

What's in a Building?

Composition Analysis of C&D Debris

A critical concern of contractors is what to do with the waste generated on construction, demolition, and renovation projects. Building-related construction and Demolition (C&D) debris totals more than 136 million tons/year or nearly 40% of the C&D and municipal solid wastestream (U.S. EPA). With landfill and transportation costs rising and new recycling requirements, waste disposal has become a major cost component of demolition and renovation bids. In order to minimize waste, and the cost of disposal, it is important to have a clear understanding of what is being landfilled.

What can be reused or recycled and what must be disposed of? Having a general sense of the types and quantities of waste materials generated on your jobsites is the starting place for any organized plan for achieving waste reduction. Although composition varies by season, location and project type, C&D debris generally consists of asphalt, concrete, brick, dirt, wood, metal, wallboard, roofing and insulation materials, plastics, cardboard, glass, and miscellaneous trash.

Typical Components of Building-Related C&D Debris

Materials	Content Examples
Wood	forming and framing lumber, stumps, plywood, laminates, scraps
Drywall	sheetrock, gypsum, plaster
Metals	pipes, rebar, flashing, steel, aluminium, copper, brass, stainless steel
Plastics	vinyl siding, doors, windows, floor tiles, pipes
Roofing	asphalt and wood shingles, slate, tile, roofing felt
Rubble	asphalt, concrete, cinder blocks, rock, earth
Brick	bricks, decorative blocks
Glass	windows, mirrors, lights
Misc.	carpeting, fixtures, insulation, ceramic tile

Source: U.S. EPA, *Characterization of Building-Related Construction and Demolition Debris in the United States*, 1999, <<http://www.epa.gov/epaoswer/osw/pub-c.htm>>.

C&D wastes are often bulked as a single wastestream. In reality, the types of debris generated through construction and demolition activities are vastly different, and differ considerably in ease of separation, recovery and recyclability. In many counties, recycling opportunities exist for most construction and demolition waste materials, including asphalt, concrete, drywall, metal, wood, brush, dirt, rocks, and cardboard.



Bright Ideas

Disposing of potentially recyclable materials and items generally represents a significant portion of a builder's budget. Becoming aware of what is in your waste bin—the types and quantities of materials that are being disposed of—can help you determine cost effective alternatives.

Additional Information

The C&D Waste Reduction and Recycling series consists of 9 fact sheets, each focusing on a different aspect of waste management. Factsheets in this series include:

- What's in a Building: Composition Analysis of C&D Debris
- Onsite Source Reduction: Cutting the Scrap
- Setting up a Jobsite Recycling Program
- Deconstruction: New Opportunities for Salvage
- Calculating Effectiveness: The Waste Management Plan
- Reducing Waste for Building Owners
- Waste Recycling Through Comingled Recovery: the Summerland Heights Residential Development
- Deconstruction on Commercial Renovation Projects: the Victoria Street Presbyterian Sanctuary
- Source Reduction in Residential Remodeling: the Las Alturas Adobe

Other resources:

- Environmental Resource Guide*, American Institute of Architects (800) 365-2724
- Environmental Building News and GreenSpec Product Directory* (802) 257-7300
- Environmental Design & Construction Magazine* (847) 291-5224
- Deconstruction* (video), Materials for the Future Foundation (415) 561-6530
- Builder's Field Guide*, National Association of Home Builders (202) 822-0200
- WasteSpec: Model Green Building Specifications*, Triangle J Council of Governments (919) 549-0551
- Sustainable Building Technical Manual*, U.S. Green Building Council (202) 828-7422

Visit these web sites for downloadable publications, listserve information, and links to other green building sites:

- www.ciwmib.ca.gov
- www.tjcoj.dst.nc.us/cd_waste.htm
- www.EDCmag.com
- www.epa.gov/greenbuilding
- www.buildinggreen.com
- www.materials4future.org
- www.aia.org
- www.oikos.org
- www.usgbc.org

The C&D Waste Reduction and Recycling Series is a joint project of the Santa Barbara County Solid Waste and Utilities Division, The Community Environmental Council, and The Sustainability Project.

For more information please contact U.S. EPA, Region 9 Office of Pollution Prevention and Solid Waste at (415) 972-3282.

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What Can Be Reused?

With advance planning many items can be reused on the jobsite. Additionally, if the project combines a demolition phase followed by new construction, many materials and items can be salvaged.

- x Easy to remove items include: doors, hardware, appliances, and fixtures. These can be salvaged for donation or use during the rebuild or on other jobs.
- x Wood cutoffs can be used for cripples, lintels, and blocking to eliminate the need to cut full length lumber. Scrap wood can be chipped on site and used as mulch or groundcover.
- x Gypsum drywall can be placed inside wall cavities to eliminate the need for transportation and landfill disposal. (Note: This method is really waste deferral rather than diversion).
- x De-papered and crushed gypsum can be used, in moderate quantities, as a soil amendment.
- x Brick, concrete and masonry can be recycled on site as fill, subbase material or driveway bedding.
- x Excess insulation from exterior walls can be used in interior walls as noise deadening material.
- x Paint can be remixed and used in garage or storage areas, or as primer coat on other jobs.
- x Packaging materials can be returned to suppliers for reuse.

Typical Discards from a 2,000 square foot Residential Construction Project

Material	Weight (pounds)	Volume (cubic yards)
Drywall	2,000	6
Solid Sawn Wood	1,600	6
Engineered Wood	1,400	5
Masonry	1,000	1
Cardboard	600	20
Metals	150	20
Vinyl (PVC)	150	1
Hazardous Materials	50	—
Other	1,050	11
TOTAL	8,000 lbs. waste	70 cu. yds.

Source: National Association of Home Builders, 1997.



What Can Be Recycled?

With locally available recycling outlets, economics favor the recycling of heavy materials such as concrete and steel. The cost effectiveness of recycling other materials depends on a variety of factors, but large quantities of any material will often make recycling competitive compared to the cost of landfill disposal.

- x Wood waste, along with mixed C&D debris, is accepted for a reduce tipping fee at MarBorg Industries and the Santa Barbara County South Coast Transfer Station.
- x Clean drywall is also processed by local C&D materials processing facilities.
- x Local industry accepts inert C&D debris for use as road base.
- x Some suppliers will take back used or scrap material. Carpet remains can be taken back to many suppliers. Also, it is sometimes possible to salvage and sell large scraps or find other uses for carpet on-site. Likewise, vinyl siding and ceiling tiles are sometimes taken back by manufacturers, when previously agreed upon.
- x Some manufacturers will pickup used product or packaging when delivering a new order. Conversely, waste hauling costs can be absorbed by back-hauling new materials on the return trip.

What Must be Disposed of?

A certain portion of the waste from construction and demolition projects is toxic and/or classified as hazardous waste. Materials generated in new construction that require special handling include latex paints, chemical solvents, and cements, spackles, and adhesives. Make a special effort not to purchase these materials in excess, and reuse them on other jobs where possible. Unused portions should be disposed of at a hazardous waste collection facility.

The age of structures on demolition projects ranges considerably, and many contain materials that are no longer allowed in new construction. Although asbestos abatement is required prior to demolition, there are sometimes remnants in subflooring or insulation that were not detected during abatement. Some older structures also contain significant quantities of lead based paint. Handling and disposal of asbestos or lead based paint that is removed from a structure varies according to volume and condition. For asbestos guidance, contact your local air pollution control district or call (415) 972-3989, and contact the National Lead Clearinghouse at (800) 424-LEAD for information about your responsibilities.

Construction waste originates from the construction, repair, and remodel of residential and nonresidential structures. The waste generated is relatively clean, and can be readily separated at the jobsite. On residential construction and renovation projects, wood, drywall, and cardboard make up 60 - 80% of jobsite waste (NAHB). Metal, brick, block, vinyl, and asphalt waste are generated in relatively smaller quantities. "Drive-by" waste, unauthorized dumping during off hours, can be as high as 30% of the total waste volume. Commercial construction waste volume varies based upon the size and type of construction.

Demolition waste is generated during the removal of existing structures; structures that were built over a range of time periods using a variety of materials and construction methods—some of which are no longer appropriate. Demolition materials include: aggregate, concrete, wood, paper, metal, insulation, and glass. Demolition waste is often contaminated with paints, adhesives, and insulation, and the recyclability of wood may be hindered by nails and other fasteners. Large pieces of wood and dimensional lumber can be recovered through dewatering and replanning and, because of the availability of local outlets, many demolition projects have been able to recycle as much as 80% of mixed debris.