



# Water Quality & Waste Management

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## **Deconstruction:**

### *Giving Old Buildings New Lives*

*Nationwide, construction and demolition debris is a significant portion—an estimated 15 to 20 percent—of the waste going to landfills. One building is torn down for every six houses or apartment buildings constructed in the United States, totaling about 150,000 demolitions each year. As land changes use and ownership, many old buildings are considered in the way of progress. Although some of these structures could be moved to another location, renovated, or salvaged, most often the old buildings are burned to the ground or bulldozed and sent to the landfill. Burning or burying usable building materials should be the last options for consideration, since these methods destroy materials that could be used again, and cause air and water pollution and other problems.*

## **Deconstruction: A Viable Alternative**

Deconstruction is a new term for a process that has been taking place for decades—dismantling old buildings and reusing the materials to build or remodel new structures. Instead of burning or demolishing old houses, schools, factories, barns, and warehouses, deconstruction can recover the materials for reuse. Materials that can be reused or recycled include framing lumber, timbers, bricks, stone, siding, windows, doors, asphalt, plumbing, lighting, cabinets, and other fixtures. Often, older buildings contain valuable materials such as old growth timber that cannot be purchased elsewhere.

The process of deconstruction is the exact opposite of constructing a new building; structures are dismantled

backward from the order in which they were built. There are five basic steps to deconstruction:

- Remove the trim work, including door casings and molding.
- Take out kitchen appliances, plumbing, cabinets, windows, and doors.
- Remove the wall covering, insulation, wiring, and plumbing pipes.
- Disassemble the roof.
- Dismantle the walls, frame, and flooring, one story at a time.

At each step of the process, pick up the materials; remove any nails; and sort, clean, and stack the materials for future reuse.

The deconstruction process is demonstrated in a recently released video, "Old Buildings Don't have to Go to Waste." The 23-minute production, which was

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produced by the North Carolina Cooperative Extension Service in cooperation with the Triangle J Council of Governments, also shows how the materials can be reused. The film features Pete Hendricks, a Wake Forest, North Carolina native and the leading expert in the deconstruction movement. Since 1970, Hendricks has been recycling old buildings and using the recovered materials to build and remodel homes.

The deconstruction movement is gaining momentum nationwide. More and more military bases throughout the United States are allowing deconstructionists to salvage buildings. During 1997, the Department of Defense deconstructed half a dozen timber-frame buildings and found markets for many of the materials. Military officials estimate that hundreds of millions of board-feet of old-growth timber may be available in buildings constructed during World War II.

Several chapters of Habitat for Humanity are also getting into the deconstruction business and using salvaged materials on their building projects. For example, in 1996 the Wake County Habitat for Humanity salvaged materials from sixteen buildings and reduced their home prices by \$5,000 by using the recovered materials.

In early 1997, a high-profile deconstruction pilot project was conducted by the U.S. Environmental Protection Agency in cooperation with the National Association of Home Builders Research Center. A 2,000-square-foot, four-unit apartment building that was part of an affordable housing complex in Baltimore, Maryland was disassembled by Pete Hendricks and a crew (including workers from a private demolition firm) in three and one-half weeks. They salvaged or recycled 70 percent by volume of the materials from the two-story building. The total cost for deconstruction was estimated at \$4.50 to \$5.40 per square foot (including maximum salvage and recycling); standard demolition costs were estimated at \$3.50 to \$5.00 a square foot (including no salvage and limited recycling of metals, wood, and clean rubble).

## Advantages of Deconstruction

Taking buildings apart by hand was a standard practice before the building industry started using primarily mechanized demolition tools such as bulldozers and wrecking balls. Deconstruction has become practical again for a number of reasons:

- savings on disposal costs
- reducing demolition costs
- decreasing disturbance to job sites
- gaining revenues from the sale of recovered materials
- decreasing airborne asbestos, lead, and nuisance dust at the job site
- enhancing builders' images of environmental responsibility
- conserving landfill space
- reducing air pollution from burning buildings.

Deconstruction also saves energy and raw materials. More than one-third of the raw materials entering the global economy annually is consumed by the construction industry. This industry also accounts for over 11 percent of the total energy consumed each year in the United States. About 85 percent of this energy is used for the production and transportation of materials used in new construction, while only 15 percent of the energy is used directly at the construction site. These energy consumption levels can be reduced significantly by deconstructing buildings and reusing the materials locally.

## Challenges Facing Deconstruction

Modern materials such as plywood and composite boards are difficult to remove from structures, and new building techniques such as gluing floorboards and using high-tech fasteners inhibit deconstruction. Thus buildings constructed before 1950 should ideally be targeted for deconstruction. Asbestos-containing materials are another problem deconstructionists may encounter in buildings constructed after 1900 or in buildings that have been renovated. Used in more than 3,000 building products, asbestos may be found in pipe, duct, wall and ceiling insulation, ceiling tiles, roofing, siding, vinyl sheet flooring, wallboard and mudjoint compound, plaster, and window caulking. Proper removal of asbestos-containing materials requires special equipment and training, so before undertaking the deconstruction of any buildings, contact the Health Hazards Control Branch of the North Carolina Division of Epidemiology for assistance (see *National and State Contacts*).

Because deconstruction requires more time and care than demolition, project labor costs can be higher. One way to minimize labor costs is to recruit volunteers. People who are willing to deconstruct buildings in exchange for taking home materials they want to keep will save the project manager from having to

locate markets for the salvaged material. Volunteer laborers can also enable organizations to collect building materials for reuse and either give them away or sell them at a low cost for a charitable purpose (such as Habitat for Humanity).

Before finding volunteers for deconstruction projects, contractors should contact the North Carolina Department of Insurance (Engineering Division, 919-733-3901) to discuss their liability protection options. The Department suggests that before work begins, volunteers should be assessed as physically capable of performing deconstruction work and they should sign a "hold-harmless" liability disclaimer. Furthermore, a trained supervisor should oversee all work to ensure safe deconstruction practices.

## Markets for Salvage Materials

Deconstruction is now recognized as an important field because of a new appreciation for the shortage of

beautiful, old building material and the need to conserve existing resources and landfill space. One of the most valuable materials found in old buildings is virgin heart lumber, which when sanded down and refinished, gives off a light and texture that can not be found in wood taken from trees that are grown and harvested today. Architects can use this wood and other reclaimed material creatively in new construction. This material is also valuable to remodelers and to historic preservationists restoring old buildings.

Much of the wood recovered through deconstruction is used for old wood flooring, and the demand is, for the most part, very consistent. Deconstructionists can usually salvage 90 to 100 percent of the floor of a building, and the sale of the flooring will often cover the cost of deconstructing the building, including labor and clean-up costs.

**Table 1. Recovered Material Recycling Options<sup>a</sup>**

Recovered Material	Recycling Options
Asphalt	Recycle into new asphalt pavement or use as clean fill on or off site.
Brick	Clean for reuse or sell for crushing or chipping into landscaping material.
Drywall and plaster	Grind up for use as a soil amendment or kitty litter, or recycle as feedstock for new drywall.
Earth/soil	Incorporate into new asphalt pavement or use as clean fill.
Electrical fixtures	Reuse if unique; recycle metal components.
Glass	Recycle as aggregate.
Masonry and rubble	Reuse on other structures or use as clean fill.
Metal	Sell to a scrap metal dealer.
Plastics	Send to a plastics recycler.
Roof materials (asphaltic)	Recycle as aggregate in asphalt pavement.
Vinyl	Reuse if removed intact or send to a recycler.
Wood	Reuse in other structures or recycle as raw material for engineered building products, landscaping mulch, compost, animal bedding, or boiler fuel

<sup>a</sup> if local and state regulations allow

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## A Note About Preservation

Preservation, rather than deconstruction or demolition, should be the first consideration when deciding what to do with an old building. Buildings with historical relevance or architecturally important features are best left intact. Such buildings can be restored and possibly moved to a new site, if necessary. For more information, contact your local preservation organization or one of the statewide agencies in Raleigh: North Carolina Historic Preservation Office - (919) 733-4763 or Preservation NC - (919) 832-3652.

Although historic preservation agencies prefer that historic structures or older, architecturally-interesting buildings be preserved, Preservation NC of Greensboro has taken an unusual step by establishing a deconstruction branch called Architectural Salvage Greensboro (ASG). Volunteers for ASG remove architecturally significant features in buildings slated for demolition, and salvaged materials are sold in ASG's retail supply warehouse. The program has been so successful that ASG has 50 volunteers at their disposal and last year they made a profit.

## National and State Contacts

Division of Pollution Prevention and Environmental Assistance, North Carolina Department of Environment and Natural Resources, P.O. Box 29569, Raleigh, NC 27626-9569. Telephone (919) 715-6500 or (800) 763-0136, fax (919) 715-6794. Contact Diane Minor for recycling market information.

Health Hazards Control Branch, Division of Epidemiology, North Carolina Department of Environment and Natural Resources, P.O. Box 29601, Raleigh, NC 27626-0601. Telephone (919) 733-0668, fax (919) 733-8493. Contact Jeffery Dellinger for information about asbestos and lead hazards.

National Home Builders Association Research Center, 400 Prince George's Blvd., Upper Marlboro, MD 20774-8731. Telephone (301) 249-4000, ext 542; fax (301) 249-0305; e-mail: [pyost@nahbrc.org](mailto:pyost@nahbrc.org). Contact Peter Yost about deconstruction pilot projects such as *Deconstruction - Building Disassembly and Material Salvage: The Riverdale Case Study*.

North Carolina Cooperative Extension Service, Biological & Agricultural Engineering Department, North Carolina State University, Box 7625, Raleigh, NC 27695-7625. Telephone (919) 515-6770; fax (919) 515-6772; e-mail: [sherman@eos.ncsu.edu](mailto:sherman@eos.ncsu.edu);

<http://www.bae.ncsu.edu/people/faculty/sherman>. Contact: Rhonda Sherman.

To obtain a copy of the video *Old Buildings Don't Have to Go to Waste*, send a check payable to North Carolina State University for \$25.00 to Ag Comm Video Productions, North Carolina State University, Box 7603, Raleigh, NC 27695.

Triangle J Council of Governments, P.O. Box 12276, Research Triangle Park, NC 27709. Telephone (919) 558-9343, fax (919) 549-9390, e-mail: [jkincaid@vnet.net](mailto:jkincaid@vnet.net). Contact: Judy Kincaid for deconstruction information; also *Triangle Region Construction & Demolition Waste Recycling and Disposal Directory* and *Waste Spec: Model Specifications for Construction Waste Reduction, Reuse, and Recycling*.

Used Building Materials Association, 501-428 Portage Avenue, Winnipeg, Manitoba, Canada R3C 1N6, (204) 947-0848, Fax (204) 942-4207. Hosted first international conference on deconstruction.

## Used Building Materials Outlets in North Carolina

### Albemarle

Albemarle Antiquities. Telephone (919) 794-3716. Flooring.

### Asheville

Brown's Used Building Material. Telephone (704) 254-9490.

The Used Pew. Telephone (704) 274-1898.

### Chapel Hill

Sutherland Wells, Ltd. Telephone (919) 967-1972. Floor finishing.

### Charlotte

By-Gone Days Antiques, Inc. Telephone (704) 527-8718.

### Durham

Building Supply Recycling Center, 1609 D Lakewood Avenue, Durham, NC 27707 (mailing address); business location: corner of Roxboro and Pettigrew Street in Durham. Telephone (919) 490-0414. Contact: Don Oberg. Buys and sells materials salvaged from buildings such as doors, windows, wood, and plumbing fixtures.

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Durham Community Land Trustees, 1401 Morehead Avenue, Durham. Telephone (919) 490-0063. Accepts surplus (not used) residential building materials.

Habitat for Humanity Hand-Me-Ups, 3215 Chapel Hill Road, Durham, NC. Telephone (919) 403-8668. Contact: Beth Hersey. Deals only with reusables such as furniture, blinds, and appliances.

The Summer Beam, Venable Tobacco Warehouse, 302 E. Pettigrew Street, Durham. Telephone (919) 683-1913. Contact: Kji (Kai) Kelly. Accepts reusable architectural elements and building materials for reuse.

Vintage Studios. Telephone (919) 490-5915.

### **Greensboro**

Architectural Salvage of Greensboro. Telephone (910) 373-2755 or 370-1907. Deconstructs buildings and sells salvaged materials.

D.H. Griffin Wrecking Company. 4700 Hilltop Road, Greensboro, NC 27407. Telephone (910) 855-7030. Contact Gary Stutts for information on buying or selling salvaged building materials.

Rhyme's Corner Cupboard Antiques. Telephone (910) 378-1380. Buys and sells architectural antiques.

### **Jamestown**

Leonard Antique Hardware, 509 Tangle Drive, Jamestown, NC 27282. Buys and sells architectural antiques.

### **King**

One Way, 127 Bob Rierson Street, King, NC 27021. Telephone (910) 983-6790. Contact: Rick or Carolyn Landreth. Buys and sells architectural antiques.

### **New Bern**

New Bern Preservation Foundation. P.O. Box 207, New Bern, NC 28563. (919) 633-6448. Nonprofit organization that supports the restoration of old buildings.

### **Pittsboro**

Heartwood Pine Floors, 2722 Hwy 87 South, Pittsboro, NC 27312. Telephone (800) 524-7463. Contact: Lawrence Green. Buys salvaged wood and recycles it

into hardwood flooring, cabinets, furniture, paneling, beams, baseboard, and molding.

### **Raleigh**

Habitat for Humanity Wake County ReUse Center, 2300 Capital Blvd., Raleigh, NC 27604. Telephone: (919) 833-1999, fax (919) 833-8256. Sells salvaged building materials.

Turn-of-the-Century Restoration & Salvage, P.O. Box 124, Youngsville, NC 27596. Telephone (919) 554-4652 or 556-9193. Contact: Philip Paulsen. Salvages, restores, and sells materials from old buildings.

### **Tarboro**

The Joinery Company, P.O. Box 518, Tarboro, NC 27886. Telephone (919) 823-3306, fax (919) 823-0818. Contact: Gene Jackson. Buys and sells antique heart pine products.

### **Wilson**

Phoenix Recycling Corporation, 7340 Rockridge School Road, Wilson. Telephone (919) 846-1987. Accepts demolition materials such as concrete, brick, roofing materials, railroad ties, scrap lumber, and sheet rock for recycling.

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