Green Building Materials – PAINTS, FINISHES AND STAINS

Summary for SBA Group Project
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Without direct contact with the owners, it is difficult to assess whether or not they would be interested in alternative plasters or natural/zero-VOC (volatile organic compounds) paints. Once we have targeted their needs and limitations in this area (aesthetic appeal, budget, ease of application), we can proceed with more research into the areas of choice.

Thankfully, there are a range of options within the world of wall and floor treatments, and many of them are similar in cost to non-'green' options.

PAINTS /PLASTERS

Paints – to note: a zero-VOC paint may still give off toxic vapours even if it does not contain volatile compounds. Low or zero-VOC paint can still contain the following toxic compounds: ethylene glycol, formaldehyde, acetone, crystalline silica or ammonia.

Consider this: during the normal life cycle of a home or office building which may be a hundred years or so, hundreds or thousands of gallons of primer, paint, sealers, stains and other finishes are spread from floor to ceiling and from wall to wall. A single gallon of low VOC paint contains thousands of chemicals many of which have not been thoroughly researched for their saftey to human health or their impact on the environment. These include: VOC's, Fungicides and Biocides, and Pigments.

A New Approach
But let's take a creative approach. Instead of asking how to reduce the problem of toxicity in paint, shouldn't we ask how to create a paint that is healthy? Or, is there an alternative to paint that is better for the inhabitants and the environment now and in the future? Using the Mcdonough/Braungart eco-effective model of waste equals food, shouldn't our wall and floor finishes be made of a material that is totally non-toxic and biodegradeable (not just free of VOC's)?

In the past and even today, there are cultures that finish their floors walls and ceilings with a variety of natural materials such as: organic lime washes, clay

plaster, straw/mud combinations, milk paint, natural oils, bees wax and other indigenous resources.

> **Silacote** is an inorganic permanent paint that penetrates and chemically bonds with the substrate. Comes in 250 earth tone colors and is zero VOC and completely non-toxic. Will never chip crack, peel or fade but must be used over new unpainted concrete, masonry, brick or stucco. for interior or exterior walls. Does not work well for flooring.

Milk (casein) paints are also an option. This is a simple, natural method for painting used traditionally in many cultures. Today, manufacturers provide a powder to which water is added, creating a non-toxic alternative to even many zero-VOC paints available on the market (as noted above). Natural pigments are available, as well as complete instructions on how to apply. Note: milk-based paints do not work well on gypsum-type surfaces witout additional priming.

Clay paints are another natural alternative – a traditional form of covering wall surfaces that has been takn up by eco-manufacturers to help with ease of use and availability. One company says they use "naturally-occuring"clay; however, for real sustainability, it would be wise to see where exactly their clay comes from. Ideally, if clay is desired in a wall coating, it should be sourced locally.

Note: In my research I found that some milk paints (and obviously, some clay paints) use Kaolin clay as a filler. This kind of clay has been found to contain radioactive ingredients (uranium and thorium), and would need to be more fully researched before using. Some milk paint suppliers do not use Kaolin clay.

While the latest zero-VOC, non-toxic paints have a very similar look to traditional 'stinky' paints, once you get into the realm of plasters, you discover a wide variety in the finished product. I find them very aesthetically pleasing, but this is a personal choice and may not be for everyone.

Plasters

Earth plasters – locally sourced, not as durable, needs regular re-application. I am going to venture that the Millers will not want this kind of look nor the maintenance tasks required of an earthen plaster. See American Clay, below, for a slightly easier approach.

Lime plasters – highest embodied energy highly durable and crack-resistant, commonly used in alternative construction, smooth application and aesthetically pleasing. Lime is readily available but not locally sourced.

Concrete plasters – not as breathable as the other two options, high embodied energy, more industrial look.

American Clay Earth Plaster
Manufactured in and using materials from the United States, American Clay uses natural clays, recycled and reclaimed aggregates, and vibrant natural pigments. With low inherent energy used during the manufacturing process and less waste in production and application, American Clay earth plaster was created out of a commitment to the environment and the future.

American Clay Earth Plaster Properties
The versatility, flexibility, ease of application and cost-effectiveness of clay plasters makes them a practical alternative to gypsum based plasters. Clay plaster has excellent properties of regulating both temperature and humidity, making it ideal for 'breathing' constructions. Clay plaster also has the major advantage that it can be reworked at any time in the future.

Advantages Over Paint
Clay naturally controls climate by regulating arid and humid air, absorbing and releasing moisture in response to environmental changes. Warm to the touch in winter and surprisingly cool in summer, American Clay earth plaster creates a wall surface that is inviting to the senses. It can be painted, stained or plastered over, absorbs sound, is flexible(workable until sealed), breathable, non-dusting, non-toxic, and easy to use (easy on hands).

As one example of a commercially-made, easy to use natural plaster, one 50lb. bag of American Clay covers approximately 200 square feet and costs $69.

Using a natural plaster can be a lot of fun; it can involve a work party consisting of friends and fmaily, or can be outsourced to skilled or unskilled workers.
It is possible to use a natural pigment with a plaster to obtain a desired colour for the walls. Emission of particulate from earthen finishes can sometimes be high.

There are some beautiful pictures of timber frame homes with natural plaster walls; I'll bring a book or two to class to show you next week.

For application on concrete, unfortunately I haven't been able to find any specific references. However, I don't see why you couldn't apply an earthen or lime plaster over a concrete surface. I am not sure if we are wanting to use this in the basement on the interior walls, as added thermal mass or simply for aesthetic reasons. For all three, I think it could be applicable, but I'll do my best to dig up any more info. for next Friday.

FINISHES

On tiles in bathroom, wood flooring, concrete floors, etc.

> **Deckote –** is designed for concrete basement floors because it provides good resistance to abrasion. Comes in white but can be tinted to light colors. Low VOC. Can be used on walls or decks. Made by AFM Safecoat.
>
> **GBS Penetrating Stains and Sealers -** in case you want a clear or colored stain that permanently waterproofs your basement floor, wall or patio deck, check these out. They are not paint but penetrating sealers that might be a better solution than a paint product.

Adobe floors have a warmth and softness not possible with concrete, and low embodied energy as they are made from the earth. They can be durable, dry, insulated and used as thermal mass.

STAINS for solid wood interior surfaces (vertical)

> **AFM Safe Coat –** comes in a variety of finishes to give wood a particular look. All of them are low-VOC, and are LEED certified. This product is suitable for all wood applications, including floors.
>
> **Bioshield Aqua-Resin -** is a solvent-free water-based, Zero VOC, low-drip, resilient wood stain finish for interior and exterior applications. UV-resistance. Not suited to withstand abrasion (not for floors). It has a gel-like consistency and needs to be stirred before use. Comes in a variety of wood finishes and accent colours.

Also to consider:

TRIM – covering joints and gaps in the building that are not closed by the plaster. Wood will most likely be employed in this project.

LCA Assessment of the above:

To be completed using BEES for next Friday.

Product Links:

Non-Toxic Paints and Finishes
AFM Safe Coat
Natural Lime Plaster
American Clay
Milk (Casein) Paints
Clay Paints
Adobe floors