THE BUREAU OF
PLANNING &
SUSTAINABILITY

Portland's Residential Deconstruction Program

How Portland pioneered a first-in-the-nation policy to cut carbon emissions, reduce waste, and create local value through building material reuse.

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Contents

Why Deconstruct a Building?

Deconstruction is a method to manually disassemble a building to salvage materials for reuse. In addition to the energy and climate benefits of this process, it also has the advantage of enabling workers to discover and properly dispose of materials containing hazardous substances, such as asbestos and lead, to a more detailed degree, thus protecting health and soil, water and air quality. The City of Portland advocates for building deconstruction because it reduces the construction industry's climate impact, protects public and worker health, and generates local economic activity and quality reusable building materials.

The process of extracting, processing, manufacturing, transporting, and installing building materials is known as embodied carbon or "upfront emissions." These emissions account for approximately 10% of global greenhouse gas emissions[1]. The best methods to reduce these emissions include building less, reusing existing buildings, and reusing building materials. A broader set of strategies is shown in the Built Environment Materials Management Priorities list below. Patterns of land use and real estate management do not always allow for reuse of a building, so the next alternative is to salvage materials from existing structures to build new structures. This reduces the amount of waste sent to landfill or incineration, and the emissions related extraction and production of new building materials.

Built Environment Materials Management Priorities

1. Preserve and maintain existing buildings, preventing demand for new building materials.
2. Convert existing buildings to match needs for different uses, known as adaptive reuse.
3. Salvage and reuse building materials wherever possible.
4. Maximize efficiency of use of new construction materials such as size-efficient or program-efficient buildings or methodologies to make efficient use of materials (e.g. advanced framing).
5. Remanufacture salvaged materials into new building materials and build with low-embodied carbon materials (e.g. mass timber, bio-based insulation, low carbon concrete).
6. Recycle remaining building materials that cannot be reused.
7. Utilize materials for alternative fuel, such as wood waste to hog fuel, or landfill.

History of the Program

Background

The Bureau of Planning and Sustainability (BPS) has multiple policies to reduce construction and demolition waste, including mandatory recycling of construction, renovation, and demolition debris generated on site. In 2016 Portland became the first city in the US to require deconstruction for certain buildings.

In the early 2010s, Portland's construction industry was booming and over 300 single-family homes were demolished each year to make way for new construction. Fewer than ten percent of these houses were deconstructed, despite opportunities to donate and reuse salvaged materials. In 2016, the City adopted a deconstruction ordinance and program in response to growing public concern over health hazards, materials waste, and loss of neighborhood character caused by demolitions.

Public Engagement

Neighborhood concern about the pace of demolitions peaked in 2014. Neighborhood associations argued that the 35-day public notice for demolitions was too short. They said residents needed more time to appeal or raise concerns about issues like exposure to potentially hazardous waste and dust.

A demolition subcommittee of Portland Permitting and Development (formerly Bureau of Development Services) heard these concerns and responded by proposing a shorter demolition delay for residential sites using deconstruction, as a way to encourage deconstruction over demolition. Residents rejected this proposal, but it helped raise awareness and build support for deconstruction.

Over the following year, Portland Permitting and Development (PP&D) and the Bureau of Planning and Sustainability (BPS) continued to research and discuss the issue. BPS developed an alternative proposal focused on deconstruction and presented it to Portland City Council with strong support and testimony from neighborhood associations. On February 12, 2015, Mayor Charlie Hales directed BPS to establish an advisory group to advance deconstruction to preserve and reuse materials from old Portland homes.

Deconstruction Advisory Group

In 2015, the Bureau of Planning and Sustainability convened the Deconstruction Advisory Group, which included deconstruction experts, builders, developers, neighborhood groups and historic preservationists. The group met over twenty times to advise on strategies and incentives for advancing deconstruction activities. The expertise, passion, and collaboration of this group of stakeholders was critical to the success of the program. Additionally, the group looked to other Northwest jurisdictions with relevant experience, including Seattle and King County in Washington, Vancouver in British Columbia, Metro (the Portland area's regional government), and nearby counties.

Deconstruction Incentive Grant Program

On June 3, 2015, City Council adopted Resolution 37127, which directed the Bureau of Planning and Sustainability (BPS) to establish a deconstruction grant program and to report back in January 2016 with recommendations for next steps. On September 8, 2015, BPS launched the deconstruction grant program and funded nine deconstruction projects with $3,000 incentive for each through 2017. BPS also received $50,000 from the Oregon Department of Environmental Quality (DEQ) Materials Management grant program, approved through Ordinance 187474 on July 6, 2016. This grant program resulted in innovative approaches, newly engaged participants, and increased awareness of the benefits of deconstruction.

Policy Development

On February 17, 2016, City Council adopted Resolution 37190 which directed BPS to develop requirements for residential projects seeking a demolition permit. In April 2016, a review draft of the deconstruction code language[2] was available for a four-week public comment period.

Contractor Training

To ensure the program's success, Portland needed an adequate workforce in place at the start of the new ordinance. With assistance from a local workforce development consultant, BPS convened a group of stakeholders to develop a training and certification plan for deconstruction contractor training and workforce development. In July 2016, BPS hosted a voluntary three-day hands-on training for contractors, led by the organization Build Reuse[3]. Sixteen participants from twelve companies completed the training and passed a final skills assessment.

First Deconstruction Ordinance

On July 6, 2016, staff at BPS took the final code proposal to City Council, outlining a phased approach to increasing deconstruction requirements. Council unanimously approved ordinance 188259 to amend City Code Title 17, adding a new Chapter 17.106, Deconstruction of Buildings Law. The initial Portland deconstruction requirement went into effect on October 31, 2016.

The ordinance required one and two-family structures (house or duplex) seeking a demolition permit to fully deconstruct that structure if it was built before 1917 or designated as a historic resource[4]. The ordinance used a year-built threshold instead of focusing on location, zoning, or building quality to avoid inequitable impacts across different areas of the city.

The threshold of 1916 or earlier was chosen because homes of that age represented one third of demolitions in the years leading up to the ordinance. This was a significant share, but still small enough to avoid overwhelming the City's permitting system or the local deconstruction industry.

The ordinance adopted an effective date of October 31, 2016, to allow adequate time for developing administrative rules, procedures, database programming, and training and certifying deconstruction contractors and workers.

Workforce Training

Equally critical to training existing deconstruction contractors was ensuring Portland would have enough trained workers available to enter the deconstruction workforce as peak summer construction season approached. To meet this demand, BPS held another training in March 2017. The program partnered with local pre-apprenticeship programs and nonprofits to recruit candidates for the training.

The hands-on training took place over twelve days at four different active deconstruction sites and was led by Re-Use Consulting. Half of the fifteen-student cohort was composed of female participants and there was also a contingency of participants with significant barriers to employment. The training wrapped up with a meet and greet between the students and contractors to encourage recruiting.

Deconstruction Ordinance Updates

Within the first year of the program's effective date, BPS reported back to City Council twice with updates on its status. These reports included recommendations on whether to modify, maintain, or expand the program, with the long-term goal of including houses and duplexes built before 1941 by 2019.

Increasing the year-built threshold to 1940 and older represented about two thirds of all residential demolition permits. The success of the program and development of the deconstruction contractor market from 2016 to 2019 showed that the industry was ready to take on more permits. Portland City Council adopted an amendment on November 13, 2019, which raised the year-built threshold from 1916 to 1940. The amendment went into effect January 20, 2020, with ordinance 189761.

The ordinance defines regulations for the deconstruction program. These include certification of Deconstruction Contractors, limits on the use of heavy machinery (to better preserve materials), requirements for site signage, provisions for random inspections, and requirements for reporting post-deconstruction salvage materials and waste disposal receipts.

The Deconstruction Program Today

Certified Deconstruction Contractors

An early advocate for deconstruction in the Portland area was the ReBuilding Center, a non-profit organization in North Portland dedicated to inexpensive building materials and teaching home repair skills. The ReBuilding Center trained many of Portland's early deconstruction contractors and continue to engage and inspire the local salvage materials and home repair community. The list of Certified Deconstruction Contractors has had as many as seventeen companies. Some contractors achieved certification for just one or two special projects, some have left the industry as the program increased requirements for lead-based paint and asbestos abatement training, others combine deconstruction with hazardous materials abatement. To see the current list of contractors, visit the Certified Deconstruction Contractors page[5].

Materials Salvaged

The primary material salvaged from residential deconstruction is framing lumber. In Portland this lumber is typically old growth Douglas fir, prized for its tight vertical clear grain. The wood is sometimes reused as-is for repairing historic homes whose framing match original 2″ by 4″ or 2″ by 6″ dimensions, since the dimensions do not match modern lumber (e.g. 1.75″ x 3.5″ and 1.75″ by 5.5″). More commonly this wood is used in furniture or finish applications, with some salvage shops re-milling it into profiles for siding, flooring, and interior paneling. Other salvaged materials include, in order of frequency: doors, hardware, flooring, sinks, lighting, windows, appliances, tubs, cabinets, toilets, mirrors, and roofing.

Initially, many contractors sold bundles of lumber through secondhand marketplaces such as Craiglist.org. Deconstruction contractors have now opened three retail operations to maximize the economic value of the materials they salvage. These stores add value to the lumber they harvest through re-milling and furniture building. Each part of the salvage ecosystem adds jobs to the Portland economy, creating at least thirty new jobs since the program began. These new jobs have created opportunities for individuals from under-represented communities in the field of construction.

Impact

Over 700 Projects and 30+ Jobs

Between October 2016 and June 2025, the program has seen a total of 702 deconstruction projects: 493 houses and duplexes, 89 accessory structures such as garages, and 120 structures not categorized.

Since 2018, contractors have reported salvaged materials and lumber on the post-deconstruction form. A tool converts their measurements (linear feet for dimensional lumber and square feet of sheet goods) into weight to show the total tons of wood each project diverts.

The average house size is 1,260 square feet, yields 3400 board feet of lumber, for a total 4.37 tons of materials are diverted for reuse per project site.

In total, over 4.3 million pounds of wood materials have been salvaged for reuse as well as hundreds of cabinets, fixtures, windows, and doors. A total of 676,250 square feet of buildings have been deconstructed, the equivalent of 38 of the 42 stories of Portland's "Big Pink" skyscraper.

The deconstruction ordinance is estimated to have added at least thirty jobs to the local green construction industry, including new small business owners, deconstruction laborers, and retail staff.

Carbon Emissions

A study by Oregon Department of Environmental Quality in 2019 estimated the carbon savings from deconstruction to be 7,679 kg CO2e per house compared to demolition[6]. The total carbon impact of the program in the last decade is estimated to be at least 4,588 MT CO2e. This is the equivalent of 1,070 gas-powered vehicles removed from the road for a year or 4,602 acres of U.S. forest growth in one year[7].

Reduced Landfill Waste

In addition to materials reuse, deconstruction contractors typically gather metal materials on site for recycling. The materials that remain after any hazardous material abatement, deconstruction, and metal recycling are hauled as dry waste, this averages approximately 19.45 tons per house. All mixed dry waste from demolition sites goes to a Metro permitted materials recovery facility (MRF) for sorting and recovery of recyclable materials.

From 2013 through 2023, Portland area MRFs have recovered an average of 20% of materials from construction and demolition waste, and in 2023 achieved a recovery rate of over 26%. These recovered materials typically include metals, wood waste for chipping into hog fuel, concrete and masonry for alternative daily cover (ADC) or fill, some asphalt-based products for roads and new products, and cardboard for recycling into new packaging. With this combination of diversion activities, the total materials recovery from deconstruction sites is at least 60%.

Improved Management of Hazardous Materials

Deconstruction has become a best practice for hazardous materials management because it generates less lead paint dust and increases the likelihood of discovering unabated asbestos.

Portland's deconstruction requirements influenced the definition of best practices at the State of Oregon (see 2017's Senate Bill 871 and Best Practices for the Demolition of Residences with Lead-Based Paint)[8]. These state-level changes led to increased requirements for mechanical demolitions in Portland including hand removing all painted exterior material prior to mechanical demolition and wetting the structure during active demolition and loading of debris.

The more labor-intensive requirements for mechanical demolitions raised the cost of demolition. As a result, the cost of demolition and deconstruction became roughly comparable for projects of similar sizes. At the same time, since many deconstruction contractors were already trained in lead-based paint mitigation, they were able to combine lead-mitigation services with deconstruction, which led to more voluntary adoption of deconstruction for small structures such as garages.

For more information on these regulations, see Demolition Permits – Residential - Dust and site controls for demolitions with 1-4 dwelling units[9].

Knowledge Sharing

Portland's construction and demolition staff collaborate with cities across the country and world who are interested in deconstruction and other Construction, Renovation, and Demolition (CRD) waste reduction strategies. For example, the neighboring city of Lake Oswego relies on Portland's list of Certified Deconstruction Contractors to meet its own deconstruction requirement[10].

Other jurisdictions with deconstruction programs include Seattle, WA[11]; Palo Alto, CA[12]; San Antonio, TX[13]; Boulder, CO[14]; and Hennepin County, MN[15].

For cities interested in learning more, the organization [Build Reuse] offers extensive resources and hosts the annual Decon and Reuse conference, which bring professionals together to advance building materials reuse.

Future of the Program

Increasing the Quantity of Materials

Portland is studying the possibility of requiring minimum thresholds for salvage materials to ensure contractors maximize the reuse of building materials.

Increasing the year-built threshold beyond 1940 – potentially to include houses of any age – would increase the number of deconstructed homes, but there is diminishing quality of salvaged materials from homes starting in the mid-1960s as more glue, foam, and composite materials became commonplace in house construction.

Promoting the Use of Salvaged Lumber

Even though Oregon Residential Specialty Code (2021) allows for the use of salvage lumber in section R104.9.1[16], it is still uncommon in practice. The Bureau of Planning and Sustainability is working with Portland Permitting and Development to test and operationalize the allowance of salvage lumber in local residential building projects. With this code approval, the market for salvage lumber will become more valuable and more houses, materials, and carbon can be saved.

It is critical for jurisdictions interested in deconstruction to advocate at the State and International Building Code level for the adoption of salvage materials, with the goal of reducing the embodied carbon impact of new construction.

Commercial Deconstruction

Expanding deconstruction to the commercial sector would greatly expand the program impact, however commercial deconstruction presents different challenges to residential deconstruction. Most Portland commercial demolitions yield large amounts of masonry (brick), concrete, and steel, with less recoverable lumber than residential (although a great amount of wood is still available).

Portland is exploring a commercial deconstruction pilot, like the residential deconstruction pilot from 2017, that would offer incentives for contractors, developers, and owners to deconstruct commercial buildings.

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