

the DAILY SLEDGE

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Is Stone Green? Sustainability in Stonework Construction

Stonework is a beautiful addition to any building or landscape project. Stone is a natural material and incredibly durable, both great advantages when considering sustainable building practices. Even so, there are several factors to consider when planning to use stone in your project.

What type of stone will be used? Where is it from and how is it gathered? A significant percentage of the stone used in the mountains of North Carolina comes from central Tennessee. This sandstone is lovely and very easy to work with, but it is costly in energy and money to bring it here. The customer and the planet both pay. Finding local stone supplies reduces the impact of freight and gives the project a look of belonging to this locale.

Unfortunately, there is not much green about the way stone is gathered. Large scale fieldstone gathering often resembles clear-cut logging, with large excavators scraping the hillsides for stone. Quarries are more localized but they too alter the land, cutting into mountainsides and leaving permanent scars. Researching and visiting quarries and other stone producers gives masons a better understanding of where their stone comes from and helps them to choose greener, more Earth conscious vendors.

What sort of building technique is being employed? Drystone construction, in which no mortar is used, is more sustainable than mortar masonry, but not suitable for all projects. Masons who understand the advantages of drystone work (see page 2) and know how and when to properly apply the techniques are in a great position to make more sustainable building choices.

Lime mortar is now making a comeback, in part because of its green qualities: lower carbon production costs, absorption of atmospheric CO₂ during curing and the ability to repair itself. Lime mortar is not suitable for all types of work, but should be researched in the planning phase of a project. And of course, whatever techniques are being employed, build it to last.

Really there's no simple answer to the question "Is stone green?" The choices the mason and project planners make along the way determine just how sustainable the project will be. Local stone installed by skilled craftspeople using sound building practices will create beautiful and strong works that will last generations.

Turn the page for a planning tool that will help you build more sustainably: the Green Target.



Green construction was a project focus when Biltmore Farms and Handmade in America started the Handmade House in the Ramble. This retaining wall, patio and bench are all dry laid using only locally sourced stone. My work with The Unturned Stone.

WORK IN PROGRESS: Cabin Fireplace



Relocated by oxen team to its current site in 1856, this log cabin in the Grapevine area of Madison County is being restored by friends. I am building the third fireplace and chimney it has had since being moved. I am reusing the previous chimney stone and have supplemented my supply with other local material. The mantle is black walnut, hand hewn from a tree on the property by another friend. Track progress on this and other projects at my blog: hammerheadstoneworks.com

This newsletter focusing on Sustainability was created as the handout for my presentation at the Mt. Green Conference at Warren Wilson College, June 2009.

UPCOMING CLASSES

DIY Flagstone Paths & Patios:

August & September 2009
NC Arboretum

Appreciating Stonework

November 2009
NC Arboretum

Dates to be announced later in June on the Arboretum's site: www.ncarboretum.org

Targeting Sustainable Stonework

The Green Target is a visual tool that helps analyze the sustainable properties of a stone project. Color coded pie wedges score four attributes of sustainability for any given project. The graphic is quick and clear and easily understood. The tool is meant to promote dialogue as well as encourage stone masons and wallers to challenge themselves to seek ways to improve the sustainable qualities of their work.

I broke sustainability out into four main attributes. They are equally weighted in the tool, to ensure that important parts of the sustainability conversation aren't ignored. I believe that the embodied energy of a project is a crucial concern, but not the whole picture. The work's function, it's expected lifespan and what it contributes to the community and culture are also essential.

The outer ring is red, indicating a lower overall rating in any category.

The inner ring is green, indicating that the project scores well in terms of sustainability. The middle ring is yellow indicating a neutral rating or inconclusive information. Scores in the red and yellow should prompt further inquiry and planning, to discover ways to reduce the footprint and boost the sustainable characteristics of the project.

FUNCTION

Does the stonework serve a functional purpose or is it purely decorative? Are the properties and benefits of stone utilized in some meaningful way? A retained heat oven scores well, a four inch veneer on a wood frame house scores poorly.

ENERGY

What is the embodied energy cost or carbon footprint of the project? What is the environmental impact of the project? This includes the sourcing of all materials, freight and installation. Drystone walls and carpooling to work improve the scoring here. Using Pennsylvania Bluestone in North Carolina does not.

LIFESPAN

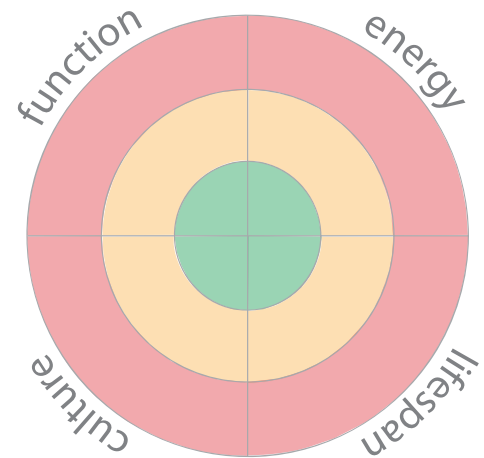
How long will the work last? How much maintenance will be needed under fairly typical usage or conditions? A well built drystone retaining wall scores well. A typical veneer with backset mortar and face bedded stone would not.

CULTURE

What does the work contribute to the community? Are local craftspeople and merchants being used? Is it a public or private project? Does it advance the craft? Does it educate people? Consider this category over the likely lifespan of the work. A public stone installation scores higher than one in a gated community. Oddly enough, cultured stone does not rate at all in the Culture category.

The Green Target can be used to rate an existing project, but its greatest utility is in the planning stages of new work. Score a few scenarios to help choose a lower impact project that contributes something unique to the world. The Target is a values-driven tool not a scientific instrument. It is a tool for dialogue and change. It should raise as many questions as it answers.

I plan to continue development of the Green Target, seeking ways to make it more objective and to broaden the scope of its application. I welcome ideas and feedback on the tool. E-mail me: marc@hammerheadstoneworks.com. You can also download a PDF worksheet of the Green Target at my web site: www.hammerheadstoneworks.com.



This target is faded, to show how the colors and attributes are laid out. Darken the appropriate segment or put check- or X-marks to score a project, as in the case study on the next page.

Why Dry? The advantages of drystone masonry

Drystone or dry laid masonry refers to stonework built without using any mortar or cement to bond the work together. Gravity, friction and skillful placement ensure that the stonework stays where it's intended. Dry stonework is the sustainable choice for landscape applications such as retaining walls, paths, patios, and steps. A well-crafted drystone retaining wall will have a smaller carbon footprint and will outlast a similarly sited mortared wall. Here are some of the other advantages of drystone masonry:

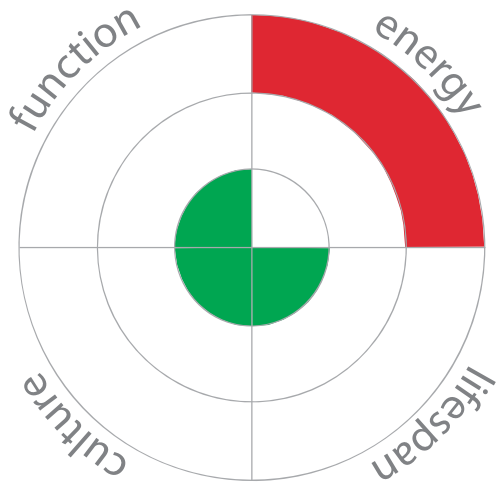
- Flexible, moves rather than breaks in response to outside stresses
- Drains water effectively, preventing build up of hydrostatic pressure, the force that pushes over mortared walls.
- Doesn't require concrete footings or slabs or block wall backing
- Weathers better and lasts longer
- Easier to repair work or reuse the stone at a later date
- Requires no waterproofing
- Looks more natural in the landscape.



Detail of drystone retaining wall of local fieldstone

Green Target Case Study

I designed The Cabin at the Black Mountains and built it with Fred Lashley of the Unturned Stone during my time working there. It is structural stone with two foot thick walls and uses hydraulic lime mortar. It is located in a remote section of the Black Mountains on privately held land. The owner uses it primarily as a weekend retreat. The cabin scores well in all but one category of the Green Target.



function + Structural stone Shelter Rumford fireplace and a wood stove	function - Secondary, part-time residence
energy + Lime mortar Daily carpooling Biodiesel to run equipment Lintels are quarry waste	energy - EVERYTHING, including water, had to be brought in Very remote location 50 minute one way commute doubled after Parkway closing
culture + Structural stonework is a dying craft Brought in other masons to help with work Great learning experience for everyone Cabin intended for public trust when owner dies	culture - Currently private property
lifespan + Built to last Lime mortar- self healing and more flexible Deep roof eaves help protect walls	lifespan - Built in an extraordinarily harsh environment

Hammerhead Stoneworks

My name is Marc Archambault and I am a stone mason and dry stone waller based in Asheville, North Carolina. I practice traditional, old school building techniques. My stonework is an artful balance between bomber structure and graceful aesthetics. In addition to building with stone, I am devoted to sharing the craft with others; I teach stonework classes and maintain an active website and stonework blog. I am a member of the Stone Foundation and Handmade in America. Hammerhead Stoneworks is my company, founded in spring 2009. I worked for the Unturned Stone for six years as a mason, a designer and project manager. I work in and around Asheville, but can be persuaded to go just about anywhere for the right project. Please call or e-mail me to discuss your project or plans or to discuss classes.

Marc Archambault

(828) 337-7582

marc@hammerheadstoneworks.com

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This newsletter is available on-line as a downloadable PDF.

SUSTAINABLE STONEWORK

Here are several projects that demonstrate some or all of the key concepts of sustainable stonework: functionality, lower embodied energy, a long lifespan, and a social and cultural contribution.



Mosaic floor in St. Mark's Basilica, Venice, circa 1500, culturally and architecturally significant, still in use.



Drystone bridge built in the mid 1800's, still in use today in Hillsborough, New Hampshire. Photo by Tomas Lipps of Stonexus Magazine



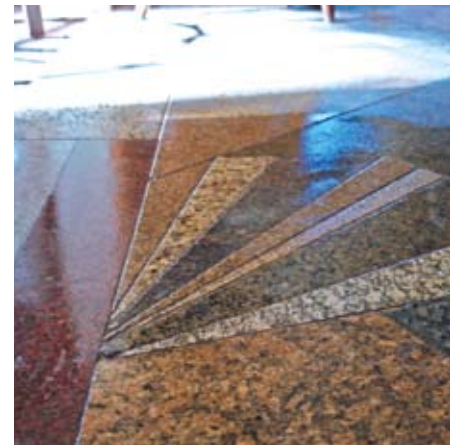
Traditional, dry wall of reclaimed stone, built at a school. Students put a time capsule in the wall. Wall & photo by Tracey Blackwell, Yorkshire.



Our Lady of Dallas, Cistercian Abbey. Modern, load-bearing structural limestone. Photo by James F. Wilson, courtesy of Stonexus Magazine



Abbey interior. Quarry split faces preserved inside and out. Could easily last 1,000 years. Photo by Craig Blackman, AIA, courtesy of Stonexus Magazine



Residential floor of scrap granite counter tops, added thermal mass in radiant floor system. Completed while with Unturned Stone.



Dry stacked retaining wall and steps, granite quarry waste, reclaimed limestone, any new stone is local. My work with Unturned Stone.



New drystone wall, meant to resemble historic stone house. Used existing, failing wall and local stone. Work of Unturned Stone.



Flagstone laid on pea gravel bed drains water and will last longer than a mortared surface. Local stone. My work with Unturned Stone.

Questions or comments? E-mail me, marc@hammerheadstoneworks.com