**

(90%) 0 0/2 0 0 0

Description:

90% of the products installed in this category must meet this.

Wood materials labeled as “no-added-urea-formaldehyde” (NAUF), also simply known as “no-added-formaldehyde” (NAF) are the best options for wood-based materials such as furniture, cabinetry, closet systems, flooring/sub-flooring, paneling, and counter tops/counter top substrates. NAUF wood materials do not have urea formaldehyde added to the wood glue or other binders. This includes products like particleboard, plywood, medium density fiberboard (MDF), and all other engineered wood products.

Since it is not always feasible to use wood products labeled as no-added-urea-formaldehyde, all exposed surfaces should be sealed prior to use to reduce formaldehyde exposure.

Non-wood materials are usually labeled as “formaldehyde-free” when glues and adhesives do not contain urea formaldehyde.

Third-party certified low emitting products have gone through rigorous independent testing to measure the off-gassing of a product. The testing must follow an established set of standards and be repeatable by any laboratory conducting the test. The following labels on a product can help guide the decision process of selecting low emitting products

- Indoor Advantage (www.greenguard.org)
- Indoor Advantage Gold (www.greenguard.org)
- Greenguard for Schools (www.greenguard.org)
- Floorscore (www.scs-certified.com)
- CRI Green Label Plus (www.carpet-rug.org)

VOC (volatile organic compound) is a common term that quantifies how much molecular off-gassing, or emissions, come from a product. VOCs are what we breathe as a result of a material being in our presence. VOCs are usually listed in grams/liter (g/l)—especially primers, paints, stains, finishes, and glues/adhesives. VOC quantity only tells how much emissions are measured from a product, but not what types of chemicals are being released. It is important to read labels or call a manufacturer’s technical services help line if you want to know the chemical make-up, especially if chemical sensitivity is a concern.

LOW EMITTING PRODUCTS are designed to be free of or lower in chemical compounds (natural or synthetic), which are released into the air that can negatively impact health and indoor air quality. Many of these compounds including formaldehyde, chlorine, and ammonia can negatively impact health, and their use should be reduced or avoided. They have been linked to increase in allergies, asthma, headaches, and chemical sensitivities. Some products, like formaldehyde, are also linked to cancer.

The following websites are helpful for defining thresholds for VOC content:

- www.green-seal.org
- www.chps.net/manual/lem_table.htm#gypsum
- www.aqmd.gov/rules/download.html (choose item XI, choose rules 1101-1196, choose r1168 pdf)

Benefit:

Urea-formaldehyde is one of the most prevalent indoor pollutants. All wood has naturally occurring phenyl formaldehyde. The small quantity is not harmful to humans unless exposed to large quantities of cut wood, such as during milling and sawing. It is recommended that workers take precautions to protect themselves from wood dust during the handling of wood materials.

- www.epa.gov/iaq/formalde.html

Verification:

Provide documentation or calculations for this measure.

11.3.5Accountability Form: **Painting / Finishing Contractor****Salvage/reclaimed/recovered**

(90%) 0 0 0 0/6 0

Description:

SALVAGED/RECLAIMED/RECOVERED materials are deconstructed from one site and kept from the waste stream by reuse as is or minimally processed into a new product—such as barn wood re-milled into flooring—at a different site.

Reuse centers and salvage yards are great places to find salvaged product. This also includes product that was recovered from forgotten or lost material such as submerged timber-cut logs found in a lake. Materials that came from sources dated before 1978 may contain lead if a finish is present. Have the material tested and ensure worker and jobsite safety when handling and refinishing these products. www.epa.gov/lead

Third-party certified salvaged/reclaimed/recovered materials come from companies that have gone through a rigorous evaluation of their process to recover product and bring it back to market. This type of review helps ensure the authenticity of the product and the integrity of the process. The following labels on a product can help guide the decision process of selecting certified salvaged/reclaimed/recovered product:

- Rediscovered Wood
(www.rainforest-alliance.org/programs/forestry/smartwood/certification/rediscovered-wood.html)
- Certified 100% Salvaged Wood (www.scs-certified.com)

Benefit:

Reducing the need for new material can save on costs, reduce waste and keep embodied energy of the project lower.

Verification:

Provide documentation or calculations for this measure.

11.3.6	Accountability Form: Painting / Finishing Contractor					
Source Bio Based Materials	(90%)	0	0	0	0/4	0

Description:

“Some examples of agricultural resources that make up many biobased products include: [soybeans](#), [corn](#), [kenaf](#), [flax](#), [jute](#), and numerous other types of crops that are harvested. Current applications of these agricultural resources create products such as [ethanol](#) (corn-based), [soy candles](#), [soy-based](#) lubricants, [kenaf](#) office paper, and [bioplastics](#) to name a few.” – Wikipedia. More and more materials are being designated as bio based. Raw materials for this product should be ASTM D6866 Testing Standards. <http://www.astm.org/Standards/D6866.htm>

Considerations - Ensuring the farming practices are sustainable is important as well. You gain extra credit for selecting products from organic certified farms and/or those that use the Agricultural Networks Sustainable agricultural standard. http://www.san.ag/biblioteca/docs/SAN-G-20-2_Agriculture_Standard_Guide.pdf

Benefit:

Biobased materials help shift the market away from petrochemicals, tend to be compostable or biodegradable at the end of their life and create more regional jobs with reliance on farming to also supply materials.

Verification:

Provide documentation or calculations for this measure.

11.3.7	Accountability Form: Painting / Finishing Contractor					
FSC certified	(90%)	0	0	0/1	0/2	0

Description:

- Create detailed plan that identifies wall/ceiling treatment by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information

Forest Stewardship Council CERTIFIED wood products are 3rd-party certified to come from sustainably managed, biodiverse forests. This process involves a Forest Stewardship Council Certification (FSC Certification) tracking method whereby each seller along the growing, processing, and distribution routes must be certified and carry a FSC Certification number. FSC Certified lumber and products must be proven to be physically separated from all non FSC Certified lumber and products.

To acquire any credits in the GreenStar program in regards to FSC Certification, the FSC Certification number from the final seller/fabricator must be included with the documentation. For instance, a cabinet shop using FSC Certified wood must provide their FSC Certification number to the general contractor in order for the project to claim the cabinetry as FSC Certified. The same holds true for millwork. The provider of the millwork must provide the FSC Certification number to the general contractor in order for the project to claim the millwork as FSC Certified.

Benefit:

FSC Certification is a way to significantly reduce Green washing associated with less-than-optimal logging and processing practices such as claiming that replanting one or more trees for every tree harvested is good environmental practice. Replanting is sound business practice for any company that wants to ensure that there is product to harvest from land in the future. But, “planting a tree” tells nothing about the biodiversity of the forest, its ability to sustain plant and animal life, erosion control, or how illegal logging is eradicated.

The Forest Stewardship Council FSC label is one of the most prominent, international certifications for wood products. In addition to rewarding practices that promote sustainably managed, biodiverse forests, the FSC label also recognizes practices that promote fair wage for all workers involved in the handling of lumber products from the forest to the end holder of the FSC Certification. (www.fsc.org)

The majority of state owned land in Minnesota is FSC certified making it easier to source FSC hardwood-based products in the Midwest.

The Sustainable Forestry Initiative Program (SFI) now offers a FSC Certification auditing process for their member products. Be aware that SFI is a membership organization and the “SFI” label is used to indicate members in the organization. To be truly certified through SFI, look for the “certified” label and provide the FSC Certification number. (www.aboutsfi.org)

Considerations

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner’s manual to maintain good indoor air quality. If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner’s manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.3.8Accountability Form: **Painting / Finishing Contractor****Refinishable / Resurfaceable**

(90%) 0 0 0 0/4 0

Description:

- Create detailed plan that identifies wall/ceiling treatment by area.
- Calculate surface area covered with each material and total surface area of project.

REFINISH-ABLE/RESURFACE-ABLE products can be renewed on-site to fix repairs or make the product look like new. Paint is an example of a surface that is easy to repair and refinish. Hardwood flooring is another example of a material that can be refinished. Stone surfaces can be polished to remove scratches and to renew. There are a variety of Resources for finishing wood products to promote good indoor air quality. Products must have existed and improved to count for credit, it cannot just count products that are in the house and that remain.

Benefit:

If a wall surface is to receive a decorative product other than paint, clay, or plaster, that surface should have Green attributes so that impact on health and the environment is minimized. Since paint, clay, and plaster can have Green attributes beyond their contribution to Indoor Environmental Quality and Resources, this section can be accessed for those additional points.

Considerations

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.3.9

Accountability Form: **Painting / Finishing Contractor****Certified sustainable manufacturing process**

(90%) 0 0 0/2 0 0

Description:

- Create detailed plan that identifies wall/ceiling treatment by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials

The following labels on a product can help guide the decision process of selecting companies that have gone through a rigorous independent third-party evaluation of their business operations and manufacturing.

- ISO 14001 (www.iso.org)
- Cradle to Cradle <http://www.c2ccertified.org/>
- Living Product Challenge <http://living-future.org/lpc>

GreenStar may also consider unique products submitted under

DECLARE <http://declareproducts.com/>

JUST http://living-future.org/Just_The_Social_Justice_Label

Considerations - Other credible and relevant certifications may apply. Please submit!

Benefit:

While it is important to look at products and their sustainable features, it is also important to support companies and manufacturers that adapt new technologies and systems to lessen their impact on the environment by reducing water, energy, and resource usage, reducing light pollution, and decreasing impact on indoor and outdoor air quality, light pollution, and noise. Many companies today are claiming that they are Green. It will require hard work and research to wade through the meaning of manufacturer claims if you are not familiar with the manufacturing process or systems used in production.

Considerations

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality. If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.3.10Accountability Form: **Painting / Finishing Contractor****Life cycle impact assessment**

(90%) 0 0 0/2 0/2 0

Description:

- Create detailed plan that identifies wall/ceiling treatment by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials

LIFE CYCLE IMPACT ASSESSMENT (LCIA) is a holistic evaluation of a product and its impact on individual health, communities, the environment, and resources from the beginning of a product's life to its end. The evaluation starts at the beginning of the product life cycle by examining the process of extraction or harvesting of the raw materials. It then evaluates impact of production, distribution, installation, maintenance, and disposal.

There are several methodologies available to assess the LCIA of a product including ATHENA and BEES. There are also well-respected third-party certification programs that review products for LCIA. The following websites and certification programs are a guide to finding products or evaluating products.

- athenasmi.ca/ (ATHENA)
- www.bfrl.nist.gov/oa/software/bees/ (BEES)
- www.csbr.u.edu (Center for Sustainable Building Research)
- www.mcdonough.com/cradle_to_cradle.htm (Cradle to Cradle)
- www.scs-certified.com (Sustainable Choice)
- (NSF/ANSI Standard 140-2007)
- www.iso.org (ISO 14040/14044)

The goal of all products would be to have a low impact throughout the life cycle and ultimately be recyclable in a closed loop; the materials that make up the product are capable of being recycled over and over again into more of the same type of product without loss of integrity and with minimal effort, thereby reducing the need for more raw material and impact that accompanies it.

Benefit:

Better understanding of the products you put in homes and how they impact the environment leads to better purchasing decisions and industry transparency.

Verification:

Provide documentation or calculations for this measure.

11.3.11Accountability Form: **Painting / Finishing Contractor****Recyclable**

(90%) 0 0 0 0/2 0

Description:

- Create detailed plan that identifies flooring by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual.

To receive credit in this program, a product labeled as recyclable must have a process established at the time of installation to collect material, AND a manufacturing or fabrication facility in existence that is actively collecting and reprocessing the material into the same type of material. Cradle to Cradle may help guide you in finding a product <http://www.c2ccertified.org/>

Benefit:

RECYCLABLE products are made of a material that can be easily gathered at the end of its life and reprocessed into more of the same product. It is important the material is a type that is easily recycled without loss of integrity in the new product AND a system must exist to collect the material and deliver it to an existing facility that can process the material. We are familiar with the collection of glass beverage bottles that become new glass beverage bottles. Steel studs can be made into new steel studs. But few products exist for interior finishes that can be called recyclable. Innovation is fueling new technologies and this area is expected to grow. Nylon 6 fiber in carpeting is an example of a recyclable fiber. The used fiber can be removed from the carpet backing and made into new nylon 6 fiber for a new carpet.

Verification:

Provide documentation or calculations for this measure.

11.3.11Accountability Form: **Painting / Finishing Contractor****Reduced waste in manufacturing**

(90%) 0 0 0 0/2 0

Description:

- Create detailed plan that identifies area.
- Calculate surface area covered with each material and total surface area of project.
- Provide receipts and product specifications for all materials.

REDUCED WASTE products are created through a process that minimizes waste during production. End-run wood flooring is an example whereby boards of improper grade or insufficient quantity are packaged together to create a quantity that is usable in an installation. Finger-joint millwork is a process that reduces waste in production.

- Products made with a process that reduces waste must explain the waste reduction process and provide manufacturer specifications to earn credit.

Benefit:**Verification:**

Provide documentation or calculations for this measure.

11.4 Flooring

11.4.2Accountability Form: **Painting / Finishing Contractor****No wall-to-wall carpet in bathrooms, kitchens, entryways and utility rooms** 011915 es

0 1 0 0 0

Description:

- Choose hard surface flooring that can withstand moisture and heavy cleaning over time.
- Create detailed plan that identifies flooring material by area.

Benefit:

Carpet and the pad underneath can act like a sponge and absorb moisture, bulk water, and airborne contaminants commonly found in these areas of the home. Trapped moisture can promote mold growth and dust mites. Both of these living organisms are known for causing a variety of health issues including sensitivities, allergies, and asthmatic reactions. Carpet and pad do not allow for thorough cleaning of these dirt-prone areas of the home.

Resources

www.lungusa.com

Verification:

Rater / Verifier visually confirm this measure.



11.4.2

Accountability Form: **Rater**



Install all hard-surface flooring (no carpet)

0 6 0 1 0

Description:

- Install hard surface flooring.
- Area rugs are acceptable.

Benefit:

Hard surface flooring is easier to maintain than carpet and does not harbor dust mites—a contributor to allergies and asthma. There are many flooring options, but they are not all made the same. It is important to choose floor coverings that promote good indoor air quality—those that do not contain formaldehyde, vinyl or other toxic chemicals.

Verification:

Rater / Verifier visually confirm this measure.

11.4.3Accountability Form: **Masonry Contractor****Install sealed concrete floor (min. 80% of interior finish slab-work)** 011915 es

0 2 0 2 0

Description:

- Create detailed plan that identifies flooring material by area.
- Document surface area covered with concrete and total surface area of project
- Provide description of products and receipt.

Exceptions

This credit also applies to an existing concrete floor that is uncovered, cleaned, and sealed

When accessing points in these credits, it will be important to consider the quantity of concrete and how it contributes to square foot requirements for those credits.

Benefit:

Concrete can be left natural or stained to add color and pattern providing a unique design without the need for an additional floor covering.

Considerations

Consider using fly ash (minimum 25%) as a replacement to the Portland cement in concrete. This helps to divert the fly ash waste from a landfill.

Resources

www.concretenetwork.com

Verification:

Provide documentation or calculations for this measure.

11.4.4	Accountability Form: Tile Contractor					
Install tile or stone for all shower flooring 011915 es		0	2	0	0	0

Description:

- Provide photographs of all shower installations.
- Rater will verify installations

Benefit:

Tile or stone installed correctly in a shower provides long-term durability and protection from mold.

Considerations

When accessing points in these credits, it will be important to consider the quantity of tile and how it contributes to square foot requirements for those credits.

Verification:

Verifier visually confirms and photographs this measure.

11.4.5	Accountability Form: Cabinetry & Millwork					
Finished floor and underlayment contains no added urea-formaldehyde 011915 es		0	1	0	0	0

Description:

- Create detailed plan that identifies flooring and sub-flooring products by area.
- Provide receipt and material specifications

Benefit:

All wood has naturally occurring formaldehyde. The small quantity is not harmful to humans unless exposed to large quantities of cut wood, such as during milling and sawing. It is recommended that workers take precautions to protect themselves from wood dust during the handling of wood materials. Homeowners can protect themselves by choosing wood-based materials that do not have formaldehyde added to the glue. Choosing these materials will reduce the health risks associated with exposure to this known carcinogen.

Considerations

When the decision has been made to install a no-added formaldehyde flooring product for air quality reasons, it is important that the underlayment also address air quality issues

Resources

www.epa.gov/iaq/formalde.html

Verification:

Provide documentation or calculations for this measure.

11.4.6 Accountability Form: **Painting / Finishing Contractor**



Use low VOC carpet glue 011915 es

0 1 0 0 0

Description:

- Specify a low VOC carpet adhesive—defined by the Green Seal standard as one that is \leq 150grams/liter (minus water) of VOC
- Provide receipt and material specifications

Benefit:

The surface area of a floor is a large area that can create an indoor air quality problem if the adhesive used to cover the space emits a high volume of VOC.

Resources

www.greenseal.org/certification/standards/commercialadhesives.cfm

Verification:

Provide documentation or calculations for this measure.

11.4.7 Accountability Form: **Tile Contractor**



Tile installed over poured cementitious bed with lathe 011915 es

0 0 0 2 0

Description:

- Provide detailed plan that identifies areas to receive cementitious bed and lathe.
- Document with a photograph during installation of each step in process.

Benefit:

Many tile durability problems can be avoided by using the proper sub-base. Wood is not an appropriate sub-base for tile as it expands and contracts with temperature and humidity increasing the risk of cracking in the tile or grout. A poured cementitious bed with lathe is a proven durable base for tile and other alternatives.

Verification:

Visually inspect and photograph implementation of this measure.

11.5 Floor area with Green Attributes

11.5.0

Accountability Form: **Cabinetry & Millwork**



Locally sourced 011915 es

(50% / 90%) 0 0 2/3 2/3 0

Description:

- If certified low emitting carpeting is used, the pad must also be certified low emitting and any glues must be \leq 150grams/liter VOC to receive credit
- Create detailed plan that identifies flooring by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

- When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.
- If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.5.2Accountability Form: **Cabinetry & Millwork****Contains mimimum 25% post-consumer recycled content** 011915 es

(50% / 90%) 0 0 0 1/2 0

Description:

- If certified low emitting carpeting is used, the pad must also be certified low emitting and any glues must be \leq 150grams/liter VOC to receive credit
- Create detailed plan that identifies flooring by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

- When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.
- If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.5.3Accountability Form: **Cabinetry & Millwork****Contains minimum 40% post-industrial recycled content** 011915 es

(50% / 90%) 0 0 0 1/2 0

Description:

- If certified low emitting carpeting is used, the pad must also be certified low emitting and any glues must be \leq 150grams/liter VOC to receive credit
- Create detailed plan that identifies flooring by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

- When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.
- If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.5.4Accountability Form: **Cabinetry & Millwork**

Low emitting or no-added-formaldehyde (NAF or NAUF) (see requirements in manual) 011915 es 0 1/2 0 0 0
(50% / 90%)

Description:

- If certified low emitting carpeting is used, the pad must also be certified low emitting and any glues must be \leq 150grams/liter VOC to receive credit
- Create detailed plan that identifies flooring by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

- When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.
- If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.5.5Accountability Form: **Cabinetry & Millwork****Salvage/reclaimed/recovered** 011915 es

(50% / 90%) 0 0 1 3/5 0

Description:

- If certified low emitting carpeting is used, the pad must also be certified low emitting and any glues must be \leq 150grams/liter VOC to receive credit
- Create detailed plan that identifies flooring by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.5.6Accountability Form: **Cabinetry & Millwork****Rapidly renewable content** 011915 es

(50% / 90%) 0 0 0 2/3 0

Description:

- If certified low emitting carpeting is used, the pad must also be certified low emitting and any glues must be \leq 150grams/liter VOC to receive credit
- Create detailed plan that identifies flooring by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.5.7Accountability Form: **Cabinetry & Millwork****FSC certified** 011915 es

(50% / 90%) 0 0 1 1/2 0

Description:

- If certified low emitting carpeting is used, the pad must also be certified low emitting and any glues must be \leq 150grams/liter VOC to receive credit
- Create detailed plan that identifies flooring by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.5.8Accountability Form: **Cabinetry & Millwork****Refinishable/resurfaceable** 011915 es

(50% / 90%) 0 0 0 2/3 0

Description:

- If certified low emitting carpeting is used, the pad must also be certified low emitting and any glues must be \leq 150grams/liter VOC to receive credit
- Create detailed plan that identifies flooring by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

- When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.
- If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.5.11Accountability Form: **Cabinetry & Millwork****Certified sustainable manufacturing process** 011915 es

(50% / 90%) 0 0 1/2 0/2 0

Description:

- If certified low emitting carpeting is used, the pad must also be certified low emitting and any glues must be \leq - 150grams/liter VOC to receive credit
- Create detailed plan that identifies flooring by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.5.12Accountability Form: **Cabinetry & Millwork****Life cycle impact assessment** 011915 es

(50% / 90%) 0 0 1/2 1/2 0

Description:

- If certified low emitting carpeting is used, the pad must also be certified low emitting and any glues must be \leq 150grams/liter VOC to receive credit
- Create detailed plan that identifies flooring by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.5.13Accountability Form: **Cabinetry & Millwork****Recyclable**

(90%) 0 0 0 0/2 0

Description:

- Create detailed plan that identifies flooring by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual.

To receive credit in this program, a product labeled as recyclable must have a process established at the time of installation to collect material, AND a manufacturing or fabrication facility in existence that is actively collecting and reprocessing the material into the same type of material. Cradle to Cradle may help guide you in finding a product <http://www.c2ccertified.org/>

Benefit:

RECYCLABLE products are made of a material that can be easily gathered at the end of its life and reprocessed into more of the same product. It is important the material is a type that is easily recycled without loss of integrity in the new product AND a system must exist to collect the material and deliver it to an existing facility that can process the material. We are familiar with the collection of glass beverage bottles that become new glass beverage bottles. Steel studs can be made into new steel studs. But few products exist for interior finishes that can be called recyclable. Innovation is fueling new technologies and this area is expected to grow. Nylon 6 fiber in carpeting is an example of a recyclable fiber. The used fiber can be removed from the carpet backing and made into new nylon 6 fiber for a new carpet.

Verification:

Provide documentation or calculations for this measure.

11.5.13Accountability Form: **Cabinetry & Millwork**

50% or 90% of flooring is in a combination of materials that have 1 or more Green attributes 011915 0 0 2/4 2/4 0
 es (50% of total area / 90% of total area)

Description:

This credit cannot be used if the quantity of any product meets the requirements for this Category. (Floor Area with Green Attributes).

All square foot quantities of total surface area and square foot area of the products with Green attributes must be calculated

Provide receipts, material specifications, maps, certifications, FSC Certification

Benefit:

The intent of this credit is to acknowledge that several materials with Green attributes may be used in a space, but none in individual quantity can earn credit. However, when combined they bring value to the project

An example of this credit would be the flooring for a whole house – the use of FSC wood in the kitchen (10%), linoleum in 2 bathrooms and laundry (15%), tile floor with 40% recycled content in 2 bathrooms and main entry (10%), sealed concrete floor in lower-level (25%).

Verification:

Provide documentation or calculations for this measure.

11.6 Millwork with Green Attributes

11.6.0

Accountability Form: **Cabinetry & Millwork**



Locally sourced 011915 es

(50% / 90%) 2/4 0 2/4 0 0

Description:

- The stains and sealers on millwork must be \leq 250 g/l VOC
- Create detailed plan that identifies millwork by area.
- Calculate linear feet of each material and total linear feet of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.6.2Accountability Form: **Cabinetry & Millwork****Contains mimimum 25% post-consumer recycled content** 011915 es

(50% / 90%) 0 0 0 1/2 0

Description:

- The stains and sealers on millwork must be \leq 250 g/l VOC
- Create detailed plan that identifies millwork by area.
- Calculate linear feet of each material and total linear feet of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.6.3Accountability Form: **Cabinetry & Millwork****Contains minimum 40% post-industrial recycled content** 011915 es

(50% / 90%) 0 0 0 1/2 0

Description:

- The stains and sealers on millwork must be \leq 250 g/l VOC
- Create detailed plan that identifies millwork by area.
- Calculate linear feet of each material and total linear feet of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.6.4Accountability Form: **Cabinetry & Millwork**

Low emitting or no-added-formaldehyde (NAF or NAUF) (see requirements in manual) 011915 es 0 1/2 0 0 0
(50% / 90%)

Description:

- The stains and sealers on millwork must be ≤ 250 g/l VOC
- Create detailed plan that identifies millwork by area.
- Calculate linear feet of each material and total linear feet of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.6.5Accountability Form: **Cabinetry & Millwork****Salvage/reclaimed/recovered** 011915 es

(50% / 90%) 0 0 1 3/5 0

Description:

- The stains and sealers on millwork must be \leq 250 g/l VOC
- Create detailed plan that identifies millwork by area.
- Calculate linear feet of each material and total linear feet of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.6.6Accountability Form: **Cabinetry & Millwork****Rapidly renewable content** 011915 es

(50% / 90%) 0 0 0 2/4 0

Description:

- The stains and sealers on millwork must be \leq 250 g/l VOC
- Create detailed plan that identifies millwork by area.
- Calculate linear feet of each material and total linear feet of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.6.7Accountability Form: **Cabinetry & Millwork****FSC certified** 011915 es

(50% / 90%) 0 0 1/2 1/2 0

Description:

- The stains and sealers on millwork must be \leq 250 g/l VOC
- Create detailed plan that identifies millwork by area.
- Calculate linear feet of each material and total linear feet of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.6.8Accountability Form: **Cabinetry & Millwork****reduced waste in manufacturing** 011915 es

(50% / 90%) 0 0 0/2 1/2 0

Description:

- The stains and sealers on millwork must be \leq 250 g/l VOC
- Create detailed plan that identifies millwork by area.
- Calculate linear feet of each material and total linear feet of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.6.9Accountability Form: **Cabinetry & Millwork****Certified sustainable manufacturing process** 011915 es

(50% / 90%) 0 0 1 1/2 0

Description:

- The stains and sealers on millwork must be \leq 250 g/l VOC
- Create detailed plan that identifies millwork by area.
- Calculate linear feet of each material and total linear feet of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.6.10Accountability Form: **Cabinetry & Millwork****Life cycle impact assessment** 011915 es

(50% / 90%) 0 0 1 1/2 0

Description:

- The stains and sealers on millwork must be \leq 250 g/l VOC
- Create detailed plan that identifies millwork by area.
- Calculate linear feet of each material and total linear feet of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.6.11Accountability Form: **Cabinetry & Millwork**

50% or 90% of millwork is in a combination of materials that have 1 or more Green attributes 011915 0 0 2 3/6 0
 es (50% of total millwork / 90% of total millwork)

Description:

- This credit cannot be used if the quantity of any product meets the requirements of this category. (Millwork with Green Attributes)
- Calculate linear feet of each material and total linear feet of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

- The intent of this credit is to acknowledge that several materials with Green attributes may be used in a space, but none in individual quantity can earn credit. However, when combined they bring value to the project
- An example of this credit would be the millwork for a whole house – the use of FSC millwork in the living room and dining room (45%), finger-joint millwork in bedrooms (40%), bamboo in kitchen and laundry (10%). No single material meets all the criteria for 8C - 1 above, but together, 90% of millwork has some Green attribute.

Verification:

Provide documentation or calculations for this measure.

11.7 Interior doors with Green Attributes

11.7.0

Accountability Form: **Cabinetry & Millwork**



Locally sourced 011915 es

(50% / 90%) 2/4 0 1/2 0 0

Description:

- Create detailed plan that identifies doors by area in project
- Provide receipts and product specifications for all doors
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.7.2Accountability Form: **Cabinetry & Millwork****Contains minimum 25% post-consumer recycled content** 011915 es

(50% / 90%) 0 0 0 1/2 0

Description:

- Create detailed plan that identifies doors by area in project
- Provide receipts and product specifications for all doors
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.7.3Accountability Form: **Cabinetry & Millwork****Contains minimum 40% post-industrial recycled content** 011915 es

(50% / 90%) 0 0 0 1/2 0

Description:

Create detailed plan that identifies doors by area in project

- Provide receipts and product specifications for all doors
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.7.4Accountability Form: **Cabinetry & Millwork**

Low emitting or no-added-formaldehyde (NAF or NAUF) (see requirements in manual) 011915 es 0 1/2 0 0 0
(50% / 90%)

Description:

- Create detailed plan that identifies doors by area in project
- Provide receipts and product specifications for all doors
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

- When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.
- If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.7.5Accountability Form: **Cabinetry & Millwork****Salvage/reclaimed/recovered** 011915 es

(50% / 90%) 0 0 0 3/5 0

Description:

- Create detailed plan that identifies doors by area in project
- Provide receipts and product specifications for all doors
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.7.6Accountability Form: **Cabinetry & Millwork****Rapidly renewable content** 011915 es

(50% / 90%) 0 0 0 2/4 0

Description:

- Create detailed plan that identifies doors by area in project
- Provide receipts and product specifications for all doors
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.7.7Accountability Form: **Cabinetry & Millwork****FSC certified** 011915 es

(50% / 90%) 0 0 1/2 1/2 0

Description:

- Create detailed plan that identifies doors by area in project
- Provide receipts and product specifications for all doors
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.7.8	Accountability Form: Cabinetry & Millwork					
Reduced waste in manufacturing 011915 es	(50% / 90%)	0	0	0	1/2	0

Description:

- Create detailed plan that identifies doors by area in project
- Provide receipts and product specifications for all doors
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.7.9	Accountability Form: Cabinetry & Millwork					
Certified sustainable manufacturing process 011915 es	(50% / 90%)	0	0	1/2	1/2	0

Description:

- Create detailed plan that identifies doors by area in project
- Provide receipts and product specifications for all doors
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.7.10Accountability Form: **Cabinetry & Millwork****Life cycle impact assessment** 011915 es

(50% / 90%) 0 0 1/2 1/2 0

Description:

- Create detailed plan that identifies doors by area in project
- Provide receipts and product specifications for all doors
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality.

If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.



11.7.11

Accountability Form: **Cabinetry & Millwork**



50% or 90% of interior doors are in a combination of materials that have 1 or more Green attributes 0 0 1 2/4 0
 011915 es (50% of total interior doors / 90% of total interior doors)

Description:

This credit cannot be used if the quantity of any product meets the requirements of this category. (Interior Doors with Green Attributes)

Create detailed plan identifying door types

Provide receipts and product specifications for all materials

Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information

Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

The intent of this credit is to acknowledge that several materials with Green attributes may be used in a space, but none in individual quantity can earn credit. However, when combined they bring value to the project

An example of this credit would be the doors for a whole house: the use of FSC doors in the bedrooms (45%), locally extracted oak doors for hall closets (40%) and salvaged doors for bathrooms (15%). No single material meets all the criteria for 8C-4 above, but together, 90% of doors has some Green attribute.

Verification:

Provide documentation or calculations for this measure.

11.8 Countertops with Green Attributes

11.8.0

Accountability Form: **Cabinetry & Millwork**



Wood substrate for countertop has no-added urea formaldehyde 0 2 1 0 0

Description:

Benefit:

Many composite wood products like particleboard and plywood are made with adhesives that can contain urea-formaldehyde. It is better for indoor air quality to use a wood substrate for laminate or linoleum that does not have urea-formaldehyde added to the adhesives.

Verification:

Provide documentation or calculations for this measure.

11.8.0Accountability Form: **Cabinetry & Millwork****Contains mimimum 25% post-consumer recycled content** 011915 es

(50% / 90%) 0 0 0 1/2 0

Description:

- Solid surface countertops that contain less than 7% petroleum by volume
- Create detailed plan that identifies countertops by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality. If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.8.2Accountability Form: **Cabinetry & Millwork****Contains minimum 40% post-industrial recycled content** 011915 es

(50% / 90%) 0 0 0 1/2 0

Description:

- Solid surface countertops that contain less than 7% petroleum by volume
- Create detailed plan that identifies countertops by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality. If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.8.3Accountability Form: **Cabinetry & Millwork**

Low emitting or no-added-formaldehyde (NAF or NAUF) (see requirements in manual) 011915 es 0 1/2 0 0 0
(50% / 90%)

Description:

- Solid surface countertops that contain less than 7% petroleum by volume
- Create detailed plan that identifies countertops by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality. If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.8.4Accountability Form: **Cabinetry & Millwork****Salvage/reclaimed/recovered** 011915 es

(50% / 90%) 0 0 0 3/5 0

Description:

- Solid surface countertops that contain less than 7% petroleum by volume
- Create detailed plan that identifies countertops by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality. If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.8.5Accountability Form: **Cabinetry & Millwork****Rapidly renewable content** 011915 es

(50% / 90%) 0 0 0 2/4 0

Description:

- Solid surface countertops that contain less than 7% petroleum by volume
- Create detailed plan that identifies countertops by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality. If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.8.6Accountability Form: **Cabinetry & Millwork****FSC certified** 011915 es

(50% / 90%) 0 0 1/2 1/2 0

Description:

- Solid surface countertops that contain less than 7% petroleum by volume
- Create detailed plan that identifies countertops by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality. If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.8.7Accountability Form: **Cabinetry & Millwork****Refinishable/resurfaceable** 011915 es

(50% / 90%) 0 0 0 2/3 0

Description:

- Solid surface countertops that contain less than 7% petroleum by volume
- Create detailed plan that identifies countertops by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality. If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.8.8Accountability Form: **Cabinetry & Millwork****Reduced waste in manufacturing** 011915 es

(50% / 90%) 0 0 0 1/2 0

Description:

- Solid surface countertops that contain less than 7% petroleum by volume
- Create detailed plan that identifies countertops by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality. If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.



11.8.9

Accountability Form: **Cabinetry & Millwork**



Recyclable 011915 es

(50% / 90%) 0 0 0 1/2 0

Description:

- Solid surface countertops that contain less than 7% petroleum by volume
- Create detailed plan that identifies countertops by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality. If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.8.10Accountability Form: **Cabinetry & Millwork****Certified sustainable manufacturing process** 011915 es

(50% / 90%) 0 0 1/2 0 0

Description:

- Solid surface countertops that contain less than 7% petroleum by volume
- Create detailed plan that identifies countertops by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality. If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.8.11Accountability Form: **Cabinetry & Millwork****Life cycle impact assessment** 011915 es

(50% / 90%) 0 0 1/2 1/2 0

Description:

- Solid surface countertops that contain less than 7% petroleum by volume
- Create detailed plan that identifies countertops by area.
- Calculate surface area covered with each material and total surface area of project
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site
- Recyclable materials will require documentation for collection method and manufacturing facility. Information on how to recycle an installed material must be included in the homeowner's manual

Benefit:

When a low emitting product has been installed for air quality reasons, it is important to document product cleaning and maintenance in the homeowner's manual to maintain good indoor air quality. If a product is chosen for its ability to be refinished or resurfaced, it is important to document this in the homeowner's manual. Provide resources for refinishing or resurfacing.

Verification:

Provide documentation or calculations for this measure.

11.8.12Accountability Form: **Cabinetry & Millwork**

50% or 90% of countertops are in a combination of materials that have 1 or more Green attributes 0 0 1 2/4 0
 011915 es (50% of total area / 90% of total area)

Description:

- This credit cannot be used if the quantity of any product meets the requirements of this category. (Countertops with Green Attributes)
- All square foot quantities of total surface area and square foot area of the products with Green attributes must be calculated
- Provide receipts, material specifications, maps, certifications, FSC Certification

Benefit:

- The intent of this credit is to acknowledge that several materials with Green attributes may be used in a space, but none in individual quantity can earn credit. However, when combined they bring value to the project
- An example of this credit would be the countertops in a whole house: the use of bamboo countertops in the kitchen (40%), linoleum countertops in 2 bathrooms and laundry (40%), reant stone countertops in a third bathroom and bar area (20%). No material meets all the criteria for 8B-2, but together, all the products have some Green attributes.

Verification:

Provide documentation or calculations for this measure.

11.10 Cabinetry with Green Attributes

11.10.0

Accountability Form: **Building Architect / Designer**



Life cycle impact assessment of cabinetry

0 0 1 1 0

Description:

- Create detailed plan that identifies cabinetry by area.
- Calculate linear feet of cabinetry in project area
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Signed Accountability Form.

Provide documentation or calculations for this measure .

11.10.2Accountability Form: **Cabinetry & Millwork****Seal all edges of cabinetry not labeled as 100% no-added urea formaldehyde free prior to assembly**

0 1 0 1 0

Description:

- Purchase product designed specifically to seal formaldehyde in wood.
- Provide receipt and material specifications.
- General contractor and homeowner will initial checklist

Benefit:

All wood has naturally occurring urea-formaldehyde. The small quantity is not harmful to humans unless exposed to large quantities of cut wood, such as during milling and sawing. It is recommended that workers take precautions to protect themselves from wood dust during the handling of wood materials.

Homeowners can protect themselves by choosing wood-based materials (furniture, cabinetry, flooring/sub-flooring, counter tops) that do not have urea-formaldehyde added to the glue or other binders. Choosing these materials will reduce the health risks associated with exposure to this known carcinogen.

When you are not able to purchase new cabinetry that has no-added urea-formaldehyde, sealing exposed edges and surfaces will help to lessen the negative impact of formaldehyde but may not eliminate it.

Resources

www.epa.gov/iaq/formalde.html

Verification:

Provide documentation or calculations for this measure.

See accountability form.

11.10.2Accountability Form: **Interior Designer****Certified sustainable manufacturing process** 011415 ms

0 0 1 1 0

Description:

- - Create detailed plan that identifies cabinetry by area.
- - Calculate linear feet of cabinetry in project area.
- - Provide product specifications for all materials.
- - Certified products will require proof of third-party certification such as Forest Stewardship Council Certification (FSC Certification) information or other certification.
- - Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site.

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Project Team to provide documentation or calculations for this measure.

Rater / Verifier to visually confirm cabinetry installed is consistent with this measure.

11.10.3Accountability Form: **Cabinetry & Millwork****Locally sourced** 011915 es

3 0 0 0 0

Description:

- Create detailed plan that identifies cabinetry by area.
- Calculate linear feet of cabinetry in project area
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.10.4Accountability Form: **Cabinetry & Millwork****Contains minimum 40% post-industrial recycled content** 011915 es

0 0 0 1 0

Description:

- Create detailed plan that identifies cabinetry by area.
- Calculate linear feet of cabinetry in project area
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.10.5Accountability Form: **Cabinetry & Millwork****Low emitting or no-added-formaldehyde (NAF or NAUF) (see requirements in manual)** 011915 es

0 2 0 0 0

Description:

- Create detailed plan that identifies cabinetry by area.
- Calculate linear feet of cabinetry in project area
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.10.6Accountability Form: **Cabinetry & Millwork****Salvage/reclaimed/recovered** 011915 es

0 0 0 5 0

Description:

- Create detailed plan that identifies cabinetry by area.
- Calculate linear feet of cabinetry in project area
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.10.7Accountability Form: **Cabinetry & Millwork****Rapidly renewable content** 011915 es

0 0 0 3 0

Description:

- Create detailed plan that identifies cabinetry by area.
- Calculate linear feet of cabinetry in project area
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.10.8Accountability Form: **Cabinetry & Millwork****FSC certified** 011915 es

0 0 1 2 0

Description:

- Create detailed plan that identifies cabinetry by area.
- Calculate linear feet of cabinetry in project area
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.10.9Accountability Form: **Cabinetry & Millwork****Reduced waste in manufacturing** 011915 es

0 0 0 1 0

Description:

- Create detailed plan that identifies cabinetry by area.
- Calculate linear feet of cabinetry in project area
- Provide receipts and product specifications for all materials
- Certified products will require proof of third-party certification or Forest Stewardship Council Certification (FSC Certification) information
- Locally sourced products will require a map showing location of raw material extraction and manufacturing noting distance to job-site

Benefit:

Resources

<http://www.healthybuilding.net/healthcare/No%20Added%20Formaldehyde%20Casework.pdf>

Verification:

Provide documentation or calculations for this measure.

11.11 Coatings and Adhesives

11.11.0Accountability Form: **General Contractor****Supply workers with VOC protection** 011915 es

0 2 1 0 0

Description:

- Create and post a job-site plan that explains the materials to be used and the type of worker protection required for each material.
- Provide worker protection in an accessible location.

Benefit:

Health of the workers is as important as the health of the occupants. Many systems exist to protect workers from inhaling VOCs* and construction dust. Use respirators rated for the material being handled.

Resources

www.health.state.us

Verification:

11.11.2Accountability Form: **General Contractor****Adhesives are urea-formaldehyde free** 011915 es

0 1 0 0 0

Description:

Provide receipt and material specifications

Benefit:

Adhesives that are formaldehyde-free are better for the workers as well as for the occupants. The MSDS, or Material Safety Data Sheet, of a product is a good source for determining product content.

Considerations

Many installers have a comfort level with certain adhesive brands because of positive experience in regards to performance. As with any new product, the product should be reviewed with an installer and tested prior to installation.

Verification:

Provide documentation or calculations for this measure.

11.11.3Accountability Form: **General Contractor****Caulks are low VOC (minimum 75% caulk applications)** 011915 es

0 1 0 0 0

Description:

Provide receipt and material specifications

Benefit:

Caulks that are low VOC are better for workers as well as for the occupants. The MSDS, or Material Safety Data Sheet, of a product is a good source for determining product content and VOC quantity. This can be sourced through the Internet or the technical services phone line of a manufacturer.

Considerations

Many installers have a comfort level with certain caulk brands because of positive experience in regards to performance. As with any new product, the product should be reviewed with an installer and tested prior to installation.

Verification:

Provide documentation or calculations for this measure.

12. Waste Management

12.1 Construction & Demolition Waste

12.1.0	Accountability Form: General Contractor					
Require subcontractors to participate in waste reduction and recycling efforts 011915 es		0	0	2	1	0

Description:

Benefit:

Recycling materials generated from the building process generally consumes less energy than producing new products from raw materials and is therefore a better option than sending waste to the landfill.

Verification:

12.1.2	Accountability Form: General Contractor					
Grind wood waste and stumps and use as mulch (70% minimum) 011915 es		0	0	0	1	0

Description:

- Grind and use on-site
- General contractor to sign-off on checklist

Benefit:

- 100% wood sheathing and lumber that is raw wood (e.g., no paint, stained, or treated wood) can be ground up on-site or sent to be ground up.
- Check recycling guides for opportunities off-site

Verification:

See accountability form.

12.1.3					
Composting portable toilet on work site 082614 MF	0	0	0	0	1

Description:

Provide photograph of unit

Benefit:

Composting toilets are readily available and do not use hazardous chemicals.

Resources

A search on the Internet will help you find potential suppliers.

Verification:

Visually inspect and photograph implementation of this measure.

12.1.4	Accountability Form: General Contractor						
Obtain products from suppliers that use recyclable or reusable packaging 011915 es	0	0	0	1	0		

Description:

Provide list of product used and type of packaging.

Benefit:

Reuse and recycling are both better strategies than disposal in a landfill.

Resources

There are Green product guides on the PCA website www.pca.state.us/oea/market/index.cfm, the Eureka website www.eurekarecycling.org/, and other websites that have info on Green products and their packaging practices.

Verification:

Provide documentation or calculations for this measure.

12.1.5 Accountability Form: **General Contractor**     

Reuse supplies for operations, such as construction fences, tarps, refillable propane tanks 011915 es 0 0 1 0 0

Description:

- Provide list of products reused.
- General contractor to sign-off on checklist

Benefit:

- Reuse and recycling are both better strategies than disposal in a landfill for fences, tarps, etc.
- Use until worn out and then recycle if possible.

Verification:

See accountability form.

12.1.6 Accountability Form: **General Contractor**     

Wash out concrete trucks in slab or pavement sub-base areas and provide appropriate clean up areas for other trades (e.g. paint or plaster) 011915 es 0 0 1 0 0

Description:

- Instruct and inform subcontractors to abide by best practices.
- Photograph wash-out area

Benefit:

Keeps waste in areas already prepped for concrete or uses best practices to prevent contamination of surrounding area by paint, plaster, etc.

Verification:

Visually inspect and photograph implementation of this measure.

12.1.7 Accountability Form: **General Contractor**



Building materials stored on site are protected from weather exposure. Materials wetted during the construction process are allowed to dry before enclosing in building assembly. 011915 es 0 1 0 1 0

Description:

- Set material off the ground on blocks.
- Cover to protect during the construction process, and if wetted, allow to dry before covering and using.
- Provide photograph of stored materials
- General contractor to sign-off on checklist stating materials were allowed to dry before enclosing in building assembly.

Benefit:

Protecting materials onsite avoids unnecessary damage and increases life expectancy.

Verification:

Visually inspect and photograph implementation of this measure.

12.1.8 Accountability Form: **General Contractor**



Framing waste is less than 10% of total framing order 011915 es 0 0 1 2 0

Description:

Provide framing order from lumberyard that indicates the percent of waste factored into order

Benefit:

Collaboration with a lumberyard on the goals of the project will help achieve a reduction in lumber sent to a job-site and potential wood that is sent to a landfill. This credit also requires that the contractor and framing carpenters collaborate on best methods to use less lumber.

Considerations

The use of a cut list can not only reduce waste, but also speed up the process of remodeling

Verification:

Provide documentation or calculations for this measure.

12.1.9	Accountability Form: General Contractor					
Job site framing plan and cut list 011915 es		1	0	1	0	0

Description:

- Submit plan and cut list
- Central cut area – framing contractor shall use a central cutting area and store wood end cuts for reuse
- A plan shall be submitted that designates all structural framing for two of the following: floors, roof, and walls. The plan shall be reviewed with framing crew to ensure minimization of unnecessary framing.

Benefit:

A framing plan cut list will maximize efficient use of framing materials

Verification:

Provide documentation or calculations for this measure.

12.1.10	Accountability Form: General Contractor					
Donate, sell or give away excess materials for reuse 011915 es		0	0	1	0	0

Description:

- Describe materials and strategy used
- Provide receipts or General contractor to sign-off on checklist

Benefit:

- Excess or surplus materials, which are put to use helps prevent resource depletion, energy consumption and pollution. This saves processing of new products from raw materials.
- Identify outlet and arrange pick up or delivery
- Remove and stage

Verification:

Provide documentation or calculations for this measure.

12.1.11Accountability Form: **General Contractor**

Store and provide weather protection to building materials for future use by homeowner 011915 es 0 0 1 0 0

Description:

- Set material off the ground on blocks.
- Cover with waterproof tarp, move inside or take other appropriate measures
- Provide photograph

Benefit:

Proper protection of building materials for future use ensures their value and embodied energy is not wasted.

Verification:

Visually inspect and photograph implementation of this measure.

12.1.12Accountability Form: **General Contractor**

Deconstruct existing structure and reuse or recycle approximately 90% of the building materials 011915 es 0 0 10 10 0

Description:

- Create deconstruction materials list, track reuse and recycling of all materials.
- Provide receipts

Benefit:

Deconstruction for reuse and recycling keeps more of the embodied energy of the deconstructed materials in use and is a more sustainable solution.

Considerations

Deconstruction takes time. Be sure to schedule accordingly

Verification:

Provide documentation or calculations for this measure.



12.2 Deconstruct for reuse the following items

12.2.0	Accountability Form: General Contractor					
Cabinets, millwork or trim (70% minimum) 011915 es		0	0	1	1	0

Description:

- Identify outlet and arrange pick up or delivery.
- Remove and stage on appropriate day.
- Provide receipt

Benefit:

Packaging such as plastic bag material and many types of paper have many residential and commercial outlets for recycling. Styrofoam has been difficult to recycle in the Twin Cities area but check the recycling guides for changes.

Verification:

Provide documentation or calculations for this measure.

12.2.2	Accountability Form: General Contractor					
Wood flooring (minimum of 150 sq. ft.) 011915 es		0	0	1	1	0

Description:

Self-manage by placing a recycling bin on-site for plastic beverage containers. It will need to be labeled clearly and likely delivered to a recycling station or center.

General contractor to sign-off on checklist

Benefit:

Ask the homeowner if you can include your containers in their curbside service. Outlets are readily available, and there is no reason this cannot be easily achieved.

An option is to encourage employees and subcontractors to take their beverage containers home to recycle in their curbside program.

Verification:

Provide documentation or calculations for this measure.

12.2.3	Accountability Form: General Contractor					
Doors (minimum of 2) 011915 es		0	0	1	1	0

Description:

- Check with homeowner to see if you can include with their curbside service if quantities are not too great.
- Identify outlet and arrange pick up or delivery.
- Remove and stage on appropriate day.
- Provide receipt

Benefit:

Often cardboard can be used to protect existing finished materials, such as floors, and then recycled.

Verification:

Provide documentation or calculations for this measure.

12.2.4	Accountability Form: General Contractor					
Bathtubs or sinks (minimum of 2) 011915 es	Default Value	0	0	1	1	0

Description:

- Identify outlet and arrange pick up or delivery.
- Remove and stage.

Exceptions

- Identify outlet and arrange pick up or delivery.

Benefit:

Old tubs are valued by some people, and if they are in good condition can easily last a long time.

Considerations

There is a limited market for sinks and bathtubs.

Look for unique qualities like claw foot tubs, larger or smaller than 5', a specific architectural period, and sinks or bathtubs in exceptional condition.

Verification:

Provide documentation or calculations for this measure.

12.2.5	Accountability Form: General Contractor					
Dimensional lumber regraded for structural use (minimum 20% landfill diversion) 011915 es		0	0	2	1	0

Description:

Most building inspectors require reused structural lumber to be re-graded or have the original stamp intact. There are also situations where it is not necessary to use stamped or re-graded lumber such as in non-structural applications.

Benefit:

- Dimensional lumber from the past can be of higher quality than new lumber and can often be reused on-site.
- Reuse on-site.
- Identify outlet and arrange pick up or delivery.
- Remove and stage.

Verification:

Provide documentation or calculations for this measure.

12.2.6	Accountability Form: General Contractor					
Windows (minimum of 2) 011915 es		0	0	1	1	0

Description:

Identify outlet and arrange pick up or delivery.

Remove as complete unit and stage or remove reusable parts and stage.

Benefit:

Windows in good condition have value when reused in seasonal cabins or other buildings where energy efficiency is not a concern. Also windows being removed can be used for replacement parts when similar windows are remaining in use, on-site.

Considerations

Be sure to keep the seals intact. We do not want to promote the use of inefficient windows even if they are re-used. If the window should not be re-used, remove the glass for recycling and dispose of or repurpose the frames.

Verification:

Provide documentation or calculations for this measure.

12.2.7

Good condition carpet (50% minimum) 082614 MF

0 0 1 1 0

Description:

Identify outlet and arrange pick up or delivery

Roll up in large pieces (room size) and mark dimensions in a visible location

Benefit:

Can be sold or given away if clean and in good condition.

Verification:

Provide documentation or calculations for this measure.

12.2.8

Accountability Form: **General Contractor**



Insulation (minimum of 50%) 011915 es

0 0 1 1 0

Description:

Reuse on-site

Exceptions

Certain types of insulation can be removed and sent or given away, such as expanded foam insulation shavings and blown-in cellulose insulation, where professional installers can accommodate hauling and recycling of material.

Benefit:

It is best to reuse insulation on-site since the labor involved to move and protect it exceeds its initial or repurchase value

It is possible to give away through Twin Cities Free Market

Considerations

Do not recycle insulation that contains mold

Verification:

Provide documentation or calculations for this measure.

12.2.9 Accountability Form: **General Contractor**



Other: The above list represents some of the materials that can be reused and is not a complete list. If you reclaim other items for reuse not included in the list above submit them on this line. 011915 es

0 0 1 1 0

Description:

Benefit:

Verification:

Provide documentation or calculations for this measure.

12.3 Recycle the following items

12.3.0 Accountability Form: **General Contractor**



Packaging 011915 es

0 0 1 0 0

Description:

- Identify outlet and arrange pick up or delivery.
- Remove and stage on appropriate day.
- Provide receipt

Benefit:

Packaging such as plastic bag material and many types of paper have many residential and commercial outlets for recycling. Styrofoam has been difficult to recycle in the Twin Cities area but check the recycling guides for changes.

Verification:

Provide documentation or calculations for this measure.



12.3.2

Accountability Form: **General Contractor**



Workers' beverage containers 011915 es

Default Value 0 0 1 0 0

Description:

Self-manage by placing a recycling bin on-site for plastic beverage containers. It will need to be labeled clearly and likely delivered to a recycling station or center.

General contractor to sign-off on checklist

Benefit:

Ask the homeowner if you can include your containers in their curbside service. Outlets are readily available, and there is no reason this cannot be easily achieved.

An option is to encourage employees and subcontractors to take their beverage containers home to recycle in their curbside program.

Verification:

See accountability form.

12.3.3

Accountability Form: **General Contractor**



Cardboard from new fixtures, appliances, and cabinets (90% minimum) 011915 es

0 0 1 0 0

Description:

- Check with homeowner to see if you can include with their curbside service if quantities are not too great.
- Identify outlet and arrange pick up or delivery.
- Remove and stage on appropriate day.
- Provide receipt

Benefit:

Often cardboard can be used to protect existing finished materials, such as floors, and then recycled.

Verification:

Provide documentation or calculations for this measure.

12.3.4 Accountability Form: **General Contractor**



Metal - copper, brass, lead and aluminum and non precious metals like steel, tin or sheet metal (90% minimum) 011915 es 0 0 1 0 0

Description:

- Identify outlet and arrange pick up or delivery.
- Combining the pick up of lesser value metals with the semi-precious metals will increase the chances of all being taken at one time. Separation of each type of metal will facilitate pick-up or acceptance if you self-deliver.
- Provide receipt.

Benefit:

Metal recycling is well established and readily available. Check the Yellow Pages under Metal (Scrap)

Verification:

Provide documentation or calculations for this measure.

12.3.5 Accountability Form: **General Contractor**



Asphalt roofing (70% minimum) 011915 es 0 0 1 0 0

Description:

- Identify outlet and arrange pick up or delivery.
- Provide receipt

Benefit:

Asphalt shingles can be recycled.

Considerations

Finding someone who is willing to separate shingles may be difficult. Also, centers that accept shingles for recycling may be full and unable to accept additional material.

Resources

See the PCA Recycling Guide for further information, although supply may be greater than demand.

Verification:

Provide documentation or calculations for this measure.



12.3.6

Accountability Form: **General Contractor**



Brick and block (70% minimum) 011915 es

0 0 1 0 0

Description:

- Identify outlet and arrange pick up or delivery.
- Provide receipt.

Benefit:

Both brick and block can be crushed for road fill if they are separated from other materials. Small quantities may be more difficult to find a hauler or recycling operation to accept. See MPCA Recycling Guide. Often brick can be reused on-site for patios or walks.

Verification:

Provide documentation or calculations for this measure.

12.3.7

Accountability Form: **General Contractor**



Drywall - grind or remove, and recycle (70% minimum) 011915 es

0 0 1 1 0

Description:

- Consult with professional gardener
- Identify outlet and arrange pick up or delivery.
- Provide receipt.

Benefit:

On-site grinding of clean drywall may be practical when used as fertilizer. It should be treated as any fertilizer product and applied in the proper quantity where needed.

Considerations

Off-site recycling opportunities may be difficult to find now, but should become more available in the future.

Verification:



12.3.8

Accountability Form: **General Contractor**



Carpet (70% minimum) 011915 es

0 0 1 0 0

Description:

Provide receipt.

Benefit:

Most types of carpet are recyclable unless in very bad condition. The Carpet America Recovery Effort (CARE) is operating in the Twin Cities metro area.

Resources

New carpet installers and the general public can recycle carpet by delivering it to specific recycling sites and following their criteria. See Eureka Recycling Guide at www.eurekarecycling.org/.

www.carpetrecovery.org

www.landfillclear.com/index.php/carpet-and-pad-recycling/where-to-take-your-carpet#!

www.brotex.com/carpetrecycling.aspx

Verification:

Provide documentation or calculations for this measure.

12.3.9	Accountability Form: Painting / Finishing Contractor					
Paints, primers, stains and sealants (100% recovery at hazardous waste site) 011915 es		0	0	1	0	0

Description:

Homeowner to sign-off on checklist that materials have been left on-site and in a safe location.

Provide receipt of drop-off to hazardous waste facility if materials are not left at job-site.

Benefit:

Homeowners may wish to keep leftover materials for touch ups over time. Many counties have hazardous waste collection facilities to accept these types of materials.

Considerations

Be sure to place materials in a safe place away from combustion appliances. Water-based products will need to be kept from freezing.

Resources

See Eureka Recycling Guide www.eurekarecycling.org/, and the PCA site

www.pca.state.us/oea/market/index.cfm has a section on what to do with paints and solvents

Verification:

Provide documentation or calculations for this measure.

12.3.10	Accountability Form: General Contractor					
Recycle or compost yard waste (minimum 90%) 011915 es		0	0	1	0	0

Description:

Provide receipt of general contractor to sign-off on checklist

Benefit:

Eureka's Recycling Guide has a breakdown of who accepts the many yard waste items from land clearing.

Yard waste (grass clippings and leaves) can be composted on-site. Most counties in the metro have compost sites.

Verification:

Provide documentation or calculations for this measure.



12.3.11

Accountability Form: **General Contractor**



Wood scrap and broken pallets (70% landfill diversion) 011915 es

0 0 1 1 0

Description:

Document means of diversion.

Provide receipts

Benefit:

There are companies all around the state that take pallets and recondition them for reuse. Clean wood can be mulched and used for a variety of applications including animal bedding and garden mulch.

Resources

Type in "pallet recycling Minnesota" on a search engine to find sources for pallet recycling in that state.

Verification:

Provide documentation or calculations for this measure.

12.3.12

Accountability Form: **General Contractor**



Asphalt or concrete rubble (90% minimum) 011915 es

0 0 1 1 0

Description:

- Separate concrete and asphalt.

- Receipt

Benefit:

If separated, asphalt and concrete can be recycled.

Considerations

You will have to haul smaller quantities or hire someone to haul it for you.

Resources

The Eureka Recycling Guide www.eureka recycling.org/ has a list of companies that accept asphalt and concrete to be recycled.

Verification:

Provide documentation or calculations for this measure.

12.4 Homeowner Waste Reduction

12.4.0	Accountability Form: General Contractor					
Install recycle center for homeowner use 011915 es		0	0	1	0	0

Description:

- The remodeling contractor to provide site-built or commercially manufactured recycling containers for newspaper, glass, and at least one other material, if they are not provided by the city or municipality
- Builder shall provide the homeowner information on recycling facilities conveniently located to the homeowner as well as a list of haulers that provide curbside service if not provided by the city or municipality.
- General contractor to sign-off on checklist

Benefit:

Providing space for and installing a recycling center encourages recycling by making it convenient, and sets an expectation which increases the likelihood of using the center for its intended purpose.

Verification:

See accountability form.

Visually inspect and photograph implementation of this measure.

12.4.2	Accountability Form: Homeowner					
Provide kitchen scrap compost bin and exterior compost bin 011915 es		0	1	2	0	0

Description:

Provide photograph of compost bins

Benefit:

Food products not consumed can be composted on-site along with some yard waste, and used to improve the health of the soil on-site and reduce unnecessary landfill. Check with county extension agencies regarding the type of food scraps that can be composted.

Resources

www.compostguide.com

Contact counties or cities for information about how to compost successfully.

Verification:

Visually inspect and photograph implementation of this measure.



12.4.3

Accountability Form: **General Contractor**



Recycle yard waste that cannot be composted 011915 es

0 0 1 0 0

Description:

Identify outlet and arrange pick up or delivery

Remove and stage

Benefit:

Most municipalities take yard waste, especially limbs, tree trunks, and trees that are not desirable to compost because of disease or other parasites.

Considerations

Some plant material is too large to recycle on-site, or has parasites or other diseases that should not be compost because of spreading the disease

Resources

Eureka Recycling Guide www.eurekarecycling.org/ has information on recycling yard waste that cannot be used on-site.

Verification:

Homeowner visually confirms this measure.



13. Education

13.1 Homeowner and Subcontractor Education

13.1.0 Accountability Form: **General Contractor**



Expand homeowner's user manual 011915 es

1 1 1 1 1

Description:

Provide additional home maintenance and lifestyle information beyond that listed in the next measure. This can include, but is not limited to:

- A site education packet covering alternatives to fertilizer and pesticide use, non-invasive plant species and irrigation systems operation
- Occupant activities that positively impact a home including non-toxic cleaning products, non-toxic pest control measures, recycling and reuse measures, and composting methods

Benefit:

A thorough explanation of how the products and systems of a home works helps to promote good maintenance practices and connects people to actions that lead to Greener lifestyle choices.

Resources

www.epa.gov/lead

Verification:

13.1.2 Accountability Form: **General Contractor**



Provide owners of home with two radon test kits designed for 48-hour exposures, including instructions for future use and guidance for follow-up actions to testing results 011915 es

0 1 0 0 0

Description:

Benefit:

Verification:

Homeowner confirms this measure.

13.1.3Accountability Form: **General Contractor**

Homeowner given a walk through education during framing to explain design and construction of home. 011915 es

1 1 1 1 1

Description:

Conduct a homeowner walk-through upon completion of framing explaining how and why the home is constructed, what stages will follow framing to reach completion and how and why they are preformed to achieve the desired results.

Conduct a final walk-through to show how stages of construction process have been completed and how they need to be maintained and coordinated in order for the home to function properly.

Benefit:

When verbal education is combined with visual and hands on education, homeowners will get a more complete understanding of the products and systems in their home.

Repeating information through multiple educational sessions is critical for retention of information, especially when there can be many systems involved in a home.

Verification:

Homeowner confirms this measure.

14. Innovation

14.1 Performance Design and Alternative Methods

14.1.0	Accountability Form: Building Architect / Designer					
Trees removed for construction are milled and incorporated in the project 011915 es		2	0	2	4	0

Description:

List tree species and intended end use of wood

Photograph if possible

Benefit:

Use of local materials significantly reduces negative affects caused by long distance transportation. Consider using lumber for flooring, millwork, paneling, and cabinetry.

Considerations

Depending on the method used for drying the lumber, a wait period of 4 months may be required before using the material. Air dried wood, while taking longer to dry, uses considerably less energy and should be strongly considered

Verification:

Visually inspect and photograph implementation of this measure.

14.1.2	Accountability Form: General Contractor					
Use alternative building systems, e.g., Durasol, Fasswall, Autoclaved Aerated Concrete 011915 es		3	1	1	2	1

Description:

- Walls must be installed according to manufacturer's specifications
- A minimum of 80% of above grade exterior area shall be precast and autoclaved aerated concrete.
- Rater verifies

Benefit:

While these systems may sound new, they have been in existence for many years. They all have a mission of combining structure and insulation in one step to reduce installation time and costs as well as to improve air sealing and energy efficiency.

Resources

www.aacpa.org/

Verification:

Provide documentation or calculations for this measure.

14.1.3	Accountability Form: General Contractor					
Cold climate appropriate natural building system (e.g. straw bale, cordwood, etc) 011915 es		5	2	4	5	4

Description:

- Provide plan and rationale to illustrate method and compatibility with the climate at the location of the project.
- Documentation will depend upon methods used.

Benefit:

There are many natural building systems that are making a comeback. Some are more appropriate to our climate and weather than others. A home made of rammed earth is an excellent building method in dry climates, but not so great in an area that may see many feet of snow. We encourage the exploration and re-introduction of these building techniques provided they are appropriate.

Verification:

Provide documentation or calculations for this measure.

14.1.4	Accountability Form: General Contractor					
Unique partnerships formed to advance resource-efficient building 011915 es		0	0	0	1	0

Description:

Provide overview of partnership and illustrate how it achieves the criteria

Benefit:

There are countless ways to explore and advance resource efficient building in any specific community or area.

Verification:

Provide documentation or calculations for this measure.

14.1.5	Accountability Form: General Contractor					
Air, moisture and insulation all kept to the exterior of the structure - PERSIST method 011915 es		4	4	0	5	0

Description:

- The PERSIST (Pressure Equalized Rain Screen Insulated Structure Technique) method is one example where the air and moisture barrier are at the exterior of the building envelope rather than enclosing the insulation within the building cavity.

- Provide proof of implementation
- Provide photographs of system
- Rater verification

Benefit:

Prevents penetration of air and moisture into the building cavity in order to encourage long-term building durability. This process was developed specifically for cold climate buildings. The roof and walls are sealed with a membrane on the exterior of the sheathing (vapor barrier). All the insulation is exterior to the vapor barrier. The area between the studs becomes part of the conditioned space of the building envelope. Any penetrations through interior sheetrock (e.g., hangers for pictures and art) or within the studs (e.g., electrical wiring) is within the building envelope.

Resources

www.cchrc.org/Reports/REMOTE%208-2-06.pdf

www.homeenergy.org/archive/hem.dis.anl.gov/eehem/99/991108.html

Verification:

Provide documentation or calculations for this measure.

Visually inspect and photograph implementation of this measure.

Verifier visually confirms and photographs this measure.

14.1.6	Accountability Form: Building Architect / Designer					
American Lung Association Health House 011915 es		0	10	0	0	0

Description:

Show certification by ALAHH

Benefit:

Proven to reduce health risks in the home.

Verification:

Provide documentation or calculations for this measure.



14.1.7

Accountability Form: **General Contractor**



Abate asbestos from home 011915 es

0 6 0 0 0

Description:

Hire licensed asbestos abatement company
Provide receipt for proof

Benefit:

Removing asbestos from the home eliminates the risk of exposure.

Considerations

Only licensed professionals should abate asbestos

Verification:

Provide documentation or calculations for this measure.

14.2 Design for Reduced Electrical and Magnetic Fields

14.2.0

Accountability Form: **Electrical Contractor**



Avoidance of grounding of electrical service to main water supply. (proper pre-existing conditions also qualify) 011915 es

0 1 0 1/0 0

(1. Install polyethylene pipe for main water service supply pipe underground / 2. Install insulated, dedicated wire, or bare copper wire in plastic conduit...)

Description:

1. Install polyethylene pipe for water service supply pipe underground
2. Install insulated, dedicated wire, or bare copper wire in plastic conduit, as new "Service" grounding conductor from main electric panel to point of entry of metal water service supply pipe before (below) water meter.

1. Install polyethylene pipe for water service supply pipe underground

- Provide a photograph of installation

2. Install insulated, dedicated wire, or bare copper wire in plastic conduit, as new "Service" grounding conductor from main electric panel to point of entry of metal water service supply pipe before (below) water meter.

- Use four or six gauge copper (depending upon size of panel).
- Route this conductor low down on basement wall along periphery of house, as far away from upstairs sleeping, sitting, and kitchen areas as possible (will carry current).
- Leave previously existing grounding conductor to be used as "Equipment" ground, which will not normally conduct electricity (see next item).
- Avoid direct contact between "System" grounding conductor and concrete wall. If "System" grounding conductor runs in attic of garage and through house, avoid high traffic areas (e.g., kitchen, bedrooms).
- Verify that service drop neutral is intact. Then install dielectric union in water service supply pipe after (above) water meter and before first branch of pipe. If no room is available before first branch, install dielectric union in each branch. Verify presence of a separate grounding conductor from main electric panel to water service supply pipe that is clamped after (above) dielectric union. Serves as "Equipment" ground. Can be un-insulated copper wire. Can use existing grounding conductor, but do not continue this conductor and clamp below dielectric union. "Equipment" ground will not carry electric current under normal conditions (as long as it is not clamped below dielectric union), so it is safe to run this conductor through occupied areas. (Reason for dielectric union: Eliminates current on metal domestic water pipes within house and on "Equipment" grounding conductor. Both can cause magnetic field exposure for occupants. Puts 100% of current onto new insulated "System" grounding conductor to be located away from occupied areas – see diagram above, "House Electrical: Equipment (Water Pipes) and System Grounding Configuration," and diagram below, "The Two Types of Grounding: Definitions and Functions.")
- Electrical contractor to sign-off on checklist

Benefit:

1. Install polyethylene pipe for water service supply pipe underground

- Prevents electric current on metal grounding conductor, metal pipes and other paths that can cause magnetic field exposure for occupants.

2. Install insulated, dedicated wire, or bare copper wire in plastic conduit, as new "Service" grounding conductor from main electric panel to point of entry of metal water service supply pipe before (below) water meter.

- Electric current presently runs on metal grounding conductor that can cause unhealthy magnetic field exposure for occupants, even ten to twenty feet away. This protocol isolates this hazard. Also, concrete foundation conducts electricity.) (See diagram below, "House Electrical: Equipment (Water Pipes) and System Grounding Configuration.")

Verification:

Provide documentation or calculations for this measure.

14.2.2Accountability Form: **Electrical Contractor****Install Ufer Ground that does NOT contribute to widespread Electro Magnetic Fields (EMF) in home.**

0 1/2 0 0 0

011915 es

(1. Embedded in concrete footing & CANNOT touch other rebar. / 2. Embedded in separate concrete caisson)

Description:

1. Install dedicated steel #4 rebar ground rod embedded in concrete footing and stubbed out for connection to electrical panel ground wire. 20' minimum rebar length and CANNOT touch other rebar.

2. Install dedicated steel #4 rebar grounding rod embedded in separate concrete caisson and stubbed out for connection to electrical panel ground wire. 20' minimum rebar length.

1. Install a steel #4 rebar in house footing as described in credit language above. Rebar must be a single continuous bar of 20' length minimum.

- Preventing Ufer grounding rebar from touching any other rebar is the key to this installation option.

- Notes on drawings and/or specifications indicating work to be done.

- Pre-backfill photo—OR—rater verification.

2. Install a steel #4 rebar in separate concrete caisson as described in credit language above. Rebar must be a single continuous bar of 20' length minimum.

- Caisson to be 3' from house foundation minimum.

- Notes on drawings and/or specifications indicating work to be done.

- Pre-backfill photo—OR—rater verification

Benefit:

A Ufer ground describes one in which the grounding conductor is embedded in buried concrete. This is typically an effective way to ground the electrical system in a building, especially in dry conditions where stand-alone grounding rods are not effective. Often, a Ufer ground is installed by connecting the ground wire from the electrical service panel of the house to the entire network of metal rebar that is in the footing, foundation, and slab. This can result in widespread electro magnetic fields in the home, which are generally better to avoid, especially for highly sensitive individuals.

The alternate Ufer ground installations described here minimize (#1) or eliminate (#2) the potential for electro magnetic fields being created in the home due to the use of a Ufer ground.

Considerations

To prevent a potential delay during construction, prior approval from electrical inspector may be advisable—especially if installing a separate caisson-type Ufer ground. Not all electrical inspectors are familiar with this method.

At least one example of the separate caisson-type Ufer ground has been installed and approved in Minnesota as of the date this document was written.

Resources

Spark Burmaster, 608-483-2604; eoptions@mwt.net ;

<http://www.environmental-options.info/> .

Verification:

Verifier visually confirms and photographs this measure.

14.2.3

Accountability Form: **Electrical Contractor**

Ground electrical panel to approved dedicated ⚡Hammered-In⚡ ground stake (not rebar, plumbing pipes or any integral part of the house) 011915 es 0 2 0 0 0

Description:

- If contractor plans to provide a stub out from metal rebar in basement slab or footer as a Ufer ground to main electric panel as primary ground (if no metal water pipe is present), bond to a concrete-encased 20' section of metal rebar in separate caisson buried 3' or more away from the foundation. Electrical code inspectors in your state have approved installing a separate caisson outside the foundation if no stub out exists from footer.

- Avoid metal water service supply pipe. Use copper alternative (PEX or ABS)

Benefit:

If ground conditions are appropriate, a grounding stake can provide effective grounding for the electrical service panel.

Prevents distribution of electric current onto the entire rebar of the building. It may be helpful to note that as of the time of writing this manual, Minnesota electrical code does not require connecting piece of rebar used as Ufer ground with rest of rebar.

Resources

See "CONCRETE-ENCASED ELECTRODE REQUIREMENT: CLARIFIED," Fall 2005 Department of Labor and Industry Electrical Licensing and Inspection Newsletter, Page 6, www.electricity.state.us/pdf/eli_fall05.pdf

Verification:

See accountability form.

14.2.4Accountability Form: **Electrical Contractor****Wiring run in metal conduit (low voltage exempt) 011915 es**

0 2/4 0 1/2 0

(All wiring within 6 feet of a bedroom is run in metal conduit (flexible and rigid qualify) / All electrical wiring in whole house run in metal conduit. (flexible and rigid qualify))

Description:

Electrical contractor to sign-off on checklist

Exceptions

Low voltage exempt.

Benefit:

- Metal conduit helps shield occupants of the home from electro magnetic fields.
- Use of metal conduit also provides added durability protection from electrical fires caused by wire shorting out or physical damage to wires when hanging photos, etc.
- Sleeping areas are the most critical ones where EMFs should be avoided.

Verification:

Visually inspect and photograph implementation of this measure.

14.2.5Accountability Form: **Electrical Contractor**
Proper sub-panels supplied by four-wire cable, where neutral and ground conductors are not connected 011915 es

0 1 0 0 0

Description:

- Three-wire cable puts current on the grounding system, causing magnetic field exposure from parallel return paths of current flow.)
- All sub-panels are to be supplied by four-wire cable, per NEC.
- All sub-panels are to be wired such that neutral and ground conductors are not connected, per NEC. (Reason: Prevents magnetic field exposure from current on the grounding system.)
- Choose brands of electric panel that allow connecting neutral conductors to a neutral bus alongside the connection of the corresponding hot conductor to its breaker. Twist the neutral and hot conductors from their point of entry into the electric panel to their connection to the bus and breaker to avoid separating the hot from the neutral conductors. This reduces magnetic field exposure from the electric panel. (Reason: Reduces magnetic field exposure from separation of branch hot conductors from branch neutral conductors.) (See photos.)
- Mount the electric panel so that incoming hot and neutral service cables connect directly to lugs. If service cables enter from underneath, turn panel upside down. Avoid running service cables up sides of breakers from bottom of panel box to lugs at top. (Reason: Reduces magnetic field exposure from separation of hot conductors from neutral conductor.) See photos.
- Electrical contractor to sign-off on checklist

Benefit:**Verification:**

Rater visually confirm measure has been met & photograph.

14.2.6Accountability Form: **Electrical Contractor**
Keep electrical service connection, electric meters, and panels at least ten feet from sleeping areas 011915 es

0 1 0 0 0

Description:

Electrical contractor to sign-off on checklist

Benefit:

- Prevents magnetic field exposure for occupants. Occupants should not sleep within 6' of exterior wall at point of connection of outside overhead electric service.
- Reduces large magnetic field exposure for occupants due to separation of hot conductors from neutral conductor outside exterior wall at weather head.

Considerations

See the introduction to Section 11 for more information about electro magnetic fields.

Verification:

See accountability form.

14.2.7 Accountability Form: **Electrical Contractor**     

No fluorescent light fixtures or transformers for halogen lighting systems in ceiling beneath a child's bedroom or within 6' of a sleeping area. 011915 es 0 1 0 0 0

Description:

- Avoid installing transformers for halogen lighting systems within 6'-10' of occupant sleeping or sitting areas.
- Electrical contractor to sign-off on checklist

Benefit:

Avoids magnetic field exposure for sleeping child when fluorescent light is turned on underneath bedroom. Prevents magnetic field exposure from transformer.

Verification:

See accountability form.

14.2.8 Accountability Form: **Electrical Contractor**     

Electric in-floor radiant heat carries 2 conductors and is located at least 6 feet away from sleeping area 011915 es 0 1 0 0 0

Description:

- Do not install electric in-floor radiant heaters with single wire conductors
- Electrical contractor to sign-off on checklist

Benefit:

- Prevents significant magnetic field exposure when heater is turned on because single hot conductors are separated from one another. Conductors therefore do not cancel the magnetic flux in one another. (Hydronic in-floor radiant heating systems create no significant magnetic, or electric, field exposure.)

- Electric in-floor radiant heaters with dual conductors are under review and may be acceptable (e.g., Warm Zone Danfoss LX Mats with "dual conductor heating cable", www.warmzone.com/under-floor-heat.asp) as long as they are 240 Volt since they prevent significant magnetic field exposure when heater is turned on because dual conductors place outgoing and incoming hot conductors immediately next to each other, avoiding separation of conductors. This cancels magnetic flux in adjoining conductors. Also, 120 Volt conductors cause electric field exposure—see below.

Verification:

Provide documentation or calculations for this measure.

14.2.9	Accountability Form: Electrical Contractor					
Wall-mounted electric heaters are installed at least 6' away from sleeping area 011915 es		0	1	0	0	0

Description:

Install 240 Volt units rather than 120 Volt units. (Reason: Avoids electric field exposure—see below. Electric fields are neutralized in each 120 Volt conductor when in close proximity in 240 Volt circuits). Electrical contractor to sign-off on checklist

Exceptions

Wall-mounted electric heaters can be used but install at least 6' away from sleeping area.

Benefit:

Prevents significant magnetic field exposure when heater is turned on

Verification:

See accountability form.

14.2.10	Accountability Form: Electrical Contractor					
Install dedicated circuit with shut off switch for all outlets that will have constant draw machines outside of media rooms 011915 es		1	1	0	0	0

Description:

- Install dedicated circuit with shut-off switch for all outlets that will have constant-draw machines outside of media rooms
- Install metal clad wiring in areas around, above and below sleeping areas, within 10' of the bed. Install a shut-off switch for all outlets within this radius. (Reason: Reduces occupant exposure to 120 Volt-induced electrostatic field exposure while sleeping.)
- Electrical contractor to sign-off on checklist

Benefit:

Ghosting appliances are responsible for considerable energy consumption. This strategy is credited under energy efficiency in the Electrical section. Additional benefit potential for EMF sensitive individuals and subsequent IEQ credits are available for the remodeler working with a sensitive client. Up to two (2) IEQ credits may be obtained (one for each additional room).

Verification:

See accountability form.

14.2.11Accountability Form: **Electrical Contractor**

Provide a shut off switch for all non-metallic (NM) circuits within ten feet of sleeping area. Run metal-clad wiring for all smoke detectors in bedrooms on independent circuits. 011915 es

0 1 0 0 0

Description:

- Smoke detectors must be hardwired and may not be connected to a shut-off switch.
- If non-metallic (NM) plastic-jacketed wiring is installed in bedroom walls, floors, and ceilings, provide a shut-off switch for all NM circuits within 10' of the bed. Install CAT-5 or CAT-6 shielded data cable throughout house to every room where computers will be used
- Electrical contractor to sign-off on checklist

Benefit:

Reduces occupant exposure to 120 Volt-induced electrostatic field exposure while sleeping.

Verification:

See accountability form.

14.2.12Accountability Form: **Electrical Contractor**

Install CAT-5e (enhanced) or CAT-6 shielded data cable throughout house to every room where computers and telephones will be used. Avoid Wi-Fi. Use hardwired, corded telephones rather than cordless telephones. 011915 es

0 1 0 1 0

Description:

Provide photograph

Electrical contractor to sign-off on checklist

Benefit:

- Some homeowners are sensitive to radio frequencies emitted by wireless routers.
- Provides hardwired smart wiring for telephone and high speed Internet connections.
- Allows homeowner to avoid using wireless Internet routers.
- CAT-5e handles speeds as high as 100 mbps

Verification:

See accountability form.

14.2.13Accountability Form: **Electrical Contractor****Do not run coolant or power lines to air conditioner compressor motors within 10' of sleeping area**

0 1 0 0 0

011915 es

Description:

General contractor to sign-off on checklist

Benefit:

Reduces large magnetic field exposure for occupants

Verification:

See accountability form.

14.2.14Accountability Form: **Building Architect / Designer****Refrigerator is not located within 6 feet of sleeping area**

0 1 0 0 0

011915 es

Description:

General contractor to sign-off on checklist

Benefit:

Reduces large magnetic field exposure for occupants from compressor motor.

Verification:

See accountability form.

14.2.15Accountability Form: **Electrical Contractor****Install alternative to electronic dimmer light switches, e.g. on/off switch or 3 way bulb that switches**

2 1 0 0 0

from 50 to 100 to 150 watt. 011915 es

Description:

- Provide a lighting plan with details regarding light reduction strategies
- Electrical contractor to sign-off on checklist

Benefit:

Reduces EMFs

Verification:

See accountability form.



14.3 INNOVATIVE DESIGN

14.3.0	Accountability Form: General Contractor					
Documentation and justification are required in order to receive consideration for innovation points	0	0	0	0	0	0
011915 es	Default Value					

Description:

Benefit:

Verification:

14.3.2						
Innovative Measure: Propose a new measure						<i>Calculated</i>

Description:

Measures recorded here are innovative or have not been specifically identified elsewhere in the GreenStar Points Worksheet. Points will be determined by GreenStar committee review.

Benefit:

Innovative measures push the envelope of current construction practice and move the industry toward a higher level of sustainability.

Verification:

On site inspection to verify and/or signed Accountability Form.

14.3.3	Accountability Form: GreenStar Administration					
Innovative Measure: Propose a new measure						<i>Calculated</i>

Description:

Measures recorded here are innovative or have not been specifically identified elsewhere in the GreenStar Points Worksheet. Points will be determined by GreenStar committee review.

Benefit:

Innovative measures push the envelope of current construction practice and move the industry toward a higher level of sustainability.

Verification:

On site inspection to verify and/or signed Accountability Form.