Green Building Program

New Residential Construction

The City of Steamboat Springs
And
Routt County
Colorado

Prepared for the City of Steamboat and Routt County by:

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In partnership with

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INTRODUCTION

Executive Summary

According to the National Association of Home Builders green homes have reached mainstream status. From coast to coast the demand for green homes has grown every year. The biggest questions for both builders and homeowners is what really is a green home and how green is green enough?

These guidelines were developed to answer those questions for residents of Routt County and Steamboat Springs. The guidelines identify green components from foundations to finishes that both act as a guide for designing a green home and as a checklist to determine how green a project will be. The city and county has determined minimums and then tiers to determine levels of performance for green homes. Typically the more points accumulated the greener the home.

With the adoption of the new 2006 IECC energy code there will be new requirements for minimum energy efficiency. The green building program will require Energy Star as the minimum energy efficiency (15% higher than the IECC code). The program recommends that in today's uncertain energy market higher energy efficiency is better for owners as well as the community.

Overview of Green Building

Three Fundamental Principles

In its simplest form green building has three fundamental components:

- Energy Efficiency
- Resource Conservation
- Good Indoor Environmental Quality

Every building is different and will have a unique mix of the three components. For a building to be effectively green it should have all three. When qualifying a home as Energy Star it would fulfill the Energy Efficiency component. An American Lung Association "Health House" fulfills the Indoor Air Quality component. If you were to build to fulfill the Resource Conservation component it would be called "Resourceful building". When all three of these components are integrated it is called Green Building. There is widespread market appeal from homebuyers due to the benefits inherent in each of these components but particularly in combination.

Energy Efficiency

Energy Efficiency is the foundation for green building. Energy codes define the minimum acceptable standards for the Routt County climate zone. In today's world of climate change and high energy prices, it is critical that buildings use as few fossil fuels (including coal-generated electricity) as possible to "futureproof" the home against rapidly-rising prices. There are two tiers to Energy Efficiency: 1) Efficiency in energy use during the construction process and 2) Efficiency in energy used in the home. Energy efficiency during the construction process requires a whole house system approach where all components interact to reduce energy consumption. All elements of the building shell including: foundation, framing insulation, roof structure and windows play key roles in defining the potential energy savings for a house. Designing the building as a system with each of these elements supporting each other will decrease the energy load. The second tier of consideration, energy use inside the home, involves sizing mechanical equipment to the actual loads of the house, natural daylighting and ventilation to greatly impact how much energy will be used to provide comfort and convenience. Appliances and lighting also

impact total energy efficiency. All need to be considered in the early design stages to maintain cost effectiveness.

Resource Conservation
Drought in Colorado is frequent. The 500-year drought in 2002 weakened the lodgepole pines--leading to the vast beetle kill we experience today. Resources are used today as if they are limitless. In fact, according to the Global Footprint Network, the global population uses 1.2 planets worth of resources every year, 40% of that making up our buildings. The numbers can be staggering. For example; the Forest Stewardship Council states that the wood used today demands that a football field of forest is cut down every second around the globe. To ensure that these resources are available for future generations our homes can be designed and built to conserve resources. By utilizing rapidly renewable, recycled and reused products we can build much more efficiently, with fewer resources and utilize those to their highest and best use.

Indoor Environmental Quality
Indoor air quality is often 10 times worse than outdoor air on smoggy days in big cities according to the EPA. It is often considered the sleeping giant of the building industry because there can be a false sense that the air in the home is safer than that outside. However, of all the chemicals that EPA regulates, only 2 are more prevalent outdoors than inside our homes and schools according to a Scientific American study. This is a quiet epidemic brewing right under our noses. There is a solution. For over a decade, building industry product manufacturers have been introducing products that reduce formaldehyde, volatile organic compounds and other potentially harmful chemicals. Today there is a wide range of products available that replace existing paints, adhesives, flooring and other finishes that are much healthier for inside the home, especially for children.

Important to the health of occupants is daylighting and fresh air ventilation. Our bodies require full spectrum daylight. An ideal home provides enough sufficient natural light that no electric lighting is needed during the day. This does, of course, depend on location and siting, which is why it is important to include daylighting in the first steps of the design process. Fresh air is also critical to optimal health. Most homes in cold climates are sealed up so tightly that the air is heated and recirculated constantly with only the air that leaks through the cracks in the envelope providing fresh air. Intentional mechanical ventilation provides control over ventilation rates and helps prevent the buildup of interior moisture within the home which reduces the likelihood of mold growth.

Benefits of Green Building
People buy green homes because of the significant benefits that green homes offer. Typical benefits of green homes include:

- Higher quality
- More comfort
- Healthier
- More affordable
- Less maintenance
- Greater durability
- Higher resale value
- More environmentally friendly

The Cost of Green Building
There is a common misconception that “green” is synonymous with expensive. It really all depends on a few variables; typically; the experience of the architect/builder, how early in the design process was green building incorporated, what are the sources of the green materials, and how green or energy efficient do you want the home to be? Even with a higher sticker price, a

green home will save the owner money in the long term with reduced, sometimes dramatically reduced, energy bills. With energy costs as high as they are today and the predictions being that they will only continue to grow, this can be incentive enough to invest in a green home.

Green homes built over the last 15 years have proven that it doesn't have to cost more to build green. The sooner green principles are incorporated into the design the lower the cost can be. For example, just siting the home for passive solar so that the south face has properly sized windows can reduce heating bills by 30-50% with little or no additional cost. There are renewable energy measures that can be taken that do add to the cost, such as installing a photovoltaic system. While the up-front investments in energy efficiency are greater, the operational costs of the home over its life are reduced or eliminated. With experience, architects and builders will learn how to balance the design of a green home to make it competitive with a conventional home. Experience has shown in national surveys that the first green home a builder builds is the most expensive often 3-5% higher than conventional construction costs. Their second house is 2-3% more. The third is often equivalent to the cost of conventional homes.

Shipping costs can make non-local materials much more expensive than traditional products. Typically, however, as green building programs are adopted, lumber yards and green building product suppliers come into the area to meet the new demand. With greater volume of use the prices go down.

How green or energy efficient the house is dictates increases in first costs. When energy improvements are involved, costs are really investments. Money spent on energy improvements reduces monthly utility bills. This yields a return on investment for those improvements. For example, if the energy improvements add $5000 to the initial cost of the house and the owners get a 30 year mortgage at 7%, the monthly increase in the mortgage payment is $33.00. If those improvements reduce monthly utility bills by at least $34, the owner accrues a monthly return on investment. The faster energy prices rise the greater the Return on Investment. It is a pretty safe bet that energy prices will continue to rise over the life of the home yielding greater returns year after year.

HOW TO USE THIS BOOKLET

Purpose of the Program

These guidelines are meant to inform and educate the citizens of Routt County and Steamboat Springs on how to design, build and live in more energy efficient, carbon friendly and healthier homes. Guidelines are just that, a guide to make your way through the myriad decisions required in any construction project. The County and City have adopted new energy codes that will define the minimums for the area. These guidelines instruct how to build to these higher levels of energy efficiency required by code. Some of the following measures are required and others offer a variety of options for improving the quality of the home. Some homeowners may feel indoor air quality is their highest priority. Others may feel that building a near-zero energy home is the best investment they can make today. Across the country 85% of people living in green homes are more comfortable and happier with their new home than their past home.

Applicability

This checklist applies to single family, duplex, and row townhome construction.

Organization of the Checklist

The Building Process

The green building measures are organized to follow the construction process. This is how a builder puts together an estimate for the cost of the job. Often each section is the domain of a trade or specialty contractor such as an electrician, plumber or mechanical contractor. Therefore each section can be given to the respective contractor to gauge his experience and access to appropriate materials or products.

Descriptions by Credit

These guidelines describe each measure, what it means, how to apply it, what benefits it provides and how it will be documented. That way everyone can make informed decisions about the aspects of green building that are most important to them.

Green Building Components

The individual measures have a number in the right hand columns that identifies whether it affects energy, resources or indoor environmental quality. This makes it easier to focus on those aspects that are of greatest import to you and your building team.

Compliance

A green program checklist will be required at the time of permit application. If Energy Star is a performance goal of the project a private Energy Star consultant may be employed at the time of design development. A plan reviewer will compare the checklist to your blueprints and specifications. If the minimum has been met the application will proceed as usual through the other departments for sign off.

A new inspection protocol has been adopted with the IECC energy code. Once the home is completed a private Home Energy Rating System or HERS rater will test the house for energy efficiency. This test result will be submitted to the building department before the Certificate of Occupancy will be awarded.

Certification

Certification under this program will be awarded by points earned. There are four levels of certification, each with increasing point thresholds, which reflect the increasing energy and resource efficiency of each level. Levels and corresponding point thresholds are as follows:

Certification Level	Points Required
● Green	90
■ Blue	120
♦ Black Diamond	180
♦♦ Double Black Diamond	240
Total Points Possible:	**321**

HOME SIZE ADJUSTMENT

Explanation

The Home Size Adjustment compensates for the overarching effect of home size on resource consumption by adjusting the award level point thresholds based on home size. All things being equal, a large home consumes more materials and energy than a small home over its lifecycle. The adjustment compensates for these impacts by requiring more points based on house size over the threshold of 3,000 sq. ft. Available published data and informal studies of energy and materials usage in homes reveal two key relationships:

- A 100% increase in home size yields an increase in **annual energy usage of 15% to 50%**, depending on the design, location, and occupants of the home.
- A 100% increase in home size yields an increase in **materials usage of 40% to 90%**, depending on the design and location of the home.

As home size doubles, energy consumption increases by roughly one-quarter and material consumption increases by roughly one-half; combined these amount to an increase in impact of roughly one-third with each doubling in home size.

Calculation

Determine the **floor area** of the project. Then refer to the chart below to determine the number of points needed for the project and enter the floor area and points required in the spaces provided on the checklist.

"Floor Area" means the total square footage of all levels included within the outside walls of a building or portion thereof, but excluding courts, garages usable exclusively for the storage of motor vehicles, and uninhabitable areas that are located above the highest level or below the first floor level.

Floor Area	**Points Required**
Up to 3,000 sq. ft.	90 Points – Green Certification
3,001 sq. ft. and greater (each additional 100 sq. ft.)	Points required under compliance, plus 1 point for each additional 100 sq. ft. area up to a maximum of 100% of all available points. (fractional points will round up to whole number

Example

A 10,000 sq. ft. home would be required to obtain an additional 70 points over the 90 points required for Green Certification. (10,000 - 3,000 = 7,000/100 = 70 points added to thresholds)

SECTION A Energy

Home energy efficiency is the cornerstone of green building. Energy-efficient homes have lower energy bills, are more comfortable, and provide better indoor air quality. They are also more affordable than homes built below the minimum energy code levels because of lower energy bills. The City of Steamboat Springs and Routt County require that all new homes be designed and built to meet the requirements of the U.S. Environmental Protection Agency (EPA) ENERGY STAR Program (see www.energystar.gov/homes).

Verification of a home's energy efficiency by a third-party certified home energy rater is required in order for a home to earn the ENERGY STAR label. There are two paths to verifying that a home meets the ENERGY STAR guidelines: The Performance Path or the Prescriptive Path. The first step to certifying a home as ENERGY STAR is to contact a Residential Energy Services Network (RESNET) accredited Home Energy Rater. A Home Energy Rater will certify the home and act as a guide through the ENERGY STAR certification process.

A.1 Meet ENERGY STAR® Performance Path Requirements – *Mandatory*
Definition: The Performance Path, where software is used to model the home's energy use to verify that it meets a target score. The target score is based on the Home Energy Rating System Index Score (HERS Index Score). The HERS Index is a measure of the home's energy performance in relation to the 2006 International Energy Conservation Code (2006 IECC). A home meeting the minimum 2006 IECC requirements will have a HERS Index of 100, while a zero-energy home will have a HERS Index of 0. A lower HERS Index means that a home has a higher level of energy efficiency. A Home Energy Rater certified by the Residential Energy Services Network (RESNET) is required to conduct the testing and verification activities and issue a home energy rating that will determine the HERS Index Score of the home.
Action: To qualify as ENERGY STAR using the Performance Path, a home must:

- Have a HERS Index less than or equal to 80 (for Climate Zone 7)
- Be verified and field-tested in accordance with the mandatory ENERGY STAR testing protocols and RESNET Standards by a RESNET-accredited Home Energy Rater.
- Complete the ENERGY STAR Thermal Bypass Inspection Checklist.
- Additional requirements of the ENERGY STAR Qualified Homes National Performance Path Requirements are available at http://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.homes_guidelns

Advantage: Proven energy performance by a third party Home Energy Rater using the latest testing methods. This ensures the home is operating at the highest level of energy efficiency and air tightness.
Documentation: Proof that home performs to ENERGY STAR performance criteria through ENERGY STAR reports from REM/Rate or EnergyGuage. This Home Energy Rating Index will be necessary to determine the number of points awarded for Green Building Program.

OR

A.2 Meet ENERGY STAR® Prescriptive Path Requirements – *Mandatory*
Definition: The Prescriptive Path, where builders construct the home using a prescribed set of construction specifications that meet program requirements. A Builder Option Package (BOP) provides a set of construction specifications that enable a home to qualify for the ENERGY STAR label. Although using the BOP negates the need for a HERS rating, a RESNET-certified Home Energy Rater must verify that all BOP requirements have been met.
Action: To qualify as ENERGY STAR using the Prescriptive Path, a home must:

- Be built to the requirements specified in the appropriate ENERGY STAR Builder Option Package (BOP) for Steamboat Springs/Routt County Climate Zone 7. The BOP for

Steamboat Springs/Routt County is available online (http://www.energystar.gov/ia/partners/downloads/BOP_074.pdf) or can be picked up at the building department.

- Complete the ENERGY STAR Thermal Bypass Inspection Checklist.
- Be verified and field-tested in accordance with the mandatory ENERGY STAR testing protocols and RESNET Standards by a RESNET-accredited Home Energy Rater.2
- Meet all applicable codes listed online (http://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/RefStdsFinal_112006.pdf) or can be picked up at the building department.

Advantage: Showing ENERGY STAR compliance using prescriptive methods proves that a home is built to a level15% better than a 2006 International Energy Conservation Code reference home. Duct tests and blower door tests confirm the house is sealed tightly.
Documentation: Verification from a Home Energy Rater that the home is designed to Steamboat Springs BOP minimum requirements must be submitted with building permit plans. Verification can be in the form of a letter or report submittal. The BOP submittal shall verify the home meets the minimum requirements for the building envelope, windows, ducts, mechanical equipment, infiltration, and lighting and appliances. The final ENERGY STAR Certificate must be submitted to Steamboat Springs/Routt County before issuance of a Certificate of Occupancy. For new construction, the HERS rater will also need to perform a pre-drywall inspection and final inspection as part of the Thermal Bypass Checklist.

SECTION B General Requirements

B.1 Incorporate Checklist in Blueprints – *Mandatory*
Definition: Attaching the Single-Family Green Checklist to the blueprints makes it easier for everyone involved—including the building professionals, homebuyer and municipality—to see which green features are included in the home.
Action: In one of the first few pages of the project blueprints, include the Green Checklist, with the applicable points checked off. To make it easier to verify the project's achievements, next to each item on the checklist note the blueprint page number that corresponds to that particular point and make an obvious note on that blueprint page.
Advantage: Including the Single-Family Green Checklist in the blueprints raises the visibility of green building. This may encourage builders to incorporate more green features. It also provides a quick reference and benchmark for the builder, buyer and municipality.

B.2 Develop Homeowner Manual of Green Features/Benefits – *Mandatory*
Definition: A green homeowner manual describes all of the home's green features and their benefits. It also gives important information about best practices for maintaining and operating the home.
Action: Develop a separate green homeowner manual or include a green section in the standard homeowner manual. A comprehensive manual should include the following information:

- Description of the home's green building features
- Explanation of importance of maintenance and operations to achieve ongoing green building benefits
- Warranty, operation and maintenance instructions for equipment and appliances
- Household recycling opportunities
- Ways to optimize water and energy use
- clear labeling of safety valves and controls for major house systems
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Advantage: Green homeowner manuals instruct homeowners on best practices to maximize their investment by maintaining their home and its landscaping in a healthy and environmentally responsible manner.

SECTION C Site

C.1 Protect Native Soil and Minimize Disruption of Existing Plants & Trees – *Mandatory*
Definition: Soil is a valuable, living resource that should be protected. Through careful planning and construction practices, valuable soil as well as mature trees and other plants can be preserved.
Action:

- Restrict heavy equipment that compacts soil, including cars, to areas that are or will be paved or built over.
- Identify areas to be paved as a place to store existing topsoil, if topsoil needs to be removed from an area during construction. Protect stored soil from erosion. Delineate on the construction site management plan.
- Protect trees and shrubs from construction equipment by placing temporary fencing beyond their drip lines. Delineate on the construction site management plan.
- When grading is unavoidable, existing horticulturally suitable topsoil shall be stockpiled and re-spread during final landscape grading. After construction, evaluate the quality of the stockpiled soil, amend with compost, and re-spread. Any new soil that needs to be added shall be similar to existing soil in pH, texture, permeability, and other characteristics, unless soil analysis reveals that a different type of soil is appropriate.

Advantage: Plants thrive in healthy soil. Healthy soils can also significantly reduce storm runoff, reduce fertilizer and pesticide requirements, improve water quality and conserve irrigation water. Protection of existing mature landscape features helps prevent soil erosion, keeps the home and surrounding environment cooler in the summer, keeps plant waste out of landfills, preserves nature and adds value to the community.
Documentation: Show protected areas on a construction site management plan (CSMP)

C.2 Erosion Controls During Construction – *Mandatory*
Definition: Sedimentation of drainages, creeks, and rivers is not permitted under state and federal law. When the earth is disturbed to build, it makes the site vulnerable to erosion. Valuable nutrients can be lost, making landscaping a challenge.
Action: Prevent sediment from leaving construction sites by providing best management practices such as, silt fencing or straw-bales in runoff areas. Protect stockpiled soil and disturbed areas from erosion.
Advantage: Prevents culverts and drainage ways from clogging which reduces the chances for flooding. Erosion controls also have environmental benefits for aquatic species.
Documentation: Show on a construction site management plan (CSMP)

C.3 Site is within 1/4 Mile of Public Transportation or 3/4 of a Mile of a Community Center
Definition: Community centers are those existing areas that have commercial uses, services, activities, and public facilities.
Action: Choose site located within ¼ mile radius of public transportation or ¾ of a mile radius of a community center.
Advantage: Americans drive an average of 24 miles to work every day. Constructing in areas that are within walking distance to public transportation and community centers allows homeowners to cut back on automobile and oil dependency.
Documentation: Show on site plan and/or vicinity map showing compliance. Provide a vicinity map and location of nearest public transit to scale.

C.4 Recycle Green Waste
Definition: Green waste is the clippings, shrubs, and any trees that have been cut, torn down, or pulled up for clearing the construction site.

Action: Use composted or mulched waste to enhance soil onsite or to reduce evaporation.
Choose 1 of the following:

a. On Site

b. At Community Compost Center

Advantage: Re-use of organic material on site and keeps waste out of landfills.
Documentation: Show on a construction site management plan or indicate the receiving site.

C.5 100% Excavated Topsoil Reused on Site
Definition: Excavated topsoil is the top 6-12 inches of earth that is removed for construction.
Action: Remove topsoil and stockpile in a roped-off section of the site to be undisturbed during construction for reuse on site post construction.
Advantage: By re-using the topsoil on site, it eliminates the need to truck in soil for landscaping.
Documentation: Show on a construction site management plan (CSMP)

C.6 Use Recycled-Content Aggregate (Minimum 25%)
Definition: Virgin aggregate comes from sources such as riverbeds and quarries where mining activities may disturb the environment. Recycled aggregate consists mainly of reused concrete and asphalt pavement that has been crushed to 3/4-inch.
Action: Use recycled-content aggregate wherever Class 2 aggregate is specified for these applications:

a. Walkway and Driveway
b. Roadway Base

Advantage: Protects sources of virgin aggregate and reuses a waste material keeping it out of the waste stream.
Documentation: Make a note on plans and provide the source of materials.

C.7 35% or more Fly Ash Content in 100% of Concrete Used (non foundation)
Definition: Flyash is a byproduct of coal-burning power plants. It is typically sent to the landfill, but can be an inexpensive and quality substitute for a portion of the Portland cement in concrete. Concrete suppliers routinely replace 20% of the Portland cement in their mixes with flyash.
Action: Up to 50% of cement can be replaced with flyash or slag in many residential concrete mixes. However, high-volume flyash mixes (35% replacement or more) may require longer cure times and different finishing techniques than standard concrete. Follow guidelines of American Concrete Institute for cure time.
Advantage: Flyash improves the performance of concrete by increasing strength, reducing permeability and reducing corrosion of reinforcing steel. Using flyash also reduces use of water and cement needed. Cement production is energy intensive; it accounts for more than 8% of the world's carbon dioxide emissions that contribute to global warming.
Documentation: Provide receipt from batch plant.

C.8 Concrete Curing Process does not Include Propane or Additional Energy to Cure
Definition: During the colder months throughout Routt County, the common practice has been to heat the concrete foundations for quicker curing times. This uses unnecessary amounts of energy that could be avoided if concrete were poured during the warmer months of the year or appropriate admixtures were used.
Action: Pour concrete during the warmer months, May-September or allow for longer curing times in the winter months. If this can not be done, use renewable energy sources.
Advantage: Saves energy.
Documentation: Provide documentation at the time of Certificate of Occupancy.

C.9 Pervious Materials
Definition: Pervious materials are those that permit the passage of water through the paved area to the soil below. These materials are used to replace asphalt or concrete paving for driveways,

parking surfaces, patios and walkways. Stone, pavers, brick and gravel are all examples of pervious materials.
Action: Construct hardscape (paved) areas with pervious materials. **Choose 1 of the following:**

a. **25-50% of hardscape area**
b. **50-100% of hardscape area**

Advantage: Installing pervious materials in paved areas allows rainwater to penetrate the soil reducing demand on using potable water for irrigation.
Documentation: Show impervious materials and locations on site plan or grading and drainage plan.

C.10 No Fossil Fueled Snowmelt System
Definition: A typical practice in Colorado mountain towns is a snowmelt system in the driveways and walkways to keep them clear of snow and ice. This practice uses excessive amounts of energy. Some homes can be found with running snowmelt systems even when the home is unoccupied for weeks at a time.
Action: Do not install a fossil-fueled snowmelt system in the driveway of the home.
Advantage: Lowers energy costs and demand of local energy supply.
Documentation: If using a renewable energy source for snowmelt system, please show in plan set.

C.11 Engineered/Vegetated Swales to Filter Stormwater Runoff
Definition: A vegetated swale is a broad, shallow channel with a dense stand of vegetation covering the side slopes and bottom. Swales serve as short-term retention areas providing water to vegetation and keeping storm water from flooding streets and roads.
Action: On the grading and drainage plan show water drainage patterns (paths) from developed areas and a watercourse to vegetated swales. Water from developed areas should be diverted to vegetated swales to slow and filter storm water egress flow prior to leaving the site.
Advantage: Allowing the water to percolate into the soil on site filters out pollutants and improves water quality, it promotes infiltration and keeps storm water from flooding streets and roads.
Documentation: Show on grading and drainage plan.

SECTION D Recycle and Reuse

D.1 Deconstruction Plan for Existing Building Demolition
Definition: Create a site-specific program to reduce the deconstruction waste stream by dismantling the structure for reuse of valuable building materials. The plan requires a description of the materials to be recovered, designation of deconstruction contractor, site plan for collection bins, and destination designation of all materials expected to be recycled, reused, or resold. Materials from the following categories should be considered: doors, windows, cabinets, wood flooring, plumbing fixtures, framing materials, concrete, and brick.
Action: Completed plan must be submitted to Building Inspection during plan review. Plan should detail how 60% of the total volume of reusable or recyclable materials is to be reused or recycled.
Advantage: Preserves natural resources and diverts material from the landfill.
Documentation: Provide plan.

D.2 Recycle Job Site Construction Waste
Definition: A typical new home creates anywhere from 3.0 to 5.2 pounds of waste per square foot, and roughly 80% of a homebuilder's waste stream is recyclable. The primary components of this waste stream are wood, drywall, cardboard, metals and other materials. The minimization of construction waste through strategies that prevent the generation of

waste at its source can provide significant cost savings to both the builder and solid waste management agencies.
Action: Strategies include packaging source reduction (primarily cardboard and plastics from plumbing, appliance and cabinet vendors) and more accurate lumber estimates that include a reduced waste factor. Many builders have seen a significant reduction in lumber waste through turnkey framing operations. To facilitate jobsite recycling, the various materials should be sorted on-site. Identify the types and quantities of materials generated at the job site and determine what can be reused in the current project or on another project, and what can be recycled. On the jobsite, allocate space for recycling bins and storage areas for reusable materials and label them in both English and Spanish. Train workers on what goes where. Cardboard, concrete and asphalt can almost always be recycled. At least 90% of the remaining construction materials should be recycled. Contact local recycling facilities and haulers to identify terms and conditions required for recycling materials.
Advantage: Reuse and recycling of construction debris conserves natural resources and slows the rate at which landfills reach capacity. In addition, builders can save money by lowering disposal fees.
Documentation: Show construction recycling areas on a construction site management plan.

D.3 Install Built-In Recycling Center
Definition: To encourage homeowners to recycle their waste, install a built-in recycling center into the home for plastic, glass and cardboard. Adding a built-in composting center encourages kitchen waste is recycled.
Action:

a. Built-in recycling center: Provide storage and bins for plastic, glass and cardboard to be easily separated and contained. This could be an extra cupboard space in the kitchen or a built-in cabinet in the garage that contain clearly labeled bins.

b. Built-in composting center: Include a built-in space near kitchen sink for kitchen waste to be composted. Outdoor compost needs to be placed where it can be protected from wildlife in a bear-proof container. Varieties and styles can be found on www.compostbins.com

Advantage: Will encourage homeowners to recycle, cutting down the load on the landfills and closing the loop on recycled products.
Documentation: Show on floor plans.

D.4 Recycled Concrete or Asphalt
Definition: Recycled concrete takes discarded concrete and breaks it up to be used in aggregate for new concrete. Larger pieces of the recycled concrete can be used as sub-base for driveways.
Action: Call locally to use this material for road base or driveways.
Advantage: Use of local materials and keeps waste out of landfills.
Documentation: Make a note on plans and provide the source of materials.

SECTION E Foundation

E.1 Pre-pipe under Slab for Radon Resistant Construction – *Mandatory*
Definition: Radon is a clear, odorless gaseous by-product of the natural breakdown of uranium in soil, rock, and water. While radon gas dissipates in open spaces, it tends to cling to particulate matter and accumulates when enclosed. The Surgeon General has stated that radon exposure is second only to tobacco smoke as a cause of lung cancer. In Colorado many homes have radon levels above the recommended mitigation level (4 picocuries per liter). Radon mitigation systems are designed to ventilate this gas out of the house before it has a chance to accumulate and apply to both crawl spaces and slab-on-grade.
Action: Lay a perforated pipe in a 4- to 6-inch layer of large gravel under the foundation slab. If radon is detected after completion, connect this to a solid pipe running to the attic and through the roof. Attach a fan to this pipe for discharging the radon. There are other strategies for radon

remediation that are available on the EPA website (www.epa.gov). **An alternative compliance method for future radon mitigation may be approved as acceptable by the Building Department.**
Advantage: Pre-piping a radon mitigation system will significantly reduce the occupants' cost of future radon exposure.
Documentation: Show on foundation plan.

E.2 Replace Portland cement in Concrete with Recycled Flyash (Western coal) in Foundation – *Mandatory 20% Minimum*
Definition: Flyash is a byproduct of coal-burning power plants. It is typically sent to the landfill, but can be an inexpensive and quality substitute for a portion of the Portland cement in concrete. Concrete suppliers routinely replace 20% of the Portland cement in their mixes with flyash.
Action: Up to 50% of cement can be replaced with flyash or slag in many residential concrete mixes. However, high-volume flyash mixes (35% replacement or more) may require longer cure times and different finishing techniques than standard concrete. Follow guidelines of American Concrete Institute for cure time.
Advantage: Flyash improves the performance of concrete by increasing strength, reducing permeability and reducing corrosion of reinforcing steel. Using flyash also reduces use of water and cement needed. Cement production is energy intensive; it accounts for more than 8% of the world's carbon dioxide emissions that contribute to global warming.
Documentation: Provide receipt from batch plant. Make a note on plans and provide the source of materials.

E.3 Conditioned Crawlspace
Definition: Traditionally, crawlspaces are uninsulated and have vents that allow air to pass through, with the intent of keeping them dry. During the winter, when moist air can enter the cool crawlspace, moisture can condense, leading to mold and wood rot. A conditioned crawlspace closes up the vents and insulates the crawlspace making it part of the conditioned envelope.
Action:

1. Eliminate the vents when blocking or pouring the cement for the foundation.
2. Make sure there is a tight seal between the mud sill and the top of the foundation by placing a sill sealer and expanding foam between the mud sill and the top of the foundation.
3. Caulk the joints between the pieces of lumber making up the rim joist, then caulk or glue the entire rim joist to the mud sill.
4. Glue and screw the subfloor on top of the floor joists and the top rim joist, so no air can work its way under the subfloor.
5. To prevent drafts and moisture from getting into the crawlspace, use expanding foam to seal up any penetrations in the foundation walls, rim joist, or subfloor. These penetrations could include hose bibs or electrical services.
6. On the floor of the crawlspace, create a moisture and vapor barrier by laying down sheets of polyethylene, 10 mm. or thicker, lapping them over each other with at least a 6-inch overlap.
7. Tape the sheets together and seal them to the foundation walls with caulk, and secure to the wall a pressure-treated furring strip. This will create continuous water and vapor barrier.
8. Drape a perforated fiberglass blanket, with a minimum insulating value of R11, down the walls and attach them to the rim joist and staple them to the underside of the subfloor and the furring strip. Or use rigid closed cell foam board inside or outside the foundation walls.
9. Make sure the batts fit snugly together and add additional insulation to the rim joist for a continuous plane of insulation from the subfloor to the crawlspace floor.
10. Install a small register for heat to enter the crawlspace area for conditioning.

Advantage: Insulating the walls of the crawlspace, sealing up penetrations and creating a moisture barrier will give homeowners a safer, more durable home with lower utility bills.

Documentation: Insulation to be drawn on plans with indication of duct register in the crawl space.

E.4 Insulate Heated Garage Slabs & Perimeter (Min of R10)
Definition: If the garage is not a part of the thermal envelope of the home, it is still good practice to insulate around the perimeter of the foundation of a heated garage slab. Include in the home energy calculation.
Action: Before pouring the slab, install 2" closed-cell rigid foam insulation (minimum of R-10), inside the perimeter of the slab form.
Advantage: Significantly reduces the cost of heating the garage.
Documentation: Show in section on foundation plan.

E.5 Frost-Protected Shallow Foundation (FPSF)
Definition: Foundations in cold climates typically sit deep below the frost line to prevent heaving damage from the freeze-thaw cycles. A frost-protected shallow foundation (FPSF) is surrounded by horizontal and vertical insulation, which, in effect, raises the frost line to just below the surface, allowing reduced excavation and foundation wall depths.
Action: Excavate the foundation perimeter to 16 inches deep rather than the 48 inches typical to the Routt County climate. Place a minimum of 2" closed cell rigid foam insulation vertically down to the 16 inch depth and place the same rigid foam horizontally 4 feet wide extending out from the foundation, against the outside face of the foundation wall.
Advantage: An FPSF typically reduces both concrete use and labor by up to 40%. An FPSF's insulation can significantly moderate the foundation temperatures, making the home more energy efficient and comfortable.
Documentation: Show in foundation/footing plan and details.

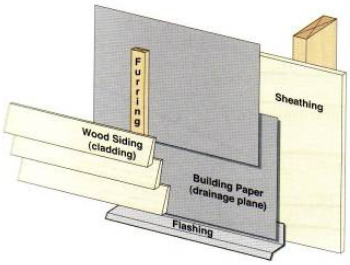
E.6 Non-asphalt-based Water Proofing
Definition: Damp proofing protects the porous concrete foundation wall from absorbing ground moisture by capillary action or wicking. Damp proof all basement walls, as well as those garage and crawl space walls common to basement walls. Asphalt damp proofing can leach into the soil and the water table.
Action: The normal specification for damp proofing material should be a non-solvent based coating, sprayed in one coat, and installed within 1' +/- of level of finished grade.
Advantage: Solvent-based damp proofing products tend to have a high VOC content and may be a source of groundwater contamination. Non-asphalt damp proofing reduces the potential for groundwater contamination.
Documentation: Provide specification and receipt for non-asphalt based water proofing.

SECTION F Structural Frame and Building Envelope

F.1 Design Energy Heels on Trusses (120% of Attic Insulation Height at Outside Edge of Exterior Wall) – *Mandatory*
Definition: Trusses save time in the field and require less dimensional lumber to make than a conventionally framed roof. Standard trusses, however, don't leave room at the eaves for insulation. Switching to a raised-heel truss solves the problem by allowing full-depth insulation to extend all the way to the outside of the wall. Be sure to accommodate trim details to raised dimension.
Action: When designing the trusses for the roof framing, be sure to design a raised heel that will accommodate 120% of the attic insulation height at the outside edge of the exterior wall.
Advantage: Designing energy heels on trusses will allow for insulation in common problem areas. Provides insurance against ice dams and will cut heating and cooling costs.
Documentation: To be shown in framing plan and called out in specifications
F.2 Low-VOC Caulk and Construction Adhesives (<70 gpl VOCs) used for All Adhesives

Definition: Low-VOC caulks and adhesives are typically water-based rather than incorporating solvents such as toluene and xylene that are known to be carcinogens by the State of California and the EPA.
Action: Use only water-based or urethane adhesives for all applications inside the envelope of the house. For a list of products go to www.buildinggreen.com under Products, Caulks & Adhesives.
Advantage: These alternatives are healthier for both the installer and the homeowner.
Documentation: Self certified.

F.3 Structure Wrapped with an Exterior Drainage Plane Barrier to Manufacturer's Specifications – *Mandatory*
Definition: A drainage plane provides for positive moisture drainage down the walls of a building behind the siding.
Action: Housewrap, drainage membranes or felt paper is installed from the bottom up providing for overlap on each row. There must be weep holes at the bottom to assure the moisture escapes the wall surface on to the ground.
Advantage: Moisture damage is the most common type of building failure. Preventing the intrusion of moisture from the exterior during hard rains or snow buildup can protect the structure from long term moisture damage,
Documentation: Show in wall section with drainage plane in specifications.



F.4 Sill Plate Sealed with Foam Sill Sealer – *Mandatory*
Definition: Sill plates without a total seal are prone to leak air losing interior conditioned air and causing drafts.
Action: Lay a strip of sill sealer under the sill plate on all floors before standing the wall.
Advantage: Drafts can result in as much 25% of the cost of heating and cooling a house. This is one of the primary places where drafts can occur.
Documentation: Self-certified.

F.5 Simple Footprint
Definition: A simple footprint is defined in terms of the number of corners formed into the foundation of the project.
Action: Reduce the number of corners that are unnecessary. **Choose 1 of the following:**

a. **10 Corners or less**
b. **8 Corners or less**
c. **6 Corners or less**
d. **4 Corners or less**

Advantage: Not only does reducing corners improve energy efficiency but it saves money. Fewer corners mean less heat loss, less finishing, less material, less waste, less time, and less cost.
Documentation: Show on site plan with building footprint.

F.6 Building Envelope Dimensions in 2 Foot Increments
Definition: Modular construction refers to designing a building on 2-foot increments to make the most efficient use of building materials (e.g., framing lumber, wood sheathing, drywall, and trim) that typically are stocked in multiples of 2-foot dimensions.
Action: Provide plan and elevation drawings that clearly mark the framing members.
Advantage: This technique reduces waste associated with making cuts in lumber.
Documentation: Show dimensions on plan

F.7 All Framing Members Shown on Drawings in Plan and Section for Advanced Framing
Definition: During construction discrepancies can be found between the plan and section drawings creating problems that take time and resources to fix. Having the framing members

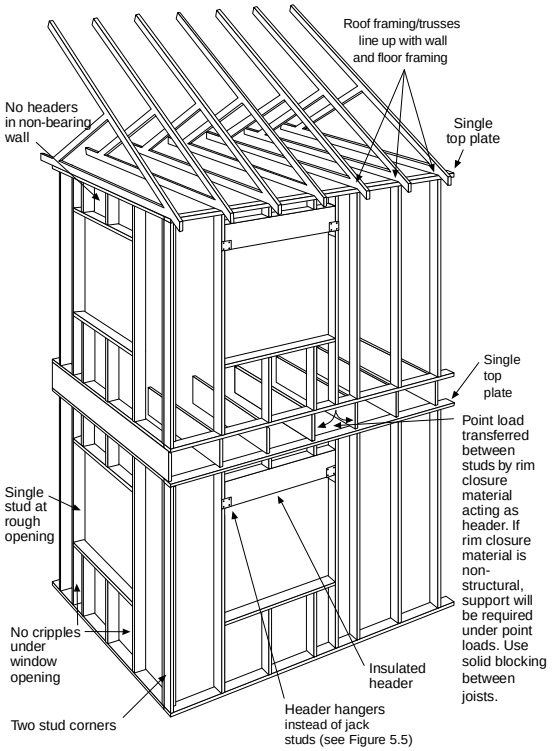
shown in both the plan and section drawings ensures that the frame stacks properly and the construction process goes smoothly without costly change orders that need to be made during construction.
Action: Provide plan and typical sections that clearly mark the framing members. Structurally Insulated Panels (SIPs) panels should be shown on drawings.
Advantage: Specifying framing members are clearly represented in both the plan and section drawings can highlight problems in the drawing phase making it easier to correct before construction breaks ground. Advanced framing saves lumber and money.
Documentation: Provide plan and section drawings that clearly mark the framing members or SIPs engineering drawings submitted.

F.8 Design Roof Trusses to Accommodate Ductwork under Insulation
Definition: One way to include HVAC ducts in conditioned space is to design trusses with sections that accommodate the ducts. This may add only slightly to the cost of the trusses.
Action: Coordinate with the HVAC contractor and structural engineer before ordering trusses to identify opportunities for including all ducts in conditioned space. If feasible, order trusses with a plenum space between the bottom truss chord and the ceiling; insulate the plenum and seal it with drywall or another air barrier.
Advantage: Designing trusses to accommodate ducts can reduce the cost of the duct installation. It also reduces duct heat loss/gain and air leakage to the attic.
Documentation: Shown in plans.

F.9 Materials Manufactured Regionally/Locally
Definition: Transportation of building materials can consume tremendous amounts of energy in addition to the energy it takes to produce the materials used in the construction of the home. Locally produced framing products reduce the shipping impacts.
Action: Provide documentation on-site for any materials used that are manufactured in the state of Colorado.

a. **20% within 500 miles of Routt County**
b. **20% from Routt County**

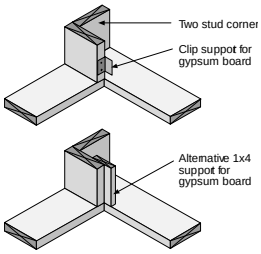
Advantage: By using materials that were manufactured in Colorado you are cutting down on the resources used to transport materials to the home. This is not only good for the environment, but it supports local business and the local economy.
Documentation: Make a note on plans or specifications and provide the source of materials.



F.10 Optimal Value Engineering (Advanced Framing) (Min. 3 Points)
Definition: Optimal Value Engineering (OVE), also known as advanced framing, refers to techniques that reduce the amount of lumber used to build a home, while maintaining structural integrity and meeting or exceeding the building code.
Action: Implement any number of common OVE techniques including framing 2x6 on 24-inch centers instead of 16-inch, using the right-sized headers for the load, using only jack and cripple studs required for the load, using insulated headers on exterior walls, and building two-stud corners with drywall clips.

a) **All roof and floor loads stacked over studs**
b) **2x6 Studs at 24-Inch On Center Framing**

c) **Two-stud Insulated Corners:** Frame corners using only two studs. Insulate with wall insulation to fill cavity.
d) **Door and Window headers sized for load**
e) **Insulated headers (R-10 min) installed on all exterior walls** Also eliminate headers in non-load bearing walls.
f) **Use only jack and cripple studs required for load**
g) **Trusses replacing rafters for 90% of roof area**
h) **Insulate partition wall intersections during construction**
i) **Ladder blocking for partition intersections**



Two-stud Corner

Advantage: Using OVE techniques saves wood and construction costs without a reduction in structural strength. Many OVE techniques also allow more of the wall to be better insulated, which improves energy efficiency and comfort. Make sure structural materials are graded. Builders should consult with structural engineer.
Documentation: Framing plan to be included in drawings. Observed by inspectors.

F.11 Salvaged or Reclaimed Structural Materials
Definition: Salvaged material is that which has been saved from being sent to a land fill. Reclaimed material is that which has been claimed from an existing building being deconstructed.
Action: Use salvaged or reclaimed wood from an existing structure that has been deconstructed for the major framing components of the home. Salvaged and reclaimed structural framing components need to be stamped by an engineer for structural uses. **Choose 1 of the following:**

a. **5% of the structural materials**
b. **10% of the structural materials**

Advantage: Using salvaged and reclaimed materials in the structure not only saves material from landfills and repurposes it, but it cuts down on the amount of trees clear cut for use in framing. It also can add character and an eclectic aesthetic to the home.
Documentation: Make a note on plans and provide the source of materials.

F.12 Engineered Lumber for 90% of Framing
Definition: Solid-sawn lumber in sizes 2x10 and greater typically comes from old-growth forests or large diameter trees. Engineered lumber products, on the other hand, come from small-diameter, fast-growing plantation trees. These products include glued laminated timber (glulam), laminated veneer lumber (LVL), laminated strand lumber (LSL), parallel strand lumber (PSL), wood I-joists, wood floor trusses, finger-jointed studs and oriented strand board (OSB).

Action: Use engineered lumber instead of solid-sawn lumber wherever applicable. Review structural building plans to make sure that engineered lumber is called out on the plans.

a. Beams and Headers Engineered beams and headers can easily replace any solid-sawn member of similar size or even larger. In addition, large solid-sawn lumber is often used for headers and beams when smaller dimension lumber would suffice.
b. Wood I-Joists or Web Trusses for Floors The typical 2x10 and larger solid lumber used for floor joists can be replaced with engineered lumber in most applications. For long-span floor joists use floor web trusses. Not only are web trusses or I-joists stronger than solid beams, they are lighter. Some have knock-outs or cavities that allow ducts, pipes and wires to easily pass through them, resulting in quicker installation.
c. Wood I-Joists or Trusses for Roof Rafters For roof rafters use I-joists or trusses instead of solid lumber for roof framing.
d. Engineered or Finger-Jointed Studs for Vertical Applications Use engineered or finger-jointed studs wherever conventional studs are typically used. Finger-jointed studs use short pieces of 2x4 or 2x6 material glued together to form standard stud lengths,

while engineered lumber is typically veneers, strands or flakes of wood glued to form studs. These studs are all dimensionally straight and save on labor and material costs associated with culling crooked lumber and shimming and straightening crooked walls.

Advantage: Reducing demand for large dimensional lumber decreases pressure to harvest old-growth or large-diameter trees. Engineered lumber uses wood fiber more efficiently than conventional lumber. Most engineered wood products are straighter and stronger than solid-sawn equivalents, eliminating crooked walls and reducing material waste.
Documentation: Shown on plans and specifications.

F.13 Beetle Kill Pine Salvaged Wood for Studs
Definition: Bark beetles have been killing off lodgepole pines in Colorado at an increasing rate, 1.5 million acres to date.
Action: Can not receive points for F.14a or b. Buy timber milled from the beetle killed pines and/or use beetle killed pines from on site or surrounding areas to mill for structural timber.
Advantage: Uses the abundant local source of dead lodgepole pines and decreases the need for lumber trucked in from distant sources.
Documentation: Make a note on plans and provide the source of materials.

F.14 FSC-Certified Wood
Definition: Forest Stewardship Council (FSC) certification assures that the forest from which the wood was harvested is managed in an environmentally, economically and socially responsible manner. FSC is the only lumber verification rating that maintains chain-of-custody certification throughout the cutting, milling and final delivery of products, thus ensuring that the end product originated from a certified, sustainably managed forest.
Action: Use FSC-certified solid wood framing, engineered lumber, oriented strand board and plywood.

a. **Dimensional Studs: Minimum 40% (Can not receive points for b or F.13)**
b. **Dimensional Studs: Minimum 70% (Can not receive points for a or F.13)**
c. **Panel Products: Minimum 40% (Can not receive points for d)**
d. **Panel Products: Minimum 70% (Can not receive points for c)**

Advantage: FSC certification assures that forests are managed in a way that protects the long-term availability of wood resources, the health of forest ecosystems, and the sustainability of local economies.
Documentation: Make a note on plans and provide the source of materials.

F.15 Solid Wall Systems (Includes SIPs, ICFs, & Any Non-Stick Frame Assembly)
Definition: Solid wall systems include structural insulated panels (SIPs), insulated pre-cast concrete, insulated concrete forms (ICFs), and similar systems that are not constructed of wood studs and include insulation in the system.
Action: Each of these systems entails its own specialized installation techniques. Always follow manufacturer specifications.

a. Floors
b. Walls
c. Roofs

Advantage: These walls replace wood-frame construction by including structure, sheathing and insulation in a single durable, energy-efficient system. Most solid wall systems improve home comfort and save significant amounts of wood and energy.
Documentation: Inspected.

F.16 OSB for Subfloor
Definition: Oriented Strand Board (OSB) is chips of wood, cross-oriented in layers, compressed and bonded together with resin binders. Because OSB uses chips, the production process uses 95% of the tree, while plywood can leave 35% as waste. It also uses species of trees such as Aspen that can be harvested young and are quick growing, keeping old growth forests protected. The resins used to bond the chips are very low-emitting phenolic resin and can even be found without added formaldehyde.

Action: Use OSB wherever plywood is specified.
Advantage: The use of OSB for sub floors and sheathing helps protect old growth forests, uses resources efficiently and contributes to good indoor air quality.
Documentation: Inspected.

F.17 OSB for Sheathing
Definition: Oriented Strand Board (OSB) is chips of wood, cross-oriented in layers, compressed and bonded together with resins and wax. Because OSB uses chips, the production process uses 95% of the tree, while plywood can leave 35% as waste. It also uses certain species of trees that can be harvested young and are quick growing, keeping old growth forests protected. The resins used to bond the chips are very low-emitting phenol resin and can even be found without added formaldehyde.
Action: Use OSB for wall or roof sheathing.
Advantage: By using OSB for wall and roof sheathing, you are protecting old growth forests and contributing to good indoor air quality.
Documentation: Inspected.

F.18 Install Rain Screen Wall System
Definition: A rain screen wall system or ventilated drainage plane is an effective solution to external moisture penetration. It allows for an air space between the siding and wall structure, protecting the home from damaging rain intrusion.
Action: Install siding over rainscreen product that creates an air space between siding and the structural wall. Flash all wall openings correctly and create vent strips at the top and bottom of the wall.
Advantage: Rain screen wall systems protect against moisture intrusion and rot by assuring water drains completely; reduce potential for indoor air quality problems associated with mold; increase the life of siding materials; and reduce heat gain by ventilating walls.
Documentation: Show wall section with drainage plane in specifications.

F.19 Roof Design includes Overhang
Definition: An overhang extends or projects the roof beyond the exterior walls of the building to protect the envelope. This excludes roof elements above dormers or other architectural details.
Action: Design at least a 24-inch overhang around the building's entire roof. Consider adding deeper overhangs where needed to shade walls and windows to provide cooling during summer.
Choose 1 of the following:

a. **Minimum 24-Inch Overhang**
b. **Minimum 30-Inch Overhang**

Advantage: Overhangs increase a home's durability by protecting siding, windows and doors from water intrusion, thereby reducing the likelihood of moisture penetration. They provide protection from the sun's harsh UV rays, which can degrade building materials and furnishings.
Documentation: Show on plan set.

F.20 Recycled-Content Steel Studs used for 90% of Interior Wall Framing Only
Definition: Steel studs can be either stand-alone or contain wood pieces within the "C" channel. Steel studs may or may not be load-bearing, depending on their rating.
Action: Use in non-insulated interior walls.
Advantage: In addition to its recycled content, steel provides strength, light weight, exacting specifications, fire- and pest-resistance, and fewer of the twisting, warping and other defects that can plague wood framing which impacts trim.
Documentation: Self-certified.

F.21 All Closet Headers Flat Framed
Definition: Closet headers don't typically carry any load but are often framed like a window with double 2x4s. Flat headers are single 2x4s framed flat since they only need to accept the door jam.
Action: When framing closets, use 1 2x4 for the header.
Advantage: Saves wasted lumber and uses wood responsibly.
Documentation: Inspected.

SECTION G Exterior Finish

G.1 Select Durable and Non-Combustible ≥ 40 Year Roofing Materials – *Mandatory*
Definition: A typical 15-year asphalt shingle roof won't last as long as the mortgage of a home. Forty- to fifty-year asphalt shingles, tile, slate, fiber-cement, recycled plastic and metal are examples of durable roofing materials. A Class A fire rating offers a home the highest in fire protection.
Action: Applicable anytime roofing materials are specified. The Class A fire rating is achieved through the roofing material itself or through the roof assembly as a whole.
Advantage: Short-lived roofing materials result in more waste going to landfills and more money spent on roof replacement.
Documentation: Make a note on roofing plan.

G.2 Recycled-Content (No Virgin Plastic) Decking for all non-structural Decking
Definition: There are two types of recycled content lumber: recycled plastic lumber, which contains only recycled plastic and composite lumber, which combines recycled wood fiber and recycled plastic.
Action: Use recycled-content decking in all non-structural deck applications. Recycled content decking can be used in place of redwood, cedar and pressure-treated lumber for the top planks and railing. These products accept screws and nails, and cut like wood. Follow the manufacturer's installation recommendations closely. Choose recycled-content lumber that contains no virgin plastic.
Advantage: Recycled-content plastic and composite decking is more durable than most wood. It doesn't rot, crack, splinter, or require staining, and isn't treated with potentially toxic chemicals. Using recycled-content decking also reduces pressure to harvest forests.
Documentation: Make a note on plans and provide the source of materials.

G.3 FSC-Certified Wood Decking
Definition: FSC-certified lumber comes from forests managed in an environmentally and socially responsible manner.
Action: Use FSC-certified cedar or redwood lumber for all exterior decking applications or as structural decking members in conjunction with recycled-content decking. Choose a species of FSC-certified wood that are appropriate for exterior decking.
Advantage: FSC certification guarantees that forests are managed in a way that will assure the long-term availability of wood resources such as redwood and cedar and protects the health of forests.
Documentation: Make a note on plans and provide the source of materials.

G.4 Durable and Non-Combustible Siding Materials used on over 50% of Wall Surfaces
Definition: When choosing a siding material, the two most important qualities are durability and the source of the material. Sidings made of metal, stone, and brick offer a durable and non-combustible home exterior. Fiber cement and stucco are both very durable materials that withstand age, rot, and fire.
Action: Can not receive points for G.5 or G.6 Install non-combustible, durable siding for over 50% of exterior wall surfaces. Use in place of conventional wood siding.

Advantage: Using these siding materials can reduce repainting and maintenance, protects from fire, and may lower the homeowner's insurance, especially in fire-prone areas.
Documentation: Show on plan set and specify the materials to be used.

G.5 FSC-Certified Cedar Shakes
Definition: Cedar shakes can make a durable and attractive siding, but the best ones are manufactured from the sound heartwood of old-growth cedar trees. FSC-certified cedar ensures that the wood used was sustainably harvested allowing the old-growth trees to remain.
Action: Can not receive points for G.4 Use FSC-certified cedar for 100% of the shakes.
Advantage: Protects a valuable resource that is being rapidly diminished.
Documentation: Make a note on plans and provide the source of materials.

G.6 Beetle Kill Pine Salvaged Wood for Siding
Definition: Bark beetles have been killing off lodgepole pines in Colorado at an increasing rate, 1.5 million acres to date.
Action: Can not receive points for G.4 Buy timber milled from the beetle killed pines and/or use beetle killed pines from on site or surrounding areas to mill for siding. Must use for at least 50% of siding.
Advantage: Uses the abundant local source of dead lodgepole pines and decreases the need for lumber trucked in from distant sources.
Documentation: Make a note on plans and provide the source of materials.

G.7 Stone Exterior Finish Quarried within 500 Mile Radius
Definition: Routt County is situated central to many quarries of stone products. There is little need to import stone from distant places or other countries.
Action: Stone products and materials must be purchased and extracted from sites within 500 miles distance from Steamboat Springs/Routt County.
Advantage: By purchasing regional building materials, the local economy is supported, transportation costs and environmental impacts are reduced, and dollars are retained in the region, supporting the regional economy.
Documentation: List sources of stone exterior finish with address and distance from building site accompanied by map showing 500 mile radius circle around Routt County.

G.8 Reclaimed Exterior Trim/Siding
Definition: Reclaimed wood offers an environmental benefit because it reuses existing materials and therefore reduces the impact that the materials would have had on our local landfills had it not been reclaimed. The use of reclaimed lumber also reduces the impact of timber harvesting.
Action: Install reclaimed materials for 10 to 100% of all trim, siding and flooring areas.
Advantage: Reuse of building materials reduces our impact on timber harvesting.
Documentation: Make a note on plans and provide the source of materials.

G.9 Recycled Content Roofing for 50-100% of Roof
Definition: A typical 15-year asphalt shingle roof won't last as long as the mortgage of a home. They are made up of virgin materials and caustic asphalt chemicals and are not recycled. Approved roofing materials include non-combustible tiles made of concrete, recycled plastic panels, faux shake/slate and recycled aluminum. Steel roofing with at least 75% recycled steel content is also permitted. All roofing materials must be hail-rated for Colorado. Provide snow slide resistance devices for steep roofs.
Action: Install recycled-content roofing on 50 - 100% of roof. **Choose 1 of the following:**

a. **Recycled Content**
b. **75% Recycled Steel**

Advantage: Investing in a recycled-content roof, such as steel give you a longer lasting roof, that needs less maintenance, and when the roof does need repairs or replacement, can be recycled back into a new roof or other steel materials.
Documentation: Make a note on plans and provide the source of materials.

G.10 Vegetated Roof for 20% or More of Roof Area
Definition: Also known as living roofs, they typically consist of a flat or low-pitch roof with various roofing layers topped with a growing medium and plants chosen for their ability to withstand a roof's extreme conditions. These roofs replace heat-absorbing materials with plants that cool air through evapotranspiration (or evaporation of water from leaves).
Action: Both plants and soil must be matched very carefully to local climatic conditions. Use low maintenance, drought resistant plants. Soil depth is also key. A shallow soil layer may not be enough to protect root systems from intense cold, or may not hold enough moisture in dry areas to keep the roof healthy without additional watering. Additional roof structure is typically required and consultation with a professional is recommended.
Advantage: Vegetated roofs act as an additional insulation layer to reduce summer heat gain and winter heat loss. The soil captures, filters, and slows roof runoff, and it extends the life of the roof itself by protecting the waterproof membrane from sunlight and punctures.
Documentation: Show on plans.

G.11 Recycled and/or Recovered-content Fascia, Soffit and Trim
Definition: Fascia, soffit and trim must contain a minimum of 50% pre- or post-consumer waste.
Action: Can not receive points for G.12 Use recycled and/or recovered-content fascia, soffit or trim for 50% or more of the fascia, soffit, and trim.
Advantage: Keeps waste out of landfills and saves energy on the process of producing virgin products.
Documentation: Make a note on plans and provide the source of materials.

G.12 Fiber Cement Fascia and Soffit
Definition: Fiber cement is a durable material that withstands age, rot and fire.
Action: Can not receive points for G.11 Use fiber cement fascia and soffits on a minimum 75% of the home.
Advantage: Uses a material that reduces the need for maintenance.
Documentation: Make a note on plans.

SECTION H Windows and Doors

H.1 Design Entry with "Airlock"
Definition: A solid-core door is about R-1 per inch and sometimes less when composition material is used. Even a well insulated entry door with high-quality weatherstripping is not as energy efficient as a well-insulated wall. One solution is to include a mudroom or entry "airlock" that helps buffer the rest of the house from the relatively low thermal performance of the door itself.
Action: At the design stage of the house, plan in an entry airlock space.
Advantage: Reduces the cost of heating the home by decreasing the loss of conditioned air through doorways. Provides a space to take off shoes and hang up coats before entering the home.
Documentation: Show on plan set.

H.2 R-5 Insulated Exterior Doors
Definition: A solid-core door is about R-1 per inch and sometimes less when composition material is used. Entry doors have about the same insulating potential as a double-glazed window but with more opportunity to leak air. Insulated steel or fiberglass entry doors are several times more energy efficient than a solid wood door.
Action: Install R-5 insulated doors in all exterior doorways. Fiberglass is more impact resistant and less likely to show dings and dents and conducts less heat than a metal-skinned door.
Advantage: Installing insulated exterior doors will increase the R-value and save money on heating and cooling costs as well as save energy.
Documentation: Show on plan set.

H.3 Recycled and/or Recovered Content Interior Doors (100%)
Definition: Luan, the tropical wood used as a skin on hollow-core doors, has been harvested by clear-cutting thousands of square miles in South East Asia, mountain sides denuded and ravaged by erosion. Another undesirable feature of hollow-core doors is that they are glued together with urea formaldehyde adhesives, contributing to indoor air quality problems.
Action: Use solid wood doors, doors using recycled materials or re-use reclaimed or recovered doors. MDF (medium density fiberboard) uses wood scrap that would otherwise end up in landfills and repurposes it into panels. If using MDF doors, be sure that it is made without urea-formaldehyde binders. If installing doors containing urea formaldehyde binders use two coats of low VOC paint to seal all sides of the doors.
Advantage: Reduces deforestation and improves indoor air quality.
Documentation: Make a note on plans and provide the source of materials.

H.4 Insulating Window Shades Installed (> 75% of all exterior windows R-3 or higher)
Definition: Windows, even high performance models, are still typically the largest point of heat loss in walls. By utilizing insulating window coverings, a window's thermal performance can be doubled or tripled. The idea is to let in light and open up views during the day while you're using the room, then close off the window with an insulating layer when the room is unoccupied or at night. There are products available that incorporate an insulating airspace between two layers of fabric. Other approaches include movable panels of fabric, covered rigid foam, and exterior motorized shutters that automatically open and close depending on sunlight and temperature with a manual override.
Action: Window coverings must be properly installed and have a minimum R-3 to qualify. Some common options are cellular shades, quilted shades, or shutters.
Advantage: Blanketing the windows with insulating window shades increases the R-value of the window keeping conditioned air in the house and not conducting out through the windows. Insulating the windows will save money and energy.
Documentation: Inspected at time of Certificate of Occupancy.

SECTION I Plumbing

I.1 Install R-15 Insulated Tank Water Heaters If Tank Heaters are Used – *Mandatory*
Definition: Water heaters loose 15% of their energy consumption through the tank while the water sits waiting to be used.
Action: If installing a tank water heater install a model with R-15 insulation. This is typically referred to as a "California builder model" It is acceptable to install an R-8 blanket around the tank if it doesn't void manufacturer's warranty. Provide information to homeowners on the added benefits of insulating the tank.
Advantage: Installing a tank that is insulated to R-15 or better helps to keep the heat in the tank where it is needed saving energy and money.
Documentation: Make note on plan set.

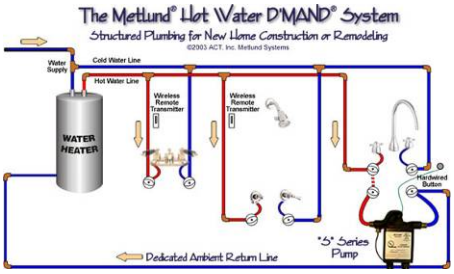
I.2 Distribute Domestic Hot Water Efficiently (Min. 3 Points)
Definition: Efficient distribution of hot water means shortening the wait time for hot water at the faucet and preventing any heat loss through the pipes.
Action:

a. Insulate All Hot Water Pipes with R-6 or Better Reduce heat loss, waste less water, and improve service by insulating all hot water pipes.

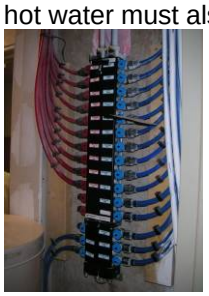
b. Insulate Cold Water Pipes 8 Feet from the Water Heater with R-6 Insulation Reduces convective heat loss that would be conducted through the water pipes if hot water from the water heater convects up through the house.

c. Use Central Core Plumbing (trunk and branch) (Can not receive points for e) The most effective means of reducing energy and water loss and material use, is to locate the

water heater within 8 to 15 feet in plan view of all hot water fixtures, including bathrooms, kitchen and laundry. This can be accomplished by stacking or clustering rooms that need water, and creating a central core mechanical space to house the water heater and pipes and integrate the furnace, air conditioner and ducts.



d. Use Structured Plumbing with Recirculation Loop and On Demand Pump (can not receive points for e) In larger homes with branched piping systems, another way to greatly shorten hot water delivery times is to install an on-demand hot water circulation system. These consist of a pump with on-demand controls (push button or motion-sensor activated) that circulate water from the hot water line through the cold line or via a dedicated return loop to the water heater. The term "structured plumbing" is similar to the term "engineered" (as used with parallel pipe systems) in that a structured pipe system is designed from the outset to optimize the circulation system. Only one pump is needed to supply hot water to all fixtures in the same circulation loop. All pipes carrying circulated hot water must also be insulated.



e. Use Engineered Parallel Piping (can not receive points for c or d) Often termed "home run," "manifold," or "parallel" piping, this alternative to typical "branched" piping can save water and water heating energy, if the system is well designed. Small diameter flexible pipes are run from a manifold (with branched outlets) located near the water heater directly to the fixtures, thereby decreasing the volume of water in the individual pipe and reducing friction losses and leaks imposed by elbows and other fittings. Parallel piping typically uses PEX (cross-linked polyethylene) pipe. With low-flow fixtures, 3/8-in. diameter piping is adequate for sinks and toilets; use 1/2-in. piping for other fixtures. To ensure that pipe efficiency is actually gained, that lengths are minimized, and that sufficient flow will be provided, prepare an engineered piping plan to show the location and diameter of hot water pipes.

Advantage: Locating the water heater close to usage points reduces heat loss, speeds the rate of hot water delivery, and reduces water wasted while waiting for hot water to arrive at a plumbing fixture. For larger houses, an on-demand hot water circulation pump may reduce waiting time without wasting energy.
Documentation: Shown on plumbing plans.

I.3 Drain Waste Heat Recovery System
Definition: An inline heat exchanger that uses hot water typically lost down the drain to preheat the incoming supply water.
Action: Install directly past waste trap in tubs and showers.
Advantage: The system can save up to 50% of the heat normally lost which translates into energy savings.
Documentation: Shown on plumbing plans.

I.4 Install Only High Efficiency Toilets (Dual-Flush or ≤1.3 gpf)
Definition: Standard new toilets use 1.6 gallons per flush (gpf). Toilets that use less than 1.3 gpf are called High Efficiency Toilets (HETs). HETs are available in dual-flush, pressure-assist and conventional gravity-flush models. Unlike some older models of ultra low-flow toilets, the majority of today's HET toilets perform well and doesn't require multiple flushes.
Action: Install HETs that meet or exceed the Maximum Performance (MaP) testing report or Uniform North American Requirements (UNAR).
Advantage: HETs perform well, reduce homeowners' water and sewer costs, and reduce demand on water supplies and treatment facilities.
Documentation: Note in specifications.

I.5 Composting Toilets
Definition: Composting toilets are toilet systems which treat human waste by composting and dehydration to produce a useable end-product that is a valuable soil additive. They come in a variety of models and brand names as well as different shapes and designs to enhance the natural composting process.
Action: Install minimum of 1 composting toilet.
Advantage: They use little or no water, are not connected to expensive sewage or septic systems, cause no environmental damage and produce a valuable resource for non-edible gardening.
Documentation: Note in specifications.

I.6 ≤2.0 gpm Showerheads Installed
Definition: Installing flow reducers on shower heads are an easy way to conserve water. Low-volume showerheads can save an estimated 38 gallons of water per day in a typical household when compared to showers with older shower heads of 5 gpm or more.
Action: Showerheads 2.0 gallons per minute or less must be installed on all showers. Provide any documentation for on-site inspection.
Advantage: Reduces water and energy use per shower.
Documentation: Receipt from supplier.

I.7 Grey Water Reuse for Toilets
Definition: Grey water reuse takes waste water from sinks and uses it to flush toilets.
Action: There is only one legal application at this time. It is a product from Australia that takes water directly from a sink drain and pipes it to a toilet tank. The water never leaves the closed system. Any other use of grey water inside the house is prevented by state plumbing codes.
Advantage: Grey water is useful for subsequent purposes rather than going down the drain. Several states are considering grey water for outdoor applications. Water can be reused several times saving the potable water for human use.
Documentation: Show on plumbing plans.

I.8 Side-arm Hot Water Heater
Definition: A side-arm or indirect heater uses hot water the boiler is already producing for a hydronic heating system so there is no separate heating element just for the water.
Action: Install a side-arm or indirect heat coil from the boiler for domestic hot water.
Advantage: Indirect heaters have the lowest lifecycle costs of any type of heater because they last longer, 30 years compared to an average of 13 for tank heaters. They are efficient, long lasting and save energy.
Documentation: Shown on plumbing plans.

I.9 Faucets Fitted with Aerator Restricting Flow to 2.0 gpm
Definition: An aerator mixes air into the water flow from the faucet.
Action: Either install low-flow faucets from manufacturers or retrofit aerators into higher flow faucets. This credit required for all faucets.
Advantage: Installing faucets with aerators cuts back on the amount of water used, without a noticeable change in the pressure of water coming out of the tap.
Documentation: Receipt from supplier.

I.10 Install Real Time Water Use Read Out
Definition: Water meters are typically outside the house and out of view of the occupants. This allows leaks particularly to be undetected for months or years. A meter read out also heightens the awareness of water consumption by the occupants.
Action: Install a meter that is connected to the exterior water meter in a conspicuous place that displays instantaneous water use.
Advantage: When there is a display within sight of the occupants, water leaks are immediately apparent and water can be conserved.

Documentation: Observed by inspector.

SECTION J Heating, Ventilation and Air Conditioning

J.1 Install Carbon Monoxide Alarm(s) (look for Canada CSA Standard) – *Mandatory*
Definition: Carbon monoxide (CO) is emitted from fuel-burning appliances such as stoves, cook tops, water heaters, furnaces and fireplaces, as well as from cars and some landscape equipment. If a home is tightly built for energy efficiency but has leaky HVAC ducts, the air leaks may depressurize the home and reverse the flow of exhaust vent pipes. This can introduce carbon monoxide from fuel-burning appliances back into the home, a process known as backdrafting.
Action: Install a carbon monoxide alarm per manufacturer's instructions near sources of CO and on each floor. Alarms must comply with both UL 2034 and CSA 6.19 (Canadian) standards. Alarms must be replaced every three to five years, as they lose their sensitivity over time.
Advantage: A carbon monoxide alarm provides an added level of home safety.
Documentation: Observed at final inspection.

J.2 Ground-source Heat Pump
Definition: Ground Source Heat Pumps (GSHPs) use the earth's energy, just below the surface, to heat and cool a home, and to help provide domestic hot water. Four to six feet beneath the surface, the earth's temperature remains fairly constant year-round, ranging from 45º to 60. GSHPs take advantage of this constant temperature to provide extremely efficient heating and cooling.
In winter, a fluid circulating through pipes buried in the ground absorbs heat from the earth and carries it into the home. The GSHP unit inside the home uses a heat pump to concentrate the earth's thermal energy and then to transfer it to the interior space for warmth.
In the summer, the process is reversed: heat is extracted from the air in the house and transferred through the heat pump to the ground loop piping. The fluid in the ground loop then carries the heat back to the earth. The only external energy needed for GSHP is the electricity needed to operate the heat pump, ground loop pump and distribution fan or pump.
Action: While designing a residential GSHP system is not particularly complicated, carefully select the size of the GSHP system, the size and design of the loop, and the type of fluid that will circulate through it. GSHP systems that are too large waste energy and do not provide proper humidity control. The actual size of the system should be within 15 percent of the calculated load. Always examine ways to use the GSHP system to provide hot water. Finally, minimizing heating and cooling needs reduces the required size, hence the cost, of the GSHP system.
Look for equipment that is certified by the Air-Conditioning and Refrigeration Institute (ARI), a non-profit organization that rates the performance of residential and small commercial GSHP equipment. Certified equipment carries the ARI seal.
Advantage: A Ground Source Heat Pump (GSHP) takes advantage of the earth's stable sub-surface temperatures to provide energy efficient heating and cooling. GSHPs can be installed on almost any size lot—under lawns, landscaped areas, driveways, or the house itself. An existing house can be retrofitted with a GSHP using the home's existing ductwork.
Documentation: GSHP design specifications, energy calculations (heating/cooling load bin analysis), and engineer stamped plans must be submitted during plan review.

J.3 Install Zoned, Hydronic Radiant Heating with Slab Edge Insulation
Definition: Instead of providing warm air via ducts, hydronic radiant heating systems circulate hot water through under-floor tubing, wall radiators, or surface applications routed out in subfloor or baseboard convectors. Hydronic radiant heating is most appropriate in cold climates or in homes where air conditioning is not needed.
Action: Design the system in accordance with Radiant Panel Association guidelines and use an RPA-certified installer. To reduce heat loss to the ground, the entire slab (edge and bottom) should be insulated to a minimum of R-5.

Advantage: Many people find hydronic radiant heating to be more comfortable than forced air heating. Hydronic radiant heating can provide even heat throughout a room, reduce drafts and eliminate duct leakage. They are also easily zoned which can save energy.
Documentation: Inspected.

J.4 Install Sealed Combustion Unit
Definition: Sealed combustion furnaces and water heaters duct outdoor air directly into a sealed jacket around the combustion chamber and then vent it directly outdoors, eliminating the use of house air for combustion.
Action: Can not receive points for J.6 Install in place of conventional atmospherically vented furnaces or water heaters.

a. Furnaces
b. Water Heaters
c. Boilers (cannot receive points for a or b)

Advantage: When a house is negatively pressurized by exhaust fans, dryers or leaky ducts, carbon monoxide can be pulled into the house (called backdrafting) from the combustion chambers of gas units. Sealed furnaces and water heaters eliminate that condition, thereby improving indoor air quality and reducing the danger of carbon monoxide contamination. Sealed combustion furnaces can also be installed (by code) in conditioned indoor spaces in tightly sealed houses, thus reducing heat loss to outdoors.
Documentation: Inspected.

J.5 Mechanical Equipment Centrally Located
Definition: Additional space is often required when mechanical rooms cannot be centrally located or when space requirements are fragmented throughout the building. Centrally located mechanical rooms in the house are placed within the middle third (1/3) of the distance of the longest horizontal diagonal.
Action: Locate mechanical equipment within the middle third (1/3) of the distance of the longest horizontal diagonal.
Advantage: Centrally locating mechanical rooms will minimize construction, maintenance, and operating costs through the reduction of ductwork, piping, and conduit runs. In addition, centrally located mechanical rooms will simplify distribution systems.
Documentation: Show on plan set.

J.6 Sealed Mechanical Room for Non-sealed Combustion Units
Definition: A sealed mechanical room isolates the combustion air from air in the conditioned space. Combustion air is supplied directly to the mechanical room and uses the room sealed from the interior spaces via an air barrier.
Action: Can not receive points for J.4 Mechanical equipment such as the furnace/boiler and water heater must be located in a separate room. The room should be sealed off with a continuous air-barrier, to minimize air infiltration from the mechanical area to the rest of the house and be insulated to R-11. Room must be fitted with an exterior solid-core door weather-stripped to exterior specifications.
Advantage: A sealed mechanical room reduces the risk of backdrafting due to negative pressures in the mechanical room as well as the threat of carbon monoxide poisoning.
Documentation: Observed by inspector.

J.7 Install High Efficiency HVAC Filter (MERV 6-13)
Definition: HVAC filters remove particulates from the air. MERV, or Minimum Efficiency Reporting Value, is a metric used to measure an air filter's efficiency. The MERV scale ranges from 1 to 20. The higher the MERV number, the more efficient the filter is at removing particles.
Action: Use HVAC air filters rated at MERV 6 to 13. These filters are recommended for cleaner air without compromising the performance of standard mechanical systems. Filters with MERV ratings of more than 13 create too much resistance to airflow, because the filter media becomes denser as efficiency increases. Only use a filter with a MERV of greater than 13 if the HVAC system is specifically designed for it.

Advantage: The U.S. EPA has identified micro-particulates as a leading cause of respiratory discomfort. By reducing these particles in the indoor air, a high efficiency filter protects the HVAC equipment and makes the living space healthier.
Documentation: Receipt

J.8 Gas Fireplaces
Definition: Gas fireplaces are installed in a large percentage of new homes mostly for decorative use. Many have very low efficiency (as low as 13%), yet homeowners often depend on them to meet some percentage of the heating load. Though there are no U.S. or state standards regulating their efficiency, efficiency listings are required in Canada and are available for many models sold in the United States. The energy efficiency rating of the fireplace is either on the EnerGuide label or in the product's technical information when multiple models are listed. The rating is expressed as a percentage; the higher the percentage, the more energy efficient the model.
Action: Do not install gas fireplaces unless their listed efficiency (from Natural Resources Canada) exceeds 60%. More points awarded for not installing a fireplace. **Choose 1 of the following:**

a. **None**
b. **Install sealed gas fireplaces with efficiency rating exceeding 60%**

Advantage: Efficient gas fireplaces consume less gas and reduce winter heating costs.
Documentation: Receipt

J.9 Install Effective Exhaust Systems in Bathrooms and Kitchens
Definition: Bathrooms and kitchens produce odors and a lot of moisture that can cause mold and other problems if the rooms are not properly ventilated. Gas ovens and cook tops produce carbon monoxide, nitrogen dioxide and other pollutants. Additionally, cooking food produces odors and particulates.
Action:

a. Install ENERGY STAR Bathroom Fans Vented to the Outside
Exhaust all bathroom ventilation fans to the outdoors, not to the attic. Choose ENERGY STAR®–qualified bathroom fans; quieter fans will have a rating of 1.5 sones or less.
b. All Bathroom Fans Are on Timer or Humidistat
This ensures proper run-time to adequately remove moisture from the room. Timers are triggered when the lights are turned on, and then run for a set time, such as 15 to 30 minutes. Humidistat controllers are even better, as they automatically switch on when moisture in the air reaches a threshold level, and shut down when the moisture level subsides.
c. Install Kitchen Range Hood Vented to the Outside
Use high efficiency range-hood exhaust systems that are ENERGY STAR®–qualified and vent them to the outside. ENERGY STAR® units are typically designed to be quieter (less than 4 sones) so that people will be more likely to use them. Don't install overpowered hoods that may cause backdrafting of combustion appliances.

Advantage: Effective bathroom and kitchen exhaust systems reduce energy use compared to standard models, provide better efficiency and comfort with less noise, and reduce moisture and indoor air quality problems.
Documentation: Note CFM and sone ratings in specifications.

J.10 Install Mechanical Fresh Air Ventilation System (Maximum 3 Points)
Definition: As the envelope is tightened the availability of fresh exterior air is diminished causing low indoor air quality. Mechanical ventilation systems exhaust stale, contaminated air caused by fumes and gases of home appliances, radon build up and mold and mildew. Introducing fresh, clean air is required if the house has less than >35 Natural Air Changes per hour (NACH).
Action: Use of this equipment is particularly appropriate if a blower door test of the home shows less than 0.35 Natural Air Changes per Hour (NACH). Provide the homeowner with clear information about such systems, so that they can operate and maintain them properly.
Choose from the following, not to exceed 3 points:

a. **Install Whole House Fan with Variable Speeds** exhaust fans should operate continuously and include provisions for filtered makeup air.
b. **Automatically Controlled Integrated Ventilation System** Integrated systems use the furnace fan to bring in outside air into the return duct through a dampered duct, and should be equipped with controls to regulate volume of air.
c. **Automatically Controlled Integrated System with Variable Speed Control** Integrated systems use the furnace fan to bring in outside air through a dampered duct, and should be equipped with controls to regulate volume of air.
d. **Any Whole House Ventilation System That Meets ASHRAE 62.2**
e. **Install Air-to-Air Heat Exchanger that meets ASHRAE 62.2** Stand-alone systems include heat recovery ventilators (HRV's) and energy recovery ventilators (ERV's) that employ heat exchangers to recover heat and/or moisture from the exhaust air stream. Install an air-to-air heat exchanger to deliver fresh air to high occupancy areas like bedrooms and living rooms.

Advantage: Mechanical ventilation systems provide today's tighter homes with fresh outdoor air. Whole house ventilation systems improve indoor air quality by diluting pollutants. Air-to-air heat exchangers introduce fresh air into the home while reducing energy loss by capturing heat from the exhausted air stream and transferring it to the incoming air.
Documentation: Inspected

SECTION K Electrical

K.1 Exterior Lighting Minimized (5500 lumens or less) to meet International Dark Sky Standard for Nighttime Light Pollution - *Mandatory*
Definition: Pollution doesn't just come in smog form. It also can affect us through too much light at night. Light pollution affects sleeping patterns, reduces night sky visibility and can be a nuisance to local animals. Exterior lighting that provides low contrast on critical areas, such as sidewalks and home entrances, is better for visual acuity than over lighting. Eliminate all unshielded fixtures that let light escape skyward or trespass on neighboring properties, such as floodlights.
Action: Total exterior lighting must be less than 5500 lumens (A 100-Watt incandescent or 23-watt CFL light bulb produce around 1750 lumens; 60-Watt incandescent or 13-Watt CFL produce around 800 lumens). Avoid outdoor lighting where it is not needed. Install lighting controls such as motion sensors, timers and photo sensors so that the lights are only on when and where needed. Look for fixtures certified by the Dark Sky Association for light pollution reduction (www.darksky.org).
Advantage: Helps keep sleeping patterns and helps nocturnal animals keep their natural rhythms. Saves energy.
Documentation: Exterior lighting plan to be submitted with construction plans. Lighting must be down-facing. Show in lighting plan.

K.2 Hard-wired Fixtures are Supplied with ENERGY STAR®-qualified Self-ballasted CFLs
Definition: Hard-wired fixtures using ENERGY STAR qualified compact fluorescent light (CFL) bulbs.
Action: (Prescriptive Path only) Specify in the plans showing hard-wired lighting fixtures in the kitchen, bedrooms, living room, and dining room contain ENERGY STAR CFLs.
a. **10% of all installed fixtures are supplied with bulbs that meet the requirement**
b. **20% of all installed fixtures are supplied with bulbs that meet the requirement**

Advantage: ENERGY STAR qualified light fixtures use two-thirds less energy and the bulbs last up to ten times longer than incandescent light bulbs.
Documentation: Specify in the plans showing hard-wired lighting fixtures in the kitchen, bedrooms, living room, and dining room contain ENERGY STAR CFLs.

K.3 Lighting Efficiency Packages

Definition: Standard incandescent light bulbs create more heat than they do light. Lighting efficiency packages specify the installation of ENERGY STAR®-qualified fixtures and bulbs that use less energy and create more light than heat.
Action:
Prescriptive Path: (**Must meet both a and b**)

a. **50% of total number of fixtures in interior rooms are ENERGY STAR®-qualified**
b. **50% of total number of outdoor fixtures are ENERGY STAR®-qualified**

Prescriptive or Performance Path: **(cannot receive points for a or b)**

c. **Comply with the ENERGY STAR® Advanced Lighting Package (ALP)** An ENERGY STAR Advanced Lighting Package (ALP) designation identifies homes equipped with a comprehensive set of ENERGY STAR qualified light fixtures. The ALP designation applies to lighting packages, for new home construction, that consist of a minimum of 60% ENERGY STAR qualified hard-wired fixtures and 100% ENERGY STAR qualified ceiling fans where installed. Go to http://www.energystar.gov/index.cfm?c=fixtures.alp_consumers for more information.

Advantage: With a lighting efficiency package installed, homebuyers can expect to save energy and money through reduced lighting operating costs.
Documentation: Specify on building plans.

K.4 Natural Day Lighting
Definition: Designing the home to take advantage of natural daylight. By planning rooms according to use and time of day, occupants can function with the natural light from the windows and not have to use artificial light until the sun goes down.
Action: Size and place windows and light tubes to allow for the most daylighting when people are likely to occupy the room. Plan rooms according to function:

a. **Design for high use rooms to be on the South facing side of home** ex. kitchen, living and family room
b. **Design for medium/low use rooms to be on North side of home** ex. master bedroom and dining room

Advantage: Cuts down on the use of artificial light, saving on energy bills by reducing the need for electricity during the day.
Documentation: Observed by inspectors

K.5 Light Tubes (2 Points per light tube, Max 6 Points)
Definition: In some cases, natural lighting is hard to get into spaces; an interior bathroom for example. Installing light tubes brings light into these spaces efficiently without the loss of much conditioned air since the tubes are insulated. Skylights do not fit this requirement as they often leak both air and water and contribute to inefficient heating.
Action: Install light tubes in hallways and interior rooms. Flash roof penetration properly.
Advantage: Provides natural daylighting in interior spaces and maintains the thermal envelope to save energy.
Documentation: Show on plan set.

K.6 Efficient Light Controls
Definition: Efficient lighting controls include occupancy/motion sensors and automatic daylight dimming controls.
Action: Will not receive points for K.3 Control at least 2 interior spaces with efficient lighting controls.

a. **Install dimmers** Dimmers save energy by adjusting the light levels to the task.
b. **Install motion detecting light switches** Occupancy sensors automatically turn lights on and off while detecting motion in a room

Advantage: Adjusting the level of light to match the need saves energy and makes a room more comfortable.
Documentation: Make note on plan set.

K.7 LED Lighting
Definition: A Light Emitting Diode (LED) is a semiconductor device which converts electricity into light. LED lighting has been around since the 1960s, but is just now beginning to appear in the residential market for space lighting. The efficacy of a typical residential application LED is approximately 60-100 lumens per watt (LPW), though efficacies of up to 100 LPW have been created in laboratory settings. Incandescent bulbs have an efficacy of about 15 LPW and ENERGY STAR® qualified compact fluorescents are about 25 LPW. LED strip lights can be installed under counters, in hallways, and in staircases; concentrated arrays can be used for room lighting. Waterproof, outdoor fixtures are also available.
Action: Will not receive points for K.3 Install LED lights anywhere artificial lighting is needed.
Advantage: LEDs are better at placing light in a single direction than incandescent or fluorescent bulbs. Because of their directional output, they have unique design features that can be exploited by clever designs. LED lights are more rugged and damage-resistant than compact fluorescents and incandescent bulbs. LED lights don't flicker. They are very heat sensitive; excessive heat or inappropriate applications dramatically reduce both light output and lifetime.
Documentation: Show in building plans where LED lighting has been installed as well as the wattage of LEDs

K.8 Real-time Electrical Read Out
Definition: Electric meters are typically located outside of the building and out of sight. Real-time readouts give feedback to the occupant on their total electrical use.
Action: Install a real-time meter in a conspicuous place in the house that is easily readable by occupants.
Advantage: Department of Energy research has shown that when people see how much energy they are using at a time they tend to turn off unnecessary lights and appliances. Saves energy and money.
Documentation: Observed at final inspection.

SECTION L Insulation

(Insulation levels and R values are covered in the Energy Section)
Insulation is the key to energy conservation, a cornerstone of green building. Poorly insulated houses waste energy, and most heating and cooling equipment runs on fossil fuels. Well-insulated houses not only save energy, thus lowering operating costs, but also keep people more comfortable. If building with a solid wall system, such as SIPs, points in the insulations section may not be taken. The point total for credit F.15 Solid Wall Systems includes points awarded for the insulation built in to the system.

L.1 Inspect Quality of Insulation Installation before Applying Vapor Barrier – *Mandatory*
Definition: Studies show that poorly installed insulation severely decreases the material's insulating value. The California Energy Commission study showed that a 4% void in insulation reduces its effectiveness by 50%. Ensure quality installation of insulation in walls, floors and ceilings.
Action: Pay proper attention to installation detail and quality assurance. Install insulation with no gaps or voids. Size insulation correctly to fill the cavity side-to-side, top-to-bottom and front-to-back. Cut or fill to fit around wiring and plumbing without compression. Compared to batts, blown-in fiberglass, blown-in cellulose or spray-foam insulation typically do a much better job of filling gaps and sealing around pipes and wires.
Advantage: Effectively installed insulation creates a more comfortable home and reduces the owner's utility costs. Lower energy demand reduces pollution and improves public health.
Documentation: Building Department or 3rd party inspection.

L.2 Install Batt Insulation with No Added Formaldehyde (> 50% of all insulation)
Definition: European standards for permissible levels of formaldehyde are 10 times lower than those in the U.S. Here, rules are based on the OSHA standard setting exposure levels that a 35-year-old worker should be allowed to encounter over an 8-hour workday, or 100 parts per billion (ppb) per product. Today, batts meet that standard. But, in Denmark, the standard of 10 ppb is based on the permissible exposure of an 18-month-old child roughly 18 inches from the source of formaldehyde over a 24-hour span. In California, there is a proposed standard of 27 ppb for the *entire home* one week after construction is finished. On the basis of California's standards, fiberglass batts that contain formaldehyde don't meet those standards, yet it gets used more often than any other type of insulation in U.S. homes. There are batts on the market that don't use added formaldehyde
Action: Can not receive points for L.4 If installing fiberglass batts, only install no added formaldehyde batts.
Advantage: Minimizing formaldehyde and VOCs in the home improves indoor air quality and the health of children.
Documentation: Receipt from supplier

L.3 Install Insulation with 75% Recycled Content
Definition: In terms of percentages, cellulose, cotton, and slag wool lead by using 75% or more recycled material in newly manufactured insulation. Recycled content can be either post-consumer or post-industrial. Post-consumer recycled content comes from products that have been used and discarded by a consumer and are then reprocessed as a raw material for a new product. Post-industrial content is waste material from a manufacturing process that is reused to create a new product.
Action: Install products with 75% or more recycled content into walls and/or ceilings.
Advantage: Recycled content insulation keeps hundreds of millions of pounds of waste out of landfills. High post-consumer recycled content closes the loop in the curbside recycling process and reduces landfill deposits.
Documentation: Receipt from supplier

L.4 Blown/Sprayed Insulation (> 50% of all insulation)
Definition: Blown/sprayed insulation uses fiberglass or cellulose and is, blown or sprayed into the wall cavities. The spray insulation is usually mixed with a latex liquid that dries into a semi-rigid mass that won't settle. It fills voids better that batt insulation, particularly around wiring, plumbing and hard to reach places. Dry blown insulation is best used in attic spaces.
Action: Can not receive points for L.2 Install blown / sprayed insulation in walls and/or roofs/attics. Cellulose based materials should be treated with borates only. Spray insulation must dry to less than 19% moisture content before covering with drywall.
Advantage: Spray insulation in particular greatly reduces air movement in wall cavities reducing the possibility of mold. It also reduces infiltration providing greater comfort. Dry insulation fills in all cavities and can be blown in with greater depth than batts, creating a higher R-value.
Documentation: Observed by inspector

L.5 HCFC-free Rigid Foam Insulation
Definition: Foam insulation products are typically petroleum derived, but most have superior air-sealing, moisture resistance, and insulating properties when compared to fiberglass and other fiber-insulation materials. Many types of foam require a blowing agent to create the foaming action. CFC's were used for this in the past, but have been eliminated because of their high ozone-depleting potential. CFC's were replaced primarily by HCFC's (hydrochloroflorocarbons), which have 1/10 the ozone depleting potential. Expanded polystyrene and polyiso foams can be HCFC free.
Action: Rigid foam insulation can be applied to roofs and wall exteriors. Some polyiso boards are laminated to OSB as a roofing nail base. Exterior foam should be water resistant so expanded polystyrene, open cell foam, should only be used as an interior insulation or in combination with products like structural insulated panels. Must be applied to 100% of wall exterior or 100% of roof.

Advantage: Rigid foam applied to the outside of the structure reduces thermal bridging through structural members creating a tighter thermal envelope in the home. The energy saved more than compensates for the embodied fossil fuels in the insulation.
Documentation: Receipt from supplier

SECTION M Renewable Energy

M.1 Sun Tempered Design
Definition: Sun tempering incorporates more windows on the south side of the home to reduce fossil fuel heating requirements without requiring extra thermal mass inside the home. Not to be confused with passive solar heating which includes shading and thermal mass.
Action: Can not receive points for M.2 Install south facing glass equivalent to 6-7% of adjacent heated floor area. Provide calculation showing south facing glass vs. total heated floor area on plans.
Advantage: The sun's free energy can reduce the need for fossil fuels with little or no added cost.
Documentation: Provide calculation showing south facing glass vs. total heated floor area on plans.

M.2 Passive Solar Space Heating That Includes: A) South facing glazing, B) Properly sized overhangs and C) Installation of appropriately sized thermal mass for glazing

Definition: Passive solar space heating requires the appropriate balance of south-facing glazing, thermal mass and summer shading. Sizing the glazing properly allows the right amount of the suns heat into the home during the winter months. Shading blocks out the heat in the summer months. Installing appropriately sized thermal mass in the room adjacent to the south facing wall allows for the suns heat to be captured during the day and will be radiated back into the room at night when it is cooler.
Action: Can not receive points for M.1 Run computer energy modeling using Energy10 or equivalent to show contribution of Passive Solar Measures to heating load of home. Passive solar must contribute at least 10% of the heating load.
A. South facing glazing Install south facing glass equivalent to 7-12% of total floor area. Must be oriented within 30° east or west of true south.
B. Properly sized overhangs Size overhangs so that south facing glazing is not shaded between 10 a.m. and 2 p.m. on a clear winter solstice day and is totally shaded (by the eaves) between 10 a.m. and 2 p.m. on the summer solstice.
C. Install appropriately sized thermal mass for glazing Thermal mass must be added, either in the floor or walls, for each square foot of south facing glass over 7% of the **adjacent** floor area. Types of thermal mass which can be used include: concrete floors, two layers of sheetrock, gypcrete (2 inches or more), tile floors, masonry, thick plaster, adobe walls, and stone fireplaces.
Advantage: A passive solar home is the least expensive way to dramatically reduce heating costs. Heating costs can be reduced 20-50%. Points are awarded based on the percentage of the heating load that is covered by passive solar space heating.
Documentation: Calculations to be included in plans.

M.3 Passive Cooling
Definition: Air conditioners can use up to 1/6th of U.S. electricity and, on hot summer days, consume 43% of the U.S. peak power load. According to the U.S. Department of Energy, heating and cooling systems in the U.S. emit over a half billion tons of carbon dioxide into the atmosphere each year, adding to

global warming. They also generate about 24% of the nations' sulfur dioxide, a chief ingredient in acid rain.
Natural (Passive) cooling of the home consists of using passive cooling techniques such as blocking the heat coming into the home, reducing internal heat loads, and removing heat from the home.
Action: Do not provide mechanical air conditioning systems in the home.

a. **Vertical shading devices for east and west-facing glass**
b. **Reflective films on east and west-facing glass or use windows with an SHGC of less than 0.45**
c. **Radiant heat-reflective barriers installed in attic**

Advantage: Keeps the home cool without the need for mechanical cooling. Saves energy and reduces CO2 emitted into the atmosphere which contributes to global warming.
Documentation: Self certified.

M.4 Provide 200ft² of South-Facing Roof
Definition: Making provisions during construction for installing future PV or solar thermal systems can significantly lower the cost when systems are installed later. Allow space for installation of PV modules on south-facing roofs, and ensure that roof trusses are adequate to accommodate any added roof loads.
Action: Maintain a 200-square-foot or larger section of south roof area clear of vent pipes and other obstructions to allow for the installation of modules. Provide the owner with a roof plan with the preferred location for collectors or PV modules and the conduit location clearly marked, and provide structural information on what added loads the roof can accommodate. (One type of PV systems, called building-integrated PV modules, typically weighs less than the roof tiles they replace.)
Advantage: Net metering rules and time-of-use electric rates are improving the economics of photovoltaic systems, which can provide much of the electrical energy needed by a home on a net annual basis. PV-generated electricity produces no air pollution and reduces the need for building new power plants. Photovoltaic panels and systems may drop in price over the next few years.
Documentation: Show on plan set.

M.5 Pre-Plumb for Solar Hot Water Heating
Definition: Preparing for the installation of solar water heating will substantially reduce the cost of future installation, and adds little cost during the time of construction.
Action: Installation of insulated copper pipes and sensor wiring between the attic and the water heater location will facilitate future installation of a solar water heater. To accommodate “active” systems, provisions should also be made for a solar storage tank (with pressure relief drain line) and an electrical outlet for a pump. Provide at least an 8 ft. by 8 ft. clear section of south-facing roof for future installation of solar panels.
Advantage: Solar hot water pre-plumbing will make it easier and less expensive to install a solar water heater in the future.
Documentation: Show in plumbing plan.

M.6 Install Wiring Conduit for Future Photovoltaic Installation
Definition: Making provisions during construction for installing future PV systems can significantly lower the cost when systems are installed later. Install conduit from the attic to a location near the electric service entrance/circuit breaker panel.
Action: Install 1-inch or larger conduit with pull boxes as needed to run wire from the attic to a junction box near the main panel and meter.
Advantage: Net metering rules and time-of-use electric rates are improving the economics of photovoltaic systems, which can provide all of the electrical energy needed by a home on a net annual basis.
Documentation: Show on electrical plan.

M.7 Install Solar Water Heating System

Definition: Solar water heating systems use solar panels and water storage to collect and store heat from the sun for domestic hot water use or space heating. Solar water heating systems are typically used to deliver preheated water to a standard water heater. Solar water heating is more cost effective than ever, as a result of new technologies, reliable products, and rising energy prices.
Action: Use only solar water heaters that are SRCC (Solar Rating and Certification Corporation) certified. Ensure that there is sufficient south-facing roof area for collectors, that the roof structure will accommodate the system's weight, and that there is adequate area near the conventional water heater for additional mechanical equipment such as storage tanks, pumps, pipes and controllers. Federal tax credits are currently available for installing solar hot water systems. Consult a solar energy installer for more information.
Advantage: Many solar water heating systems can provide all the hot water needed during summer months. For many households, these energy savings can offset the cost of the system in less than five years.
Documentation: Inspected

M.8 Install Photovoltaic (PV) Panels
Definition: PV systems convert solar energy into electricity when sunlight strikes the PV cells. Most residential systems are grid connected; when the PV system is providing more power than the home uses, additional electricity is fed back into the utility grid. This effectively spins the home's electricity meter backward in what is known as net metering. When the sun is not shining or when the home requires more electricity than the PV system can produce, the home draws power from the grid. If there is a power outage, a home with a grid-connected PV system will lose power just like homes without PV systems. Adding battery back-up to the PV system is expensive but allows the homeowner to keep some electrical systems running during power outages.
Action: Can not receive points for M.9 For cost and appearance, the best location for PV modules is flush on south or west-facing roofs. South facing modules produce more energy annually, but west-facing modules can take better advantage of time-of-use rates that are available from some utilities, and help reduce the electricity grid's peak load. For tile or metal roofs, building integrated modules can be easier to install and are designed to blend in well with the roof. For other roof types, specially designed racks that anchor to the rafters are typically used to mount the PV panels. Current incentives include a Colorado utility incentive and a federal tax credit.
Advantage: Benefits include lower utility costs, reduced greenhouse gas and other emissions from fossil fuel–burning power plants, reduced need to develop new power plants, and improved national energy security.
Documentation: Inspected

M.9 Purchase of 100% Renewable Power
Definition: Renewable power is either wind or solar power. Purchasing renewable power reduces smog, acid rain, and air pollution. Each cent you spend on renewable power keeps one pound of carbon dioxide, the chief greenhouse gas, out of the air. This translates to just a few dollars more on your bill monthly.
Action: Can not receive points for M.8 Purchase renewable power for 100% of the estimated electricity consumed for one year.
Advantage: Reduces smog, acid rain, and air pollution.
Documentation: Provide a receipt at the time of Certificate of Occupancy.

M.10 Pellet Stove (rated for 2.0 grams per hour of particulate or less)
Definition: Pellet stoves utilize a salvage/recycled renewable fuel source, are clean burning, cost effective, energy efficient, and are considered a carbon-neutral energy source.
Action: Pellet stove must generate 2.0 grams/hour of particulate or less.
Advantage: Pellet stoves may be a good use for beetle-kill trees.
Documentation: Plan check and field inspected.

SECTION N Flooring

N.1 Flooring Adhesives Have <70 gpl VOCs – *Mandatory*
Definition: Many solvent based flooring adhesives can have as high as 700 grams per liter (gpl) of volatile organic compounds that escape into the house air. New generation adhesives are often lower than 50 gpl and have superior adhesive properties. Less can be used for the same holding strength since they are stronger.
Action: Adhesives used for flooring application have less than 70 gpl VOCs.
Advantage: Improves indoor air quality and improves quality of installation.
Documentation: Self-certified

N.2 Leave Concrete Exposed as Finished Floor
Definition: With slab-on-grade construction or gyp-crete floors, the concrete can be polished, scored with joints in various patterns, or stained with pigments to make an attractive finish floor. This approach is especially appropriate for use with in-floor radiant heating systems and passive solar design.
Action: Use this approach for slab-on-grade construction. The finish must be designed and constructed when the slab is being poured, and well protected throughout construction. **Choose 1 of the following:**

a. **Minimum 15% of floor area**
b. **Minimum 30% of floor area**
c. **Minimum 50% of floor area**

Advantage: Using the slab as a finish floor eliminates the need to use other flooring materials. It is also durable and easy to clean.
Documentation: Make a note on floor plans.

N.3 90% Recycled-content Ceramic Tile
Definition: Recycled-content ceramic tiles can contain up to 70% recycled glass or other materials. Most recycled-content tile is made from either recycled glass or feldspar tailings, which is a post-industrial waste product. These products represent an excellent example of resource-efficient manufacturing.
Action: Install recycled-content tiles wherever conventional tiles are specified.
Advantage: Recycled-content products keep valuable resources out of the waste stream. Some recycled-content ceramic tile is very dense, which significantly reduces the amount of moisture and stains that are absorbed into the tile, making it more durable and easier to maintain.
Documentation: Make a note on plans and provide the source of materials.

N.4 90% Natural Stone Tile From Within a 500 Mile Radius
Definition: Routt County is situated central to many quarries of stone products. There is little need to import stone from distant places or other countries.
Action: 90% of stone tile must be purchased and extracted from sites within 500 miles distance from Steamboat Springs/Routt County.
Advantage: By purchasing regional building materials transportation costs and environmental impacts are reduced, and dollars are retained in the region, supporting the regional economy.
Documentation: List sources of stone exterior finish with address and distance from building site accompanied by map showing 500 mile radius around Routt County.

N.5 Stone or Ceramic Tile Installed with Plasticizer-free Grout
Definition: For hundreds of years, grout was basically cement used to connect stone or tile floors. Plasticizers have been added the contemporary products that can off gas synthetic chemicals for weeks. Grout should be resealed every year or more frequently as needed.
Action: Use unadulterated grout or seal grout with 2 coats of low VOC grout sealer.
Advantage: Natural grout reduces chemicals introduced into the home's air improving air quality.
Documentation: Self-certified

N.6 Natural Linoleum
Definition: Linoleum is a hard surface flooring made of rapidly renewable resources, using a production process that has a very low environmental impact. Linoleum is made with natural raw

materials: linseed oil, wood and cork flour, pine resins, and ground pigments. It is burn and scratch resistant, and easy to maintain. Linoleum has a proven record of durability; is easy to cut/customize with borders etc. It is typically used in kitchens and bathrooms. It is more brittle than vinyl sheet goods at temperatures below 55°.
Action: Install natural linoleum anywhere vinyl is specified.
Advantage: Improved air quality by eliminating vinyl chloride off gassing.
Documentation: Make a note on plans and provide the source of materials.

N.7 FSC–Certified Wood Flooring
Definition: FSC-certified wood flooring comes from forests managed in accordance with stringent sustainable forestry practices. FSC-certified products are available in a wide variety of domestic and exotic species.
Action: Can not receive points for N.10 Use FSC-certified or reclaimed wood in place of conventional hardwood flooring.
Advantage: FSC certification assures that forests are managed in a way that protects the long-term availability of wood resources, the health of forest ecosystems, and the sustainability of local economies.
Documentation: Make a note on plans and provide the source of materials.

N.8 Wood Flooring
Definition: High quality salvaged wood flooring or other salvaged flooring products can often be reclaimed from demolished or remodeled buildings.
Action: Use low-VOC sealers when refinishing reclaimed wood floors. Find salvaged flooring from building materials reuse stores or through online resources. **Choose 1 of the following:**

a. **From Reused, Reclaimed or Re-milled Sources**
b. **From Reused, Reclaimed or Re-milled Sources within 500 Mile Radius**

Advantage: Reclaimed building materials reduce resource consumption and landfill deposits. Many salvaged products are of higher quality and often cost less than new materials.
Documentation: Make a note on floor plans and provide source of materials.

N.9 Beetle Kill Pine Salvaged Wood Floor (25% minimum)
Definition: Bark beetles have been killing off lodgepole pines in Colorado at an increasing rate, 1.5 million acres to date. Pine beetle affected lumber harvested in Colorado can be utilized as flooring and trim.
Action: Install wood flooring from beetle kill pine salvaged wood for a minimum of 25% of the total floor area.
Advantage: Uses the abundant local source of dead lodgepole pines and decreases the need for lumber trucked in from distant sources.
Documentation: Make a note on plans and provide the source of materials.

N.10 Rapidly Renewable Flooring
Definition: Rapidly renewable flooring is flooring made of cork or bamboo. Cork is harvested from the outer bark of the cork oak tree; the tree regenerates its bark within about 10 years. Cork flooring is a byproduct of the bottle stopper industry. Scraps are ground and pressed into flat floor tiles which are typically pre-finished. Bamboo is an alternative to conventional hardwood flooring, carpet or vinyl flooring. Bamboo, which is as durable as most hardwood used for floors, is a fast-growing grass that can be harvested in three to five years.
Action: Can not receive points for N.7

a. **Natural Cork** Cork is installed similar to any floor tile with low-toxic adhesives.
b. **Bamboo** Bamboo flooring materials are installed like conventional hardwood.

Advantage: Rapidly renewable flooring materials are attractive, durable, low-toxic, perform well and reduce pressure to harvest forests. Cork is a rapidly renewable material that is also biodegradable, low in VOC emissions, and much less energy intensive to produce. Cork is hypoallergenic, can withstand years of commercial traffic, does not offgass, is flexible, absorbs shock, and reduces noise. Bamboo is as durable as most hardwoods.
Documentation: Make a note on plans and provide the source of materials.

N.11 Natural or Recycled-content Carpet Pad Made from Textile, Carpet, or Carpet Cushion
Definition: Carpet pad is responsible for much of the off gassing attributed to carpet. The "standard" pad is an amalgamation of brightly colored recycled synthetic foam rubber. (A petroleum based product). Similarly priced, low VOC alternatives include (but are not limited to) "felt" pads made from (pre-consumer) denim cotton scraps and from (pre-consumer) garment scraps pad. No VOC, felted wool, and jute pads are also available. Underlayment can perform several functions; to create a level surface, as a sound barrier or to insulate from heat loss.
Action: Reclaimed content underlayment should include 50% of the material as reclaimed, resulting in less energy consumed than harvesting and manufacturing a virgin underlayment. Install in 100% of carpeted areas.
Advantage: Natural or recycled content padding reduces indoor air quality components found in conventional padding.
Documentation: Make a note on plans and provide the source of materials.

N.12 Recycled-content Carpet
Definition: Recycled-content Carpet is made from recycled bottles or old carpets.
Action: Can not receive points for N. 14 Install recycled content carpeting in 100% of all carpeted area.
Advantage: Keeps material out of landfills and can improve indoor air quality.
Documentation: Make a note on plans and provide the source of materials.

N.13 Carpeting Meets CRI Green Label Plus Requirements (50% Minimum)
Definition: Flooring products may emit formaldehyde and other volatile organic compounds. To protect indoor air quality, look for carpets that have been tested and approved for low-emissions by a reputable third party or government organization.
Action: Install carpet that meets or exceeds the CRI Green Label Plus requirements (www.carpet-rug.org) for 50% or more of the carpet installed.
Advantage: Minimizing formaldehyde and volatile organic compounds in the home improves indoor air quality.
Documentation: Make a note on plans and provide the source of materials.

N.14 Natural Fiber Carpet Made with Natural Latex rather than SB (styrene-butadiene) Latex Backing
Definition: The vast majority of carpet is made of petroleum based and synthetic materials. Nylon 6, nylon 6.6, polyester, and polypropylene (PP) are used for face fibers. Most carpet backings are a sandwich of polypropylene fabric and latex, or polyvinyl chloride (PVC). Commercial carpets are made by attaching a face fiber to a backing fiber, using one of a variety of strong bonding agents. To produce the five billion pounds of carpet each year, over 2 billion pounds of nylon fiber are used, 800 million pounds of polypropylene, and 230 million pounds of polyester, plus various clays, chalks, and adhesives. Types of Natural carpet are: **Wool:** The initial cost of wool carpets is higher than synthetic carpet. They can last 50 years or more. Imported wool carpets are treated with a pesticide for mothproofing. **Sisal:** a natural fiber derived from the 'agave sisalana' cactus plant. Sisal grows in semi-arid regions. Sisal fibers (which can be up to three feet long) are sustainably harvested by hand from the leaves of the cactus plant. **Seagrass:** This durable grass is obtained from a tall plant with grass-like stems found in wet lands. Seagrass can be recognized by its grassy, hay-like scent and coloring. Seagrass has a non-porous surface that gives it a naturally smooth texture, and its rigidity gives it natural durability. **Jute:** Jute is extracted from stem fiber plants, similar to flax and hemp. Due to its firmness and stability, this fiber is suited for the manufacturing of stable and durable carpets.
Action: Can not receive points for N.12 Natural fiber carpet should be stretched and tacked rather than glued. Often it is laid loosely over another flooring material such as bamboo flooring.
Advantage: Natural fiber carpet eliminates most of the indoor air quality problems with synthetic fiber carpet, is durable and often is more easily cleaned.
Documentation: Make a note on plans and provide the source of materials.

SECTION O Finishes

O.1 Use Low-VOC Caulk and Construction Adhesives (<70 gpl VOCs) for All Adhesives - *Mandatory*
Definition: Low-VOC caulks and adhesives are typically water-based rather than incorporating solvents such as toluene and xylene that are known to be carcinogens by the State of California.
Action: Use caulks and adhesives with VOC concentrations of 70 g/l or less in place of standard caulks and adhesives for all interior applications such as installation of subfloors, finish flooring, countertops, trim, wall coverings, paneling and tub/shower enclosures. Packaging should note the VOC levels contained in the product. For a list of products go to www.buildinggreen.com under Products, Caulks & Adhesives.
Advantage: Low-VOC caulks and adhesives work as well as or better than conventional products, emit fewer pollutants, and reduce the risk of potentially harmful health impacts.
Documentation: Self certified.

O.2 Design Entryways to Reduce Tracked in Contaminants
Definition: Up to two-thirds of dust and particulates in houses is tracked in on shoes. These tracked-in contaminants contain everything from soil and pesticides to abrasive sand, mold, road grime and bacteria. Once these particulates are inside the home, they can be difficult to get rid of.
Action: The most effective way to avoid tracking contaminants into the home is for people to remove their shoes upon entering. Provide features near all entryways that encourage the removal and storage of outerwear and shoes, such as benches or a mudroom. For entryways, avoid carpet, and choose easily cleaned flooring with a hard surface, such as hardwood, bamboo, concrete, ceramic tile or natural linoleum.
Advantage: The home will be cleaner, with less dirt and other pollution tracked in.
Documentation: Self-certified

O.3 Elimination of All Particleboard and MDF Inside Building Envelope
Definition: Formaldehyde is often used as a binder in home-building products such as plywood, particleboard, medium density fiberboard (MDF) and other composite wood products. These binders come in two basic forms: urea and phenol. Urea-formaldehyde binders are common in interior-grade products. Phenol-formaldehyde binders are used in exterior applications because they are more water resistant. This water resistance quality makes phenolic resins offgas more slowly and in lower quantities than urea glues, reducing some of the harmful effects on indoor air quality by as much as 90%.
Action: Can not receive points for O.5 Eliminate the use of particleboard and MDF in all applications:

a. **Subfloor**
b. **Stair Treads**
c. **Cabinets**
d. **Countertop Substrate**
e. **Interior Trim**
f. **Shelving**

Advantage: Reducing formaldehyde exposure helps protect the health of residents, particularly children, who are most susceptible. Advise homeowner that furniture is often made from particleboard which may undo what has been accomplished by eliminating particleboard from building materials.
Documentation: Receipts from suppliers

O.4 Environmentally Preferable Materials used for Interior Finish: A) FSC-Certified Wood, B) Reclaimed (within a 500 mile radius), C) Rapidly Renewable, D) Recycled-Content, E) Finger-Jointed, or F) Beetle Kill Pine
Definition: Forest Stewardship Council (FSC)–certified wood comes from forests managed in accordance with stringent sustainable forestry practices. Reclaimed Materials must come from

within a 500 mile radius of Steamboat/Routt County. Rapidly renewable materials are made from agricultural products that grow quickly and can be harvested on a relatively short cycle compared to slower-growing wood. Examples include bamboo and sheet goods made from straw, the stalk of wheat, rice, barley and other grains. Some recycled-content interior finishes, such as molding, are made from recycled polystyrene or other plastics. Recycled-content countertops include recycled glass tiles, terrazzo-like materials that blend recycled glass and concrete, and natural fiber composites derived from rapidly renewable or recycled resources. Finger-jointed trim is manufactured from short pieces of wood glued together to create a finished material. Beetle kill pine is wood milled from the lodgepole pine.
Action: Install environmentally preferable materials for these applications:

a. **Cabinets (cannot receive points for O.6)**
b. **Interior Trim**
c. **Shelving (cannot receive points for O.6)**
d. **Doors**
e. **Countertops (cannot receive points for O.6)**

A minimum of 50% of the material used for the application must come from environmentally preferable sources.
Advantage: Reclaimed materials reduce resource consumption and landfill deposits. Reclaimed lumber and many other salvaged materials are often of higher quality than new products. Rapidly renewable materials are attractive, durable and reduce pressure to harvest forests. Recycled-content products keep valuable resources out of the waste stream. Recycled-content trim materials are often straighter and more stable than conventional clear wood. Recycled plastic materials are good for water-prone areas in kitchens and baths. Finger-jointed elements are straighter and more stable than conventional clear wood, and use wood more efficiently.
Documentation: Make a note on plans and provide the source of materials.

O.5 All Particleboard Sealed with 2 Coats of Sealer
Definition: Particleboard is the prime source of formaldehyde inside the envelope of the house. Sealant must be low/no VOC.
Action: Can not receive points for O.3 When elimination is not an option, particleboard should be sealed with 2 coats of a low/no VOC sealer. This includes the underside of countertops, cabinet and shelving edges and stair treads before carpeting is installed.
Advantage: Sealing the particleboard slows the rate of formaldehyde off gassing allowing it to be diluted by fresh air in the house resulting in better indoor air quality.
Documentation: Self-certified

O.6 100% Agricultural Waste Board
Definition: Waste products such as rice husks and wheat straw which are manufactured with a formaldehyde-free binder and used as sheet goods that replace particleboard
Action: Can not receive points for the same applications in O.4 Use wherever particleboard is used such as cabinet boxes, shelving or substrate for countertops. It can also be used as a finish material.
Advantage: Agricultural waste boards are bonded with non-formaldehyde binders making the house healthier.
Documentation: Self-certified. Receipt from supplier

O.7 90% Recycled-content Ceramic Tile (non-flooring)
Definition: Ceramic tile can incorporate a wide variety of waste or recycled materials such as glass or waste slag.
Action: Install recycled-content tile in 10% - 100% of all tiled area.
Advantage: Not only do the tiles reduce the waste stream, but some are in demand for their aesthetic qualities.
Documentation: Make a note on specifications and provide the source of materials.

O.8 90% Natural Stone From Within 500 Mile Radius (non-flooring)

Definition: Routt County is situated central to many quarries of stone products. There is little need to import stone from distant places or other countries.
Action: 90% of stone tile must be purchased and extracted from sites within 500 miles distance from Steamboat Springs/Routt County.
Advantage: By purchasing regional building materials transportation costs and environmental impacts are reduced, and dollars are retained in the region, supporting the regional economy.
Documentation: List sources of stone exterior finish with address and distance from building site accompanied by map showing 500 mile radius circle around Routt County.

O.9 Low VOC, Water-Based Wood Finishes (<250 gpl VOCs) used on All Wood Finished Surfaces
Definition: Conventional petroleum-based wood finishes can off gas for months and can be harmful to children and chemically sensitive individuals. Off gassing means the solvents in the product are released into the air, contaminating indoor air quality. Low-VOC finishes, such as waterborne urethane and acrylic or plant-based oils, are lower in toxic compounds compared to conventional solvent-based finishes while providing similar durability.
Action: Use wood finishes with VOC concentrations of 250 gpl or less. If oil-based wood finishes must be used, they should be applied off-site or allowed to off gas for three to four weeks prior to occupancy.
Advantage: Using low-VOC wood finishes reduces off gassing, improving indoor air quality for both workers and occupants, and reducing the formation of smog.
Documentation: Receipt from supplier

O.10 Low-VOC or Zero-VOC Paint used on All Painted Surfaces
Definition: Most interior paints contain volatile organic compounds (VOCs), a major class of indoor and outdoor air pollutants. Besides affecting indoor air quality, certain VOCs react with other chemicals in the atmosphere, producing ozone that can affect human health. Low- and zero-VOC paints reduce these sources of pollution.
Action: Interior paints with low or zero levels of VOCs are available from most major manufacturers. They are applied and perform like conventional paint. Low-VOC paints contain less than 100 grams per liter (gpl) of VOCs for non-flat finishes, and 50 gpl or less for flat finishes. Paints that contain less than 5 gpl of VOCs are classified as zero VOC. **Choose 1 of the following:**

a. **Low-VOC Interior Wall/Ceiling Paints**
b. **Zero-VOC Interior Wall/Ceiling Paints**

Advantage: Low- or zero-VOC paint reduces the emissions of VOCs, improving indoor air quality.
Documentation: Receipt from supplier

O.11 After Installation of Finishes, Test of Indoor Air Shows Formaldehyde Level <27 ppb
Definition: The California Air Resources Board (ARB) has classified formaldehyde as a Toxic Air Contaminant. ARB, the first American agency to develop a health standard, recommends that formaldehyde levels inside buildings be as low as possible (no greater than 27 parts per billion) because of formaldehyde's cancer-causing potential. Formaldehyde, a colorless gas, is usually present at higher levels in indoor air than outdoor air, in part because it is used as a binder and preservative in many common building products and furnishings. Formaldehyde evaporates from products into the home's interior, often for many years after the product is installed.
Action: Using products with low formaldehyde emissions, such as those mentioned in O.4 of these Guidelines, will usually lower formaldehyde to this level. Test the building after installation of all finishes. Home test kits are available that measure the average indoor concentration of formaldehyde.
Advantage: Reducing formaldehyde can decrease the risks associated with exposure.
Documentation: Provide test results.

SECTION P Landscaping

P.1 Use Fire-Safe Landscaping Techniques per Fire Wise (Lands with in City of Steamboat Springs are exempt)

Definition: Routt County's hot, dry summer climate makes fire protection an important consideration for landscape design, especially because new home developments are increasingly located adjacent to areas that may be prone to wildfires. Simple landscaping design practices can help defend the homes by reducing fuel accumulation and interrupting the fire path. Understanding the topography, fuel, and local weather are critical to designing and maintaining a landscape that reduces the potential for loss to fire. Dense vegetation in hedges, screens or espaliers can be a fire hazard because the competition for limited water, nutrients and space results in a large amount of dry twiggy material.

Action: Determine whether the site is in a high-risk area. Contact local Fire Chief or State Forester to determine whether the subject site is in a high-risk area. Map the site, identifying exposure to prevailing winds during the dry season and steep slopes that can increase wind speed and convey heat. Identify adjacent wildlands or open space, as well as south- and west-facing slopes and their vegetation, particularly species that burn readily. Construct roofs, siding and decks with fire-resistant materials. Consider alternatives to wood fences, such as rock walls.

a. **No surface vegetation within 15 feet of building** Use irrigated, low-growing, fire-resistant vegetation, patios, paving stones and other low-risk features in the zone immediately surrounding the structure.
a. **Thinning of fuels surrounding home** Specify plants with low fuel volume and/or high moisture content. Avoid plants with high oil content or that tend to accumulate an excessive amount of dead wood or debris. Use mulch (except fine shredded bark) and decomposed granite to control weeds and reduce fuel for fires.
b. **Ladder fuels removed up at least 6 feet from the ground** Do not plant trees and shrubs at distances where limbs and branches will reach the house or grow under overhangs as they mature. To minimize fire ladders, do not plant dense hedges or space tall vegetation too closely together.
c. **Defensible space around home** For sites adjacent to fire sensitive open space or wildlands, create defensible space around buildings; this is an area where vegetation is modified to reduce fuel load and allow firefighters to operate.

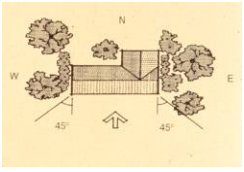
Contact the local fire department for additional guidance, particularly for sites at the urban-wildland interface or those with significant fire risk.

Advantage: Fire-safe landscaping reduces the fire hazard and risk of harm to residents and firefighters, and protects valuable personal and community assets.

Documentation: On landscape plan.

Passive Solar Design

P.2 Plant Shade Trees



Definition: In the hot summer months the sun is higher in the sky and therefore the east and west facing glazing gets the most solar gain when the sun is rising and setting. Shading these facades helps cut down on solar gain in the home and lowers the cooling load of the home. Augment the existing tree cover on the site, particularly to the west of the building, by planting Colorado native tree species that are drought tolerant and appropriate for the site's soil and microclimates. Plant a variety of deciduous trees and choose as large a tree as possible but be sure it will be allowed to grow to its natural shape and size in the allotted space. Choose trees with root systems that do not sucker or damage the pavement.

Action: Plant trees to shade walls, windows and paved areas. If the building design includes passive solar heating, do not plant trees too close to the home's south side. Avoid planting trees too close to utilities.

a. **All new trees have trunk located adjacent to the area to be served for shading.**
b. **Landscaping that Shades 75% of East and West Facing Glazing During the Summer Season (June-August)**

Advantage: Shade trees can create a microclimate that is up to 15°F cooler than the surrounding area, and can reduce summer air-conditioning costs by 25 to 40%. Peak electricity demand is at its highest during late afternoons in the summer; shade trees play an important role in reducing this demand. Trees provide numerous additional benefits including absorbing carbon dioxide, cleansing the air, creating habitats for birds and other creatures, providing play places for children, making neighborhood more beautiful and increasing property values.
Documentation: On landscape plan.

P.3 Design Vegetative Wind Breaks or Channel as Appropriate to Local Conditions
Definition: Dense conifers to the north and west helps reduce wind speed of winter storms. They can also spread the wind around the house to reduce drafts and air infiltration inside.
Action: A combination of low bushes, such as junipers, and evergreens make an effective windbreak. A windbreak placed twice the distance from the house as the trees are tall reduces the wind effect on the house by 75%.
Advantage: Trees planted a distance from the house can be an effective buffer against winter winds, reducing heating loads and making the house more comfortable.
Documentation: On landscape plan.

Xeriscaping

P.4 Addition of Compost to and Aeration of Soil
Definition: Compost is thriving with microorganisms – one teaspoon can have more than one billion beneficial microbes. Adding good quality compost before planting turf, annuals, perennials, trees and shrubs brings life to the soil and feeds existing soil organisms. Compost is effective in improving problem soils – in particular those that are compacted, heavy clay or sandy, poor in nutrients, or lead contamination. It is one of the most important practices for a healthy, thriving, landscape. After construction is over, it is important to till organic material into the soil of the site to ready it for landscaping.
Action: It is important to first assess the soil for physical and chemical problems.

- If topsoil has been removed and stored during building construction, mix one cubic yard of compost into 3-5 cubic yards of soil before re-spreading.
- If the topsoil has not been removed then sheet mulching is an efficient means of adding compost & other organic matter while controlling weeds.
- For turf installations: Incorporate 1-2 inches (3 1/3 – 6 2/3 cubic yards) of compost into 1000 square feet. Mix with the top 5-7 inches of soil.
- For preparing planting beds: Spread 2-4 inches of compost over the surface of the soil and incorporate it into the top 6-12 inches of the planting bed.
- And, consider the conditions under which the plant grows naturally. Some Colorado natives require less fertile soils and compost may not be necessary.

Advantage: Compost fosters a divers, fertile, and disease suppressive soil. It can improve structure, aeration and water holding capacity. You and your clients may see both long and short-term benefits, including faster plant establishment, decreased fertilizer & pesticide use and lower water bills.
Documentation: On landscape plan.

P.5 Compost from Local Landfills
Definition: Compost is high in nutrients and oxygen needed for healthy landscaping.
Action: Purchase the compost used from local landfills.
Advantage: Using compost from local landfills uses local waste and makes a beautiful site. It creates a demand for compost in the area, encouraging local homeowners and businesses to compost their biodegradable waste, keeping it out of the landfill.
Documentation: Make a note on plans and provide the source of materials.

P.6 Mulch All Planting Beds to the Greater of 2 Inches

Definition: Mulch is any organic material spread evenly over the surface of the soil. Organic materials, including chipped landscape debris, are preferable over inorganic materials because they supply nutrients over time. Nitrogen 'drag' is usually not a problem, even when woody materials are used.
Actions:

- Keep 2-4 inches of an organic mulch over the surface of the soil at all times, or at least until plants grow to cover the soil. Typically, larger particle size mulches are better for weed control.
- Designate less visible areas, away from storm drains, for leaves to remain as mulch after they fall.

Advantage: Mulch conserves water, enhances the growth of plants and the appearance of the landscape. It can also simplify your operations – thereby lowering your costs – by suppressing annual weed growth and reducing the need for trimming around trees and poles.
Documentation: On landscape plan.

P.7 Construct Water-Efficient Landscapes – *Mandatory*
Definition: Conventional residential landscapes are often designed without regard for climate and soil conditions. Typically, they require high inputs of water and chemicals and produce excessive plant debris from pruning and mowing activities. Invasive plants used in landscaping often escape into natural areas, where they can spread rapidly, crowd out native plants, degrade wildlife habitat and increase the wildfire fuel load. Resource-efficient landscapes use plants and techniques that are better suited to local soils, wildlife, rainfall and climate.
Action: Evaluate the climate, exposure, and topography of the site. Assess the soil. Have the soil professionally analyzed for texture, nutrients, organic matter content and pH, especially if the topsoil was not protected during construction activities. If soil amendments are advised, ask the laboratory to recommend organic environmentally friendly amendments.

a. **No Invasive Species Are Planted** Find out which invasive species are problematic locally; do not include them in the planting palette and eliminate any from the site before planting. A noxious weed list can be found on the Routt County website: http://www.co.routt.co.us/sections.php?op=viewarticle&artid=80839
b. **75% of Plants are Native Species** Select drought-tolerant species that are appropriate for the site's soil and microclimates. Plant a variety of trees, shrubs and other perennials and limit annuals.

Give plants plenty of room to mature, reducing the need for pruning and shearing. Limit turf to the smallest area that will meet recreational needs (see Minimize Turf Areas, below). Include a site for composting and mulching plant debris.
Advantage: A diverse landscape of native species supports beneficial birds, bees and other insects and may resist disease and other pests better than one with little variety. Choosing and placing plants appropriately will also reduce the amount of plant debris sent to landfills and water used for irrigation.
Documentation: On landscape plan.

P.8 Group Plants by Water Needs (Hydrozoning)
Definition: Different plants have different water requirements. Hydrozoning involves dividing the landscape into zones of low, medium and high water use to prevent over watering.
Action: Group plants by water needs, creating irrigation zones based on the plants' water requirements and their exposure. Delineate each hydrozone on the site, irrigation and planting plans. Place thirstier plants in relatively small, highly visible areas and if possible, in spots that naturally collect water. Plant the larger areas with drought-tolerant species. Install separate irrigation valves for different zones. Consider that some Colorado natives do not tolerate water in the summer after they are established; be sure to separate them from plants that need ongoing irrigation.
Advantage: Hydrozoning matches irrigation to the plants' water requirements, conserving water and fostering resistance to pests and disease. Plant mortality is also reduced, saving time and money.
Documentation: On landscape plan.

P.9 Minimize Turf Areas in Landscape Installed by Builder – *Mandatory Turf Type*
Definition: Lawns (or turf) are useful for recreation and relaxation, but installing large turf areas solely for their looks is resource inefficient, requiring frequent cutting, watering and application of fertilizers or other chemicals to stay green during Colorado's hot, dry summers. One study estimated that over a 20 year period, the cumulative cost of maintaining a prairie or a wetland totals $3,000 per acre versus $20,000 per acre for non-native turf grasses.
Action: Replace decorative lawns with water-conserving Colorado native groundcovers or perennial grasses, shrubs and trees.

a. **All Turf will have a Water Requirement less than or equal to Tall Fescue, Buffalo Grass, or Blue Gama** Choose plant species that are native or regionally appropriate and have a water requirement less than or equal to tall fescue.
b. **Turf shall not be installed on slopes exceeding 10% or in areas less than 8 feet wide** Avoid planting turf on slopes greater than 10% or in irregularly shaped areas that cannot be irrigated efficiently. Avoid turf in isolated areas (driveway strips) or other areas less than 8 feet wide on the shortest side.
c. **Turf is ≤33% of landscaped area (Not to exceed footprint of home)** If lawns are desired, plant in small areas where they are most likely to be used for play and relaxation. **(cannot receive points for d)**
d. **Turf is ≤10% of landscaped area (Not to exceed footprint of home)** If lawns are desired, plant in small areas where they are most likely to be used for play and relaxation. **(cannot receive points for c)**

Advantage: Minimizing turf conserves water. If a 1,000-square-foot lawn needs 1 inch of water per week, reducing it to 500 square feet can save approximately 10,000 gallons of water per dry season. Minimizing turf reduces the need for mowing and removing grass clippings. Chemical use may also be decreased, thereby protecting the quality of local waterways and aquifers.
Documentation: On landscape plan, self certified, inspected.

P.10 Install High-Efficiency Irrigation Systems – *Mandatory*
Definition: With increasing demand on supplies of fresh water, efficient landscaping irrigation is vital in Colorado. Efficient irrigation systems apply only the amount of water that the plants need, with little or no waste through runoff, over watering or misting. Drip and bubbler irrigation technologies apply water to the soil at the plant root zones at the rate the soil can absorb it, and are often more appropriate than overhead sprinklers in areas that are narrow, oddly shaped or densely planted, or in areas such as parking lots and medians. Low-flow sprinkler heads apply water uniformly and slowly. Smart controllers regulate the irrigation program based on weather or moisture sensors, historic data or a signal. A rain sensor overrides the system in the event of rainy weather.
Action:

a. **System uses only low-flow drip, bubblers, or low-flow sprinklers** Install drip, subsurface drip or low-flow irrigation systems in place of standard systems for all landscape applications. If necessary, turn off the irrigation system or valve for the landscape or hydrozone that includes only low water use Colorado natives, once the plants are fully established.
b. **Rain sensor installed on irrigation system (cannot receive points for c)**
c. **System has smart (weather-based) controllers (cannot receive points for b)** A smart irrigation controller will provide even more water savings. Choose a smart irrigation controller that has at a minimum the following capabilities: 1) automatic periodic adjustments to the irrigation program, accomplished through external sensors, internally stored historical weather data or a provider-supplied signal, 2) multiple start times, 3) run-times able to support low-volume applications, 4) irrigation intervals for days of the week or same-day intervals, and 5) more than one operating program (for example, A=turf, B=shrubs, C=water features).

Advantage: High efficiency irrigation systems minimize overspray and evaporation and reduce runoff, dramatically reducing landscape water use while preventing disease and minimizing weed growth that results from overwatering.

Documentation: Inspected.

P.11 Site-rock Reclaimed
Definition: Rock that has been dug up or moved for construction can be beneficial in creating retaining walls or fenced off areas. In a dry climate like Colorado it makes sense to utilize rock wherever possible in the landscape to avoid potential fire hazards.
Action:

a. **Reused on Site** Reclaim 10-100% of site rock on site. Rock must remain on site during construction. Site rock is used for rock applications i.e. retaining walls, landscaping, veneer applications, etc.
b. **All Rock Kept on Site**

Advantage: Little or no cost for landscaping rock, use of local material cutting out the time, money, and labor to haul rock to the site.
Documentation: Storage area for rock must be indicated on the site plan. Reuse of rock indicated on landscape plan.

P.12 50% Salvaged or Recycled-Content Materials for 50% of Non-Plant Landscape Elements
Definition: Salvaged materials are not remanufactured between uses. Finding and using them takes time and ingenuity but in the long run, salvaging conserves resources, can save money and adds interesting elements to the design. Recycled content materials such as plastic or composite lumber make very durable decks or raised garden beds that do not rot, crack or splinter.
Actions:

- Get creative and specify that hardscapes and other landscape structures be constructed with salvaged items. For example, use broken concrete for very attractive retaining walls and ground glass cullet for beautiful walkways.
- Specify the use of recycled content materials or those made from rapidly renewable resources.

Advantages: Lower maintenance costs can recover the added cost of plastic or composite lumber within a year. Waste can be reduced, natural resources conserved, markets for recycled products strengthened.
Documentation: On landscape plan.

SECTION Q Innovation

The measures in this program are not an exhaustive list of all the green elements that could be incorporated into a home. Rather, they are a list of field-tested options that are more likely to be used by custom and production builders. Look for opportunities that significantly go beyond these measures and incorporate innovative techniques and materials that will conserve natural resources and improve the home's energy efficiency, durability and healthfulness.

Q.1 Alternative Fuel Infrastructure for Vehicle Use
Definition: Alternative fuel is becoming more prevalent. This can be anything from bio-diesel to a wind or solar generated plug-in station for electric vehicles.
Action: Install infrastructure to support current or future alternative fuel vehicle use.
Advantage: This encourages the use of alternatively fueled vehicles and can promote less green house gas emissions that contribute to global warming, smog and dirty cities.
Documentation: As acceptable to the Building Department

Q.2 Innovation by Design
Definition: Minimize the environmental impact of the house by incorporating green design and construction measures that have significant tangible and demonstrable benefits beyond those

outlined in the Steamboat program. Suggested innovations include: exceptional performance (e.g., zero energy, carbon neutral); innovative design strategies; or emerging technologies, materials, or construction practices.

Action: The applicant MUST prepare a written submittal that includes:

- The intent of the innovation measure(s)
- The proposed requirement for compliance
- The proposed documentation to demonstrate compliance
- A description and an estimate of the benefit/impact provided by the proposed measure

The above information must document how such an approach will minimize the impacts of the building in a tangible and demonstrable way beyond the methods outlined in the Steamboat Program. The product, design, or technology must comply with existing city codes and standards.

Advantage: Minimizes the overall environmental impact of the house.

Documentation: As acceptable to the Building Department.

APPENDIX A

Construction Site Management Plan

Prior to the issuance of a building permit, any commercial, multi-family, or multi-lot single family project must complete an approved Construction Site Management Plan. The proposed CSMP, at a minimum, must include the following:

1) Erosion and Sedimentation Control Plan showing:

a. Topographic Information- including sufficient detail to characterize the site.
b. Areas and extent of soil disturbance (show any phasing).
c. Location of all on site and adjacent water bodies, wetlands, drainages, and storm water systems. Include the following:
    - Location of diversion structures, check dams, silt fencing, straw wattles, sediment ponds, or other measures.
    - Vehicle soil tracking measures (vehicle track pad, vehicle wash station, etc.).
    - Inlet protection as necessary
    - Temporary sedimentation ponds
    - Identify site personnel responsible for inspecting storm water controls.

***NOTE: Sites are responsible for obtaining a state storm water management permit and a separate discharge permit, if required. (see web-link @ www.cdphe.state.co.us/wq/PermitsUnit)**

2) Site Construction Facilities (Identify the following):

a. Staging areas
b. Storage areas
c. Stockpile areas
d. Dumpsters, trash receptacles and recycling bins
e. Sanitary facilities
f. Loading areas
g. Trailers and field offices (show access)
h. LPG Tank- Liquid Propane Gas tank (for winter heating of structures prior to full power)

3) Parking

a. Location and number of onsite and any offsite parking spaces

4) External Traffic Control Plan showing:

a. Truck schedule (# of movements per day, and time of day)
b. Site access points; show existing adjacent streets and driveways; identify any changes and associated signage
c. Sidewalks and trails; identify any changes and associated signage
d. Use of the public Right of Way (ROW) - generally not permitted (For constrained sites show any proposed use of ROW)
e. Crane use details, including but not limited to, ROW encroachment, swing radius, loading locations (Crane will require revocable permit from the City)

5) Internal Access Control showing:

a. Internal routes
b. Emergency access- 24’ all weather surface for emergency access thru site (to be maintained at all times)

6) **CSMP Standard Notes**: See handout or visit **http://www.steamboatsprings.net/index.php?id=88**

**** Plans shall be phased and updated as the project evolves and site conditions change. A current copy of the CSMP must be on file with the City Construction Site Manager and at the job site.**
*****Refer to chapter 36 of the Community Development Code for more information.**

Standard Notes for Construction Site Management Plans:

1. This plan shall be kept on site at all times and updated to reflect any changes.
2. Concrete waste and washout water from mixing trucks shall be contained on site, removed from the site, and properly disposed. Materials should not enter state waters.
3. Contractor is responsible for installing and maintaining temporary erosion and sediment control during construction and establishing any required permanent Best Management Practices (BMPs) to prevent release of pollutants from the project site.
4. Contractor is responsible for complying with all local, state, and federal laws. In addition contractor must obtain required permits.
5. Clearing or grading shall not begin until all sediment control devices have been installed.
6. The contractor shall promptly remove all sediment, mud, and construction debris that may accumulate in the right of way, private property, or water ways as a result of the construction activities.
7. All ingress, egress points and vehicle access points onto disturbed site must be stabilized with a vehicle tracking control pad. Access shall only be via approved locations as shown on approved CSMP.
8. Soil stabilization measures shall be in place and areas are to be revegetated:(1) for stockpiles, if inactive for more than 30 days (2) for areas of land disturbance within one growing season.
9. Inlet protection shall be installed in conjunction with storm drain inlets where drainage area is not vegetated.
10. BMPs shall be used, modified, and maintained whenever necessary to reflect current conditions. BMPs shall be inspected weekly and after every precipitation event. Accumulated sediment shall be removed from BMPs when the sediment level reaches ½ the height of the bmp.
11. Emergency access must be kept obstacle free and passable at all times.