

Finally, we would like to extend our deepest gratitude to all the individuals and organizations involved with the case study projects who generously took the time to talk or work with our research team. Your stories and insights are the foundation of this publication. We feel honored to be able to share these signature examples of reuse with a wider public.

Thank you.

Liz Ogbu
Co-Principal Investigator
Design for Reuse Primer project

INTRO- DUCTION

WASTE NOT

What does it mean to build green? As the concept of sustainable building has gained greater traction within and outside of the design and construction industry, “building green” has often been linked with achieving higher levels of energy efficiency or improved air quality. Materials have often played a secondary role. Even when considered, the sustainable materials market tends to focus on new rapidly renewable materials, sustainably harvested materials and materials with recycled content such as bamboo flooring, certified wood and recycled glass finishes. Yet, as the 15 projects profiled in the *Design for Reuse Primer* show, material reuse represents one of most creative, exciting and effective approaches to building green.

Reused, or reclaimed, materials are materials extracted from the waste stream and repurposed without further processing or with only minor processing that does not alter the material’s nature. Old bricks cleaned of their mortar and used to create a new facade, wood beams remilled into flooring, and wood from packing crates fashioned into window trim are all examples of reuse. Reuse is not to be confused with recycling. Recycling also involves removal



The Jewish Reconstructionist Congregation used reclaimed materials extensively as part of the first LEED Platinum house of worship.

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of materials from the waste stream, but those materials undergo significant processing to convert them into new products. Waste paper reduced to pulp and then combined with pulp from new wood to produce new paper is a form of recycling.

By not undertaking extensive reprocessing, material reuse provides buildings with features difficult to retain in the recycling process. From reclaimed cypress that recalls 19th-century Eastern European Jewish culture to 100-year-old brick from the deconstruction of an Army warehouse, reclaimed materials infuse the buildings profiled here with a beauty, texture and history that inspired creativity in the designers and brings richness to the experience of the users.

This is alarming not only because we're filling up landfills and wasting valuable materials, but because of the harm it is doing to our atmosphere. Organic materials such as wood, which represent a significant amount of overall construction and demolition debris, eventually break down and produce methane. A greenhouse gas, methane has a global warming impact many times worse than carbon dioxide. Reusing wood reduces methane emissions from landfills. What's more, according to the Deconstruction Institute, every ton of reused wood avoids the emission of 60 pounds of greenhouse gases created when new lumber is harvested and milled.

The projects profiled here are part of a movement among certain designers, builders and clients to turn these statistics around. By reducing the need for raw material consumption, the energy associated with manufacturing and transporting raw materials, and the amount of waste sent to landfills, reclaimed materials provide a prime opportunity to follow the sustainability mantra of "Do more with less."



A living building, the Omega Center incorporates reclaimed Cypress as part of its commitment to tread lightly on the earth.

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SEE ONE, DO ONE, TEACH ONE

Despite the potential of material reuse, it has been a largely untapped resource. Although many case studies exist about sustainable building projects, it is often difficult find examples of material reuse. This is particularly true in commercial-scale construction, where integrating material reuse into the design and construction process can sometimes seem daunting. The *Design for Reuse Primer* is part of an ongoing initiative by Public Architecture to bring reuse stories to light. By discussing the challenges and demonstrating the benefits of reclaimed materials, we hope to demystify reuse.

The case studies represent a diverse mix of program type, location, size and client. They reveal that there is not one path to material reuse. However, some common lessons to consider can be found across projects:

Think reuse from the start

Building sustainably requires thinking about relevant strategies from the early phases of design. Material reuse, which should be integrated into a comprehensive sustainability strategy, should be discussed from the beginning. The project team of the [Vancouver Materials Testing Facility](#) found strategizing early about reuse made it easier to navigate the challenges and capitalize on the benefits.

Get team buy in

Beyond starting the discussions early, it is critical to engage all stakeholders in the process. Many good ideas arise outside of the formal design process. At the [Alberici Corporate Headquarters](#), members of the construction team came up with the idea of using reclaimed sheet piling for a landscaping retaining wall.



Ever since ScrapHouse, a demonstration house built completely from scrap in 2005 in San Francisco, Public Architecture has been committed to inspiring and facilitating reuse. Previous resources developed include a podcast, articles and presentations. Visit designforreuse.org to learn more.

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Don't write the specs in stone

Reclaimed materials aren't off the shelf products for which a manufacturer can provide standard information. It is important to write specifications that are clear about expectations, such as structural performance or storage requirements, but build in flexibility, such as providing a range of acceptable hues for a particular finish material. Clear specifications for the [Long Center for Performing Arts](#) helped with the deconstruction and reuse of tricky items such as the multicolored aluminum roof panel. By also being clear about who has responsibility for sourcing, approving, purchasing, storing, decontaminating, refurbishing or modifying, and installing the reclaimed materials, they made it easier for subcontractors to bid on the job.

Build reuse relationships

Several projects, including the [Mountain Equipment Co-op stores in Ottawa and Winnipeg](#), obtained materials through "shopping the site," or onsite deconstruction. Others, such as the [Omega Center for Sustainable Living](#) and the [Chartwell School](#), showed how reclaimed material stores, suppliers and brokers can also be valuable sources. Building relationships with these additional sources can make you more familiar with the range of materials available and make suppliers better acquainted with your needs. Knowing more can facilitate a more efficient, creative and cost-effective material reuse process.

Be flexible

Reclaimed materials have an inherent variability to them. Everyone, from the client to the designer to the contractor, needs to maintain some flexibility around material appearance and availability.



Aluminum panels from the original structure's dome added color to the Long Center's facade.

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But also identify things that shouldn't be compromised, such as energy efficiency, indoor air quality and overall aesthetic goals.

Factor in time

On every construction project, timing is always an issue, and it's even more so when it comes to material reuse. New materials can often be ordered within a defined time frame that fits the mainstream building process. The infrastructure around reclaimed materials, particularly for commercial-scale construction, is less refined. By engaging a reuse supplier early in the design process, the [Sidwell Friends School](#) project team was able to factor into the overall project schedule adequate time for identification, sourcing, procurement and refurbishment of key reclaimed materials.

Be strategic with contracts

From design/build to multiple prime, there are various types of contracts used in the building industry. When it comes to reuse, it is important to clarify roles and responsibilities regardless of the type contract used. The [Portola Valley Town Center](#) found the multiple prime contract structure facilitated the reuse process through strategies such as phasing. Splitting up abatement, deconstruction and demolition helped manage costs. It also enabled them to have a construction manager serve as the primary reuse champion and keep everyone on track.

Be creative

Think of reclaimed materials as a tool for creative invention. Their features can sometimes provide textures, colors or sizes unavailable—or unaffordable—new. Also think about reusing materials in applications different than their original use, such as the steel railroad tracks used

**"MOM
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TO EAT
EVERYTHING
ON THE
PLATE.
I VIEW IT THE
SAME WAY
DEALING
WITH
STRUCTURE.
IF THERE'S
MATERIAL
AVAILABLE,
WHY WASTE
IT IF IT
COULD BE
SENSIBLY
BUILT IN
A NEW
DESIGN?"**

—Paul Fast, structural engineer,
Vancouver Materials Testing Facility

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as a trellis at the [Eastern Sierra House](#) or the exterior aluminum roof panels used as interior paneling at the [Long Center for the Performing Arts](#).

Test it out

Reclaimed materials may not come from a factory, but that doesn't mean they can't be viewed beforehand. Try to get samples during the design process, and test out ideas and address challenges with mockups as was done with the interior wall and ceiling panel assemblies in the [Portola Valley Town Center](#). Testing materials for structural integrity or grading wood can also make the reuse process easier.

Share the story

Unlike most new materials, reclaimed materials often come with a history. Incorporating these materials, with their embedded narrative of a place or culture, can provide a meaningful connection to a sustainable vision. Projects such as the [Omega Center for Sustainable Living](#) and the Sidwell Friends School show how highlighting reclaimed materials through design, signage or tours shares that history and vision with others.

DOES REUSE COST MORE?

As frustrating as it can be to hear this, the answer is: It depends.

Sometimes using reclaimed materials is flat-out less expensive, such as when reclaimed lumber provided a cost savings over new Forest Stewardship Certified wood for the [Omega Center for Sustainable Living](#). Reuse can also be a way to build with higher quality materials that would be too expensive if purchased new, such as the wood flooring at [Benny Farm](#). In other cases, the cost of the material or refurbishment may be a

“WE WANTED A BUILDING THAT WOULD PHYSICALLY EMBODY WHO WE WERE.”

—Rabbi Brant Rosen, client,
Jewish Reconstructionist Congregation

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significant increase over new but the client may choose it anyway because it meets their design, functional or environmental goals. When building their [Town Center](#), the Town of Portola Valley decided to purchase reclaimed Alaska Yellow Cedar at a premium because it provided an aesthetic that reflected the values of the community. Reclaimed materials often have intangible financial benefits. Several projects, such as the [Portola Valley Town Center](#) and the [Long Center](#), found that incorporating reclaimed materials provided a compelling narrative that gave their capital campaign efforts an extra boost

When evaluating cost, it is important to be strategic and to understand tradeoffs. Before deciding on a material, the project team should assess what's involved, from decontamination and storage to refurbishment, installation and future maintenance. Tapping into the network of reuse consultants such as deconstruction contractors, reuse suppliers and reuse brokers can help supply this knowledge. This evaluation should not only be based on pre-installation cost, but should also include what it takes to maintain the material once the project is built.

THE REUSE PROCESS

The various projects reveal several strategies of how to deal with these issues. In general, it is useful if material identification occurs at the project start or initial design phases. Research around sourcing should also occur at this point, but depending on the contract structure and materials desired, actual sourcing and procurement, can occur in the latter design phases or during construction. It is sometimes advisable for the owner to pre-purchase high value materials that may be of limited availability. But the financial and storage capacity of the owner is an



Portola Valley Town Center.
Reclaimed Yellow Cedar was
used to create sunscreen
louvers. The buildings are clad
in reclaimed redwood.

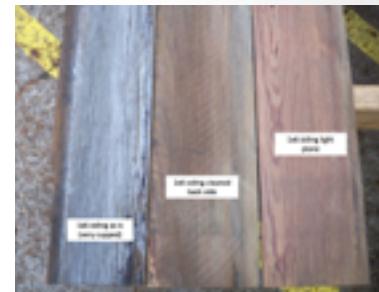
important consideration. In some cases, reuse brokers or contractors may be able to help provide the space.

Any reclaimed material chosen should be carefully evaluated for its refurbishment needs, and the time associated with that process should be factored into the overall project timeline. This information as well as details concerning selection, storage, and installation processes should be captured in the project's material specifications. During construction, the design team should review the quality of any reclaimed materials procured by the contractor.

WHAT TO REUSE?

Wood is by far the most commonly reclaimed material used in the case study projects. In the past decade, the infrastructure around this market has matured considerably. There are many sources, from deconstruction companies to reuse retailers to specialty suppliers. Much of the reclaimed wood available is old growth lumber, often of greater quality and durability than the newer woods on the market. If using reclaimed wood from onsite deconstruction, a certified wood grader is helpful for verifying strength and quality. A structural engineer should be brought in if the wood is to be used in structural applications.

Other common materials used include brick and metal. But many of the projects profiled here also provide examples of a wide range of reclaimed materials and components, from marble toilet partitions in the [Long Center for the Performing Arts](#), airplane flaps in the [Eastern Sierra House](#), granite slabs in the [Alberici Corporate Headquarters](#), carpet in the [Philips Eco-Enterprise Center](#) and gas-fired HVAC units in the [Vancouver Materials Testing Facility](#).

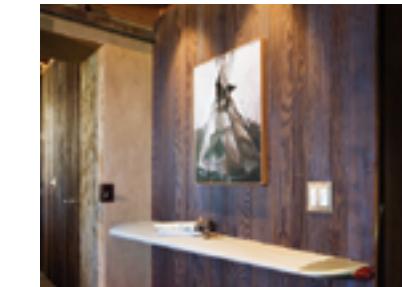


Reclaimed wood samples considered for use in the Operation Comeback 5200 Dauphine Street project.

WHERE DO WE GO FROM HERE?

As sustainable building continues to evolve beyond energy efficiency to encompass issues like cradle to cradle design and carbon footprint reduction, material reuse takes on even greater importance. Clearly, the infrastructure of the reclaimed materials market has not fully matured. Issues around codes, supply and demand, and experience present challenges to development. This is not dissimilar to the state of the recycled materials market more than a decade ago. At the time, few manufacturers developed products with — let alone provided information about — recycled content. Yet, as the green building movement matured, demand for such products increased. Now, there are countless products that brandish their recycled content as the foundation of their marketing strategy. Such materials have become commonplace.

At the heart of many of the issues around a material reuse market is lack of awareness. Sharing knowledge is perhaps the best solution to that. The *Design for Reuse Primer* features process-based case studies of 15 projects from the U.S. and Canada and a variety of resources. From a school for children with learning differences to a performing arts center to a corporate headquarters, the diverse projects in the *Design for Reuse Primer* provide insights about the material reuse process in many contexts. Notably, they are not just fascinating examples of material reuse, but inspiring models of good design.



A shelf made from a salvaged airplane flap in the Eastern Sierra House.



Chartwell school not only incorporates reuse, but thinks for the future by being design for disassembly.

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