

*As new materials emerge in the quest for more durable, energy efficient, and cost-effective buildings, historic preservation professionals and local commissions are faced with the dilemma of assessing if, and when, the use of alternative materials is appropriate. The Secretary of the Interior's Standards for Rehabilitation counsels that, "deteriorated architectural features be repaired rather than replaced, wherever possible" but continues to suggest that if material replacement is necessary, "new material should match the material being replaced in design, color, texture, and other visual properties." Preservation Brief 16 on replacement materials echoes this equivocal approach leaving historic preservation boards and commissions to make determinations on a case-by-case basis. In the following essays Sharon Ferraro, Historic Preservation Coordinator for the City of Kalamazoo, Michigan and Bob Yapp, President of Preservation Resources, Inc. a Hannibal, Missouri based historic preservation restoration company, weigh in on the use of alternative materials on historic buildings.*

# “And, Where Possible, Materials” — Considering Alternative Materials

By Sharon Ferraro

Every historic district commission or architectural review board has been presented at least once with an applicant who wants to use an alternative material. Sometimes the original historic material is not available or the nearby stock of wood or other material is inferior to the original material. Sometimes the applicant sees the magical new product as superior to the original proven material. And sometimes they want to fancy up a simple house with pseudo-Victorian frippery. Alternative or faux materials have been available for as long as the original materials. Tin ceilings were meant to mimic fine custom plaster work, rock faced concrete block to imitate real granite and stone, Insulbrick made of tarry fibers and covered with a faux brick pattern to cover wooden clapboards and wooden clapboards scored every eight inches to look like brick from even a few feet away.

The *Secretary of the Interior's Standard #6* reads “Deteriorated historic features will be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature will match the old in design, color, texture, **and, where possible, materials.** Replacement of missing features will be substantiated by

documentary and physical evidence.”

The material should match the old in design, color and texture in the visual appearance:

Design includes dimensions like thickness of a clapboard or a porch deck board, width of a fish scale, height of a rail and baluster, diameter of a



Credit: King County Historic Preservation Program

**Asphalt/fiberboard siding, trade named Insulbrick, applied in the 1940s to an 1880s miner's cottage.**

Doric column or the pattern of a turned post. Color needs to match when stone or brick is being replaced. Wood can be painted to match, or new material painted along with old to be consistent. Texture is the final and perhaps the most important characteristic. PVC vinyl, an easily available replacement material, usually has a sheen, a shiny surface that will take a decade or more of weathering to achieve a flat texture. Replacement siding often has an exaggerated grain, like wood left unpainted and weathered for 25 years so clearly the texture is not a visual match.

If the original material is still in place, then the condition and repairability become the first consideration and these questions need to be answered:

Is the remaining original material repairable? If yes,

then it should be repaired. Repair should always be the first choice. Wood, concrete, brick and other materials can be repaired with consolidants and fillers (no, not automobile body fillers!). A wooden door with holes for four locks cut into the stile could have just the damaged stile replaced rather than replacing the entire door. And many wooden trim pieces can be replicated with salvaged old growth lumber.

Is a matching material available and of a similar quality? Wood for wood, stucco for stucco, cedar shingles for cedar shingles? This is a big question. Old growth lumber, common in many old houses, has a fine grain and is 30% stronger than the same species grown today. In the virgin forests, trees grew close to each other and grew less each year producing slender growth rings and a tighter

grain. Modern lumber of the same species is often plantation grown, with optimal spacing for rapid growth and making a wide grain and a weaker, less rot resistant wood. A piece of modern lumber of the same species and with the same dimensions can weigh as much as 25-30% less than a piece of old growth wood. And wood or other material needs to be shaped to match the historic material like replacing a beadboard porch ceiling or turned balusters.

Are there craftspeople in the area that can do the work? Of course, there may be no one in the area to make the replacement piece that is needed or there may be several.

If the answer is no to any, or all, of these questions an alternative material may be appropriate. The preferred choice is still similar or matching historic material, whether newly crafted or salvage, but in some cases that option is not available. If the historic material is missing, like a cornice removed when a cheese grater metal façade was installed in the 1950s or a door installed in a window opening to serve a second-floor apartment or a front porch rail long ago replaced with a grid of 2"x 4"s, appropriate historic material from salvage should be considered first. With missing historic fabric the commission can immediately move to consider whether the proposed alternative material is appropriate in the application.

While not a visual quality, thermal expansion and contraction need to be considered. Some materials, especially plastics and vinyl, have a greater expansion and contraction than wood or other traditional building materials. These materials may expand and detach or crush the wood next to them when they expand or loosen and fall off. Although they may bear a resemblance to the original material, they may age differently and be clearly incompatible at some later date.

Materials should never be mixed. If replacement

siding is used, for example, an entire side or elevation should be replaced, not just a few boards.

(That kind of repair should be in kind.)

Window replacement is the elephant in the room. At least 90% of the time, when existing windows are still present, the windows are repairable and will offer a superior performance and longer life than all but the most expensive replacement window. In a replacement window made of modern materials, the failure point will always be a small, seemingly insignificant piece such as the latch that holds the "tilt-in" sash in place, the pin that holds the spring to the sash, or the weather stripping when the adhesive fails. When that happens, repairs are nearly impossible because "we don't make that model anymore." And thus the replacement needs to be replaced. An original window, cleaned of paint that makes it hard to open, with new ropes, an operating lock and some simple weather stripping along with a storm window is as energy efficient as a new double glazed window. The old window will last longer and is repairable.

### **Evaluating an Alternative Material**

There will be cases where the only reasonable alternative is a matching replacement material. Design, dimensions, color and texture should be the closest match possible. While cementitious replacement siding, such as those made by Hardie or Boral have textured material with a deep faux grain, they also make smooth siding that looks very much like new wooden weatherboards. The applicant should supply a sample of the material. Often samples can be obtained from suppliers with a phone call, through the website or at a retail store. If possible, a sample of the authentic historic material may be useful for comparison. Photos are second best for evaluation and should always show the material applied to a building not just a photo of the product.

Commissioners or staff can take a little time to research the proposed material online, and it's best to look for reviews that do not originate with the



Credit: Sharon Ferraro

**Fiber cement siding (one common trade name is HardiePlank) showing a false wood grain.**



Credit: Sharon Ferraro

**A comparison of new and old growth lumber.**

Awesome comparison of an old growth 2x4 vs a new growth 2x4. Notice the old growth has 60 rings and the new growth has 16. The old wood is more dense, stronger, burns slower and is more insect resistant. The new wood was grown for the sole purpose of being used for timber and the old growth was taken from natural forests which we have very few natural forests left.

manufacturer. What is the warranty? How long does the company predict the product will last? How does the material react to high humidity or cold temperatures? Does it change when exposed to snow piled against it? Remember the material being replaced has probably already lasted a century and is proven by time not by theoretical or laboratory testing. It is not up to the commission to find materials. The commission's charge is to review the proposed material.

### Additions and New Construction

Additions should be compatible in design, but clearly differentiated from the historic building. It may be appropriate to consider an alternative material to side a new garage or for the corner boards on an addition. Ultimately the product must be evaluated by the commission for its visual qualities – design, color and texture. The new material must do no harm to the historic building like modern mortar spalling old brick or vinyl components displacing the wood. Each application must be considered on its own merit. Is this product, old salvage or new alternative material appropriate for this application?

### Are Alternative Materials Really Necessary?

By Bob Yapp

As we discuss alternative materials for the exterior preservation of historic properties in this issue, I think it may be instructive to walk through what original materials were used to construct these historic properties. There are five basic materials:

- 1) Masonry. This includes brick, stone, stucco, ceramic tile and concrete.
- 2) Lime. Uses for lime include lime-based mortar & plaster.
- 3) Glass. Glass for windows, transoms, sidelights and doors.

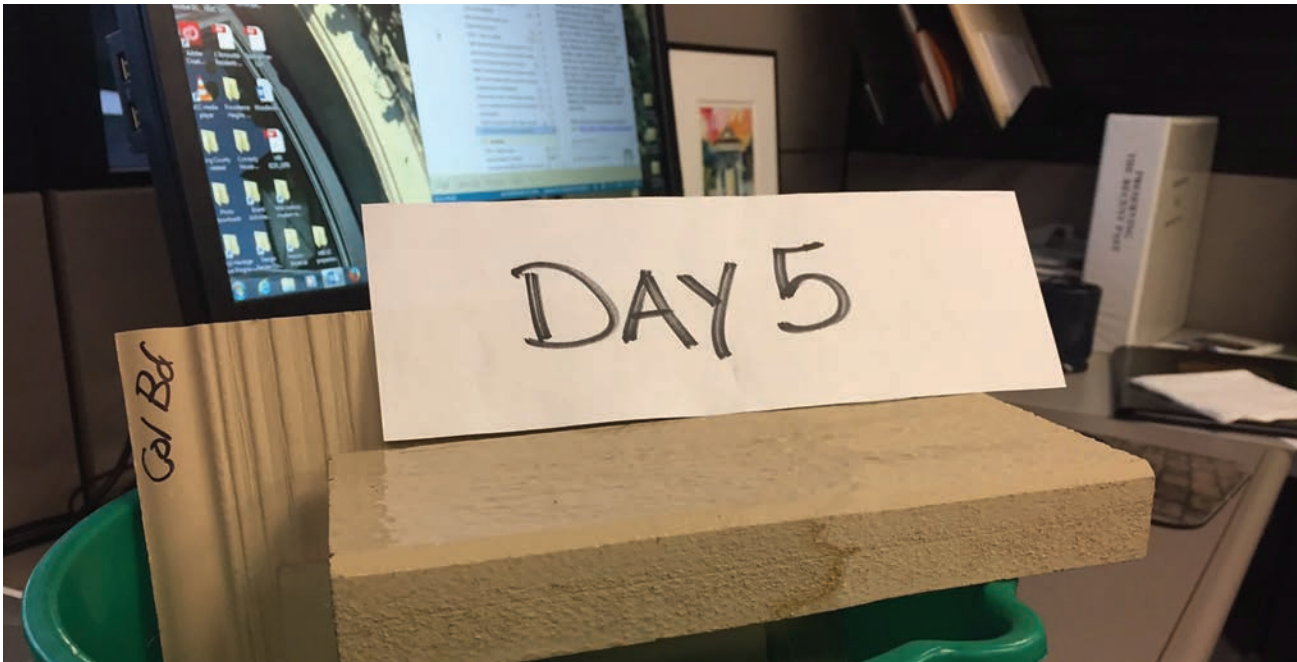
- 4) Wood. While an obvious element, it includes structural, siding, trim, windows, eaves, roofing, balustrades, stairs, porch decking, etc.
- 5) Metal. This can vary but generally windows, window hoods, sills, cornices, hardware, fasteners, wiring, etc.

The good news is that all these materials are readily available from multiple sources at pricing competitive with replacement alternative materials.

In my career, I have rehabilitated over 160 endangered, historic properties. I have never used an alternative material on any exterior of these historic structures, or additions. I haven't because authentic materials are available and cost less to use and last longer, with less maintenance, than alternative materials. Most of us live within the *Secretary of the Interior's Standards for Rehabilitation* (SISR). While not the bible of preservation, it is a wonderful set of ten standards we all live by in our work. Many of you are required to work within the SISR in order to maintain your Certified Local Government status. The following section of the introduction to the Standards is key to our discussion:

*"The Standards are to be applied to specific rehabilitation projects in a reasonable manner, taking into consideration economic and technical feasibility."*

This is a challenging statement in the introduction. *Reasonable manner, the consideration of economic and technical feasibility* can all seem like subjective language. In truth, all three can be objective through research data, determining the availability of skilled trades artisans and proper tool availability. Over the last two years my firm has been researching the true cost of preserving original materials, replacing elements beyond repair and availability of skilled artisans to do the work. This research data is being applied by historic preservation commissions across the country utilizing our *Historic Preservation Cost Comparison Tool*.



Credit: NAPC

**Testing alternative building material's resistance to moisture in the NAPC field office.**

What the data show may seem surprising. In almost every category of exterior preservation work (residential and commercial), the costs to retain original materials and/or replace deteriorated elements with the same in-kind or authentic material, costs no more, and usually less, than replacing with alternative materials. For instance, according to our research, in Ft. Collins, Colorado, if an old growth, vertical grained (quarter sawn), 3¼" wide x ¾" thick tongue and groove, douglas fir porch floor is rotted beyond repair, the costs play out like this:

Replacement with new, old growth (60-year-old trees are considered old growth in the lumber industry), vertical grained douglas fir to match the original including the demo of the old floor, installing the floor, sanding, back priming and applying 3 coats of oil enamel deck paint costs, on average, \$9.04 per square foot.

Installing a new, composite or vinyl based 1" x 6", tongue and groove decking to replace the original wood, including demo and installation costs, on average, costs \$13.80 per square foot.

For a 229 square foot porch floor the cost for the in-kind/authentic wood product and paint would be \$2,500.68 with a \$125.03 yearly paint maintenance cost. The cost for an "alternative" composite or vinyl-based decking on the same porch would be \$3,160.20 with a yearly maintenance cost of \$210.68. From an economic standpoint, the authentic material costs \$659.52 less, up front, than the alternative material. The paint maintenance of the authentic material is a savings of \$85.65 per year. Maintenance of the alternative decking includes constant power washing and labor. It must be noted that the unpainted alternative decking becomes brittle from UV light and must be replaced about once every 20 years. The painted, authentic material will need to be completely repainted, with minor wood repairs, in 20 years at a much lower cost than replacing the alternative material and, if maintained, can last 100 plus years.

If we stay with this porch flooring example, several other things must be considered. The SISR #6 states:



Credit: Sharon Ferraro

**Historic narrow tongue & groove porch flooring.**

“Deteriorated historic features shall be repaired rather than replaced. Where the severity of deterioration requires replacement of a distinctive feature, the new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials. Replacement of missing features shall be substantiated by documentary, physical, or pictorial evidence.”

Since the “new feature shall match the old in design, color, texture, and other visual qualities and, where possible, materials.” The argument must be made that the alternative composite or vinyl-based decking can never achieve any of these requirements. It is almost

double the width of the authentic, it cannot be painted, and most all authentic, wooden porch floors were painted, gray, green or red. Painted wooden porch floors never show the grain and all the alternative flooring has a textured wood grain that also hold mold and mildew.

Authentic 3¼" x ¾", new, old growth, vertical grain, douglas fir porch flooring is available from multiple sources. Salvaged, douglas fir flooring is also available from multiple salvage operations across the country for less money than the new, old growth, douglas fir. This example cuts across every single exterior feature with similar results. That includes porch and staircase balustrades, exterior doors, vinyl or cement board siding, cladding, masonry repair, windows, and most roofs. With a few simple Google searches, authentic materials can be found. Also, in our studies of various communities large and small, there are contractors who can do the work.

In conclusion, I argued that alternative materials, in almost every case, do not match the original, authentic materials in cost, design, color, texture or any other visual qualities. Our research, and our practical everyday use of authentic replacement materials, shows that all the original, exterior materials our historic houses and buildings were constructed with are still available, cost effectively. There are contractors to do the work and as such, most alternative materials do not meet the *Secretary of the Interior's Standards for Rehabilitation*. ■



Credit: www.timbertech.com

New polymer flooring showing enhanced faux wood grain.

<i>Cornices &amp; Eaves</i>	PAINTING		COVERING WITH Vinyl or Aluminum	
<b>Soffit/Fascia &amp; Brackets/Corbels</b>	Remove all paint to bare wood, cleaning, wood repairs, one coat oil primer, caulking, two latex top coats, all brushed. Three colors.	Lifespan Cost per Year	Installation of vinyl or aluminum with caulking.	Lifespan Cost per Year
	Costs are quoted per rounded square foot	(20 Year Lifespan)*	Costs are quoted per rounded square foot	(10 Year Lifespan)*
Cost Per Window	\$1,687.20	\$84.36	\$1,896.00	\$189.60
Cost over Twenty (20) Years	\$1,687.20		\$3,792.00	
Enter your dimensions on the table to the right.	<p>* = Periodic paint maintenance/touchup, periodic cleaning. Repaint same colors, two coats at 20 years. Includes materials.</p> <p>* = Yearly cleaning, vinyl and aluminum cladding will need to be replaced at 10 years. Clad wood begin rotting under cladding at four (4) to ten (10) years. Rotted wood repairs before re-cladding. Re-caulk twice in ten (10) years. Includes all materials.</p> <p>Note: Vinyl and aluminum cladding must be completely replaced at ten (10) years. Cladding joints will need to be re-caulked at five (5) years. Original wood soffit and fascia brackets etc., can be retained, repaired and painted again in twenty (20) years.</p>			
			Square Feet	240

Credit: City of Hutchinson

Screenshot of the Historic Preservation Cost Comparison Tool developed for Hutchinson, Kansas by Preservation Resources, Inc. This shot demonstrates the cost difference between repairing/painting cornices and eaves on a commercial building versus the cost of covering them with vinyl or aluminum.



# PRESERVATION BRIEF 16: The Use of Substitute Materials on Historic Building Exteriors

Preservation Brief 16, released in 1988, covers the use of substitute materials on historic buildings, and is another resource available to local commissions when reviewing these types of proposals on designated properties. The brief emphasizes that substitute materials should only be used when all repair or restoration alternatives have been explored. When considering the appropriateness of a substitute material, a “thorough investigation” should be carried out to determine its durability, compatibility, and physical properties. It further suggests that the consideration of substitute materials should be based on the unavailability of historic materials and craftsmen, flaws in the original materials, and code compliance. Cost factors can vary depending on the area of the country, the amount of material needed, and the projected life cycle of the material. The brief does not go into detail on common small-scale residential projects

such as the installation of vinyl siding and replacement windows, noting the greater availability of in-kind materials and restoration solutions for these types of proposals. However, the points listed in determining the appropriateness of a substitute material can be instructive for local commissions which are regularly reviewing proposals for purported “maintenance-free” products such as engineered siding or trim. “Green” and energy-efficiency issues are also not addressed in the brief, although there is an emphasis on determining the performance expectations and sustainability of a proposed substitute material. In sum, the message is clear in Preservation Brief 16 that the restoration and repair of original materials is always the preferred option. For the full brief go to the National Park Service’s website: <http://www.nps.gov/history/hps/TPS/briefs/presbhom.htm>