

Deconstruction and Reuse



October 2012 | Second Edition

ABOUT DELTA'S GO-GUIDES

The Green Economy is full of exciting opportunities, but the path isn't always obvious or easy. Delta knows, because we have been there since the beginning, and we have the experience and know-how to get you from where you are to wherever you want to go. Delta's GO-Guides identify green opportunities in growing industries and provide hands-on, practical guidance to help businesses, government entities, communities and individuals take the next steps toward success. The GO-Guide to Deconstruction and Reuse is the first in the series, based on Delta's experience launching and growing Chicago's ReBuilding Exchange (www.rebuildingexchange.org).

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INTRODUCTION

It has been said that our old growth forests still stand — not in our forests, but in our buildings. Think about all that wood, every timber that makes up the bones of our homes, our schools and our workplaces. There's a lot of it, and it is reusable, along with doors, windows, tubs and sinks. The challenge is managing the removal of these materials in ways that allow us to reuse them.



A home undergoing deconstruction. (Photo courtesy of Rebuilding Exchange.)

The purpose of this guide is to help policymakers, architects and designers, homeowners, contractors, salvage retailers and economic development professionals work in concert to help create a thriving, sustainable deconstruction and reuse industry. Our goal is to provide a snapshot of the economic, environmental and job creation opportunities offered by this evolving industry, along with information, recommendations and resources that will help each of these stakeholders advance the field.

It's no small feat to shift the way people perceive their built environment — to see assets where they've always seen dilapidated ruins destined for the landfill. As these perspectives shift, people will begin to see opportunities to maximize the value

of materials, reduce the amount of materials sent to landfills and create jobs and new businesses.

The deconstruction and materials reuse industry has the added economic development value of creating demand for vacant and underutilized properties. Often reclaimed building material stores are located in older industrial buildings in neighborhoods where there is demand for reclaimed materials and real estate prices and rent levels are lower; this reduces the operating costs for these types of ventures. This guide discusses how the deconstruction and building materials reuse industry can be used to revitalize vacant and underutilized properties.

Reclaimed building materials can be used as a resource for creating green infrastructure on vacant sites while these properties are in transition. For example, materials such as concrete and lumber are valuable resources that can be transformed into landscape berms to prevent soil erosion.

Despite these benefits, most cities, developers and land banks demolish residences in ways that do not promote the healthy reuse of the building materials or the property. To help communities improve their practices, the

Environmental Protection Agency (EPA) is creating a set of Green Demolition bid specifications that include deconstruction. In addition to deconstruction, these specifications will include best practices on building removal procedures including soil placement, impervious surface removal, materials management, and deconstruction. To access this resource, please visit www.epa.gov.

This GO Guide and the EPA's new Green Demolition Specifications are part of a growing recognition that deconstruction and the development of the building material reuse industry provide substantial enough environmental, social and economic benefits to warrant a change in our thinking and our actions. This GO Guide is a tool to help everyone with a role to play in this effort, understand why it is important and what they can do to bring these benefits to their community.

PART I: OVERVIEW OF DECONSTRUCTION AND REUSE

What is Deconstruction?

Deconstruction is the process of systematically dismantling a structure in an environmentally, economically and socially responsible manner, aiming to maximize the recovery of materials for reuse and recycling.

The process is also sometimes referred to as “soft demolition,” which refers to the manual method used to recover materials, as opposed to “regular demolition,” which involves mechanically bulldozing a structure, often using heavy machinery (EPA, 2000). The demolition industry is involved in recycling building materials to some extent, but traditional demolition typically results in minimal reuse opportunities. Deconstruction, on the other hand, places the emphasis on recovering building materials with the primary goal of reusing them (Leroux and Seldman, 1999; NAHB, 2000).

Why Deconstruct?

The deconstruction industry has gained ground consistently in recent years due to the considerable economic and environmental opportunities it offers. Although the environmental benefits are a significant driver, the economics are becoming an important impetus in certain parts of the United States, especially in economically depressed regions.

Deconstruction activities increase the opportunity for local business development and because deconstruction is labor-intensive it results in local job growth. This enhances the local tax base and contributes to a multiplier effect of money invested in the community (NAHB, 2000). The ReBuilding Center in Portland, Oregon, (2010) has found that “deconstruction creates six to eight jobs for every one created by standard demolition.”

Deconstruction can be cost-competitive with standard demolition, in some cases. Reduced disposal costs, avoided purchases of new materials, revenue earned from material sales and potential tax incentives add up to enhanced financial value from deconstruction. Tax deductions from donated used building materials can result in a significant reduction in overall cost as compared to demolition for the same project (EPA 2000). Moreover, integrating recycled and reused materials into a project can help achieve Leadership in Energy and Environmental Design LEED® certification.¹

Environmentally, deconstruction reduces construction and demolition (C&D) waste, reduces air pollution, reduces carbon dioxide emissions, abates the

¹ LEED is an international program of the US Green Building Council, which provides third party certification of green buildings.

need for new landfills and incinerators, preserves resources and saves energy by decreasing the extraction and processing of raw materials, and supports sustainable building practices (ILSR, 2008).

Who Benefits from Deconstruction?

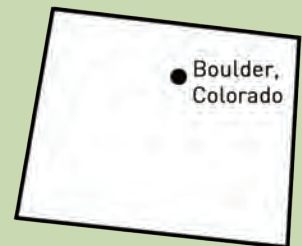
The broad socio-economic and environmental benefits of deconstruction point to opportunities for a wide range of stakeholders in different ways. For example:

- **Property owners** can obtain a tax deduction by donating materials or gain income from reselling materials;
- **Remodelers** can get a large stream of quality materials at lower costs;
- **Traditional demolition contractors** can use deconstruction as an additional or new revenue source;
- **Architects, engineers and design professionals** can innovate designs and find cost reductions by incorporating reclaimed building materials, that can also help achieve LEED® points;
- **General contractors** can use deconstruction to meet LEED® requirements, gain a competitive edge from reduced waste fees and obtain valuable materials for resale;
- **Developers** can save money, reduce environmental impacts, contribute toward community development and potentially command higher prices given the reuse aesthetic in new design trends; and
- **Cities and local governments** can help improve management of solid waste, meet C&D waste diversion and recycling objectives, and redevelop brownfields and other vacant properties thereby increasing sales and real estate tax revenues.

What is the State of the Deconstruction Industry?

Increasing awareness about household recycling in the 1970s and 1980s, followed by the explosive growth of the green building movement in the 1990s and early 21st century, has led to the recognition of deconstruction as an alternative to removing unwanted buildings through simple demolition. In recent years, this has been coupled with various other economic, social and political factors that have underscored the importance of the deconstruction industry.

Opportunities to salvage valuable materials and recycle or resell them occur at several points in the demolition process (see Figure 1). However, the amount of salvaged recyclable materials that are sold on site or make their



Exemplary Program

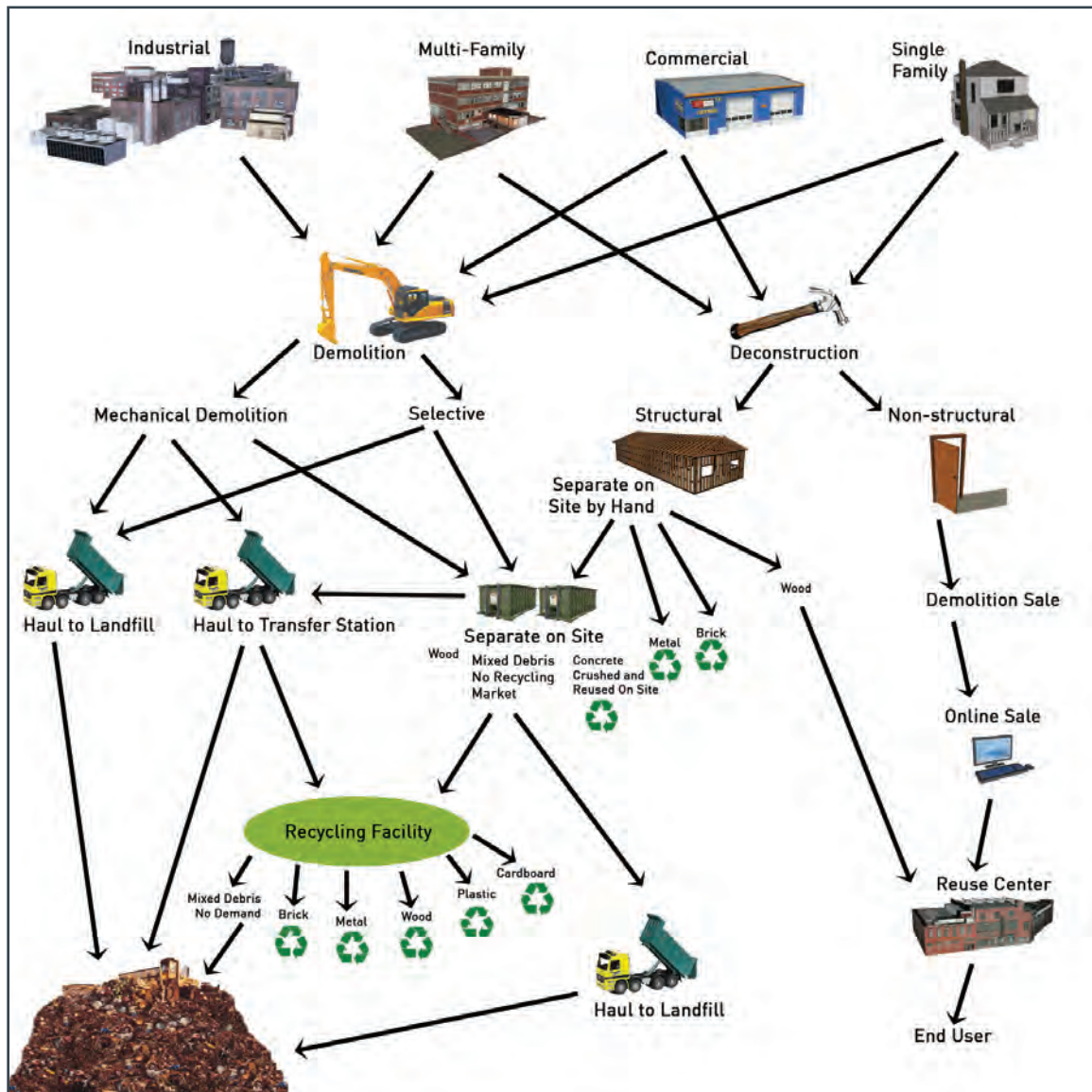
The Green Building and Green Points program of Boulder, CO, adopted by the City Council in 2007, emphasizes the preservation of existing buildings. The program requires recycling of at least 50% of the construction waste generated by a new building or rehabilitation project. If “more than 50% of exterior walls are removed, at least 65% of material must be diverted from landfills.”

way to a reuse store varies widely depending on the type and scale of the project, the policy environment (including disposal, landfilling and recycling policies), the depth of the local market for reused or recycled materials, the duration of and budget for the project, and the experience level of the contractors and other stakeholders.

Figure 1: Market for C&D Materials

Source: University of Illinois at Chicago, 2009

Graphic Courtesy of Yochai Eisenberg



What is Driving the Market for Deconstruction?

The market for the deconstruction industry at large is contingent upon social and economic conditions, local policies and the presence of organizations driving the industry.

Green Building Movement

The green building movement has been a major factor driving material reuse and recycling in the U.S. and influencing other sustainable building practices over the last decade (Kilbert, 2004; EPA, 2010). The U.S. Green Building Council (USGBC) was founded in 1993, and, in 1998, the USGBC launched its LEED® program.

As described by U.S. EPA, “green building is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building’s life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction” (EPA, 2010). Green buildings ensure that waste is recycled or reused in their construction along with materials made from high-recycled-content and/or renewable resources.

Rising Landfill Costs

Landfills have always been the cheapest option for disposing of materials perceived as “waste.” Such practices have been widespread in the development and construction industry. But the number of landfills and the space within them is diminishing in many urban areas. Some jurisdictions are imposing surcharges or additional taxes on tipping fees and requiring waste plans that require demolition contractors to consider alternatives to landfill disposal.

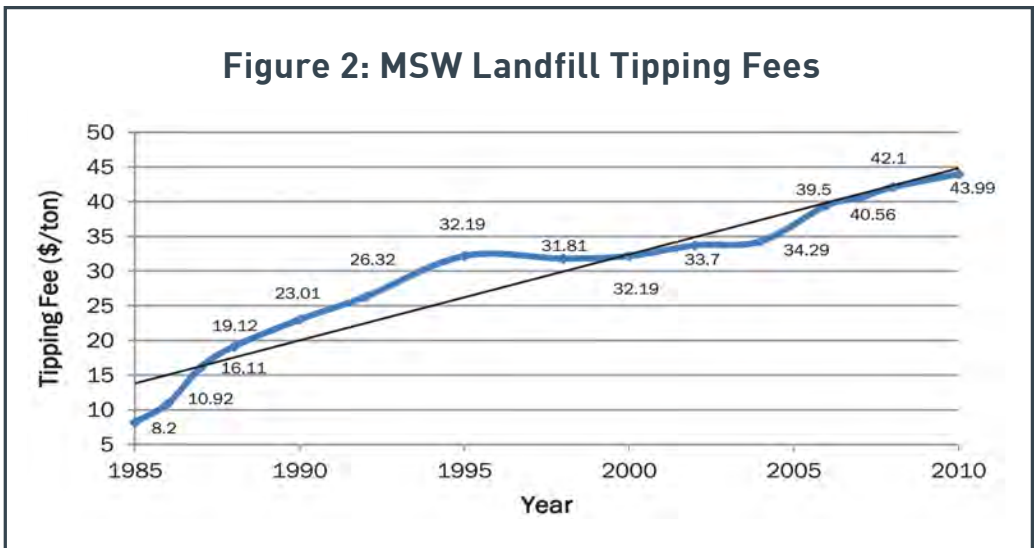
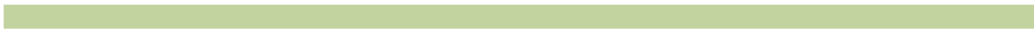
According to the National Solid Waste Management Association (NSWMA), the cost of landfilling is highest in the northeast states, where the average tipping fee is \$70.53 per ton, and lowest in the south central and west central states, where the fees are \$24.06 and \$24.13 per ton, respectively. The average tipping fee for the Midwest is about \$34.96 per ton. The following table (Table 1) demonstrates cost trends for tipping fees over a 2-decade period.

² LEED participants may receive up to 100 points and 10 possible bonus points over five major categories. Within each of the LEED credit categories, projects must satisfy prerequisites and earn points. The number of points the project earns determines its level of LEED certification. For example, access to open space is worth 1 point in the “location and linkages” category.



LEED® Points for Reuse

The U.S. Green Building Council’s LEED® for Homes program provides an additional incentive for reusing materials. Except in the case of flooring, each time a project reuses materials for more than 90% of a building component, it will receive 1 LEED® point.² Although MR2.2 has a maximum of 8 points, projects that go above and beyond can achieve up to 4 exemplary performance points.



Between 1985 and 1995, tipping fees increased steadily at \$2.40 per year. This increase was likely caused by states implementing the federal Resource Conservation and Recovery Act (RCRA) Subtitle D regulations or their state equivalents. Tipping fees remained relatively constant between 1995 and 2004. From 2004 to 2010 tipping fees rose at a rate similar to the 1985 to 1995 period at \$1.62 per year. This increase was probably caused in part to rising fuel costs. Source: National Solid Waste Management Association, 2011

Table 1: Landfill Tipping Fees (dollar per ton)

Source: National Solid Waste Management Association, 2005

Region	1985	1986	1987	1988	1990	1992	1995	1998	2000	2002	2004
Northeast (CT, ME, MA, NH, NY, RI, VT)	12.66	17.11	52.41	61.11	64.76	65.83	73.17	68.68	69.84	69.07	70.53
Mid-Atlantic (DE, MD, NJ, PA, VA, WV)	16.99	22.08	26.32	33.84	40.75	47.94	45.68	44.11	45.84	45.26	46.29
South (AL, FL, GA, KY, MS, NC, SC, TN)	3.24	5.76	13.13	16.46	16.92	22.48	28.50	30.89	30.53	30.43	30.97
Midwest (IL, IN, IA, MI, MN, MO, OH, WI)	7.23	11.75	16.42	17.70	23.15	27.10	31.15	30.64	32.85	34.14	34.96
South Central (AZ, AR, LA, NM, OK, TX)	7.24	7.61	10.17	11.28	12.05	12.53	20.30	21.02	21.90	23.28	24.06
West Central (CO, KS, MT, NE, ND, SD, UT, WY)	5.36	6.21	7.23	8.50	11.06	12.62	23.29	22.51	22.29	23.40	24.13
West (AK, CA, HI, ID, NV, OR, WA)	10.96	11.10	13.92	19.45	25.63	27.92	37.69	36.08	34.54	38.90	37.74

Note that regional averages may not reflect tipping fees in specific states or counties, as some are considerably higher or lower than regional averages. For example, although the Midwest 2006 average is \$34.96, Indiana's rate is \$29.57 per ton, while Minnesota's is \$40 per ton (Arsova, L et al., 2008).



Rise in Vacant and Abandoned Properties

National Trends: More Vacant Properties

The increasing percentage of vacant property in the region poses a significant challenge to municipalities, as vacant properties decrease tax rolls while raising maintenance and public safety costs (Buitrago, 2010). Deconstruction can help redevelop these vacant or abandoned properties, while salvaging component building materials

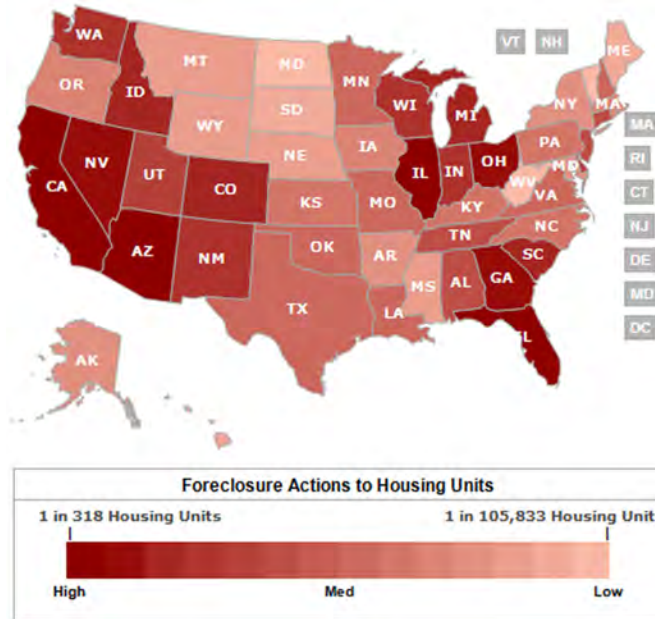
for reuse, providing transitional job training opportunities, and creating jobs. Some communities, including the City of Chicago and Wayne County are leveraging federal neighborhood stabilization funding to create model deconstruction programs to address foreclosed properties in need of removal.

According to the U.S. Census Bureau, the number of “other vacant properties” doubled from 1970 to 2000, going from just under one million units to 2.3 million in that time frame. The number doubled again between 2000 and 2008, increasing the national total to 4.7 million, or one of every 28 dwellings in the country (Leonard and Mallach, 2010). Figure 2. shows foreclosure rates across the nation in 2010, with highs approaching 20% in Florida and Nevada.

Social and Cultural Trends:

Environmental awareness continues to shape consumer decision-making, as early adopters identified with the LOHAS demographic (Lifestyles of Health and Sustainability) drive interest in local, sustainable products and practices across a wide variety of product categories. An “eco-chic” aesthetic has permeated the home design and decorating markets, driven by the emergence of the green building movement. Young adults ages 25 - 40 who are entering the housing market are particularly influenced by this trend. The trend has been further fueled by the recession, which has ushered in a period of frugality, resource conservation and reuse that spans the generations by necessity and choice.

Figure 3: Foreclosure Heat Map, August 2012



High rate in the Midwest, especially in IL with approximately 18,000 foreclosures. Source: RealtyTrac (<http://www.realtytrac.com/trendcenter/>)



Vacant Property Loan Fund

Cleveland’s Vacant Property Loan Initiative Program provides Vacant Property Initiative Funds to promote reuse of abandoned, idle or under-utilized commercial and industrial properties. Funds may be used for demolition, site clearance, and new construction (Cleveland Department of Economic Development, 2010). See Appendix A for more information.

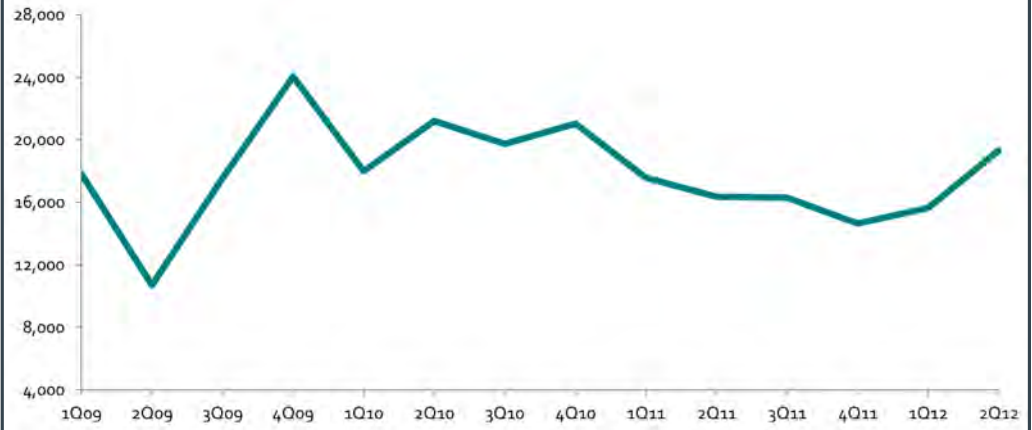


Affordable Green Neighborhoods

The USGBC's Affordable Green Neighborhood Grants are selected by industry leaders and given a cash award of approximately \$25,000 to pursue LEED®-ND certification and cover other related expenses (USGBC, 2010).

Figure 4: Properties with Foreclosure Filing by Quarter, Chicago Six County Region

Source: Woodstock Institute, 2012



Funding for Redevelopment, Demolition and Job Training

The recent rise in foreclosures and abandoned properties prompted the development of new federal, state and local policies and programs that have the potential to transform these liabilities into assets (Leonard and Mallach, 2010). Some programs that are active at time of writing are listed below, but because such programs change frequently readers are encouraged to visit websites to check status and details for the programs.

Federal Neighborhood Stabilization Program (NSP): This U.S. Department of Housing and Urban Development (HUD) grant program targets communities that have suffered from foreclosures and abandonment. In January 2010, a total of \$1.93 billion in NSP grants for rebuilding, rehabilitation or demolition was awarded to 56 grantees nationwide, including 33 regional consortium and four national consortium carrying out activities in target areas throughout the country (Department of Housing and Urban Development, 2010).

Affordable Green Neighborhoods Grant Program: The U.S. Green Building Council (USGBC), with support from the Bank of America Foundation, offers a grant program that provides funding and educational resources to affordable housing developers that are also committed to green construction and related public agencies that choose to pursue LEED® 2009 for Neighborhood Development certification (U.S. Green Building Council, 2010).

Local Commercial Redevelopment Incentive Programs: Many cities have local economic incentive programs, such as Tax Increment Financing (TIF), that can be used to reimburse costs of building demolition. Some cities, such as Cleveland, also have commercial loan programs designed to help owners

and buyers of “vacant or little used commercial property” with financing for demolition, renovation or hazardous materials abatement. (See sidebar on page 10.)

Government Policies, Regulations and Programs

Nationally, deconstruction has gained impetus from a number of local policies, regulations and programs that promote waste diversion and recycling, sustainable building practices and community revitalization.

Recycling Ordinances: Local ordinances typically set targets for C&D Recycling from 50% and to as much as 75%, excluding waste containing asbestos, lead or other hazardous materials. Ordinances typically apply to new construction and remodeling projects over a certain size, as well as demolition. Cook County recently passed an ordinance that will take effect in November 2012, requiring that 70% of all commercial and residential demolition material be recycling, with an additional 5% reuse requirement for residential projects.

Green Building Ordinances: Local ordinances may also require building developers to meet specific standards regarding diversion of C&D waste and/or meet other specifications related to waste management and other LEED®-related requirements. For example, the City of Chicago’s C&D Debris Recycling Ordinance came into effect in March 2006. It requires contractors to track the amount of C&D debris generated on project sites, recycle at least 50% of the debris and submit a “recycling compliance form” to the City of Chicago with an affidavit from the waste hauler or recycler.

Land Banks: A land bank is a public authority that acts as a legal and financial mechanism to efficiently manage and develop vacant, abandoned and tax-foreclosed/tax-delinquent properties and return them to productive use. Typically, land banks are supported by funding from a local government that is later recovered by the revenue generated by the sale of such properties and the cost-saving that governments enjoy, which otherwise would have been borne by them for the maintenance of these properties. Land banks can play an important role in deconstruction. With ownership of large portfolios of properties, land banks can create economies of scale with deconstruction initiatives and potentially recoup some of their costs in the resale of deconstructed materials.



City C&D Ordinance

The City of Chicago’s C&D Debris Recycling Ordinance came into effect in March 2006. It requires contractors to track the amount of C&D debris generated on project sites, recycle at least 50% of the debris and submit a “recycling compliance form” to the Chicago Department of Environment with an affidavit from the waste hauler or recycler.

Presence of Market Leaders

Non-profit organizations, industry associations, social entrepreneurs and small businesses are seeing the opportunities in deconstruction and reuse and are actively involved in developing this market in a variety of ways (Table 2).

Table 2: Activities of Market Leaders

Type of Activity	Description
Policy	Create policies at the local, state or national levels and/or educate the public about the value of deconstruction and reuse.
Economic Development Professional/Entrepreneur	Identify potential sites for a retail operation and facilitate stakeholder dialogue. Assess local market potential.
Training	Provide specialized training for contractors and laborers involved in deconstruction, as well as for warehouse workers, retail staff and craftspeople involved in reuse.
Deconstruction Contracting	Provide direct deconstruction and salvage services to homeowners and building industry intermediaries.
Deconstruction Consulting	Provide indirect assistance in the form of planning, valuing, documenting, contracting and disposing of materials.
Retail Sales/Other	Sell salvaged material online, in a store or, in some cases, on site.

PART II: POLICIES TO SUPPORT AND EXPAND THE DECONSTRUCTION INDUSTRY

Policy leadership from government and non-profit partners is needed to encourage more developers and contractors to consider deconstruction as a supplement to traditional salvage and recycling methods and to help expand the market for reused materials. Most developers and demolition contractors have experience in salvaging valuable recyclable materials, such as metal, or finding the most cost-effective means of processing and recycling materials, such as concrete for reuse on site. Information, financial and market incentives can ensure it is practiced more widely.

Strategy #1: Be a Role Model

In areas of the country where disposal costs are high or for specific buildings that have a large volume of higher-value reusable materials, deconstruction is cost competitive with traditional demolition and disposal. Local governments can be role models by requiring audits or inventories of salvageable materials for public projects as part of the bid process.

Strategy #2: Fund Demonstration Programs

Grant funds can subsidize deconstruction project costs in cases where the higher cost of deconstruction is unlikely to be offset by avoided disposal costs, value of reused materials, or tax benefits to the building owner. Government grants for housing rehabilitation, job training or energy conservation can be directed to deconstruction programs. Subsidized programs can be used to train contractors on handling materials and to find markets for higher-value reusable materials. The City of Chicago and Cook County are examples of local governments that are currently using government grants to subsidize deconstruction work, provide an example, build capacity and jumpstart the local market.

Strategy #3: Adopt Supportive Local Ordinances

Local governments can support the reuse and recycling of C&D materials by passing ordinances that require private demolition contractors to recycle and reuse a specific percentage of materials or that incorporate green building standards in public building projects. These types of ordinances have been passed in several states, including California, Colorado and Washington. Further details are provided in the sidebar and Appendix A.

Some local governments are also supporting deconstruction activities by expediting the permitting process or waiving permit fees for demolition and

Photo courtesy of King County (WA) GreenTools.



Diversion of C&D Waste Reduces Disposal Costs for Public Projects

Washington's Harbor Island Warehouse, a government-owned project exempt from tax incentives, maximized the amount of salvaged materials, which, in turn, significantly minimized disposal costs. The materials that were diverted from the landfill resulted in \$40,000-\$60,000 of avoided disposal costs.

Local C&D Materials Recycling Ordinances or Programs

Concord, CA

C&D Materials Recycling Ordinance

San Jose, CA

Construction Demolition Debris Deposit (CDDD) program

Boulder, CO

Green Building and Green Points program

Chicago, IL

C&D Debris Recycling Ordinance

Evanston, IL

Green Building Ordinance

Orange County, NC

Regulated Recyclable Materials Ordinance

King County, WA

Green Building and Sustainable Development Ordinance

Madison, WI

Construction and Recycling Ordinance

new construction that involves deconstruction. For example, Los Altos Hills, CA, waives the permitting fee for projects when a deconstruction contract is attached to the permit application and expedites the process for new buildings.

Strategy #4: Provide Education and Training for Contractors

Local government and non-government partners can provide funding, education and training for contractors on topics that will help them grow deconstruction as a line of their business, including:

- The value and markets for a broad range of reusable materials;
- Methods for carefully handling and packaging reusable materials for re-sale markets;
- Risks and regulations in handling materials that may contain lead-based paint or other potential contamination;
- Labor standards for deconstruction workers and risks relating to work in areas where these standards have not yet been defined formally;
- Hybrid deconstruction techniques, which combine manual deconstruction to maximize reuse and recycling and traditional machine-operated demolition techniques; and
- Potential tax incentives for donation of building materials by higher-income homeowners or commercial building redevelopers

More detailed information on these topics is included in the Practitioners Guide for Contractors, Part V.

Strategy #5: Support New Labor Standards

Because deconstruction is relatively new, there are no specific labor standards for deconstruction workers in many states. Government-funded programs that require payment of prevailing wage have been stalled because of the high cost of paying lower-skill and youth trainee-level wages that may not fit their job site activities. Defining deconstruction as an occupation through the Department of Labor's Office of Apprenticeship is one solution to this barrier.

Strategy #6: Support New Appraisal Standards

Charitable tax deductions for the donation of used building materials are an important incentive to offset the higher upfront cost of deconstruction. The IRS requires an appraisal by a qualified appraiser of materials valued

at more than \$5,000. Deconstruction of an entire home is sure to yield materials with a value over this threshold. Finding a qualified appraiser that has education and experience in valuing used building materials may be a challenge, however, given that national appraisal organizations do not yet have specialized certification programs for this type of personal property. Outreach to appraisal organizations is needed to encourage them to provide new appraisal standards for valuing donated building materials.

Strategy #7: Advocate for Clear Environmental and Public Health Policies for Handling and Selling Salvaged Materials

Environmental and health regulations are clear on the removal and disposal of asbestos-containing materials and other types of hazardous building materials, and on handling lead-based paint in rehab situations.³ However, it is not yet clear if this rule or other regulations apply in deconstruction or demolition cases where a building will no longer exist or be occupied. Some national deconstruction advocacy groups are seeking clarity from government officials on this issue. Organizations that sell used building materials are also establishing best practices for the safe reuse of salvaged materials, and can direct customers to existing materials, such as those published by the EPA, but cannot play the role of educational resource regarding lead issues because of potential liability.

Strategy #8: Build Public Awareness

Although there is a long-standing public preference for new goods, the recent economic downturn and changing tastes are increasing demand for salvaged and reclaimed materials. A small but growing group of artists, craftsmen, do-it-yourselfers and architects are embracing the reclaimed aesthetic and making it a norm of the green building movement. Education and marketing by government and advocacy groups is needed to increase awareness among homeowners and building managers about deconstruction and reuse opportunities. Non-government organizations taking a leading role in raising awareness include:

- **Building Material Reuse Association (BMRA)**, disseminates information on best practices in the reuse and deconstruction industry, provides training resources, and manages a huge network of industry practitioners working together to build a robust material reuse industry.
- **Reuse Alliance** hosts annual conference and develops informational resources that increase public awareness and access to the reuse sector's innovative waste prevention services. Also, provides training that strengthens the capacity for individuals and organizations to reuse our materials resources.

³ See OSHA and the EPA's Renovation, Repair and Painting (RRP) rule.

- **Delta Institute** has been a pioneer in the deconstruction movement through a variety of initiatives including the launch of **Rebuilding Exchange**, Chicago's first building material reuse center; leading the national dialogue on industry best practices and communicating the need for a coordinated national strategy and standardized curriculum for worker training; working to replicate the successful Rebuilding Exchange model in communities throughout the Great Lakes region and to scale the initiative to result in more regional impact. Delta continues to educate architects, contractors, developers, homeowners, the general public and other audiences about the benefits, opportunities, and best practices of deconstruction, building awareness of possible new uses for reclaimed materials and creating demand for workers trained in deconstruction.

Strategy #9: Promote Foreclosure Deconstruction Instead of Demolition

Deconstruction of foreclosed properties is a sustainable alternative to traditional demolition, resulting in myriad benefits. Large property portfolio holders such as lenders and land banks can be advocates of deconstruction and with large volumes of properties, can also achieve economies of scale with managing costs for building removals.

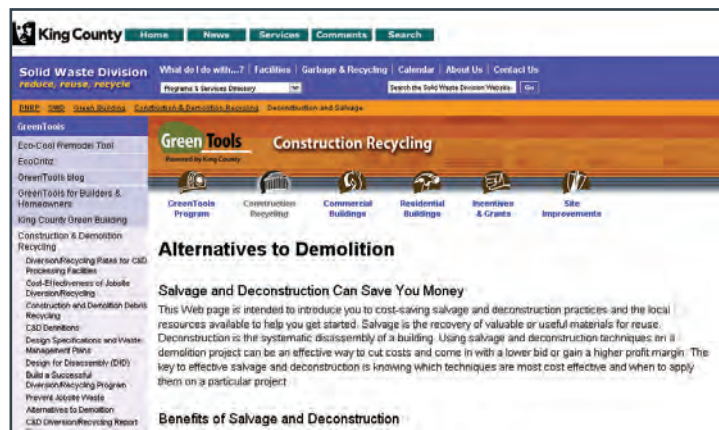


Lead Safety Strategy

The Rebuilding Center in Portland, OR, directs customers to existing resources on lead safety and advises customers on how to deal with materials that may contain lead. To alert customers of materials that may contain lead, the Center labels items with bright yellow stickers and provides links to lead information resources, such as the U.S. EPA's website and question hotline.

Figure 5: King County, WA, Screenshot

Source: your.kingcounty.gov/solidwaste/greenbuilding/deconstruction-salvage.asp



King County, WA, is an example of a local government that is effectively educating the public about deconstruction. Its Solid Waste Division provides web-based information on deconstruction as an alternative to demolition.

PART III: PRACTITIONERS GUIDE FOR ECONOMIC DEVELOPMENT PROFESSIONALS

Economic developers can help develop the building material reuse industry to create new value from the waste stream, foster new enterprises, create jobs and reuse older industrial buildings. Not only can they support and advocate for the policy changes described above, but they should analyze the local market potential, build supply and demand, identify potential locations, bridge the economic development and workforce development worlds and assess potential spin-off business opportunities.⁴

Analyze Local Market Potential

In order to develop a strong, local building material reuse industry, it is important to understand market trends related to the existing materials reuse industry as well as the broader home improvement market.

Approximately 80% of the supply of reclaimed building materials sold by Rebuilding Exchange comes from home renovations and 20% comes from full deconstruction projects. While some of the demand for used building materials comes from homeowners, most of the demand comes from craftsmen, contractors, architects, and designers involved in residential and small business renovations.

Overall Market Trends

Economic development professionals and entrepreneurs should examine broader property, market and economic trends in their community and region, to assess the viability of a local deconstruction industry. According to the National Homebuilders Association, renovation is a \$300 billion industry in the United States. The average cost per project is \$3,000 in the United States and \$11,000–15,000 in Canada. Between 2007 and 2010, the housing crisis and related economic downturn devastated the market for new homes, while also limiting the ability of consumers to invest in home improvement. However, home improvement activity is beginning to trend upward, including building projects, repair, remodeling, and renovation to housing structures and gardens, and outdoor structures (see sidebar/text box). This bodes well for both the supply and demand for building materials dealers such as Rebuilding Exchange.

The Home Improvement Research Institute has conducted a five-year forecast for the home improvement market. They are projecting growth of home improvement product sales to average 3.7% over 2012-2013. As employment

⁴ Delta Institute has played the role of economic developer in the Chicago area and this section uses this experience to provide examples and ideas for economic development practitioners in other locations.

A January 2012 report from the Home Improvement Research Institute found that:

- 2007-2009[2]: The home improvement market shrunk from by 15.5%
- 2010: Since the low of 2009, the market rebounded by 5% over two years (2010 (2.3%) and 2010 (2.8%))
- 2010 – 2011: Beginning in October 2010 the market was up by 4%
- 2011: The month of December was up 6.1% from previous year.
- 2012: The outlook is cautiously optimistic with signs of an improving economy increasing consumer confidence to plan and finance home improvement.

The study further projects that the decline in project planning since 2008 has stabilized and is beginning to trend upward creating opportunities for growth in home improvement projects.

- Consumer pessimism on home sales is pushing interest and growth in the home improvement market.
- Improvement in the economy may unleash pent-up demand for projects that were deferred over past few years.

growth accelerates and housing markets improve in 2014, they predict stronger growth averaging 5.8% in 2014-2015 (see Table 3).

Table 3: Home Improvement Market Growth Rates

	2011	2012	2013	2014	2015	2016
Billion Dollars	266.9	277.4	286.8	303.0	321.0	336.8
% Change	2.8	4.0	3.4	5.7	5.9	4.9

This projected growth in the home improvement market should be good for both the supply of and demand for used building materials.

Building Demand

Building awareness of how reclaimed materials can be used, and developing skills to do this, is central to building demand. Rebuilding Exchange has developed an extensive program of workshops and education to build demand for used building materials. Based on the success of the current workshops programs, and the clear mission and revenue fit of this initiative, Rebuilding Exchange plans to increase investment in this program, ultimately devoting more and improved space conditions to these activities (see sidebar).

Design competitions conducted in partnership with other organizations, such as the American Institute of Architects, which represent important segments of Rebuilding Exchange's customer base have also helped build demand and develop new markets for slower moving materials.

The media has also been an important component of Rebuilding Exchange's demand building strategy. Television newscasts, radio shows and print media have all increased public awareness of Rebuilding Exchange and its work and has led to new customers and sales.

Building Supply

Economic development professionals should examine the likely type, source and quality of materials in their location available for reuse. First, it is important to understand how much material is expected to come from demolitions and how much from renovations. Renovations produce an average of only 23 lbs/sq foot of reusable waste material in comparison with 111 lbs/sq foot for full deconstructions (EPA). Nonetheless, the far larger volume of renovations versus full deconstructions has made renovations the major source of supply (80%) for Rebuilding Exchange.

When analyzing supply, it is important to ask questions that will help shed some light on how much reclaimed building material your community produces overall and how much comes from demolition versus renovation, since these products are sourced differently.

Workshops and educational forums have been a very successful way to reach individual do-it-yourselfers by teaching them how to reuse the materials available at Rebuilding Exchange. Rebuilding Exchange offers over 100 hands-on workshops a year. These workshops support Rebuilding Exchange's triple bottom line mission, by providing educational opportunities, creating demand for our materials, driving revenue, and acting as a strong marketing initiative. Rebuilding Exchange provides a unique environment for alternative learning. It is also interesting to note that workshops registration has demonstrated a particularly popularity with people between the ages of 25 and 40.

- How much demolition and renovation are occurring in your community. Are these numbers increasing or decreasing?
- Are demolition contractors capable and or interested in doing deconstruction instead of demolition? How many homes do they deconstruct each year under the current conditions? Where do they sell these materials?
- Are remodeling contractors capable or interested in doing deconstruction instead of demolition? How much reusable material do they currently produce from their remodeling work? Where do they sell these materials?

It is also important to understand the potential pipeline of supply available in your community.

Identifying Potential Locations

Another potential economic development benefit of reclaimed building material sales outlets for local economic development is that they often reuse older vacant industrial facilities that are obsolete for many current industrial uses. These sales outlets require between 10,000 and 65,000 square feet in buildings that have at least one loading dock, 12-14 foot ceilings and room to maneuver lumber and other large product between building columns. Most of these sales outlets rent buildings that are zoned and priced for industrial use in order to address both the logistical and the economic constraints of the business. Finding an appropriately zoned building can be a challenge because of the combined warehousing and retail nature of the business.

Reclaimed building materials sales outlets also need to be located on busy streets with good visibility near their target markets. An analysis of the composition of this customer base conducted by a team from the University of Illinois at Chicago (UIC) in Fall, 2009 confirms that location does in fact facilitate or hinder sales growth for Rebuilding Exchange. This market analysis can be found here: <http://www.delta-institute.org/sites/default/files/2-DeltaUICMaterialReuseAnalysis.pdf>.

Bridging the Economic Development and Workforce Development Worlds

In many communities the economic development and workforce development worlds work separately in their development of policy, as well as on-the-ground strategies. However, the deconstruction and reclaimed building material industry has the potential to foster overlapping interests between them. Workforce development grants can provide an important source of training funds that build the foundation for new businesses emerging in the industry while at the same time provide solid training opportunities for people

with barriers to employment. A retail warehouse store the size of Chicago's Rebuilding Exchange employs 14FTE and supports 20 additional jobs in the deconstruction industry.

Assessing Spin-off Business Opportunities

In addition to retail sales outlets, as noted above, deconstruction contractors are a critical component of the industry and provide a significant number of the job opportunities. There are also other spin-off value-added business opportunities that can be developed as the deconstruction and reuse industry grows, such as furniture fabrication with reclaimed building materials.

Since late 2010, Rebuilding Exchange has been incrementally building a new product line of furniture, RX Made, which is fabricated with its own inventory and produced, in part, by participants in the job training program.

In addition to RX Made, Rebuilding Exchange is experimenting with consignment sales, workshops, subleases with compatible businesses, and event space rentals as business development opportunities. Rebuilding Exchange supports many craftsmen and artisans who use its plentiful, affordable materials to build furniture, picture frames, art and many other products. It also provides unique value-added materials for many service businesses such as architects, designers, remodeling and construction companies.

1. Joint Center for Housing Studies of Harvard University
2. Source: Home Improvement Research Institute (HIRI), January 2012
3. Woodstock Institute

PART IV: PRACTITIONERS GUIDE FOR WORKFORCE DEVELOPMENT PROFESSIONALS

A complete deconstruction workforce will allow the industry to flourish. Those organizations seeking to create economic opportunities and green jobs out of the C&D waste stream should understand the job opportunities in deconstruction, identify the training needs and sources, and understand the conditions needed to grow the deconstruction workforce.



A trainee at work at Rebuilding Exchange in Chicago. (Photo courtesy of Rebuilding Exchange.)

What are the Job Opportunities?

The deconstruction workforce includes a variety of skilled and unskilled labor, craftsmen and professionals. Thousands of individuals are working in the field, and that number is expected to grow, as disposal costs rise, the demand for reclaimed materials grows and the costs for deconstruction decreases. Primary job categories include:

- **Interns or Apprentices:** These are unskilled individuals, typically engaged in training programs.
- **Deconstruction Workers:** These are laborers who do the hands-on work of dismantling structures and handling materials for recycling or reuse.
- **Deconstruction Supervisors:** These are skilled laborers or contractors, who interface with customers and oversee deconstruction, recycling and disposal operations.
- **Reused Building Materials Retailers:** These are professionals who manage building reuse operations, often warehouses or retail facilities and lead market development initiatives to grow demand for reclaimed building materials.
- **Reused Building Materials Retail Associates:** These are professionals, laborers and administrative staff who work in building reuse operations, often warehouses or retail facilities. Activities include warehousing, customer service and sales.
- **Transportation and logistics:** These are professional who schedule and plan the transport of reclaimed building materials between deconstruction project sites and retail outlets.
- **Skilled Craftsmen:** Deconstruction is also creating opportunities for artists and skilled craftsmen who create value-added products, such as furniture, from reclaimed building materials.



Training Resource

Baltimore's Second Chance Training and Workforce Development Program provides classroom instruction and hands-on training for previously incarcerated or unemployed people through partnerships with organizations such as Jericho, Jumpstart, and the Mayor's Office of Unemployment. Following training, students are assisted with job placement and sometimes become employees at Second Chance.

What are the Training Sources and Needs?

Training Sources: A variety of stakeholders are involved in developing the deconstruction workforce. In fact, because of the specialized nature of the work, most reuse organizations provide some type of training programs, sometimes in partnership with local government, workforce groups, colleges and/or youth development organizations. A few prominent examples include:

- The national industry association, Building Materials Reuse Association (BMRA) offers the country's first standardized deconstruction curriculum for the community college market.
- Independent deconstruction businesses, such as The ReUse People of America (TRP) and RE-USE Consulting, provide training programs for contractors and laborers.
- YouthBuild U.S.A., a national non-profit that gives academic and career opportunities to low-income youth through community development, has been exploring opportunities to train high school students in the deconstruction industry through chapters in Illinois and Vermont.
- Non-profits, such as WasteCap Resource Solutions, provide training and education programs to a wide range of contractors and green building professionals on more sustainable management of construction and demolition materials on the construction and demolition sites.
- The non-profit Rebuilding Exchange, in partnership with The ReUse People of America, trains individuals with employment barriers in deconstruction, retail services and value-added furniture creation and works with banks to ensure foreclosed properties are sustainably deconstructed (see Box/sidebar above, p.16).

Conditions Needed to Grow the Workforce

In the near term, federal stimulus funding to local governments is channeling millions of dollars into deconstruction and material recovery through job training, energy efficiency and housing rehabilitation grant programs, such as:

- Department of Labor Youth Build program grants;
- Department of Housing and Urban Development Community Development Block Grants;
- Department of Housing and Urban Development Neighborhood Stabilization and Sustainable Communities grants; and
- Department of Energy's Energy Efficiency and Conservation Block Grants, which may also be used to plan for material conservation as an energy-saving strategy.

Additionally, community foundations that focus on workforce development are also beginning to fund deconstruction training, although most will only fund these initiatives for a limited time.

Clarify the occupational category so the labor market can operate effectively

Ultimately, advocates expect the market to pick up where government leaves off. However, the lack of a clear occupational category for deconstruction industry jobs in the Bureau of Labor Statistics, creates a range of challenges for the growth of the industry. From identifying appropriate wage rates to obtaining affordable insurance coverage, this lack of standard identification has presented numerous problems when launching training programs and starting deconstruction businesses, for example.

These issues can be addressed by recognizing “deconstruction” as a new occupation, with clear demarcation from demolition, at the federal level. Once this new category exists, a standardized national training curriculum can also be created, which would allow for a “deconstruction apprentice” or intern category of training. The federal Department of Labor’s approval process takes time, however, and more work is needed to establish labor standards and wage classifications for deconstruction workers on a state by state basis in the meantime.

PART V: PRACTITIONERS GUIDE FOR CONTRACTORS

What is the Business Opportunity?

In this time of slow housing starts and limited construction activity, deconstruction is attracting construction and remodeling industry professionals seeking to diversify their businesses and take advantage of growth in the material recovery sector. Contractors in particular are finding that deconstruction can benefit the bottom line by helping them:



Deconstruction underway.
(Photo courtesy of
Rebuilding Exchange.)

- Save money by reducing waste disposal costs and reusing materials;
- Earn revenue from sale of valuable materials;
- Take tax deductions for donation of materials they own;
- Help clients earn LEED® green building credits;
- Reduce noise and air quality impacts on neighbors, helping improve receptivity to larger-scale projects that might attract local opposition; and
- Enhance the contractor's or developer's image and position them as an environmentally conscious business.

Potential Tax Benefits of Donating Used Building Materials: The ReUse People of America estimate that the cost to demolish a single-story 2,200-square-foot house is roughly \$10,000. However, it is not unusual for a homeowner to offset the higher cost of deconstruction (which can cost more than twice as much) through tax deductions from donation of building materials. Documentation by a third-party appraiser is required for donations of more than \$5,000. Despite this additional step, tax deductions have been an important benefit in residential deconstruction.

Getting Started in Deconstruction

Consultants and non-profit organizations that specialize in deconstruction (such as RE-USE Consulting or The ReUse People of America) can help plan, value, execute, document and publicize the results of recycling and salvaging material from a construction site. If you don't want to use a consultant for part or all of a job, here are a few key steps for getting started and succeeding:

Identify Training Requirements: Even experienced demolition contractors may need training in how many deconstruction workers are needed to deconstruct a single-family home, how to work as efficiently as possible to get the job done as quickly as possible, and how to carefully handle materials and package them for donation or reuse applications. Depending on the size of the home, deconstruction may take an experienced crew of 5-6 workers a week to fully remove materials. In expedited cases, and in the case of hybrid deconstruction, fewer workers might spend a day or two to salvage some materials prior to demolition. In some cases, the charitable deduction for donation of materials is essential to offset higher labor costs, and the value of the deduction depends on the condition of the materials that are donated.



Trainees remove a sink during a deconstruction course taught by Delta Institute and RE-USE Consulting, Inc. (Photo by Delta Institute.)

Collect and Apply Procedures and Processes: Commonly used procedures for deconstruction to preserve materials for resale and protect against personal injury include:

- Using a simple “tracking form,” to identify salvageable items (building materials, fixtures, furniture, etc.), recyclables and disposable/waste materials. See Appendix G for a sample form and checklist.
- Checking for potential hazards, such as lead and asbestos exposure, uneven flooring, or overhead wire. In fact, conducting an engineering survey by trained personnel is required by OSHA [Deconstruction Institute, 2003].
- Using personal protection equipment, such as hard-hats, gloves, safety glasses, boots, masks (where required), etc. at all times. When using an integrated process of manual labor and mechanized demolition, extra care should be taken about separating work zones.
- Following the “LOFO” principle, i.e., “Last On if First Off” [Deconstruction Institute, 2003] to prevent injury during deconstruction.
- Cleaning up the site frequently to avoid the accumulation of potentially dangerous and dirty materials in the work area.

In 2001, the California EPA published a step-by-step deconstruction guide that is available online at www.calrecycle.ca.gov/publications/condemo/43301027.pdf Other guides and resources are listed in Appendix E.

Understand Permitting Requirements: Requirements depend on local jurisdictions and most require permits for demolition. Generally, there is no difference between the procedures required to obtain a permit for demolition

Deconstruction Beats Demolition

In Washington State, a building owner was faced with a choice: deconstruct or demolish.

Demolishing would have been easy and cheap — the owner's son-in-law was a demolition contractor willing to do free work, and the only expense would have been a \$2,500 tipping fee.

But, working with RE-USE Consulting, the owner decided to deconstruct. The process took longer, but, in the end, the owner actually *earned* \$500.

Here's what happened:

First, the paneling, flooring, metal roofing and other items were removed. The deconstruction fee was \$7,500.

Then, the reusable materials were appraised and donated to a non-profit used materials store. The 1,900-ft² home yielded a high volume of reusable materials worth \$23,500.

Finally, the owner met with his tax consultant to determine the refund from his donation within his tax bracket: \$8,000.

Conclusion? Even when demolition was offered for an unusually low price, deconstruction was the better deal. Deconstruction saved the owner \$3,000 — you can take that to the bank.

versus deconstruction. Some advocates are pushing to create an incentive for deconstruction by offering expedited permitting, but, in smaller cities and towns, that strategy may not offer any real advantage.

Identifying Reuse Opportunities: Demolition contractors are often willing to invest extra time and labor to carefully salvage building materials that have known market value, such as bricks. They may not be aware, however, of local markets for resale or donation of other materials, such as used lumber, plumbing fixtures, cabinets and ceiling tiles. Some opportunities may be specific to certain locations. A summary of the most common categories of used building materials can be found in Appendix C.

Value Materials: To determine the value of various items in your market, you can look for comparable items on Craigslist or in other classified directories. There are also consultants and brokers that provide this kind of information. If you are planning to donate a single material or group of materials in excess of \$5,000 in value, the IRS requires a certified appraisal. Two IRS publications are helpful in understanding Charitable Contributions [Publication 526 found at: www.irs.gov/pub/irs-pdf/p526.pdf] and Determining the Value of Donated Property [Publication 561 found at: www.irs.gov/pub/irs-pdf/p561.pdf]. Donations must also be made to an IRS recognized 501c3 charity that is qualified to accept used building materials [Publication 78 found at: www.irs.gov/app/pub-78/ and <http://www.irs.gov/Charities-&-Non-Profits/Exempt-Organizations-Select-Check>].

As with other types of donated personal property, the condition of the property at the time of the donation is closely related to the value of the material. Finding a contractor that is skilled at removing materials, preserving their value, and documenting the condition of the materials at the time of donation is important.

The IRS's Publication 561 explains that qualified appraisal is required for donations valued at more than \$5,000. Finding a qualified appraiser may be a challenge, however, given that there are few appraisers that have education or experience in valuing used building materials. The IRS excludes parties that are employed by the donor (e.g., the contractor who removes the materials) as qualified appraisers.

Recognized professional appraiser organizations, such as the Appraisal Institute and the American Society of Appraisers, do not as yet have training or certifications in valuing this category of personal property. Most personal property appraisers are primarily experts in valuing art, antiques or machinery. There is a need for appraiser organizations to help identify and train qualified appraisers of this type of personal property. The Building Materials Reuse Association has plans to support this effort.

Plan How to Manage Sold or Donated Materials: There are a variety of ways to manage the transfer of reclaimed material from deconstruction, including on-site sales, online sales or donation to a broker or resale center. The number of deconstruction consultants, building material reuse stores and non-profit organizations that can help resell or find markets for used materials is growing. In fact, most major cities have building material reuse retail sales outlets.



Used lumber available for resale. (Photo courtesy of Rebuilding Exchange.)

Marketing Deconstruction Services

The Market: Depending on where the contractor is in the building and construction supply chain, deconstruction services may be targeted to the following market segments:

- Individual homeowners;
- Residential developers/builders;
- Remodeling and rehab companies;
- Commercial developers; and
- City planning departments.

The “sales pitch” should include:

- For homeowners: Deconstruction provides potential tax benefits associated with donation, revenue from material resale and reduced waste management costs.
- For developers, general contractors and others in the building, remodeling and renovation industry: Deconstruction can reduce landfill disposal costs and provide an additional revenue source from high-value materials or a low-cost source of materials for other jobs.
- For cities and local governments: Deconstruction can help meet C&D waste diversion, recycling objectives and other sustainability goals, and reduce noise and dust impacts for deconstruction versus demolition. It also creates jobs and promotes local economic development opportunities. Finally, it preserves cultural and architectural assets.

Deconstruction is a new industry, and awareness of deconstruction and reuse as an alternative to demolition and disposal is limited in most locations to a relatively small niche. Educating a wider range of customers, whether homeowners or market intermediaries, about the concept and how it works, along with the financial and environmental benefits, is a critical component of a contractor’s marketing strategy.

Sample marketing materials that contractors can adapt for their use with homeowners and other prospects are included in Appendix G.

Overcoming Common Challenges

1. Time and Cost Barriers: Although deconstruction diverts materials from landfills and create jobs, in some cases, it can cost more and take longer than traditional machine-driven demolition, especially in cases involving newer, abandoned buildings where salvageable materials have already been stripped or damaged. Strategies for overcoming these barriers include:

- **Hybrid Deconstruction:** Hybrid deconstruction involves manual deconstruction followed by traditional machine-operated demolition techniques. This approach is preferable in situations where full deconstruction does not make economic sense. For example, if a building poses a public hazard and needs to be demolished immediately, the value of materials in a building does not warrant extra effort, or there is no other form of subsidized labor to cover the additional labor cost. Because hybrid deconstruction may only require an extra 1-2 days prior to demolition, it can save time and labor costs while recovering most valuable materials from a building prior to finishing the demolition job. According to Sonya Newenhouse, president of deconstruction consulting firm Madison Environmental Group, "Time is often a factor, but you'd be amazed at what we can accomplish in just a few days or a week."
- **Advanced Planning:** It helps to plan where to move the salvaged materials, recyclables and waste. On-site selling of potential "resale" materials can help lower costs by avoiding hauling. Establishing relationships with resale and recycling partners can save time and money [see sidebar]. In cases of hybrid deconstruction, it is helpful to separate small, light deconstructed materials from large, heavy ones [or structural and nonstructural items] and identify which organizations will remove which items; for example, Habitat ReUse stores generally do not haul large, heavy structural items.

2. Environmental Hazards: Some salvageable materials, such as lead-painted windows, also raise environmental concerns. Detailed information on how to handle materials in a safe manner, package material for resale and find markets for used materials is available from a variety of sources. Government agencies, such as the EPA, are also resources for information on handling materials that may be contaminated with asbestos or lead paint. A list of references and resources is found in Appendix E.

Online Tools

WasteCapDirect is an online directory of local C&D recyclers, haulers and end-markets in the Milwaukee-Madison region. Listings of resale opportunities are made available to deconstruction project managers to help plan for the efficient transportation of salvaged materials.

Source: www.wastecap.org/wastecap-direct/about-wastecapdirect/

PART VI: PRACTITIONERS GUIDE FOR RETAIL SALES ENTERPRISE

There is growing recognition in many older cities that C&D waste is the largest category of landfilled waste. This, together with new C&D recycling mandates, has contributed to the expansion in the number of resale stores for used building materials.

Stores exist in most major cities and some smaller ones. Habitat for Humanity operates Habitat ReStores in 48 states and several foreign countries. There are also local non-profit stores, such as Boston Restore, the Reuse Center stores in the Twin Cities, Rebuilding Exchange in Chicago, ReSOURCE in Burlington (Vermont), Second Chance in Baltimore, The Rebuilding Center in Portland, and Construction Junction in Pittsburgh, that provide similar services. Some non-profit organizations, such as WasteCap Resource Solutions in Milwaukee, or for-profit material brokers, such as Planet Reuse, also provide online tools to help identify markets for salvaged C&D materials. Additional examples of retail stores is provided in Appendix D.

What is the Business Opportunity?

Business appears to be booming for some reuse stores. Habitat for Humanity's Kansas City ReStore had sales of roughly \$1.7 million in 2007, an increase of more than 500% since it launched in 2001, with the added environmental benefits of diverting an estimated 2,600 tons of C&D waste from landfills in 2007. Smaller reuse stores, such as Chicago's Rebuilding Exchange, are also diverting impressive but lower volumes of material (roughly 7,000 tons of material since 2009). Since the capacity of different markets to support a particular size and type of reuse operation varies significantly from location to location, it is important to invest time to assess the market and choose the right model, location, suppliers and marketing strategy.

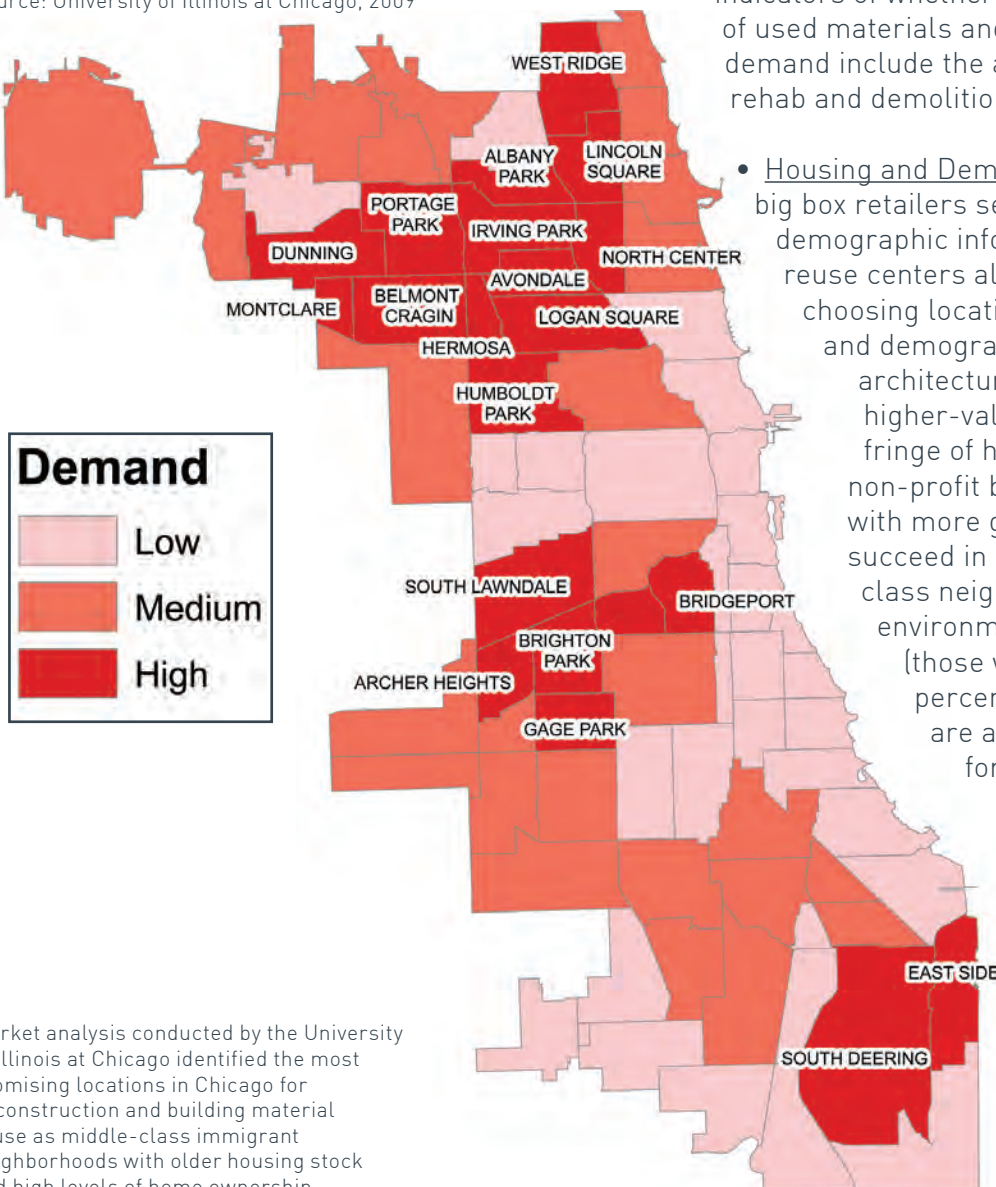
Getting Started

1. Assessing the Market:

- Favorable Market Conditions: Reuse centers tend to thrive in locations where there are policies, economic factors and a culture of support for C&D waste recycling. A strong green building movement, as evidenced by a large number of existing and pending LEED®-certified buildings and an above-average number of LEED® Accredited Professionals, is one key indicator. The EcoTrust building in Portland is an example of a prominent green building where recycling materials was a major goal of the renovation project. Other indicators of whether there is sufficient supply of used materials and strong enough customer demand include the age of the housing stock and rehab and demolition permit activity.

Figure 6: Chicago Community Areas with High Potential Demand for Used Building Materials

Source: University of Illinois at Chicago, 2009



Market analysis conducted by the University of Illinois at Chicago identified the most promising locations in Chicago for deconstruction and building material reuse as middle-class immigrant neighborhoods with older housing stock and high levels of home ownership.

- Housing and Demographic Profile: Just as big box retailers select locations based on demographic information, building material reuse centers also can benefit from choosing locations with the right housing and demographic profile. For-profit architectural salvage businesses with higher-value stock tend to locate on the fringe of higher-income areas, while non-profit building material reuse centers with more garden-variety inventory can succeed in middle-income and working class neighborhoods. Higher-income, environmentally aware communities (those with a relatively high percentage of Green Party voters) are also considered prime markets for building material donation.

2. Choosing a Model:

Choosing the right business model is another consideration for new store operators. There are different models, but the value and type of inventory is a major factor in making this choice.

- Retail Store Models: Used or salvaged building materials are most commonly sold in stores. Architectural salvage stores that deal in higher-value historic building components are much more likely to be for-profit businesses. Building material reuse stores that deal with more generic lower-value stock tend to be run by non-profit organizations. In addition to accepting deliveries or drop-offs of donated materials, many non-profit stores also provide pick-ups of materials and deconstruction services. Although there are additional costs to adding side businesses or services, having them can drive more sales.
- Consulting Services Model: For-profit consultants or non-profit waste organizations work with building owners or developers to manage on-site salvage services and identify buyers for materials that are not sold through open houses or auctions.
- Online Material Brokers Model: Architects looking to source reused or recycled materials may turn to material brokers, such as PlanetReuse.

Most retailers, brokers or consultants concentrate in one of these areas, but some play multiple roles in the value chain, managing retail stores as well providing salvage or deconstruction services.

3. Choosing a Retail Store Location: Even though most resale stores sell to the public, few are found in traditional retail locations. Stores across the country range in size from 10,000 square feet for some Habitat ReStores to 64,000 square feet for the Rebuilding Center in Portland, OR. Most are also run by non-profit organizations selling stock at heavily discounted prices and lack the capital or cash flow to secure space in prime retail locations. Unlike national chains with just-in-time inventory control systems, independent retail stores also need some additional warehouse space where they can store and prepare stock for sale. This may involve cleaning used appliances or cabinets or removing nails from lumber or plywood. Co-locating with other discount stores in a semi-retail/industrial center can be the best approach if affordable space is available. Leasing existing industrial space on the fringe of commercial districts is another common strategy for this type of use and budget, rather than a more traditional retail location.

4. Lining Up Suppliers: Some reuse centers manage deconstruction services that supply them with their own source of materials, but most reuse stores have relationships with contractors that supply used materials. Having your own deconstruction service gives you more control over your supply, but involves additional labor and equipment and associated expenses. National organizations, such as Habitat for Humanity, also have relationships with national retailers, such as Home Depot and Pella windows, that donate new overstock inventory.

Delta Institute solicited the help of a deconstruction expert, The ReUse People of America (TRP) to launch Rebuilding Exchange in Chicago in 2009. TRP is a non-profit organization that deconstructs residential and commercial buildings, provides deconstruction training programs and has become Rebuilding Exchange's major source of building materials.

Table 4: Sales Revenue Per Square Foot

Reuse Store	Store Size (ft ²)	Estimated Annual Sales	Year	Sales/ft ²	Biggest Sellers
Habitat Re-store (Kansas City)	35,000	\$1.6 million	2007	\$45.71	Appliances, cabinets, furniture, plumbing fixtures*
Habitat Re-store (Chicago South Suburbs)	10,000	\$450,000	2008 & 2009	\$45.00	Cabinets, appliances, furniture
ReBuilding Exchange (Chicago)	15,000	\$160,000	2009	\$10.67	Lumber, cabinets, fixtures

*These items were featured on the KC ReStore website as "What's New" and are not necessarily the biggest sellers. Habitat's pickup trucks also advertise "gently used lumber" and thank corporate donors for a range of other building materials including windows & doors, paint, flooring, tile, roofing, and hardware.



Used doors and chairs available for resale in Chicago. (Photo courtesy of Rebuilding Exchange.)

5. Managing Your Stock: Salvage centers have traditionally been "mom-and-pop," low-tech businesses that serve a niche audience of bargain hunters. State-of-the-art technologies can help change this paradigm by helping them manage the storage, inventory and sale of salvaged materials.

Many building projects require specific materials and precise amounts of high-quality materials. To compete with new material stores, reuse centers are developing their own lumber grading systems, equipping their warehouses with standardization machinery for lumber, using advanced inventory software and advertising special stock online.

For example, building inspectors may require lumber for structural elements to meet certain quality standards. The Rebuilding Center in Portland offers a lumber grading service to grade and stamp lumber that meets specific quality standards.

Inventory systems are less common in retail sales outlets, but are beginning to emerge. PlanetReuse's Invenquery system, and retail sales outlets such as Second Use in Seattle and Build It Green NYC, are leading the way in the online sales of reclaimed building materials.

6. Staffing Your Store: Successful retailers or brokers will have staff who understand construction materials and building trades and can help customers navigate projects. As with any other retail business, customer service is important. Volunteers and trainees can also help keep prices low, but need supervision and are not always reliable. The number of staff and volunteers needed depends on the size of the store and the range of services, such as pick-up service or workshops. Training in inventory systems and warehousing are also valuable skills in dealing with a wide range of varied stock.

7. Marketing Your Building Materials:

- Understanding the Customer: Cost-conscious contractors, remodelers and community-based groups looking for bargains, green building professionals, architects, millworkers, artisans and craftsmen are key customers for architectural salvage and building material reuse stores.
- Communicating the Value Proposition: Many people go into deconstruction and reuse for environmental reasons, but that isn't always the reason people shop at reuse centers or purchase salvaged material. Market research indicates that only about 17% of the U.S. population places a premium on greener options; so a purely environmental message is likely to miss the mark more than 80% of the time. Most market segments are receptive to eco-friendly products and practices if they are shown to provide a cost-saving benefit, especially in the current economic climate. It is important to clearly communicate benefits, such as affordability, aesthetics, quality and nostalgia when marketing reclaimed building material.
- Targeting the Right Geography: Most reuse centers draw from the immediate trade area, but the actual radius can vary depending on the physical and demographic features of the community. Some segments, such as artisans or craftsmen, may be willing to travel further to obtain specialized materials. Thus, it is important to target the immediate geographic area with traditional marketing (posters, flyers, local advertising, etc.), translated as needed, as well as to use mass media, online marketing and educational outreach to address non-local audiences.
- Promoting Education & Awareness: The concept of reusing building materials is a relatively new one, so there are awareness, education and perceptual barriers to overcome. For instance, even within the green building community, many people may not know that LEED® points are available for incorporating used materials. In Chicago, reuse proponents have targeted architects and developers with educational programs to increase their awareness of this fact. Despite the cultural shift away from consumption and toward reuse, it could take a generation for this trend to work its way into the mainstream and requires ongoing effort to bring to fruition.

Overcoming Common Challenges

1. Environmental Hazards: Valuable salvaged materials from older buildings may contain chemicals or lead. This is especially true for painted or treated wood from buildings that pre-date the 1978 ban on lead-based paint. Rather than rejecting all potentially suspect materials, most reuse stores instead are careful to inspect painted wood for flaking, peeling, or cracking, and to inform customers about existing lead-management resources.

Reuse retailers cannot play the role of educational resource regarding lead issues because of potential liability. Instead, they encourage customers to educate themselves about lead, especially given the amount of information already published by the EPA.

Attention: This item may contain lead.

To learn more about lead hazards & safety,
call the lead hotline at 1-800-424-5323
or visit www.epa.gov/lead.

At the Rebuilding Center in Portland, OR, items that may contain lead-based paint are adorned with these bright yellow stickers. (Image courtesy of the Rebuilding Center.)

2. Long-Term Financial Viability: The ReUse People estimates that the normal time needed to achieve financial viability is three years, a common time frame for most start-up businesses. Mission-driven social ventures are likely to need additional time and some ongoing subsidies in the form of grants, donations or volunteer labor to maintain their operation. Some also attempt to close the gap by diversifying their product mix to include training and value-added products. It is the hope of industry leaders that as deconstruction and reuse expands and demand grows, the ability to sustain a reuse operation on earned income alone will become the norm.

APPENDIX A: LOCAL ORDINANCES & LAND BANKS

Outside the Great Lakes

Concord, CA — C&D Materials Recycling Ordinance: The City of Concord adopted a local C&D Materials Recycling Ordinance in July 2007. The ordinance requires that at least 50% of the waste materials generated by a construction or demolition project be diverted from the landfill through waste management options, such as reuse or recycling.

The Ordinance also requires that at least 75% of all inert debris generated by a construction or demolition project be diverted from the landfill. Inert debris includes concrete, asphalt, brick and similar masonry products.

All projects requiring a demolition, building, encroachment or grading permit must comply with the C&D Ordinance if the project is either:

- A residential or commercial project where total costs are valued at \$50,000 or greater;
- A residential or commercial demolition project regardless of permit value;
- A city-owned or -sponsored project where total costs are valued at \$150,000 or greater;
- A residential or commercial roofing or re-roofing project valued at \$10,000 or greater; or
- A residential or commercial project where 50% or more of the roof area is replaced or requires five or more squares of roofing material regardless of permit value.

San Jose, CA — Construction Demolition Debris Deposit (CDDD) Program:

The CDDD program is an incentive to encourage the minimization and recovery of debris generated from C&D projects. When a contractor or remodeler submits an application for a project permit, the city assesses a deposit fee for C&D debris that will be generated based on the type and square footage of the project. The deposit fee is collected during the issuance of the permit and is fully refundable with proper documentation of the diversion of C&D debris from burial in the landfill (Environmental Services, City of San Jose, 2011).

Boulder, CO — Green Building and Green Points Program: The Green Building and Green Points program of Boulder, CO, was adopted by the City Council in November 2007 (ordinance 7565) and went into effect in February 2008 in order to extend the lifecycle of materials, reduce waste and overall resource use, reduce energy use and limit pollution from transportation of

construction materials (City of Boulder, 2009). The program emphasizes the preservation of existing building structures and requires that any person applying for a permit to develop a new building or remodel a dwelling to recycle at least 50% of the construction waste generated by the project. Moreover, if in a project “more than 50% demolition of exterior walls is proposed, then at least 65% of material by weight from such deconstruction of the existing structure should be diverted from landfill” (City of Boulder, 2009).

Orange County, NC — Regulated Recyclable Materials Ordinance: The Regulated Recyclable Materials Ordinance (effective since October 1, 2002) was developed in response to the county’s imminent landfill crisis. The ordinance requires contractors and homeowners to recycle certain C&D materials, including corrugated cardboard, clean wood (that has not been treated or painted) and scrap metal. A double tipping fee will be charged for loads going to the landfill that contain the above-mentioned materials. It also requires C&D projects to have a waste management plan in place and to have licensed waste haulers. Individuals conducting building activities without the appropriate “Recyclable Material Permit “will be issued a “civil citation.”

King County, WA — Green Building and Sustainable Development

Ordinance: The King County (WA) Green Building and Sustainable Development Ordinance, which went into effect in July 2008, applies to all King County-owned and-financed projects, including projects using alternative financing. The specifications for green development are as follows:

- All eligible new construction and major remodel and renovation projects are required to achieve the LEED® Gold certification.
- All capital projects that are not eligible or are limited in their ability to achieve LEED® certification (e.g., infrastructure projects) must incorporate cost-effective green building and sustainable development practices using a county-developed “scorecard” or checklist.
- The county-wide Green Building Team is directed to develop guidelines for using green practices in operating and remodeling existing buildings.
- The ordinance also clarifies the roles and responsibilities of the Green Building Team, requires project managers to be trained in green building practices and specifies reporting requirements to improve the information compiled on county-wide green practices.

In the Great Lakes Region

Chicago, IL — C&D Debris Recycling Ordinance: The C&D Debris Recycling Ordinance came into effect in March 2006 with the aim to divert C&D debris from the waste stream by promoting considerable debris recycling. Initially, the recycling target for C&D waste was 25%, which was increased to 50% in January 2007 (excluding wastes containing lead, asbestos or other hazardous material). The ordinance applies to “construction of new residential buildings with four or more units, non-residential buildings that are more than 4,000 square feet, any rehabilitation of a building that will require a certificate of occupancy from the department of buildings, demolition of a residential building with four or more units that includes the demolition of at least one outside wall, demolition of a non-residential building more than 4,000 square feet.”

Evanston, IL — Green Building Ordinance: The Evanston Green Building Ordinance was passed in October 2009 and became effective in January 2010. The ordinance requires buildings to meet the LEED® Silver standard and applies to: new construction and additions of 10,000 square feet or greater; city-owned or city-financed buildings; and all commercial and multi-family buildings.

Madison, WI — Construction Recycling Ordinance: Madison’s Construction and Recycling Ordinance took effect in January 2010. The goal of the ordinance is to save resources by curbing the amount of waste going to landfill. The ordinance applies to new construction, remodeling projects that costs more than \$20,000, and all roofing projects where old shingles are removed. The ordinance also specifies which materials must be recycled from various projects and sets a goal of 70% recycling of all debris from concrete and steel construction projects. In all cases, recyclers will be inspected and certified by the city (City of Madison, 2010).

Cook County, IL — Cook County’s ordinance requires the recycling and reuse of building waste from residential and commercial projects in suburban Cook County. Specifically, 5% by weight reuse will be required of residential buildings less than 4 units and demolition contractors will be required to recycle 70% by weight of debris for all demolition projects. This waste diversion ordinance, depending on the reuse diversion requirement, represents a potential sea change in the available supply of building materials for reuse. It is the single most significant development in the marketplace in the Chicagoland region and could dramatically shift the marketplace for deconstruction and building material reuse.

Gary, IN — The City of Gary, Indiana is planning to pass a C&D debris recycling ordinance in 2013, with a requirement of 25% recycling of inert solids including asphalt and brick, and 50% of traditional construction and

demolition materials. To support the roll-out of the ordinance, they are also developing a framework and strategy for deconstruction and building materials reuse, including business planning for the reuse and recycling of various waste streams.

Land Banks

Atlanta, GA — Fulton County Land Bank: The Atlanta Land Bank was created in 1991 in conjunction with Fulton County. Since inception, the land bank has played a crucial role in the development and redevelopment efforts of the City of Atlanta and Fulton County, community development corporations, and non-profit and for-profit developers of the region. A primary focus of the land bank remains the creation of affordable housing, new local industries and jobs for local residents (LBA, Atlanta, 2009).

Genesee County, MI — Genesee County Land Bank: Land banks have emerged as significant drivers aiding redevelopment and renovation efforts in various communities. In 2001, with a \$270,000 grant from the Mott Foundation, a local team of Genesee County representatives from both the public and private sectors started working with several national organizations, including the Brookings Institution, Local Initiatives Support Corporation, Urban Land Institute, Emory University School of Law, and University of Michigan's Taubman College of Architecture and Urban Planning, to research and design an "intergovernmental, policy-based land reutilization plan." In 2002, Michigan's first land bank was created.

On creation, the bank received \$331,559 in fee revenue from delinquent taxes from the Genesee County Board of Commissioners to support the land bank program for the 2002-2003 fiscal years. The Genesee County Land Bank provides services that include demolition, foreclosure prevention, rental management, housing renovation, property maintenance and a side lot program, through which empty lots are sold to adjacent homeowners. The land bank holds title to slightly more than 2,600 properties and has sold more than 1,000 properties since 2003 (Mott Foundation, 2006).

APPENDIX B: NATIONAL AND REGIONAL FUNDING FOR DECONSTRUCTION

Affordable Green Neighborhoods Grant Program: The U.S. Green Building Council (USGBC), with support from Bank of America Foundation, offers grants that provide funding and educational resources to affordable housing developers committed to green construction and related public agencies that choose to pursue LEED® 2009 for Neighborhood Development certification.

In November 2010, the U.S. Green Building Council and Bank of America announced the ten recipients of the Affordable Green Neighborhoods Grant Program. Funded by a \$500,000 grant from the Bank of America Charitable Foundation, the program awards financial and educational resources to help neighborhood projects with affordable green housing (USGBC, 2010). A review committee of industry leaders awarded a select group of projects with an Affordable Green Neighborhoods grant. Each award included a cash award of approximately \$25,000, which may be used to pursue LEED®-ND certification and cover other related expenses (USGBC, 2010).

Cleveland Vacant Property Initiative Loan Program for Vacant Property:

The Vacant Property Initiative Loan program is designed to help owners and buyers of “vacant or little used commercial property” with the loan process or demolition, renovation or other construction and hazardous materials abatement needs. To be eligible for the loans, “buildings must be at least 20 years old and 40% vacant for at least 2 years” (City of Cleveland, 2010). Big-Box facility or retail mall developments are not eligible. The city approved loans totaling more than \$21 million for 25 projects in 2008 and 2009 through its Vacant Property Initiative. Individual loan amounts have typically ranged from \$83,750 to \$1.25 million, and forgivable loans have typically ranged up to \$70,000 for projects with a budget of less than \$2 million (City of Cleveland, 2010).

Federal Neighborhood Stabilization Program (NSP): The Neighborhood Stabilization Program (NSP) was established by the U.S. Department of Housing and Urban Development (HUD) to help communities that have suffered from foreclosures and abandonment to rebuild or redevelop. According to HUD, NSP funds may be used for activities that include, but are not limited to, the purchase and rehabilitation/redevelopment of abandoned or foreclosed homes and properties, demolition of blighted structures and establishment of land banks (Department of Housing and Urban Development, 2010).

In January 2010, \$1.93 billion in NSP grants was awarded by HUD to 56 grantees nationwide, including 33 consortium at a regional level and four

national consortium carrying out activities in target areas throughout the country. The grant recipients were selected on the basis of foreclosure needs in their selected target areas, recent past experience, program design and compliance with NSP rules (Department of Housing and Urban Development, 2010)

HUD Hope VI Program: The HOPE VI program encourages creativity and the exploration of new ideas by public housing authorities (PHAs) and, potentially, may provide a unique opportunity to pursue deconstruction. Since 1993, the program has disbursed considerable funds among local authorities every year for the demolition, construction or rehabilitation of public housing (Leroux and Seldman, 1999).

The HUD grant for demolition was primarily available between FY 1996 and FY 2003, during which HUD awarded about \$395 million for the demolition of more than 57,000 severely distressed public housing units (U.S. Department of Housing and Urban Development, 2007). More recently, in FY 2009, HOPE VI “Revitalization Grant” awarded a total of \$113.6 million to six housing authorities across the nation for rehabilitation of severely distressed housing (U.S. Department of Housing and Urban Development, 2010).

U.S. Department of Labor Pathways Out of Poverty Grants: In January 2010, the U.S. Department of Labor announced \$150 million in “Pathways Out of Poverty” grants, as authorized by the American Recovery and Reinvestment Act of 2009 (ARRA). Grants are targeted toward supporting programs that will help workers in disadvantaged communities prepare for green jobs through job training that will help them secure employment in the growing green economy. Grant recipients can be classified broadly into two categories: (1) national non-profit entities with networks of local affiliates, coalition members or other established partners; and (2) local entities, including non-profit organizations, such as community- and faith-based organizations, the public workforce investment system, the education and training community, labor organizations, and employer- and industry-related organizations (DOL, 2010). The City of Chicago is an example of a grant recipient that is using a part of the award to train workers for deconstruction activities.

APPENDIX C: REUSABLE MATERIALS CHART

The following items are examples of materials that are often desired by others and generally available for reuse. Disposal options, health concerns, and considerations for buying new are also indicated.

Item	What to Reuse	What to Recycle	What to Dispose	Environmental & Health Concerns
Wood (lumber, flooring, etc.)	Timbers; large dimension lumber; plywood; flooring; molding; lumber longer than 6 feet	Unpainted and untreated wood unfit for reuse	Painted, pressure-treated and rotting wood	Lead paint; structural integrity
Windows	Windows in good condition (for single panes, consider adding storm windows)	Metal frames and screens; unpainted and untreated wood	Glass; unusable painted items; wood in disrepair	Lead paint; asbestos in older window glazing compound; energy inefficiency
Cabinets	Cabinets; hardware (hinges and knobs)	Hardware; unpainted and unfinished wood	Painted or finished wood	Lead paint; formaldehyde in particleboard or interior-grade plywood
Plumbing products	Sinks; tubs; faucets	Metal pipe; toilets; inefficient plumbing fixtures; faucets with lead content	PVC and other plastic pipe; toilet seats (not accepted at recycling stations)	Drinking water: lead content in faucets, solder, and old galvanized pipe
Plaster and gypsum wallboard	Wallboard in good condition (to repair cracks or "skim coat")	Clean wood lath; unpainted wallboard	Painted plaster or wallboard	Nuisance dust; lead paint on walls; possible asbestos in older wallboard
Electrical products	Electrical products in good working order	Metals (fixtures, conduit)	Ceramic and plastic parts	Frayed wires; possible asbestos insulation
Landscape materials	Timbers; stone; concrete	Untreated, unpainted wood	Rotting, treated, and painted wood	Treated wood may contain arsenic, etc.
Non-wood flooring (tile, carpet, etc.)	Clean carpet in good condition	Large quantities of ceramic tile	Vinyl; stained carpet; broken tile	Asbestos content in 9-inch tiles or sheet vinyl flooring; lead particles in dust in old carpet
Roofing materials (see Building Envelope guide for more details)	Sheathing in good condition; terra cotta or slate tiles	Metal materials; asphalt roofing materials; untreated cedar shingles	Treated cedar shingles	Possible asbestos content

Source: Adapted from Salvage & Reuse, green home remodeling series, Chicago Department of Environment (October 2007). Originally developed by Seattle Public Utilities.

APPENDIX D: SAMPLING OF DECONSTRUCTION AND BUILDING MATERIAL REUSE ORGANIZATIONS

aswdetroit.org **Detroit, MI — Architectural Salvage Warehouse:** This non-profit salvage and resale organization was started in response to the tremendous amount of waste from housing demolition in Detroit and its suburbs. At first, they conducted outreach/advocacy in 2003; in 2004, the organization got involved in “educational speaking engagements;” and, in 2005, they started working on deconstruction and resale. In addition, the organization provides training and employment opportunities for local residents in the deconstruction industry and has partnered with Youth Build Detroit to expose dozens of young construction apprentices to deconstruction. They also collaborate with Focus Hope, Wayne State University and the University of Detroit Mercy School of Architecture to formalize training and educational partnerships to enrich the economic prospects of Detroit’s youth and neighborhoods. The earnings from salvage and resale offset historic preservation projects.

bmra.org **Beaverton, OR — Building Materials Reuse Association (BMRA):** BMRA is a non-profit educational and research organization whose primary mission is to facilitate building deconstruction and the reuse/recycling of recovered building materials. First of its kind, the BMRA has established a “national deconstruction accreditation program” to create job opportunities and train workers with skills required for deconstruction.

buffaloreuse.org **Buffalo, NY — Buffalo ReUse:** This non-profit “green demolition and salvage company” offers comprehensive deconstruction services and also helps green building projects (LEED® projects) obtain credits for deconstruction, recycling and reuse. The materials salvaged during the process of deconstruction are considered a donation to the company, for which they offer supportive documents for receiving a tax deduction. The company also accepts salvaged items from other demolition/deconstruction contractors. In addition to providing deconstruction services, Buffalo ReUse also operates a retail store called “ReSource” and helps online services like eBay sell materials. The “ReSource” also functions as a medium for getting engaged with the community and enlightening people about the benefits of deconstruction.

buildingvalue-cincy.org **Cincinnati, OH — Building Value:** This non-profit social enterprise, operational since 2004, offers professional deconstruction services and job training. The firm has professional construction managers and trained crews. Each worker has Brownfield, Hazardous Materials and OSHA training, and is insured and bonded. To date, the organization has completed more than 100 deconstructions, including residential, commercial and industrial projects. The organization also operates a retail reuse outlet where salvaged materials are provided by the deconstruction team for resale to the public.

Northbrook, IL — C&D Recycling: Built in 2007, this family-owned and -operated recycling facility offers drop-off and roll-off services for the recycling of C&D debris for businesses in Chicagoland. The roll-off service is offered by their sister company, “Active Disposal.” cd-recycling.com

Madison, WI — Deconstruction Inc./Renewable ReSources: Committed to the diversion of reusable building materials from landfills, the organization has continued to play a leading role in deconstruction activities in Wisconsin since 1986. While Deconstruction Inc. is a demolition contractor involved in dismantling and recycling building materials, Renewable Resources operates a warehouse of salvaged materials for reuse and recycle. The organization deals with all commercial, industrial and residential projects and specializes in the salvage of pre-1930 materials and preservation of architectural landmarks. deconstructioninc.org

Cleveland, OH — Green Deconstruction Services: Offers deconstruction services to homeowners, contractors, architects, builders and demolition companies of all types. greendeconstructionservices.net

Habitat for Humanity ReStores: Habitat for Humanity opened its first Habitat ReStore outlet in Canada in 1991, and the first U.S. ReStore outlet was opened in Austin, TX, in 1992. Currently, Habitat has 700 ReStores in 48 U.S. states. Habitat for Humanity’s ReStore outlets program, which promotes reuse and recycling of materials, has become an excellent tool for both community development and resource conservation. The ReStore primarily focuses on home improvement goods, such as furniture, home accessories, building materials and appliances. The collected or donated goods are sold to the general public at a fraction of the retail price, which helps communities, especially low-income people, afford such products. habitat.org/cd/env/restore.aspx

Milwaukee, WI — IM Salvage Co.: A partner of BMRA, the organization has a resale outlet and offers online purchase options for certain items. The inventory consists of a wide range of materials, including used machinery, equipment, building salvage, building supplies, HVAC, plumbing, electrical, lumber and collectibles. imsalvageco.com

Washington, D.C. — Institute for Local Self-Reliance (ILSR): Established in 1974, this D.C.-based institution entered the deconstruction industry in the late 1990s as a general contractor. Over the years, the institute changed its role and became a “facilitator,” assisting in the “start-up and expansion of deconstruction enterprises for cities and the private sector.” As an active voice for the deconstruction industry, ILSR’s Waste to Wealth program helps communities across the country create policies and practices that address environmental concerns as well as economic needs. The institute works with partners, such as The ReUse People, Re-Use Consulting, Second Chance, Bearded Brothers ilsr.org

Deconstruction, the Green Institute, Institution Recycling Network, and Deconstruction Institute.

madisonenvironmental.com **Madison, WI — Madison Environmental Group:** Started in 1998, the Madison Environmental Group is a for-profit consulting firm for green building planning and LEED® certification, waste reduction and recycling. The organization helps clients in developing deconstruction and reuse plans; manage, monitor and document recycling activities; conduct on-site marketing; and re-sell waste materials.

odomreuse.com **Grawn, MI — Odom ReUse Co.:** The organization works on commercial, institutional and residential projects, offering manual deconstruction of buildings under 30-feet tall, salvage of building and interior materials, pick-up services for salvaged materials within a certain distance and a resale store. The organization also offers consulting in resale store start-up and waste management.

pragmaticconstruction.com **Milwaukee, WI — Pragmatic Construction:** Pragmatic Construction is a green design-build firm that has a deconstruction wing called “Pragmatic Deconstruction.” The organization’s certified deconstruction contractors provide services, including free home deconstruction estimates, partial or complete deconstruction, appraisal coordination, material donation coordination, and salvaged materials documentation. Pragmatic Construction partners with The ReUse People of America for enabling tax deductible donations of salvaged home materials.

rebuildingcenter.org **Portland, OR — The ReBuilding Center:** The ReBuilding Center is a project of “Our United Villages,” a non-profit community enhancement organization. With a vision of strengthening the economic base and social fabric, the organization promotes recycling and reuse of salvaged materials for affordable home improvement. The organization has a ReUse warehouse, which is visited by about 300 people every day. The Center’s Deconstruction Services (an EPA Lead-Safe Certified Firm) assists in various projects by providing skilled crew members for salvaging materials from buildings for reuse. DeConstruction Services has completed more than 1,000 projects in its 10-year history, with projects ranging from partial deconstruction work (remodeling kitchen, bathroom etc.) to deconstruction projects involving entire city blocks. Finally, the Center’s ReFind Furniture program offers a diverse line of green furniture and home accessories to be used in new and remodeled homes and other commercial properties. The program uses about 99% salvaged building materials from local, Portland-area homes to make furniture and home decors suitable for resale.

rebuildingexchange.org **Chicago, IL — Rebuilding Exchange:** Rebuilding Exchange (RX), Chicago’s first building material reuse center, was established in February 2009 by Delta Institute as a significant step of the institute’s

“building material waste diversion” initiative. The RX aides in the diversion of reclaimed building materials from landfills, and the materials are made available to low-income communities at affordable prices for home improvement and development. It also provides education and training on deconstruction activities and creates job opportunities for local residents with barriers to workforce employment. Since early 2009, Rebuilding Exchange has diverted more than 7,000 tons of reclaimed building materials from landfills, created 70 job-training opportunities in an emerging green business sector, leveraged more than \$4.2 million in local investment on deconstruction activity, and created 34 new green-collar jobs. Delta is working towards replicating the model of its ReBuilding Exchange in other communities in the Great Lakes region.

Ann Arbor, MI — Recycle Ann Arbor: Established in 1977, this non-profit organization remains an active and dedicated player in the recycling industry. They pioneered Michigan’s curb-side recycling in 1978 and currently offer recycling for businesses in Ann Arbor. They also have the state’s largest community Drop-Off Station, a ReUse Center, and Calvert’s Roll-Off Containers, the state’s only non-profit construction recycling organization. The ReUse Center, founded in 1996, has a more than 20,000 square feet of store space and sells a variety of reusable materials. recycleannarbor.org

Chicago, IL — Recycling Systems Inc.: Recycling Systems Inc. is a family-operated company that has been in the region for nearly 40 years. The company provides recycling assistance for homeowners, businesses, builders and contractors. The organization’s material recovery facility (MRF) “was designed to meet the growing needs for recycling, LEED® projects, and city ordinances” (Recycling Systems Inc., 2010). recyclingsystemsinc.com

Burlington, VT — ReSOURCE: The non-profit organization started in 1991, initially as ReCycle North. In 2001, it expanded its scope by opening the Building Material Center and offering deconstruction services. At present, the organization operates a retail center (ReSTORE), offers deconstruction services (ReBUILD), offers job training for youth and adults (ReTRAIN), and provides goods to those in need (ReLIEF). resourcevt.org

Bellingham, WA — RE-USE Consulting: RE-USE Consulting is an international firm working with varied clients, including reuse store operators, demolition/deconstruction contractors, and building owners and architects, on a wide range of projects including residential, commercial, industrial and institutional. The firm offers a training program to demolition contractors, deconstruction companies, and up-and-coming groups doing pilot projects, and buildings owners working on a single structure. It also offers consulting services for retail operations and marketing. The firm does not operate any physical reuse store, but manages an online inventory of salvaged and reusable materials and partners up with other stores, contractors, and building owners to help them sell their materials. reuseconsulting.com

loadingdock.org **Baltimore, MD — Reuse Development Organization (ReDO):** The national non-profit started in 1995 and has since been involved in various activities related to deconstruction. The organization's National Donations Program facilitates in-kind material donations from the donor directly to non-profit reuse centers and other non-profits. ReDO also offers guidance on how to launch and maintain reuse programs through various educational materials, provides expertise through planning and consulting referrals and maintains an online listserve that addresses reuse issues and caters to the reuse community. They also help connect various interested clients/stakeholders in the reuse market through electronic and in-person discussions.

thereusepeople.org **Oakland, CA — The ReUse People:** The ReUse People began its operation in 1993 in San Diego, CA, as Building Materials Distributors and later changed its name. The organization has remained involved in deconstruction industry by offering deconstruction services, work training for the unemployed and underemployed, certification to qualified deconstruction contractors and a retail center for salvaged materials. In 2007, the organization also started a ReUse Institute, offering consulting services to clients interested in deconstruction.

secondchanceinc.org **Baltimore, MD — Second Chance Inc.:** Second Chance Inc. is primarily involved in deconstructing residential and commercial buildings and salvaging usable materials. It partners with local and regional architects, builders, developers and property owners to identify buildings that are about to undergo demolition. The organization, in operation since 2001, owns a 150,000-square-foot retail space that is used for resale of the salvaged materials. Additionally, they also offer a training and workforce development program that involves classroom instruction and hands-on training from highly trained professionals. Successful trainees are awarded a Baltimore City Mayor's Certificate of Completion. Qualified trainees also receive additional, specialized training in lead abatement and other hazardous materials removal and handling and forklift operation.

seconduse.com **Seattle, WA — Second Use:** Established in 1994, Second Use has remained a key player for reclaiming building materials for reuse and offering deconstruction services in the Puget Sound region. The company offers removal of reusable building materials, usable fixture or non-structural building materials and pickup of the same. The salvaged and donated reusable materials are made available for reuse to the community through their retail outlet. They also provide detailed documentation of recovered items, recovery rate and an environmental impact calculation to show the benefit of waste diversion. In 2006, the company received the Seattle Mayor's Small Business Award, and, in 2007, it received one of the Washington State Recycling Association's Recycler of the Year awards.

Milwaukee, WI — WasteCap: WasteCap Resource Solutions, wastecap.org launched in 1998, is a “non-profit, industry-supported organization.” The organization is largely supported by the Wisconsin Department of Natural Resources and provides planning, educational, training and technical assistance. It also monitors, measures, documents and publicizes results of waste management efforts during C&D projects. The organization also maintains a centralized online directory called WasteCapDIRECT, which provides listings and information of recycling processors, haulers and end markets for Wisconsin’s C&D debris and an online documentation program for tracking C&D recycling results (www.wastecap.org/services/wastecaptrace/). WasteCap is primarily involved in commercial and industrial projects. Currently, it is conducting a pilot project in Milwaukee, WI, that involves the deconstruction of 85 residential structures. The purpose of the study is to produce data to support the quantitative and qualitative benefits of deconstruction.

APPENDIX E: SELECTED RESOURCES

Building Materials Reuse Association Resources

Resources: www.bmra.org/resources/library

Directory of Contractors & Consultants: www.bmra.org/listings/directory-map

Deconstruction Accreditation Program: www.bmra.org/resources/training

Deconstruction Institute Guidebook

"A Guide to Deconstruction," prepared by Bradley Guy, Associate Director, University of Florida Center for Construction & Environment (2003).

www.deconstructioninstitute.com/files/learn_center/45762865_guidebook.pdf

Delta Institute Resources

Resources & Tools: www.delta-institute.org/content/resources-tools

Publications: www.delta-institute.org/content/publications

Green Training Opportunities: www.delta-institute.org/greentraining

Institute for Local Self-Reliance Publications

www.ilsr.org/pubs/pubbroch.html

Rebuilding Exchange Resources

www.rebuildingexchange.org/resources.html

RE-USE Consulting Case Studies

reuseconsulting.com/Case_Studies.php

The ReUse People

thereusepeople.org

U.S. EPA Brownfield Resources

www.epa.gov/reg5rcra/wptdiv/solidwaste/debris/brownfields/index.htm#S8

University of Illinois at Chicago Study

"Market Analysis of Construction & Demolition Material Reuse in the Chicago Region" (2009), prepared by R. Webber et al.

www.uic.edu/depts/ovcr/iesp/research/deltareport.pdf

WasteCap Resource Solutions Resources

Online Documentation System: www.wastecap.org/services/wastecaptrace/

Demonstration Video: www.youtube.com/user/WasteCap

APPENDIX F: GLOSSARY

Brownfield: Abandoned facilities that are potentially contaminated with hazardous substances and pollutants (U.S. EPA, 2011).

C&D Materials: “Debris generated during the construction, renovation, and demolition of buildings, roads, and bridges ... often contain bulky, heavy materials, such as concrete, wood, metals, glass, and salvaged building components” (EPA, 2010).

Demolition: Process of dismantling or “knocking down” buildings (usually using heavy machinery), where the materials are afterwards landfilled or partially recycled (NAHB, 2000).

Green Building: “The practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building’s life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction” (EPA, 2010).

Hybrid Deconstruction: The process of efficient and combined use of heavy machinery and manual labor for deconstruction, with the goal of maximizing the reuse and recycling of materials.

Recycling: The process of salvaging materials from the waste stream and turn them into valuable resources (EPA, 2010).

Renovation: The partial removal of a building’s interior and/or exterior followed by construction of the same with new or reused materials (EPA, 2009).

ReUse: The use of salvaged and recycled materials.

Soft Demolition: Another name for deconstruction, “where workers dismantle a building (completely or partially) in order to maximize recovery of materials for reuse and recycling. The process is labor intensive and does not use heavy machinery” (EPA, 2009).

Tipping Fee: The fee for the disposal of each ton of solid waste in the landfill. Tipping fee varies widely from state to state and also with state for various landfill sites.

Vacant Property: Vacant properties include abandoned and unused buildings or facilities (residential or commercial), whose owners typically default on the taxes or mortgages of the property and the local governments have to shoulder the burden.

APPENDIX G: TOOLS AND FORMS

The following pages include some “plug-and-play” forms and tools that can be used by any deconstruction contractor. These tools include:

- **Deconstruction Checklist** (Adapted from the Deconstruction Institute’s “A Guide to Deconstruction,” 2003)
- **Inventory Tracking Chart** (Adapted from the Deconstruction Institute’s “A Guide to Deconstruction,” 2003)

DECONSTRUCTION CHECK LIST

- Inventory materials and assign to categories with estimated quantity and value.
- Determine where the reusable, recyclable, hazardous, C&D, and solid waste materials will go. Understand and prepare specific outlets (contacts), general markets (advertisement) and methods (equipment, labor, sub-contracts) for removal of all materials.
- Determine if the building has a historic designation, is located in a historic district, or requires a review process, delay, or variable fee structure for demolition permits.
- Estimate cost and finalize contract. Issues include who pays for lead and asbestos surveys and abatement; who is responsible for the complete removal of all building-related debris (including foundations, septic tanks, site cleaning, etc.); who determines the donation value of the salvaged materials; and who receives the donation benefit.
- Conduct lead and asbestos surveys by a certified environmental firm if the building was built before 1981 and complete asbestos abatements, if needed.
- Disconnect all utilities and obtain a demolition permit.
- Conduct a building engineering survey and dismantling process plan that indicates known hazards at the time of the inspection and the general schedule, tasks, techniques and tools to be used to conduct deconstruction.
- Secure labor and materials storage areas both on- and off-site. This includes security against pilferage during project, if needed.
- Secure heavy equipment, disposal roll-offs, Porta-Potty, and any other necessary equipment for duration of project.

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GO Guide

Green Opportunities in Growing Industries