

MULBERRY GROVE P.U.D. GREEN BUILDING PROGRAM

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What is the Mulberry Grove Green Building Program?

The Mulberry Grove Green Building Program (the “GBP”) is a points-based system that promotes cost-effective and sustainable residential building methods, conservation of energy, water, and other natural resources, recycling of construction materials, reducing solid waste and improved indoor air quality. The Mulberry Grove Green Building Program defines a range of options for owners and builders to make their homes more sustainable, while allowing them flexibility to tailor their selections to specific designs or owners' preferences.

The Mulberry Grove Resource Guide (the “Resource Guide”) is a companion document to the Mulberry Grove Green Building Program and the Mulberry Grove Declaration of Covenants, Conditions and Restrictions (the “Covenants”). The Resource Guide is organized in the same format as the GBP and the Covenants, and has been created to use as a reference to help Mulberry Grove residents begin researching green building practices. For example, if more information is desired about frost protected shallow foundations under Section 3.8 in this document, go to Section 3.8 in the Resource Guide to find more information.

Who is the Mulberry Grove Green Building Program For?

Each residence built in Mulberry Grove is required to meet the minimum requirements of the Green Building Program. At a minimum the designer, contractor, and possibly the owner of each house built in Mulberry Grove will need to understand this program.

Why is the Mulberry Grove Green Building Program Important?

The GBP identifies cost effective options to facilitate the construction of healthier and more energy-efficient buildings in Mulberry Grove.

The U.S. represents only 5% of the world's population, yet uses over 25% of the world's resources. Buildings consume 40% of those resources every year and use 35% of the total U.S. energy annually. Indoor air quality is also a concern to a growing number of Americans. The Environmental Protection Agency reports that as many as 15% of citizens are allergic to their own homes from indoor air quality that can be 10 times worse than Denver on a smoggy day. Many chemicals like formaldehyde are so commonplace that we are oblivious to their presence, yet chronic exposure has been identified by medical science to be a carcinogen.

Even in our resource-rich country the impact of our consumption is worldwide. For example, the use of Luan plywood in cabinets or interior doors causes permanent deforestation of the rain forests of Southeast Asia. Closer to home, demand for old growth timber for framing materials has depleted 95% of old-growth forests. Only 20 years ago the average virgin tree was 24" in diameter. Today, the average tree is 13". When we build with 2 x 10's and 2 x 12's we require old growth trees by definition. Engineered lumber products replace solid-sawn lumber and reduces the demand for old growth trees.

The decisions that are made in the design and construction of new homes or additions create impacts we will live with for many years. We can do much to offset the impacts of buildings on our environment and our health. By designing thoughtfully, and substituting healthier and more resource-efficient products, we can reduce the harmful effects of house building while enhancing the quality of our homes.

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MULBERRY GROVE GREEN BUILDING PROGRAM INSTRUCTIONS

How does the Mulberry Grove Green Building Program work?

The GBP is divided into categories (as listed in the Table of Contents) that address aspects of homebuilding that will help owners achieve an energy efficient home. Each home built in Mulberry Grove must achieve a certain number of points, based on the size of the home. Homeowners, as they are able, are encouraged to achieve as many points as they can, but the Program requirements are the minimum.

This document awards points heavily in methods and sections related to the energy consumption of the home and moderately in the methods and sections related to material consumption. For example,

recycling plays an important role in sustainability, however its long-term impacts are far less than the impact of the energy that a house will use over its lifetime.

Strawbale, Adobe, Natural Building and Stick Frame Sections

There are not separate sections for strawbale, adobe or stick frame construction. One reason for this is because, for example, walls are a system of several components (structure, sheathing, finish, insulation) and for any wall type, there are a variety of options for each component. By breaking out the individual components in the GBP, there is more flexibility in the use of materials, and the actual green building benefits of the different components can be more accurately accounted for. In addition, some of the components may overlap between different categories (i.e., earth plaster is used on a number of alternative wall systems), and dictating their use for all would be both redundant and possibly excessively restrictive. This flexibility allows homeowners and builders to evaluate the energy or material savings/consumption for each component that goes into building a home, rather than relying on a set package, which ultimately allows for greater flexibility in building.

Mulberry Grove Energy Efficiency Standard

Section 6 addresses the building envelope of a home – the most critical aspect of energy efficiency in building. The building envelope includes insulation, windows, and mechanical heating systems. Each home in Mulberry Grove will be required to meet energy efficiency standards based on those set forth by the International Energy Conservation Code (IECC). (This is a code created by the International Code Council (ICC), a non-profit organization). Once the IECC standard has been met, homeowners may achieve points in this section for achieving greater energy efficiency.

Required Sections

➡ The red arrow symbol next to some sections indicates that the method is required, not optional. The methods in these sections are important practices in reducing environmental impact, are readily implementable, and increase cost savings over the lifetime of the house. The most involved requirement is Section 6.1 Mulberry Grove Energy Efficiency Standard. This section looks at the house envelope as a whole, including insulation in walls, roofing and flooring; windows; and heating.

INSTRUCTIONS

1. Read through this document in its entirety before scoring points or making commitments to specific building materials or methods. Note which methods are most appealing to you. Consult the Resource Guide for more information on your noted methods. Research the methods to determine whether they are viable for your situation or not.
2. Determine the floor area of your project. Then, refer to the chart below to determine the number of points needed. Enter the floor area and points required in the spaces provided on the Green Building Program Points Worksheet.
3. Enter the number of points achieved under the points column of each section. Add the total number of points achieved for each category. Then, add the total points achieved overall all at the bottom of the worksheet .
4. Some method applications require a design or plans to be submitted with this document. Prepare and organize any information that will be required as stated in each section.

5. Submit the following to the Design Review Committee:

- a. A completed GBP Points Worksheet;
- b. Any plans, designs or specifications required prior to construction as stated in this document.

“Threshold” means the total interior square footage of all levels, including interior walls and “dead spaces”, such as closets.

“Threshold” excludes exterior walls, so as not to penalize those using thick-walled assemblies, such as strawbale. Thresholds include: garages and any outbuildings, such as sheds, greenhouses, workshops and guest rooms; and excludes carports, patios and courtyards.

Square footage thresholds required to meet Green Building Program points shall be conditioned (heated and cooled) spaces only (e.g., a garden or shed that stores tools need not meet GBP requirements).

Square Footage	Points Needed	
up to:		
500	45	base
600	48	3
700	51	
800	54	
900	57	
1000	60	
1100	63	
1200	66	
1300	69	
1400	72	
1500	74	2
1600	76	
1700	78	
1800	80	
1900	82	
2000	84	
2000+	+1 point per 100 sf >2000 sf, as may only occur in houses with basements	

We hope that this document will inspire you to strive for the most resource and energy efficient living space to your ability, which meets your design and architectural goals. We expect that most, if not all, Mulberry Grove residents will find that they easily exceed the minimum required points, not because they are required to, but because by making well-informed choices, they will naturally opt for the most resource-efficient, cost-effective, low-impact, healthy design and materials. As the concept of green building catches on, people are learning that green building techniques create healthier living spaces, are more comfortable and aesthetic to live in, reduce the consumption of resources, save money in the long run, and that often initial building costs are comparable to conventional building.

Note: In the event of conflict between this document and building code, building code shall govern construction.

* * *

1 ~ CONSTRUCTION • DEMOLITION • USE OF RECYCLED MATERIALS

Demolition has conventionally been the method by which homeowners and contractors have removed houses and buildings. 20%-25% of landfill capacity is consumed by construction and demolition waste. An alternative is deconstruction. Deconstruction involves carefully dismantling a building and salvaging the parts that can be reused. By choosing deconstruction, homeowners and builders can save precious natural resources and help divert material from the landfill. Using recycled content materials also helps divert material from the landfill and helps close the recycling loop.

1.1 Local Designers and Builders • 5 points

Using local labor creates jobs, stimulates the local economy, and may create and strengthen community relationships.

Application: Calculated by cost, 80% or more of labor for home & landscape design and construction is provided by people living within 30 miles of Moab.

Compliance: Submit copies of invoices to Design Review Committee.

1.2 Construction Debris Recycled • up to 4 points

Recycling reduces pressure on landfills and provides raw materials for other building products.

Application: Use the tracking sheet (obtain from HOA) to log recycled materials. Contact Canyonlands Community Recycling Center, Bob's Sanitation and/or Wabi Sabi to identify terms and conditions required for recycling materials. One point will be awarded for recycling each of the following waste materials from the construction of the house, addition, or remodel project:

1 point: 75% of all clean wood waste (reused or burned for heat)

1 point: 100% of all metal scrap

1 point: 90% of cardboard generated at the site

1 point: 75% of unused materials such as surplus wood, windows, doors and other un-installed materials donated to Wabi Sabi and/or other non-profit organization or private individual.

Compliance: Submit provided Construction Recycling tracking log and receipts to Design Review Committee.

1.3 Reclaimed Lumber • up to 10 points

Reclaimed lumber is the re-use of already harvested and milled lumber. Reclaimed lumber is typically recovered from old buildings, railroad trestles, bridges and other structures that have been deconstructed. Reclaimed lumber saves trees from being cut down and adds character to buildings.

Application: One point will be awarded for each 10% of reclaimed lumber substituted for virgin lumber used for the entire house and accessory structure(s) (e.g., 10%-1 point, 20%-2 points, 30%-3 points, up to 100%-10 points). Lumber will be measured by board foot. Reclaimed lumber can be used for any non-structural application: trim, flooring, decorative beams. Structural applications may need an engineer's stamp.

Compliance: Submit receipts and/or documentation to Design Review Committee.

1.4 Recycled Content Carpeting • 2 points

Recycled-content carpet saves resources and diverts waste from landfills. Recycled-content carpet is made from recycled plastic bottles, recycled wool or recycled cotton. Recycled-content carpet does not differ in appearance or performance and the price is comparable to conventional carpet.

Application: Use recycled content carpet, underlayment and padding in 80% of **applications** where conventional carpet would normally be installed. Carpet must contain a minimum of 75% recycled materials.

Compliance: Submit plan and receipts to Design Review Committee.

1.5 Recycled Plastic Deck Materials • 2 points

The durability of recycled plastic deck materials is greater than wood, providing cost savings to the homeowner over the life of the products. They will not rot, crack or splinter, do not require staining and are not treated with potentially toxic chemicals like arsenic. Using recycled content decking also reduces pressure on old-growth forests. There are two types of recycled content decking: plastic lumber and composite lumber. Plastic lumber contains only recycled plastic resins, while composite lumber is made by combining recycled wood fiber and recycled plastic resins that are then formed into deck boards. These products accept screws and nails, and cut like wood.

Application: Use recycled plastic content deck materials for all exterior decking.

Compliance: Visual inspection by Design Review Committee.

1.6 Recycled Content Sheathing • 2 points

Recycled content sheathing can be made from recycled newsprint and gypsum, or an alternative sheathing product using wood fiber. This product reduces the use of wood products for wall sheathing.

Application: Use recycled sheathing that contains a minimum of 75% recycled materials on at least 90% of the exterior walls. Use wherever plywood and /or OSB would normally be used.

Compliance: Submit plan and receipts to Design Review Committee.

1.7 Recycled Content, Fiber Cement or Forest Stewardship Council (FSC) Certified Siding • 2 points

Siding that has been manufactured with recycled wood fiber will not crack, split or warp and holds paint longer than solid wood siding, therefore reducing maintenance costs and resources. Fiber cement is fire resistant and may save money on homeowner's insurance.

Application: Install recycled content siding, such as hardy board, made from compressed wood fiber, fiber cement or FSC certified wood siding. Use wherever wood siding would normally be installed.

Compliance: Submit plan and receipt to Design Review Committee.

1.8 Recycled Content Roofing • 5 points

Recycled content roofing materials include tiles, shakes, and panels made of recycled wood fiber, concrete, metal and/or plastic. Recycled content roofing can save on the use of petrochemicals in asphalt shingles. Many have significantly longer life-spans.

Application: At least 90% of roofing materials installed must have 75% or greater recycled content.

Compliance: Submit plan and receipt to Design Review Committee.

1.9 Recycled Content Wall & Ceiling Insulation • up to 4 points

Cellulose insulation is made from 100% recycled newsprint, wood fiber and agricultural waste. Styrofoam beads can be made into blocks. Recycled cotton can be made into batts similar to fiberglass.

Application: Install insulation with a minimum of 70% recycled content materials. Points may be achieved per the following:

2 points- Recycled insulation in walls

2 points- Recycled insulation in ceiling

Points may be awarded for batt component of 'flash and batt' insulation.

Compliance: Submit plan and receipts to Design Review Committee.

1.10 Concrete with reduced portland cement content • up to 4 points

The worldwide production of Portland cement accounts for 7% of human-generated CO₂. Fly ash is an industrial by-product, which contributes to air pollution when airborne, and can pollute groundwater with heavy metals when disposed in landfills. Fly ash, when substituted for cement in concrete, produces concrete of equal or greater quality. This safely isolates fly ash from the environment (and building occupants), reduces landfill needs, and reduces carbon emissions.

Application:

2 points (required) – Concrete cementitious material content is 35% or more non-portland cement for all footers, stem walls, grout, and other non-finish concrete assemblies

2 points – Concrete cementitious material content is 35% or more non-portland cement for all slabs and other finish concrete assemblies

Compliance: Submit plan and receipts to Design Review Committee.

1.11 Utilize an approach not listed that meets the goals of this section • points TBD

Application and Compliance: Arrange with Design Review Committee.

* * *

2 ~ SITEWORK • LANDSCAPING

The appropriate use of the building site can have a significant influence on the resource use of the home. Preserving outdoor areas for living space makes sense in our warm and sunny climate. Drip irrigation and xeriscaping can reduce water consumption significantly.

➤ 2.1 Xeriscape Landscaping • up to 3 points

Low water plants survive our hot, dry summers easily, can save thousands of gallons of water annually, thus conserving resources and saving money.

Application: The following points will be awarded for doing one of the following:

3 points: 100% of non-edible planted area is appropriate natives/drought tolerant plants.

2 points: 75% of non-edible planted area is appropriate natives/drought tolerant plants.

Compliance: Submit landscape design to Design Review Committee

2.2 Edible Landscaping • 2 points

Growing your own food saves fuel and emissions from transportation, saves money on groceries and promotes good health.

Application: Provide 400 square feet or more for a vegetable garden and/or fruit and nut trees.

Compliance: Submit landscape and irrigation design to Design Review Committee.

➤ 2.3 Drip Irrigation • 2 points

Drip irrigation systems provide a small but constant water supply to landscape, thus preserving soil moisture, and significantly reducing water waste from over-spray and evaporation.

Application: Points are achieved by installing the following:

2 points (required): Install drip irrigation systems for 60% or more of planted area.

Compliance: Submit irrigation plan and receipts to Design Review Committee.

2.4 Additional Water Conservation • up to 6 points

Water is a precious resource in our high desert climate, where the average annual rainfall is 6-9 inches. Thousands of gallons of water can be harvested annually from roof tops from the small amount of rain that falls in Moab, and gray water can contribute a significant amount of water used for the sub-surface irrigation of non-edible plants.

Application: Up to six points will be awarded for items not included in Sections 2.1 and 2.3.

1 point will be awarded for every ten thousand gallons of annual water saving from rain- or gray -water harvesting.

2 points: Install and commission evapotranspiration (ET) irrigation controller to control all landscape irrigation.

1 point: All overhead irrigation is designed and installed with head to head spacing, and high distribution uniformity sprinklers (e.g. stream rotor).

Compliance: Submit plan and calculations to Design Review Committee.

2.5 Outdoor Living Space • 2 points

Well-situated outdoor spaces can be an extension of the home and enables one to feel comfortable living in a smaller house.

Application: Provide at least one roofed outdoor living space of 200 square feet or greater.

Compliance: Submit design to Design Review Committee.

2.6 Convenient Bicycle Storage • 2 points

70% of the traffic in Moab is generated by local trips. Bicycling is healthier and cheaper than driving, reduces traffic and noise, and generates no exhaust. Bicycles are more likely to be used when they are easily accessible.

Application: Provide covered storage for at least 1 bike per bedroom.

Compliance: Submit design to Design Review Committee.

2.7 Outdoor Lighting • up to 3 points

It is possible to install outdoor lighting that minimizes light pollution, glare, light trespass, sky glow and conserves energy while maintaining night time safety, utility and security. Excess night lighting has been linked to hormone imbalances in humans and animals, and can disrupt the lives of nocturnal animals. Full cut-off lighting casts downward illumination, which is attractive and protects the night sky from light pollution.

Application: Outdoor lighting must be full cut off. Additionally, no bulb shall be visible from within the building envelope of another lot. The maximum illumination of each lot's outdoor lighting, not including covered outdoor living spaces greater than 150 sq ft., measured when bulbs are new, shall not exceed 3600 initial lumens. Points may be achieved by installing at least one the following:

1 point: (required) All outdoor lighting is full cutoff, and path and door lights are lamped with a maximum of 2000 lumens

1 point: Install bulbs with an efficacy of at least 44 lumens/watt (i.e., CFL or better) for at least half the lumen output of the total outdoor lighting.

1 point: Install a motion/pressure sensor on primary entrance(s) and path light(s), that is commissioned so as to not respond to activity off the property (i.e., lights don't go on every time someone walks by on the public path).

Compliance: Submit design to Design Review Committee.

2.8 Utilize an approach not listed that meets the goals of this section • points TBD

Application and Compliance: Arrange with Design Review Committee.

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3 ~ BUILDING ENVELOPE AND INSULATION

Conventional solid wood framing of the house can use many large-diameter trees. Engineered lumber, once only affordable for high-end commercial construction, is an improvement over solid-sawn lumber at competitive prices. These materials use fast-growing farm trees instead of old-growth trees and can use 50% less wood fiber to perform the same structural functions. Some structural alternatives eliminate the need for wood framing altogether.

3.1 Alternative Materials • up to 16 points

Conventional residential walls use significant amounts of wood, plywood, fiberglass, sheet rock, cement, and/or steel. There are a number of new and old wall assemblies that substitute local, less processed materials for structure, insulation and/or sheathing. These include strawbale, adobe, cob, earthbag and rammed earth.

Application: Exterior and interior walls constructed with natural, substantially unprocessed materials which may include, but are not limited to: adobe, rammed earth, cob, earth bag and straw bale, sourced within 150 miles. The Building Department may require an engineer's stamp for houses made with alternative materials. The following points may be achieved:

4 points: Exterior walls constructed with natural, unprocessed material which substitutes for insulation.

4 points: In addition to exterior walls constructed with natural, unprocessed material, walls are plastered with earth plaster (finish coat excepted) on interior and exterior.

4 points: Structural walls which support the roof. Wood must be eliminated or used minimally (maximum of 2 ½ board feet of wood product per linear foot of wall, and maximum of 1 board-foot per linear foot of interior wall). Walls must utilize less than 20 lb. Portland cement per linear foot of wall (i.e., enough for a bond beam, but not a wall), and less than 1 ½ lb. steel per/ linear foot wall.

4 points: Interior walls constructed with natural, unprocessed material, using less than one board-foot wood product / linear foot, no concrete, and no metal other than fasteners, and not sheathed before finishing. Compressed straw panels are eligible.

For all categories, points may be prorated if different wall types are used in the same building.

Compliance: Submit design plan to Design Review Committee.

➡ 3.2 Incorporate Optimal Value Engineering (OVE) Framing Techniques • 3 points

Optimum value engineering (OVE) framing techniques include: 24" on-center wall studs, two stud corners, headers sized for actual loads, stacking floor joists over studs, and using 2 foot dimensions for reducing waste. OVE framing saves energy and money. Framing costs can be reduced by 15% while improving energy efficiency.

Application: Where repetitive light wall framing is used specify OVE framing in plans with details for framing carpenters.

Compliance: Submit plan to and visual inspection performed by Design Review Committee.

3.3 FSC-Certified Sustainable Harvested Lumber Used • up to 10 points

The Forest Stewardship Council (FSC) is the leading organization in developing standards for sustainable forestry. FSC certification guarantees that forests are managed in an environmentally and socially responsible manner and assures the long-term availability of high quality wood.

Application: Replace any grade or **application** of solid-sawn lumber with FSC-certified lumber. One point will be achieved for each 10%, by volume (board foot), of framing lumber used which is FSC-certified lumber (e.g., 10%-1 point, 20%-2 points up to 100%-10 points) in wood framed homes (stick frame, timber frame, post and beam, and SIPS).

In addition, one point will be awarded for using at least 80% FSC-certified wood in each of the following categories: 1) windows and doors; 2) wall and roof sheathing; 3) ceiling and floor; 4) trim and cabinets.

Compliance: Submit plan, and receipts to Design Review Committee. If using less than 100% FSC-certified include calculations showing percentage used.

3.4 FSC-Certified Wood or Oriented Strand Board (OSB) Used in Sub floors/Roof Decking • up to 2 points

OSB is manufactured from fast growing farm trees and comes in 4' x 8' sheets, is comparable to plywood and is less expensive. OSB reduces the need for large diameter trees required for plywood. Some OSB uses lower formaldehyde content adhesives and is available as FSC- certified.

Application: The following points may be achieved for using OSB or FSC-certified wood as an alternative to plywood in at least 80% of sub-floors and/or roof decking:

1 point: sub floors

1 point: roof decking

Compliance: Visual inspection performed by Design Review Committee.

3.5 Large Solid Sawn Lumber Minimized • up to 3 points

Solid sawn lumber in sizes of 2x10 or greater typically comes from old growth forests and should be avoided. Engineered lumber products often come from small-diameter and fast-growing plantation trees. Reducing demand for large dimensional lumber decreases pressure to cut down old growth forests. Engineered lumber uses wood fiber more efficiently than conventional lumber, resulting in stronger and straighter products.

Application: The following points may be achieved (boardfoot measurement based on nominal size):
3 point: no 2x solid sawn lumber greater than 8" nominal depth used, and no more than 0.2 boardfoot/sq. ft. interior floor area of 3x10 or greater solid sawn lumber used. OR

2 point: no more than 0.1 boardfoot/sq. ft. interior area of 2x10+, and no more than 0.2 boardfoot/sq. ft. interior floor area of 3x10 or greater solid sawn lumber used.

Compliance: Submit plan and receipts to Design Review Committee.

3.6 Structural Insulated Panels (SIPs) Used for Exterior Walls and Roofs • up to 8 points

Structural insulated panels (SIPs) are manufactured with a skin of Oriented Strand Board (OSB) bonded to each face of a core of rigid foam insulation and come in 4"-12" thickness and are about R-4 per inch. SIPs are energy efficient, provide excellent soundproofing and reduce air infiltration relative to stick frame construction. They can be erected more quickly than wood framing and can save wood by eliminating much of the conventional framing lumber.

Application: Use SIPs for structural exterior walls and roofs in place of conventional framing.

2 points: SIPs for exterior walls

2 points: Wall SIPs are monolithic

2 points: SIPs for roofs

2 points: Roof SIP splines are not dimensional lumber

Compliance: Submit plan and visual inspection performed by Design Review Committee.

3.7 Comprehensive Air Sealing • up to 6 points

Reduced air leakage contributes to a more comfortable and efficient home. There are a variety of methods and products available to achieve this, and this is a continuously evolving area.

Application:

1 point: Operable windows have tested air infiltration rate of less than 0.2 CFM/sq.ft. and doors less than 0.4 CFM/sq.ft. OR

2 points: Operable windows have tested air infiltration rate of less than 0.1 CFM/sq.ft. and doors less than 0.3 CFM/sq.ft.

2 points: A continuous air barrier enclosing the conditioned space is shown in the construction documents, and verified during construction OR

4 points: air leakage of no more than 1.5 ACH50 verified by pressurization testing.

Compliance: Submit CDs or test results to Design Review Committee.

➡ 3.8 Frost Protected Shallow Foundation (only appropriate and required for slab floors) • 3 points

By adequately insulating the foundation perimeter, the heat in the building helps prevent the ground beneath the foundation from freezing, and the foundation does not need to be as deep.

The manufacture of Portland cement in concrete uses large amounts of energy. Reducing the depth of the foundation reduces the amount of concrete used, which saves resources and reduces excavation, formwork, concrete, and labor costs.

Application: Insulate slab foundation perimeter (or grade beam w/ adobe floor) as required by building code with foam insulation manufactured without ozone depleting chemicals or greenhouse gas. Reduce foundation depth to 12", or minimum allowed by building code.

Compliance: Submit plan to, and visual inspection performed by Design Review Committee.

3.9 Utilize an approach not listed that meets the goals of this section • points TBD

Application and Compliance: Arrange with Design Review Committee.

* * *

4 ~ PLUMBING

Plumbing design, fixtures and appliances affect both energy costs and water usage. Tankless hot water heaters eliminate standby losses from hot water tanks saving 10-15% of hot water costs. On demand hot water pumps provide instant hot water without running water until it is hot at distant showers and sinks.

4.1 Tankless Water Heater • 3 points

Tankless water heaters (on-demand heaters) heat water as needed rather than having a tank in which hot water is stored. Their capacity to provide hot water is virtually unlimited. Typical hot water heaters lose

15% of their energy through standing tank losses, whereas tankless heaters use energy only for immediate hot water needs. Gas tankless water heaters typically have more capacity than electric tankless heaters.

Application: Install a tankless hot water heater as close to the point of use as possible. The device should have a variable-set thermostat and be appropriately sized.

Compliance: Submit plan and receipt to Design Review Committee.

4.2 "On-Demand" Water Switch • 1 point

This switch-activated device pumps water from the fixture to the water heater through the cold water line, pulling hot water back, providing instant hot water. An on-demand hot water circulation pump sends hot water to fixtures in seconds, without wasting water while waiting for it to become hot and uses a pump to rapidly move water from the water heater to fixtures. It stops when water reaches a preset temperature. Constant circulation hot water systems do not qualify for this point.

Application: Install the pump(s) at the furthest faucet from the water heater.

Compliance: Plan and receipts submitted to Design Review Committee.

4.3 Domestic Hot Water Pipe Insulation • 1 point

Hot water running through uninsulated pipes loses heat to the surrounding space. Insulating hot water pipes results in water at the user end being hot faster, which saves water; and less water heat is lost enroute to the user, which saves energy.

Application: Insulate all hot water pipes in conditioned spaces to R-2 or greater. Refer to IECC standards for HVAC piping.

Compliance: Plan submitted to Design Review Committee.

4.4 Low Flow Fixtures • 1 point

Federal standards require that all plumbing fixtures sold today are to be significantly more efficient than fixtures sold just ten years ago. However, there are fixtures available that are much more efficient than the federal standard, which include dual-flush toilets, shower heads that have a shutoff, and faucet aerators. The EPA WaterSensesm program is similar to EnergyStar, but for water efficiency.

Application: Install toilets, faucets, and other fixtures that meet EPA WaterSensesm standards.

Compliance: Plan and receipts submitted to Design Review Committee.

4.5 Utilize an approach not listed that meets the goals of this section • points TBD

Compliance: Arrange with Design Review Committee.

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5 ~ ELECTRICAL

Saving electricity reduces monthly energy costs and helps improve local air quality by reducing the amount of coal burned to produce electricity. One compact fluorescent light bulb, over its life span, will save the equivalent amount of energy used to drive a compact car from coast to coast. When investing in new appliances, the additional costs for improved efficiency will often be recovered in savings in just a few years.

► 5.1 Energy-Efficient Appliances • up to 5 points

Refrigerators and freezers are among the largest users of electricity in most homes and can account for up to 25% of household energy use. Energy Star rated appliances can save 10% or more of the total annual electrical bill. "Energy Efficient" appliance designation is indicated on the Department of Energy required energy label and defined by the Energy Policy Act of 1992.

Application: Install one or more Energy Star rated appliances. The following points may be achieved for each of the following appliances:

1 point: freezer

1 point: dishwasher

1 point: washing machine

1 point: refrigerator

1 point (optional in addition to preceding 1 point): refrigerator in top 20% of efficiency of Energy Star rated refrigerators

Compliance: Submit receipts to Design Review Committee.

5.2 Clothesline • 3 points

Using a clothesline instead of a dryer can save an average of 1000Kwh of electricity annually, reducing air pollution and energy costs.

Application: Install a permanent outdoor clothesline and/or indoor clothes drying racks instead of an electric or gas clothes dryer. To receive points, a dryer may not be installed.

Compliance: Submit plan to Design Review Committee.

5.3 Energy Efficient Lighting • 2 points

Lighting is a significant energy use. In addition to daylighting, installing efficient bulbs and occupancy sensors can reduce energy use by more than 3 times compared to incandescent lighting.

Application: Install occupancy sensors in the halls, closets, and bathrooms. Install bulbs with an efficacy of at least 44 lumens/watt (i.e., CFL or better) in at least half the fixtures.

Compliance: Submit plan to Design Review Committee.

5.4 Utilize an approach not listed that meets the goals of this section • points TBD

Compliance: Arrange with Design Review Committee.

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6 ~ ENERGY EFFICIENCY STANDARD

Energy efficient windows make the home more comfortable and insulation is one of the best investments a homeowner can make when building or remodeling a house. The energy savings from increased insulation will pay for itself over the lifetime of the house. Increased insulation is only half of the process: the other important component is air sealing to keep out drafts and reduce infiltration of cold outside air. NOTE: This section references International Energy Conservation Code (IECC) requirements.

➡ 6.1 Mulberry Grove Energy Efficiency Standard • 1 point for each % greater than standard

All houses in Mulberry Grove are required to meet a standard of energy efficiency. Since Mulberry Grove aims to be a sustainable community, and energy use for heating and cooling homes is one of the largest impacts by individuals on the environment, our standard is designed to achieve energy efficiency while making sure that the standard can be achieved with common construction techniques and materials, and at reasonable cost. The minimum standard for MGC is the current International Energy Conservation Code, whether or not it is adopted by the state and/or county, and if locally adopted without modifications that reduce required performance. The following amendments to prescriptive insulation requirements shall apply:

- a. If stick framing is used for walls, continuous insulated sheathing of at least R-2 shall be provided over at least 90% of wall area.
- b. Glazed fenestration oriented more than 30° from south shall have a solar heat gain coefficient of no more than 0.32, or less if dictated by IECC.
- c. Glazed fenestration oriented less than or equal to 30° from south in a passive solar building shall be permitted to have a maximum U-value of 0.37

For less common materials/assemblies please use third party testing, if available, as the basis for u-values, such as from the Oak Ridge National Laboratory - www.ornl.gov/sci/roofs+walls/AWT/Ref/TechHome.htm .

Application: Homes that achieve higher levels of efficiency are credited points. One can assess a home's performance exceedance by comparing the calculated energy performance of the house if built with the minimum prescriptive insulation, and with the proposed insulation; or by a value calculated by the Department of Energy's online ResCheck program, or other energy modeling software.

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7 ~ HEATING • VENTILATION & AIR CONDITIONING

Mechanical equipment is second only to the building envelope in determining the energy costs of a home. Gas is cleaner and more efficient than electricity in providing heat. The higher the efficiency of mechanical equipment, the more heat is delivered to the home rather than lost up the flue. Heat recovery ventilation provides for year-round comfort and improved indoor air quality.

➡ 7.1 Passive Cooling • 2 points

If heat gain from windows is controlled via orientation, glazing, and shading the need for mechanical cooling can be reduced. Cool air drains along Mill Creek during summer nights, making nights at Mulberry Grove cooler than in much of Moab. If adequate ventilation and interior mass are provided, that mass can be cooled during the night to reduce cooling needs during the day.

- Cross ventilation is enhanced by an irregularly-shaped, spread-out building.
- Facing the building at an oblique angle to the prevailing wind is better than facing it directly perpendicular to the wind direction.
- Wing walls which protrude can act as scoops to enhance wind capture, and can also generate different pressures on the same side of a building, greatly increasing the air flow through the adjacent space compared to a building with a flat façade. Casement windows when open act as wing walls.
- Sizing the inlet area equal to the outlet area is best.
- Horizontally shaped windows (width greater than height) work better than vertical windows.
- Highest velocities are attained when windows and doors are unscreened, so one tactic is to do insect protection with a screened porch but leave the windows between the porch and house unscreened.

Application:

- 1) Size south window overhangs, awnings, or planted trellis to substantially shade south glazing from direct sun from May through September.
- 2) Install east and west-facing windows which have a solar heat gain coefficient (SHGC) of less than 0.31 (most double pane low-e windows).
- 3) Install one or more of the following:
 - a) Exterior vertical shading devices for east and west-facing glass.
 - b) Landscaping that shades east and west-facing glazing (may be preexisting trees)
 - c) Fenestration with an operable area, with insect screening, that is more than 12% of floor area of rooms excepting bath/powder rooms, utility, closets, and smaller than 70 sq. ft.

Compliance: Submit plan to DRC.

7.2 Attic Cooling • 1 point

A reduced cooling load results in less use of swamp coolers and their attendant water and electricity use. Benefit is highest with moderately insulated vented roofs.

Application: Install radiant, heat-reflective barriers in vented roof assemblies. Unvented roofs are not eligible for this point.

Compliance: Submit plan and receipts to Design Review Committee.

7.3 Evaporative Cooler • 5 points

Evaporative coolers (aka swamp coolers) use significantly less electricity than air conditioners, and have no potentially harmful coolant to leak.

Application: Install an evaporative cooler; no air conditioner installed.

Compliance: Submit plans Design Review Committee.

7.4 Energy Recovery Ventilator (ERV) • 8 points

An ERV is a mechanical system that recovers heat from exhausted indoor air and transfers it to the incoming fresh air stream. An ERV has an air-to-air exchanger in which outgoing exhaust air preheats or pre-cools the incoming fresh air. ERVs provide for fresh air in winter while exhausting stale indoor air. This helps to dilute any gaseous pollutants in the home. Heat is captured from the exhausted air stream and transferred to the incoming air so there is little energy penalty for good indoor air quality. It usually replaces all the exhaust fans, except for the range hood.

Application: Install a Heat or Energy Recovery Ventilator system to provide for the exhaust needs of all full bathrooms, and fresh air supply of all living and sleeping areas.

Compliance: Submit plan and receipts to Design Review Committee.

7.5 Air Destratification System • 1 point

Because hot air rises, unless it is circulated, the ceiling temperature in cathedral ceilings can be as much as 10 degrees warmer than floor temperature. Ceiling fans or high returns on hot air systems create even temperatures from floor to ceiling.

Application: Design and install a system to reduce the stratification of warm air in residential living spaces. The systems are to be used on ceilings greater than 10 feet in height, in stairwells, or between stories. Systems may include: blade-type ceiling fans, return ducting mounted at the high point of ceilings, utilizing high and low placed operable windows/vents in passive solar systems, or other proven, documented systems designed to reduce stratification. Install approaches as appropriate to design of the house.

Compliance: Submit plan to Design Review Committee.

7.6 Biofuels • 1 point

Well-designed and properly operated stoves burn cleanly and efficiently.

Application: Wood/pellet/other plant fuel stove shall emit less than 3g/hour, and meet EPA minimum efficiency requirements for their type. (The EPA sets 4.1g/hr as the maximum emission allowed for catalytic wood stoves, but many stoves, catalytic and not, achieve better than this.) Install wood/pellet/other plant fuel stove(s) that meet the preceding requirements. Size appropriately for the heating load of the spaces in which they are being installed.

Compliance: Submit plan and receipts to Design Review Committee

7.7 Active Heating/Cooling • 2 points

Most homes will utilize some form of fossil fuel powered heat, typically a furnace or boiler. This heat source(s) shall meet or exceed current EnergyStar or the following standard, whichever is greater:

- 92 AFUE gas furnace, ENERGY STAR qualified; OR
- 85 AFUE boiler, ENERGY STAR qualified; OR
- 85 AFUE oil furnace, ENERGY STAR qualified; OR
- 9.5 HSPF / 14.5 SEER / 12 EER ENERGY STAR qualified air source heat pump / AC.
- Exterior components installed sound level ≤ 50 dB at 6' regardless of efficiency; may be achieved

with enclosure.

Exception – well insulated passive solar homes may have heating requirements so low that fossil fueled heat sources are unjustifiably expensive relative to electric resistance heat. Additionally, the use of the latter may be offset relatively easily with onsite grid-tied solar. Although conversion of electricity to heat at the home is nearly 100% efficient, electric power plants operate with efficiencies as low as 35%. Transmission and distribution losses reduce delivered efficiency to about 32%, or 35% the efficiency of converting fuel directly to heat the home at the above standard.

Therefore, if the projected annual heating need of a house is less than 35% of that of a reference house (the same house built to the current minimum county efficiency standard, and not factoring in passive solar gain), active heating may be provided by electric resistance source(s).

Compliance: Submit plan, and calculations if taking the exception, to DRC.

7.8 Utilize an approach not listed that meets the goals of this section • points TBD

Compliance: Arrange with Design Review Committee.

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8 ~ SOLAR

Moab provides an excellent climate for cost-effective solar utilization. Passive solar design is easy to incorporate and increases the livability of the home with natural daylight and radiant heat. Pre-plumbing and pre-wiring is a way to prepare for future solar retrofit.

8.1 Solar Hot Water Heating System • 10 points

Solar hot water systems can pay back in as little as five years and reduce the use of gas or electricity for water heating.

Application: Install a solar system which includes rooftop or ground-mounted panels (collectors) that distribute hot water to a heat exchanger or insulated storage tank. Systems may be active, using pumps, or they may be a thermo siphon-type. System must be sized to provide at least 75% of the annual domestic hot water load. Water preheated by a solar system can also supplement use of a standard hot water heater. Providing sufficient south-facing roof area for collectors and space in a mechanical equipment room for the additional hot water storage tank is required.

Compliance: Submit plan and receipts/invoices to Design Review Committee.

➡ 8.2 Passive Solar Space Heating • up to 15 points

Passive solar systems provide heat to the structure by admitting solar heat through south facing windows during the day, and storing it in dense materials (thermal mass) that then release the heat at night and during cloudy periods. Some types of common thermal mass are slab floors (adobe & concrete), tile, and walls with at least an inch of earth, gypsum &/or concrete in the side facing the interior. Passive solar design can reduce heating requirements, saving energy and money. The percentage of mechanical heating that is offset by the solar design, calculated over the heating season, is called the solar savings fraction

(SSF). For example, if a house design that would otherwise use 5 cords of wood for heat in the winter were modified with south windows and a slab floor, and subsequently needed 4 cords of wood, it would have a SSF of 20%. The southern glazing should be shaded in the summer (as per section 7.1 in this document) to avoid heating the house when cooling is desired.

Application: Install south facing glazing, with an appropriately sized thermal mass, designed to meet the building's heating load according to the following schedule. 20% SSF is the minimum required to meet this section.

3 points: 20% SSF
6 points: 30% SSF
9 points: 40% SSF
12 points: 50% SSF
15 points: 60% SSF

Compliance: Submit plan, and calculations of heating load of the building and solar savings fraction to DRC.

➔ 8.3 Active Solar Pre-plumbing • 2 points

Solar hot water pre-plumbing can save money for, at some point in the future, installing a solar system.

Application: Pre-plumb house for future active solar retrofit (These points cannot be taken if points are claimed under element 8.1.) The piping is to be installed in an interior wall and should start near an area that will house the storage tank. The piping should terminate in an attic space under the roof that will support the solar collectors, and it should be above the insulation for easy sighting; or at an outside location. If there is no attic, the piping should end after penetrating the roof that will support the collectors. The two runs of piping shall be copper or stainless steel and be a minimum of 5/8 inch in diameter. The piping shall be insulated with a minimum R-3. The insulation shall run continuously without any exposed piping. Run two conductor sensor wire to the piping with a minimum gauge of 22, twisted pair. Insulated pipes are installed from the attic to a hot water closet or mechanical room for future solar installation. Provide south-facing roof area for collectors and access for piping to mechanical room. The most cost-effective time to install pre-plumbing is during construction or renovation. Given the changing prices for photovoltaics, substitution of PV for this element might be claimed under 8.6 Utilize an Approach Not Listed.

Compliance: Submit plan and receipts/invoices to Design Review Committee.

8.4 Active Solar Space Heating • up to 16 points

Active solar systems provide heat to the structure by collecting heat via solar thermal panels which use fluid or air as the heat transfer medium, distributing heat through the use of fans, pumps and ducts, and storing heat for use at a later time.

Application: Design and install an active solar heating system to meet the heating load of the home according to the following schedule:

4 points: 30% solar heating
8 points: 40% solar heating
12 points: 50% solar heating
16 points: 60% or greater solar heating

Compliance: Submit plan and receipts/invoices to Design Review Committee. Submit documentation by a qualified engineer of solar savings fractions using industry accepted formulas.

8.5 Solar-Generated Electricity • up to 16 points

Photovoltaic panels contain hundreds of small cells that collect the sun's energy and change it into electricity that can be used in the home. Excess electricity can be sent back into the utility grid for a credit on electric bills. The collected energy can also be stored in large batteries to meet the needs of nighttime energy requirements. The components for a residential, utility-tied system typically includes panels, a power relay center and an inverter. PV panels can be used as a means to decrease reliance on conventional power plants that contribute to air pollution.

Application: Design and install a system to meet the electricity load of the home according to the following schedule, where percentage is of annual electricity use:

4 points: 30% solar electricity

8 points: 40% solar electricity

12 points: 50% solar electricity

16 points: 60% or greater solar electricity

Mount photovoltaic panels on the roof or on the ground at an appropriate orientation and angle.

Compliance: Submit plan and invoice/receipts to Design Review Committee. Submit calculations by a qualified architect, engineer or designer certifying the capacity of solar electric power.

8.6 Utilize an approach not listed that meets the goals of this section • points TBD

Application and Compliance: Arrange with Design Review Committee.

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9 ~ INDOOR AIR & ENVIRONMENTAL QUALITY

Indoor air quality in new homes can be worse than outside air on high pollution days. Most of the indoor air quality problems arise from chemicals that are introduced into the house by building materials, adhesives, paint and finishes. An attached garage can also be a significant contributor to indoor air pollution from car exhaust.

9.1 High Efficiency Particulate Air (HEPA) Filter on Furnace • 2 points

The EPA has identified micro-particulates as a leading cause of respiratory discomfort. By removing these particles, the HEPA filter makes the living space healthier. HEPA filters are installed in the return air stream at the air handler, must be able to handle the reduced air pressure caused by the filter. Some units have an air conditioning setting for the fan that will handle the HEPA filter.

Application: Install 90% efficiency or greater HEPA filter on new forced-air furnace installations.

Compliance: Submit receipt to Design Review Committee.

9.2 Sealed Combustion Gas Furnace/Boiler & Water Heater • up to 4 points

Contaminants resulting from combustion appliance back-drafting will be minimized.

Application: The following points may be achieved for installing a sealed combustion gas furnace/boiler or water heater:

2 points: gas furnace/boiler

2 points: water heater

Compliance: Submit plan and receipts to Design Review Committee.

9.3 Low Volatile Organic Compound (VOC) Interior Paint • 1 point

Most paint releases volatile organic compounds (VOC), a major indoor air pollutant, into the home. Once outside, VOC's react with other pollutants, producing ground-level ozone that also affects human health. Low/no VOC products are manufactured without mercury or mercury compounds, or pigments of lead, cadmium, chromium, or their oxides. Paint with low or no VOC's is available from most major manufacturers and are applied like conventional paint products.

Applications: All painted areas must be painted with low or no VOC paint containing less than 160 grams VOC/liter.

Compliance: Self-certified.

9.4 Low Solvent Construction Adhesives • 2 points

Low solvent adhesives reduce toxic gasses such as aromatic hydrocarbons or solvents that contribute to air pollution. Conversely, solvent-based adhesives can off-gas toxic compounds for months.

Application: Use low solvent products in place of standard adhesives for all interior **applications** such as installation of sub-floor, wood trim, flooring, countertops, wall coverings, paneling and tub/shower enclosures.

Compliance: Self-certified.

9.5 Low-Toxicity, Water-Based Wood and Floor Finishes • 2 points

Low-toxic finishes emit fewer pollutants and reduce the potential harmful impacts on the health of the occupants and installers. These finishes reduce toxic gasses such as aromatic hydrocarbons or solvents that contribute to air pollution.

Application: All non-painted, interior wood and floor surfaces must be finished with low-toxic, water-based finishes.

Compliance: Self-certified.

9.6 All Exposed Particleboard and Medium Density Fiberboard (MDF) Sealed with Certified Sealer • 2 points

Sealing all exposed particleboard reduces exposure of harmful emissions to residents, particularly children, who are most susceptible.

Application: Wherever MDF or particleboard is used, seal all exposed edges of cabinets, undersides of counter tops, stairs, shelving, etc. with three coats of non-toxic, low permeability paint or other certified sealer prior to installation.

Compliance: Self-certified.

9.7 Alternative No-Formaldehyde Products Substituted for Particleboard • 3 points

Agricultural-based particleboard products and formaldehyde-free particleboard/MDF/plywood can be used for cabinets, counter tops, shelving, and furniture.

Application: Use agricultural-based particleboard with non-formaldehyde resins for any **application** which typically uses particleboard.

Compliance: Self-certified.

➡ 9.8 Daylighting and Ventilation • 4 points

Adequate daylighting reduces the use of electric lights, and improves the mood and productivity of the occupants.

Application: In all rooms larger than 200 ft² provide daylight from at least two sides. For above grade rooms, and all bedrooms, meet International Residential Code lighting and ventilation requirements without artificial lighting or ventilation. Bathrooms shall be provided with a minimum aggregate glazing area of 3 sq. ft. or 5% of the floor area, whichever is more.

Compliance: Submit plan to Design Review Committee.

9.9 Utilize an approach not listed that meets the goals of this section • points TBD

Compliance: Arrange with Design Review Committee.

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10 ~ SUSTAINABLY HARVESTED NATURAL MATERIALS

Natural materials harvested sustainably and as local as possible can be an efficient and simple way to reduce energy consumption and lessen the impact on our resources.

10.1 Natural and Sustainably Harvested Flooring • up to 2 points

Natural flooring that is sustainably harvested reduces stress on the environment and can be quite beautiful.

Application: 1 point may be achieved for each 50% of floor area by using one or a combination of the following materials:

- natural linoleum with low toxicity adhesive or backing
- bamboo
- natural carpeting and padding, tacked, not glued
- regionally quarried and processed stone (within 500 miles)

- regionally and sustainably cut and milled wood (within 500 miles)

Compliance: Submit plan and/or receipts to Design Review Committee

10.2 Adobe Flooring • up to 8 points

Adobe flooring uses no wood and the materials are inexpensive.

Application: 1 point may be achieved for every 12% of adobe floor installed.

Compliance: Submit plan to Design Review Committee.

10.3 Natural and Sustainably Harvested Interior/Exterior Finishes • up to 4 points

Natural finishes do not off gas harmful emissions, can be easy to work with and are quite beautiful.

Application: Use the following schedules to determine points:

Interior and exterior walls will be calculated separately. If more than one of the following materials is used, points may be taken only for the material used in greater quantity (e.g., exterior of home is finished with lime plaster for 50% of wall surface, 40% of wall surface is finished with earth and the remainder is wood siding and trim- only points for lime plaster may be taken).

Exterior

1 point: lime plaster

1 point: store-bought earth plaster/paint

2 points: locally harvested earth plaster/paint

Interior

1 point: lime plaster

1 point: gypsum plaster

1 point: store-bought earth plaster/paint

2 points: locally harvested earth plaster/paint

Use one or a combination of the above materials for exterior and/or interior finish.

Compliance: Submit plan to Design Review Committee

10.4 Utilize an approach not listed that meets the goals of this section • points TBD

Compliance: Arrange with Design Review Committee.