

Deconstruction:
Salvaging Yesterday's Buildings for Tomorrow's Sustainable
Communities

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The Institute for Local Self-Reliance (ILSR) is a nonprofit research and educational organization that provides technical assistance and information to city and state government, citizen organizations, and industry. Since 1974, ILSR has researched the technical feasibility and commercial viability of environmentally sound, state-of-the-art technologies with a view to strengthening local economies. ILSR works to involve citizens, government, and private enterprise in the development of a comprehensive materials policy oriented towards efficiency, recycling, and maximum utilization of renewable energy sources.

The mission of the Materials for the Future Foundation is to support community-based initiatives that integrate the environmental goals of resource conservation through waste prevention, reuse, and recycling with the economic development goals of job creation/retention, enterprise development, and local empowerment. Our work focuses on low-income communities, communities of color, and areas of high worker displacement, especially in the San Francisco Bay Area.

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Front cover photo: Sergio Barrera of BOSS Enterprises removing boards from roof at Naval Air Station, Alameda.
Photo courtesy of the East Bay Conversion and Reinvestment Commission.

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Executive Summary

Deconstruction is the process of carefully dismantling a building in order to salvage components for reuse and recycling. While traditional demolition is highly mechanized, capital-intensive, and waste generating, deconstruction is labor intensive, low-tech, and environmentally sound. When combined with demolition or used entirely as an alternative, deconstruction transforms a quick and dirty chore into an undertaking that supports community development with environmental, economic, and social benefits, including:

- Reducing pollution, greenhouse gas emissions, and the need for landfilling and incineration
- Conserving energy and natural resources
- Creating job training and employment opportunities, including self-employment and small business development
- Providing materials to used building materials stores and value-adding manufacturing enterprises
- Retaining the historical significance of buildings.

This report provides communities with the information needed to understand, advocate, and organize for deconstruction locally, regionally, and nationally, emphasizing partnerships with local nonprofit organizations, government agencies, and for-profit practitioners. It explains how communities can use deconstruction to produce locally-based, environmentally-sound, community economic development.

The report highlights two changes in federal policy that create major opportunities for deconstruction: the demolition of public housing under the HOPE VI program and the conversion of closed military bases across the U.S. These opportunities make deconstruction especially relevant for housing authorities, redevelopment agencies, job training and employment agencies, community development corporations, and many others.

Section II of the report provides additional background information on the deconstruction field, summarizes several nonprofit and community-based case studies, reveals common obstacles to deconstruction and potential solutions, and discusses different implementation approaches. Section III describes deconstruction's companion industries: building materials reuse stores and value-added manufacturing with salvaged materials. Section IV outlines existing local and federal government support for deconstruction, including local policies and practices to encourage deconstruction. Section V concludes with estimated benefits should deconstruction be employed nationwide and recommendations for national policy changes.

The report also includes two appendices. The first, Appendix A, provides contact information for more than 30 individuals who are experts on the various facets of deconstruction. The second, Appendix B, lists more than 25 case studies, reports, and other publications on deconstruction. Organizations wishing to pursue deconstruction should use the resources and contacts in the appendices to learn more about specific methods for assessing buildings, developing project budgets and schedules, training crews, and other necessary tasks.

Table of Contents

I. Introduction	1
A. What is Deconstruction?	1
B. How Deconstruction Provides Community Benefits	2
C. Seizing Deconstruction Opportunities	5
II. Growth of Deconstruction	8
A. Highlights of Community-Based Projects from across the Country	8
B. Addressing Deconstruction's Obstacles	11
C. Approaching Deconstruction in Different Ways	14
III. Growth of Deconstruction's Companion Industries	16
A. Used Building Materials Yards	16
B. Value-Added Manufacturing Enterprises	18
IV. Emerging Government Support for Deconstruction	20
A. Local Government Support	20
B. Federal Government Support	20
V. Conclusions and Recommendations	23
Appendix A. Deconstruction Contacts and Organizations	24
Appendix B. Key Publications	26



BOSS Enterprises' participant Kim Jenkins deconstructing at Naval Air Station, Alameda.
Photo courtesy of the East Bay Conversion and Reinvestment Commission.

Introduction

Every year, as many as 300,000 buildings are demolished in the United States.¹ At a typical demolition site, the emphasis is on removing the structure as quickly and cheaply as possible. But this approach is not without its costs to the community. What were once floors, walls, ceilings, and fixtures become tons of useless debris headed towards a landfill and few people are employed in a process relying more on heavy equipment than labor. Depending on the demolition method, noise and dust can invade the neighborhood, and surrounding trees and shrubbery can be damaged beyond repair.

Instead of this image of wastefulness, imagine one where the site is cleared, but a multitude of community benefits are left behind. Natural resources are saved, employment and training are expanded, and local businesses grow from the materials diverted from the landfill. **Deconstruction**, when combined with demolition or used entirely as an alternative, transforms a quick and dirty chore into an undertaking that supports community development with environmental and economic advantages.

This report explains how communities can take advantage of this opportunity for locally-based, environmentally-sound, community economic development by developing partnerships between nonprofit social service and environmental organizations, government agencies, and the private sector. While the activities advocated in this report are being undertaken in several communities on a strictly for-profit basis, by developing broader community partnerships around deconstruction projects, the social, environmental, and economic benefits of deconstruction can be maximized. Organizations wishing to pursue deconstruction should use the resources and contacts in the appendices to learn more about specific methods for assessing buildings, developing project budgets and schedules, training crews, and other necessary tasks.

A. What is Deconstruction?

Simply put, deconstruction is the process of carefully dismantling a building in order to salvage components for reuse and recycling. While traditional demolition is highly mechanized, capital-intensive, and waste-generating, deconstruction is labor intensive, low-tech, and environmentally sound. Demolition places high priority on removing structures as quickly and cheaply as possible, and in the process, minimizes employment and maximizes waste. Deconstruction achieves the same ends—a cleared site ready for new construction—but through different means and with added benefits. Using

deconstruction, buildings are removed in ways that maximize the recovery of materials and provide more employment and job training opportunities than traditional demolition. More akin to construction sites, deconstruction produces significantly less site disturbance compared to demolition.

Deconstruction is not a new concept. In fact, decades ago, it was the norm. For example, the Hechinger Company, the preeminent supplier to the do-it-yourself home repair market in the Baltimore-District of Columbia-Richmond area, started in 1911 as a hand-demolition company and for decades sold recovered building materials. With a firmly rooted past, contemporary deconstruction programs provide a gateway to the future of community redevelopment. They train hard-to-employ individuals for living-wage-plus jobs and foster community-oriented enterprises such as deconstruction service companies, used building materials stores, and small manufacturers, all while protecting the community's environmental health.

B. How Deconstruction Provides Community Benefits

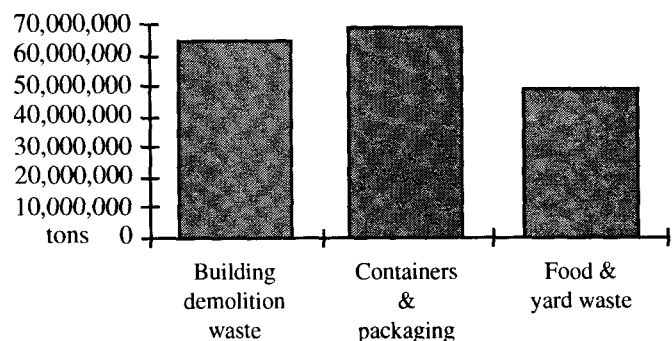
Deconstruction provides numerous environmental, economic, and social benefits to communities.

1. Environmental Benefits

According to the U.S. EPA, an estimated 65 million tons of demolition waste are generated each year, with 31 percent (20 million tons) coming from residential projects and 69 percent (45 million tons) from nonresidential projects.² This is equivalent to all of the containers and packaging waste generated by Americans each year.³ Yet only about 20–30 percent of demolition waste is reused or recycled.⁴ Deconstruction substantially increases the amount of demolition material reused or recycled by placing priority on recovering materials for use in new construction and manufacturing enterprises. Based on a review of deconstruction case studies, recovery rates of 50 percent are nearly universal at deconstruction sites and in many cases, as much as 90 percent of the materials will be reused or recycled.

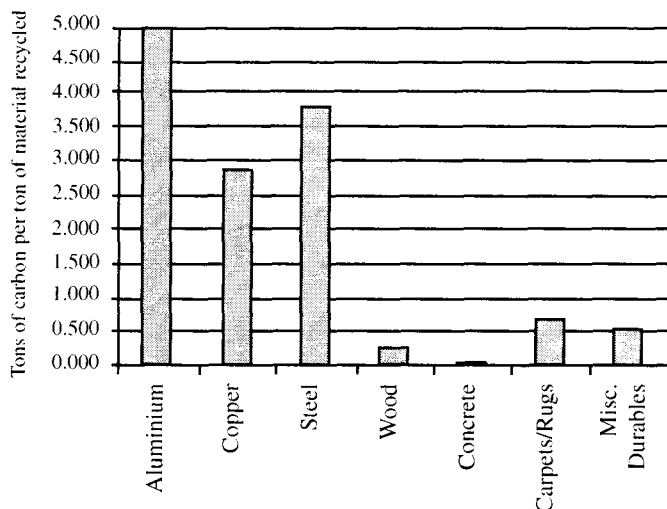
Reusing and recycling materials produces numerous environmental benefits. Each year, the construction industry is responsible for consumption of more than one-third of the world's raw materials and about 10 percent of the total energy consumption in the United States.⁵ Extraction of these natural resources, especially through mining

Exhibit 1: Comparing demolition waste to other waste streams.



Source: U.S. EPA, 1996

Exhibit 2: Average Carbon Equivalent Reduction Due to Recycling of Select Construction and Demolition Materials



Source: Institute for Local Self-Reliance

Environmental Benefits of Deconstruction and Reuse

- reduces pollution
- conserves energy
- reduces greenhouse gas emissions
- promotes reuse and recycling
- reduces the need for landfilling and incineration
- properly manages hazardous materials during removal of structures

and smelting, is one of the most wasteful, energy-intensive, and polluting industries on earth. Reusing and recycling building materials prevents this pollution by reducing the need for virgin natural resources to be mined and harvested, while saving already threatened forests and natural areas from further degradation.

Reusing building materials also conserves the energy already embodied in the products—in other words, the energy used to manufacture and transport the products in the first place is not wasted if the product is reused. Reduced extraction of virgin resources and the maintenance of this embodied energy reduce greenhouse gas emissions that cause global warming. Exhibit 2 illustrates this fact.

Reuse and recycling also reduce the need for land-filling and incineration. Forty-four states and the District of Columbia have set solid waste diversion and/or recycling goals.⁶ Since construction and demolition sites are one of the largest sources of waste headed for landfills, deconstruction will help communities reach their recycling and landfill diversion goals. Deconstruction, which has already begun on some military bases, can help the military reach a 40 percent solid waste reduction goal, which is scheduled to be introduced by the Department of Defense in 1999.⁷

Finally, deconstruction of a building encourages better management of any hazardous materials in that structure. When a building is demolished, hazardous materials including lead paint, asbestos, and PCB-containing fixtures are often crushed up with the rest of the building materials. These toxic materials are then irreversibly mixed with otherwise benign materials and disposed of in landfills not designed to contain hazardous wastes. These toxins can also contaminate neighborhoods as dust spreads from the demolition site, in addition to exposing demolition workers to unnecessary risks. Deconstruction, by its nature, forces the proper removal and handling of hazardous materials before the remainder of the building's parts can be salvaged.

2. Economic Benefits

According to industry experts and a review of case studies, deconstructing buildings requires significantly more labor than traditional demolition methods, in some cases as much as 10 to 15 times more, resulting in significantly more employment. Deconstruction companies can afford to hire more workers because deconstruction creates three sources of working capital not available to demolition companies. First, companies generate revenue by selling the salvaged materials. Second, deconstruction companies can reduce costly investments in heavy equipment, significantly reducing the capital

costs associated with clearing a site. Third, deconstruction companies avoid the disposal costs associated with landfilling the demolition debris. Deconstruction supplies useful materials to building materials yards, recycling centers, and remanufacturing enterprises, which create additional jobs and community revenues. Once materials like wood and metals have been processed and made into building materials, they have an inherent economic value. Rather than smashing this value into pieces and burying it in a landfill, reuse and recycling keep this value within the local economy where it can continue to produce financial benefits as it is remanufactured and used again.

Many cities are looking at deconstruction as a way to address their abandoned housing problems while creating job training and employment benefits, often at the same cost or less than traditional demolition. According to one developer in the mid-Atlantic region, it costs \$14,000 to deconstruct a small abandoned house as compared to \$16,000 to demolish it. The City of Hartford, Connecticut, has set aside funding from a state demolition grant to deconstruct 350 abandoned buildings as part of a program to develop deconstruction service companies that train workers for skilled employment. Deconstruction is also being used at several closing military bases where outdated structures must be removed before the property can be converted to new civilian uses. The Center for Construction and Environment of the University of Florida just completed the deconstruction of four small houses at a cost under \$2 per square foot. This compares with \$3 per square foot for demolition.⁸

3. Social Benefits

Deconstruction is well-suited to job training for the construction trades. The process of taking down buildings is an excellent way to teach workers how to construct them. This is vital for the economic recovery of inner-city communities. Despite low official unemployment rates, between 35–50 percent of the potential workforce in cities is not fully employed.⁹ Unskilled and low-skilled workers can receive on-the-job training in use of basic tools and techniques for carpentry, construction, and materials recovery, as well as critical thinking, problem-solving, good work habits, and team work.

Many recent deconstruction projects have been undertaken by environmental and job training nonprofit organizations. Because these organizations are, for the most part, outside the mainstream construction industry, they are more likely to welcome other non-traditional project elements such as training women and people of color in the construction trades, where they

Economic Benefits of Deconstruction

Phil Kreitner of the Wood Resource Efficiency Network in Portland, Oregon, characterizes the benefits of removing buildings with the following typology:

- Demolition Value Elimination
- Recycling Value Reduction
- Reuse Value Retention
- Remanufacturing Value Added

At each successful level of deconstruction activity, more skills, jobs, and local companies are added to the local economy, while less pollution is generated.



The Hartford Deconstruction Services Company formed by the Hartford Housing Authority, Manafort Brothers, Inc., and public housing residents of Hartford, Connecticut, December, 1998.

historically have been unwelcome. Women currently comprise less than 10 percent of the construction trade workforce.¹⁰

In fact, two of the more successful small deconstruction firms in the U.S., Beyond Waste of Santa Rosa, California, and Marvin Company of Lawrence, Kansas, are owned and operated by women. One of the largest deconstruction job training programs under way is operated by Youth Employment Partnership (YEP) of Oakland, California. All of the participants are low-income, unskilled youth from some of Oakland's poorest neighborhoods. Trainees are provided 34 weeks of paid training, including hands-on construction skills, leadership development, academic instruction based on individual needs, and a general education degree. Daycare is provided for trainees with children. Participants in YEP's deconstruction program have found full-time employment in the construction industry, including union apprenticeships.

Opportunities for self-employment and small business development are also made possible by deconstruction. In Hartford, the Hartford Housing Authority established a resident-owned deconstruction service company comprised of the workers trained in deconstructing public housing units. "This opportunity," said one worker, "allows me to be a father to my children." In Riverdale, Maryland, where public housing units were deconstructed, a worker said that learning deconstruction skills would allow him to be his own boss.

Deconstruction also allows communities to retain some of the historical significance of buildings slated for removal by reusing the components of the old building in new construction or in renovation of other historic structures. In Hartford, for example, deconstructed lumber and bricks will be used in the rebuilding of the downtown riverfront district. At Ford Ord near Monterey, California, siding from deconstructed structures was used to renovate other buildings so they could be used by the Goodwill Industry Vocational Training Center.

C. Seizing Deconstruction Opportunities

Opportunities for deconstruction exist in practically every community in the U.S. Virtually all houses constructed before World War II are candidates for deconstruction, due to the quality of materials used and the methods used to construct them.¹¹ Anywhere buildings must be removed, an evaluation of deconstruction opportunities can take place by assessing the building's age and condition; the materials, fixtures, and methods used in construction; and the current value of the materi-

als. By developing a niche market, such as residential deconstruction, small businesses can develop anywhere. For those communities near the Mexico border or shipping ports, export of used building materials salvaged through deconstruction may present additional markets. Two major changes in federal policy are also creating major opportunities for deconstruction: the demolition of public housing under the HOPE VI program and the conversion of closed military bases across the U.S.

1. Public Housing

Since 1993, the U.S. Department of Housing and Urban Development's (HUD) HOPE VI program has disbursed approximately \$500 million per year to local housing authorities for the demolition, construction, or rehabilitation of public housing, as well as for planning and technical assistance. In FY 1998, the HOPE VI budget included \$550 million, of which \$26 million was allocated for demolition and for revitalization of public housing designed to meet the special needs and physical requirements of the elderly. A secondary goal of HOPE VI is to move public housing residents from the welfare rolls to living-wage employment. In addition, HUD's Section 3 requirements promote job creation and business development for public housing residents.¹²

Across the nation, an estimated 200,000 public housing units will be demolished as a result of HOPE VI. For example, the City of Chicago plans to demolish 11,000 apartments, nearly 40 percent of its public housing stock for families, over the next 15 years.¹³ Recognizing that deconstruction provides communities with a unique opportunity to combine removal of structures with job training/employment, the Hartford Housing Authority (HHA) is the first housing authority in the nation to require a deconstruction program as part of its HOPE VI program. In 1998 HUD agreed to allow recipients of HOPE VI grants to re-invest demolition funds for deconstruction projects. If deconstruction were employed in conjunction with demolition to remove public housing across the country, as well as other public and private sector structures, communities could reap substantial environmental, economic, and social benefits for their residents, at little or no additional cost compared to traditional demolition alone.

2. Military Base Closures

At the same time, hundreds of military bases across the country are being closed or realigned and converted to civilian uses. Redeveloping these properties often requires buildings to be removed because they are obsolete or inconsistent with reuse plans. Many struc-

Self-Reliance Inc.

Self-Reliance Inc. (SRI) is the consulting arm of the Institute for Local Self-Reliance. Since 1979, SRI has been providing technical assistance to local governments, community groups, and private firms that want to follow up on the research completed by the ILSR's Waste-to-Wealth and Carbohydrate Economy programs. Typical projects are:

- attracting waste-based manufacturing companies to rural and urban industrial parks
- designing and implementing regional solid waste and economic development infrastructure
- designing programs which eliminate or reduce the need for incinerators and landfills
- assisting housing authorities and demolition construction companies in the design and implementation of deconstruction and community development programs
- attracting capital for deconstruction and value-added manufacturing enterprises

SRI was the general contractor for Manafort Brothers Inc. and the Hartford Housing Authority for the Stowe Village deconstruction and Family Reunification program. For more information contact: Self-Reliance, Inc. 2425 18th Street, NW, Washington, DC 20009 Phone: (202) 232-4108

Hartford Stowe Village

In 1996, the Stowe Village Redevelopment Authority received a \$5 million HOPE VI grant from the U.S. Department of Housing and Urban Development for the demolition of Stowe Village. A small part of this funding was set aside for the developer to institute a pilot program, in a joint venture with the Hartford Housing Authority, to deconstruct two buildings in Stowe Village. Through the pilot, workers were provided with union training and deconstruction training with the assistance of Self-Reliance Inc. and Beyond Waste Inc. A new company owned by public housing residents was formed to complete future deconstruction of abandoned structures in Hartford; a building materials reuse store is being formed as well. Manafort Brothers Inc., which participated as a joint venture partner, was one reason for the success of this demonstration. This company, like the Hechinger Company, started in the early years of this century as a salvage operator selling recovered building material. Frank Manafort, the current principal of the firm, started working for his grandfather in deconstruction. The Manafort Brothers Inc. headquarters is located in Plainville, Connecticut, and was built upon a foundation of recovered materials. Furthermore, the company once operated a small lumber mill which added value to all the wood the company recovered. All nine resident workers trained in deconstruction on the Hartford Stowe Village Project are now union members and subcontractors to Manafort Brothers Inc. Training costs for this project were less than \$6,000 per resident worker.

Based on the success of the Hartford Stowe Village Project, the city has committed additional buildings for deconstruction, a warehouse to use for building material resale, and a pledge to use recovered building materials in the redevelopment of downtown Hartford.

tures on military bases do not meet standard building codes and must therefore be removed or rehabilitated to protect public safety.

When a base is closed, it passes through a series of phases that present opportunities for deconstruction. Before a base is closed, military personnel can provide an abundance of information about the structures on the base to help determine good candidates for deconstruction. Funds originally budgeted for building maintenance or site preparation and cleanup may also be available to offset the costs of deconstruction. After the base is closed and it enters caretaker status, it may be difficult to pursue deconstruction projects because the military will be minimizing its financial costs and liabilities while transferring the property to the local reuse authority. At the same time, local authorities will not yet have control over most decisions regarding the property. While deconstruction is possible during the caretaker phase, close cooperation and negotiation with both the military and local agencies will be required. Once the base has been transferred, local authorities and developers will be responsible for the structures and can use deconstruction as they see fit.¹⁴

Deconstruction is a worthy pursuit for community-based organizations, government and quasi-governmental agencies, and those seeking to develop public-private partnerships. It is especially relevant for the following organizations:

- Housing authorities
- Redevelopment agencies
- Job training and employment agencies
- Community development corporations
- Local reuse authorities for closing military bases
- Low-income housing developers
- University research and business assistance programs.

The remainder of this report provides communities with the information needed to understand, advocate, and organize for deconstruction locally, regionally, and nationally, emphasizing partnerships with local nonprofit organizations, government agencies, and for-profit practitioners. Section II provides additional background information on the deconstruction field, highlighting non-profit and community-based case studies, common obstacles and solutions, and different approaches to implementing deconstruction in a community. Section III describes deconstruction's companion industries, building materials reuse stores and value-added manufacturing with salvaged materials. Section IV outlines existing government support for deconstruction. Section V concludes with estimated benefits should deconstruction be employed nationwide and recommendations for national policy changes.

II. Growth of Deconstruction

For many years, salvagers and savvy demolition companies have recovered the more valuable elements from buildings before they were destroyed. But doing so was only a minor consideration in the plan to remove the building and was typically done in a haphazard way that only salvaged the best, most accessible pieces. This process is called “architectural salvage.” Deconstructing a building allows for more comprehensive recovery of materials, because the process is designed around reuse and recycling of much or all of the structure, rather than salvaging only the easy targets before the wrecking ball swings through.

Some materials, such as large timbers and metals, are often recovered from demolition sites. In major demolition projects, concrete will often be crushed for use as fill nearby. In some cases, moldings, window, doors, and hardwood flooring will be salvaged for reuse. But these exceptions aside, the overwhelming majority of materials from demolition sites are landfilled. Deconstruction seeks to ensure that whenever possible, these valuable building materials and others such as brick and dimensional lumber, are salvaged for reuse or recycling.

A. Highlights of Community-Based Projects from across the Country

Deconstruction is occurring across the country and is being performed by small and large businesses and by nonprofit environmental and job training organizations. Many unique partnerships have developed as a result of deconstruction projects. For example, small women-owned businesses and nonprofit organizations have teamed with large demolition companies in bidding on government contracts. Nonprofit organizations have partnered with for-profit deconstruction companies to train their unskilled participants. In Hartford, the Hartford Community Deconstruction Service Company is a unique joint venture between residents of public housing, the Hartford Housing Authority, and Manafort Brothers Inc., a private demolition and development company.

Several pilot projects using creative, community-based partnerships have taken place in the last few years. Most of these pilots have enjoyed technical assistance and financial support from local, state, and federal government agencies. Technical assistance has included finding appropriate partners, interpreting applicable regulations, encouraging cooperation from developers, identifying markets for salvaged materials, and documenting project results. While ideally all deconstruction costs would be recouped by service fees and materials sales, sometimes grant funds are needed to cover costs

Exhibit 3: Cost Comparison for Presidio Building #901¹⁶

Deconstruction

Expenses:

- Labor—\$33,000
(5 people at Davis-Bacon wage
of \$32/hour)
- Equipment and Waste Disposal—
\$12,000
- Administration—\$8,000

Total Expenses: \$53,000

Income from sale of lumber:

\$43,600

NET COST: \$9,340

Demolition Bid

Total Expenses: \$16,800

NET COST: \$16,800

associated with job training, maximizing reuse and recycling, or breaking new ground in the field (e.g. attempting to deconstruct difficult structures or carefully documenting deconstruction results).

1. San Francisco, California

Building 901 at the Presidio of San Francisco, a 9,200 square-foot wood frame warehouse constructed in 1942, was deconstructed in the spring of 1996 by Beyond Waste Inc., a small for-profit deconstruction company, the Wood Resources Efficiency Network, and San Francisco Community Recyclers (SFCR), a community-based nonprofit recycler. Working with the National Park Service, the team convinced the site's contractor to withdraw the building from an existing demolition contract so it could be deconstructed. A crew of five took four weeks to dismantle the building and 87 percent of the building was salvaged for reuse, including 65,000 board feet of old growth Douglas fir and Port Orford cedar. Over half of the salvaged materials were sold on-site while the remaining materials were transported to Building REsources, a used building materials business operated by SFCR, located in San Francisco's Bayview Hunter's Point area. The project partners estimate that it cost 45 percent less to deconstruct the building than to demolish it.¹⁵

2. Oakland, California

Across the San Francisco Bay in Oakland, Youth Employment Partnership (YEP), a job-training organization for high-risk, low-income youth, worked with Beyond Waste Inc. to deconstruct Building D-733 at the U.S. Navy's former Fleet Industrial Supply Center, now owned by the Port of Oakland. During the winter of 1996/1997, four supervisors and 15 youth, who were paid a training wage ranging from \$6.50 to \$9 per hour, diverted over 425 tons of material from the local landfill and salvaged 315,000 board feet of lumber. The project's overall recovery rate was 70 percent, not including 110 tons of wood that were chipped for mulch and fuel.¹⁷ YEP is currently deconstructing another six warehouses on Port of Oakland property and will recover an estimated 1.8 million board feet of old-growth Douglas fir and redwood. During the course of the 18-month project, YEP and their partner, Building Opportunities for Self-Sufficiency (BOSS), will train 75 youth and 38 adults in construction trade skills, many of whom will be women. The project is being financed primarily through a contract with the Port of Oakland, lumber sales, and job training grants from state and federal labor departments and the Oakland Private Industry Council.¹⁸

3. Baltimore County, Maryland

In 1997, the National Association of Home Builders Research Center (NAHB-RC) issued a report on the deconstruction of a 2,000 square-foot residential building in the Riverdale housing development in Baltimore County, Maryland (see Appendix B). The study was conducted to answer various questions regarding the feasibility of using deconstruction instead of demolition. NAHB-RC carefully documented labor requirements and activities, job training potential, diversion rates, salvage values, total cost comparisons, and environmental benefits as the building was deconstructed.

Upon completion, the deconstruction crew salvaged 70 percent by volume of all materials deconstructed. The average cost of deconstruction was estimated at \$4.50 to \$5.40 per square foot with maximum reuse and recycling compared to \$3.50 to \$5 per square foot for standard demolition with no reuse and limited recycling. The authors concluded that deconstruction was an excellent mechanism to train low-skilled workers in the construction field; to limit dust and airborne chemicals, especially lead and asbestos, during the removal of buildings; and to conserve landfill space and energy.

4. Minneapolis, Minnesota

In August 1997, the Green Institute of Minneapolis, Minnesota, started its deconstruction program under a Job Opportunities for Low-Income Individuals (JOLI) grant from the Office of Community Services, which it expanded in 1998 with a Sustainable Development Challenge Grant from the U.S. EPA. The program is now hiring and training its third deconstruction crew, which will create 15 new jobs. The Green Institute has taken advantage of its nonprofit classification and provides written receipts for all materials donated through deconstruction, from windows and doors to a whole house. In other words, people who donate their houses or parts of their houses to deconstruction can receive a tax deduction like any other charitable donation.

The Green Institute is working closely with the International Laborers Union (ILU), which has agreed, for a one-year trial period, to train non-skilled workers in the field of deconstruction. The union created a residential-training wage of \$8 to \$8.50, extended its traditional 30-day training period to 60 days, and opened its training facilities for the teaching of deconstruction. If successful, this trial may become a model for teaching deconstruction across the U.S. In Hartford, Connecticut, the ILU trained workers employed in the Hartford Community Deconstruction Service Company.²⁰

Exhibit 4: Estimated Reuse/Recycling Rates at Deconstruction Sites^{*19}

- Building 901 at the Presidio of San Francisco, CA
87 percent
- Barracks at the U.S. Army's Fort McCoy, WI
85 percent
- Motor pool building at the Navy FISC, San Diego, CA (The Reuse People project)
84 percent
- Fort Ord Pilot Demonstration Project, Marina, CA
80–90 percent
- Warehouses at the Twin Cities Army Ammunition Plant, MN
60–80 percent
- Four-unit residential housing in Baltimore, MD
76 percent
- Warehouse at the Port of Oakland, Harbor Transportation Center, CA (YEP project)
70 percent
- Residential buildings near Minneapolis (Green Institute projects)
50–75 percent

^{*}Calculation methods vary significantly in each example, so these projects should not be compared directly. Rather, this information is provided to demonstrate the potential for significant landfill diversion through deconstruction.

The Green Institute

In the early 1990's, due to the proposed siting of a garbage transfer station, the citizens of the Phillips neighborhood in inner-city Minneapolis formed the Green Institute, a nonprofit, tax-exempt community economic development organization. The residents opposed the construction of the transfer station, and their continued efforts eventually paid off and the transfer station was never built.

In 1995, the Green Institute began creating economic opportunities in the Phillips neighborhood with the opening of its ReUse Center, which sells reusable building materials. Currently the center provides 11 living wage jobs with health insurance and other benefits.

The Green Institute began offering deconstruction services in order to increase the supply of used building materials at the ReUse Center. Originally, the center operated on donations only. In 1996 the Green Institute's Deconstruction Program received a Job Opportunities for Low-Income Individuals (JOLI) grant from the Office of Community Services of the U.S. Department of Health and Human Services. The grant was used to boost the Green Institute's deconstruction services program by training low-income individuals in the fields of deconstruction and building material reuse.

Currently, the Green Institute is constructing the Phillip's Eco-Enterprise Center (PEEC) on 3.2 acres of the land previously designated for the transfer station. PEEC will advance the Green Institute's goal of bringing living wage jobs to the Phillips area by attracting

B. Addressing Deconstruction's Obstacles

Deconstruction, of course, does have some obstacles to its implementation. Simply doing things differently and resistance to change are always formidable barriers. Specific arguments against deconstruction most often come in the form of two complaints: it takes too long and costs too much. While both time and money are legitimate concerns, both issues can be mitigated. Other common concerns include hazardous materials handling and the development of markets for salvaged materials.

1. Project Timelines

Deconstruction is essentially construction in reverse, so taking down a building is similar to putting one up. While deconstruction creates more jobs, it does take longer (anywhere from two to 10 times longer than demolition alone). When a developer is ready to build on a site, he or she will most likely resist extending the amount of time budgeted for site clearance. This is especially true when financing is in place and longer timelines equate to additional interest payments and delayed income from the completed project.

Planning as far in advance as possible to incorporate deconstruction is the best solution. The importance of proper planning cannot be overemphasized. As an illustration, consider Pete and Robin Hendricks, who have been deconstructing houses since 1971. They always have a plan before they begin to deconstruct any building. Before every deconstruction project, Pete performs an assessment to determine the best way to take the building apart. Before beginning the project the couple also knows where the material salvaged from the building will be used. They practice a concept known as "zero waste production," which means that all the salvaged material will be used in the construction of another building. If they don't know where the material will go, they don't deconstruct it.

Using skilled crews and mechanized techniques where appropriate can also accelerate timelines. Fully developing the following skills will greatly increase the efficiency and productivity of deconstruction projects:

- Building assessment

amount and value of salvaged materials and the amount of material remaining that will require demolition and disposal also affect project expenses and revenues. When the right buildings are selected, the cost of deconstruction is less than or similar to the cost of demolition because additional labor costs are offset by the sale of salvaged materials and avoided disposal fees. However, goals such as using trainees rather than experienced workers and pushing recovery rates to the maximum can extend project timelines and raise costs above those for demolition. However, once trained, these work crews can deconstruct buildings at cost-effective rates when combined with a contract fee and sales from recovered materials. Estimates based on the results from the Hartford Housing Authority Stowe Village Project show that deconstruction of small public housing units can be economically viable (see Exhibit 5). These estimates indicate that deconstruction can be accomplished at less than \$2 per square foot, which falls within range of recent small house deconstruction projects completed by the Center for Construction and Environment, University of Florida, Gainesville.²¹

Even in cases where the cost of a deconstruction project is more than demolition, an effective argument can be made for pursuing the project. Other community benefits such as job training, decreased environmental impact on the neighborhood, and salvaging materials for reuse by local businesses are benefits outweighing small additional costs. Providing welfare recipients with training that moves them into living-wage employment is worth at least \$10,000 per person, according to a common benchmark in the community economic development field.²² In other words, for every person sufficiently trained at deconstruction sites to leave the welfare rolls, the value to the community is \$10,000, an amount which is nearly always more than the margin between the demolition and the deconstruction estimates.

In cases where abandoned buildings need to be removed for redevelopment of sites, such as closed military bases and brownfields, figuring out who should pay for deconstruction can be difficult. While it makes sense to deconstruct abandoned buildings before a developer is ready to build because it allows deconstruction crews adequate time to complete their work, without a developer, there's often no one to pay the bill for site clearance. In San Francisco, one organization has developed a plan to address this problem. San Francisco Community Recyclers has recommended a policy to the City of San Francisco to provide money up front to clear away buildings via deconstruction. The costs would then be reimbursed to the city by the eventual developer of the property.

Assessing Good Candidates for Deconstruction*

While deconstruction is not the answer for every building that needs to be removed, it is certainly applicable to many structures, especially older buildings built before World War II. The following indicators can be used in determining if a structure might be a good candidate for deconstruction:

- Brick buildings built before 1933
- Structures containing old-growth or rare wood species
- Interesting or high-quality architectural features (e.g. doors, windows, bathroom fixtures, banisters)
- Hardwood floors
- Large timbers (e.g. warehouse beams)
- Large quantities of unpainted wood

Other factors used to assess the extent to which a building can be deconstructed include:

- Age of the structure
- Type and condition of materials in the structure
- Methods of construction, which impact the ease or difficulty of recovering materials
- Local market values for salvaged materials
- Availability of recycling options for materials that cannot be reused

*Few buildings can be totally removed through deconstruction. Demolition is required for such things as foundations, concrete walls and floors, and other concrete building materials. Therefore joint ventures between deconstruction and demolition companies are recommended.

Deconstruction Pioneers— Pete and Robin Hendricks

Pete Hendricks has been taking apart houses and putting them back together again since he was a kid, and since 1971 he and his wife have deconstructed more than 30 houses. The Hendricks' winter home in Wake Forest, North Carolina, is just one example of the homes that they have built using deconstructed material. Pete and Robin recently deconstructed a farmhouse in Pittsboro, North Carolina, that was located on the future site of the new office and conference center for the Rural Advancement Foundation International-USA (RAFI-USA).

The three-story farmhouse was built in 1835 with additions added in the 1890's, 1920's, and 1940's. RAFI did not want to demolish the house and send it to the landfill, because they wanted the removal to follow their overall goal of supporting and promoting sustainability in rural areas throughout the world.

After other environmental attempts to remove the house failed, RAFI opted for deconstruction and hired Pete Hendricks to oversee a six-man deconstruction crew made up of community residents and Duke University college students. In order to retrieve all the material the old house has to offer, Pete's crew deconstructed the house in reverse by first removing the 1940's addition, then the addition added in the 1920's, and continuing in that fashion until there was nothing left.

The house was completely deconstructed in 15 days, one day ahead of schedule. The Chapel Hill News reported that "the deconstruction project will cost the same as if the farmhouse had been bulldozed and carted off to the landfill."²³

At the end of the project RAFI was left with about three-quarters of the original farmhouse, stacked in piles for reuse in their new building. This included all of the lumber retrieved from the farm-

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3. Hazardous Materials

Deconstruction enterprises will regularly encounter hazardous materials in the course of removing a building, especially lead-based paint, chemically-treated wood, asbestos, mercury switches, and PCB ballasts. While in theory demolition companies must also handle these materials appropriately, because deconstruction crews come into direct contact with the material, special considerations apply. (In practice, at many demolition sites, hazardous materials are not removed before demolition begins.) As on any job site, asbestos abatement should be handled only by certified asbestos contractors. Chemically-treated wood often contains pentachlorophenol, creosotes, and copper-chromium-arsenate, which can be hazardous if handled or reused improperly. These materials can be reused for some purposes, such as sign posts, parking barriers, retaining walls, and fences.

In structures built before 1978, and especially those built before 1960, there is a high likelihood that painted wood contains lead. Crews should be trained in the best ways to minimize flaking the paint off of the wood and creating lead dust during deconstruction. These practices include avoiding the use of power cutting tools and excessive hammering and scraping on leaded surfaces and the exclusive use of tools like pry bars and mallets to take leaded lumber apart. Regulations concerning the use and disposal of lead-painted wood vary across the country. Check with city and/or county health and environmental regulators about the requirements in your area.

4. Markets for Salvaged Materials

For deconstruction to be profitable, the recovered materials must be sold in order to help defray the labor costs associated with salvaging them. Markets and uses for some materials, such as large timbers, metals, concrete, and fixtures like doors and windows, are more well-established than others. Estimating the expected composition of the materials to be salvaged (e.g. board feet of lumber, number of doors and windows) and the estimated market value is critical in determining whether a deconstruction project will be financially viable. The continuing development of markets for salvaged lumber, especially smaller dimensions, is needed and will have a great impact on the financial viability of deconstruction projects. Answers to questions about the quality of lumber recovered through deconstruction, appropriate quality control levels, grading, efficient de-nailing methods, and using the material in structural applications are being actively pursued.

Selling materials from deconstruction sites can occur either on-site or off-site. By selling materials on-site, deconstruction firms save valuable time and money required to move materials to another location. Selling materials on-site, even before deconstruction begins, allows the deconstruction company to clear the site faster and to collect sales revenue sooner. For materials that cannot be sold on-site, deconstruction enterprises should establish partnerships with retail businesses like used building materials outlets and lumber yards so the materials can be transported off site and sold to the public elsewhere. Manufacturing enterprises can also use recovered materials to manufacture new products.

Identifying buyers for salvaged materials is a matter of extensive networking and marketing to identify who is interested in these niche materials. Architects, construction contractors, and do-it-yourself home renovators are obvious markets for lumber and fixtures. Concrete can be recycled for use on site or in road construction. Local scrap dealers can recycle metals. With advance planning, salvaged materials can be specified for use in redevelopment or renovation projects. Additional information on market development for deconstructed materials is included in Section III.

C. Approaching Deconstruction in Different Ways

Deconstruction service providers and advocates are motivated by multiple goals:

- to salvage high-quality materials for reuse and re-manufacturing
- to make a profit
- to divert as much material as possible from landfill in order to avoid tipping costs.
- to provide short-term job training opportunities
- to provide long-term, high-quality employment
- To preserve the history associated with the building.

It is not unusual for one or two of these factors to take priority over others, depending on the specific goals of the project. For example, a training provider for low-income and low-skilled individuals may receive government subsidies to maximize training in their deconstruction project rather than breaking even or turning a profit. A private company may accept only jobs that guarantee a profit and high-quality materials, regardless of the overall recycling rate for the project or whether local residents receive training or employment. Another community organization with limited resources may choose to set modest goals for both job training and waste diversion, so that both may occur instead of choosing one over the other.

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house, all the brick and stone, and other rubble. All the metal retrieved from the farmhouse was recycled. Forty percent of the original lumber was too degraded for salvage and was chipped into mulch and resold by the county waste management authority. The remaining lumber, including large timbers, will be used for flooring, door and window trim, and other architectural elements. The brick and stone will be reused for various elements in the new structure and the rubble will be used as gravel for the new foundation. Since all the material salvaged from the house will be incorporated into RAFI's new office and conference center, transportation costs for the building materials were also eliminated. Only 20 percent of the total volume of the house was landfilled. RAFI will begin construction of its new office and conference center in the summer of 1999.²⁴ For more information contact Kathy Zaumseil at RAFI-USA at (919) 542-1396.

Exhibit 5: Assumptions for Economically Viable Deconstruction of Public Housing Units

- a. Deconstruction company bids the project in joint venture with a traditional demolition company.
- b. Crew of five fully-trained deconstruction workers, with one worker serving as supervisor/foreperson.
- c. Workers paid full union wages and benefit packages at \$200 per day.
- d. At least 30 percent deconstruction of building.

The Role of Unions in Deconstruction

The reaction of organized labor to deconstruction has been mixed. While national union leaders have expressed interest in developing a framework for deconstruction within the union structure, many local leaders are resistant to these changes. Deconstruction provides an opportunity for unions to reach out to and train women and people of color, who have traditionally faced significant barriers in obtaining union training and full-time employment.

The Laborers International Union believes that deconstruction is important enough for the union to provide services to deconstruction projects and is considering the following contributions:

- Loans to assist small deconstruction companies with start-up expenses
- Supplemental union training or apprenticeships for deconstruction trainees
- Health care for trainees with over 600 hours of work within any one year
- Introductions to demolition companies that could participate in joint ventures with deconstruction service providers or training programs.²⁵

As discussed earlier, the International Laborers Union's efforts in deconstruction projects with YEP, the Green Institute, and the Hartford Community Deconstruction Service Company may serve as models for teaching deconstruction across the U.S.

All of these examples are valid approaches to deconstruction. In each case, the community still receives more benefits than if demolition were employed instead. However, these cases demonstrate the need for deconstruction advocates to be clear about their priorities for any given deconstruction project.



Green Institute's DeConstruction Services employee removing hardwood floors from a house.

III. Growth of Deconstruction's Companion Industries

The success of deconstruction relies on the ability of deconstruction companies to sell the materials they salvage. While deconstruction service companies should charge service fees just like demolition companies do, revenues from the sale of materials help offset the additional labor costs associated with deconstruction. The used building materials industry, which is the primary market for salvaged building materials, is also an industry with a long history and one that has been rejuvenated with the growth of the recycling movement in the last twenty years. New products can be constructed out of reused materials and recycled materials can replace virgin materials in existing manufacturing processes.

A. Used Building Materials Yards

Used building materials yards are part of the growing reuse industry. Reuse operations include those organizations that accept used, overstocked, or outdated materials such as furniture, building materials, appliances, equipment, and other durable goods. Materials are made available at low cost, and in some cases for free, to nonprofit groups, low-income families, schools, and the general public. The availability of quality, reused materials allows low-income communities to pursue construction projects that would not otherwise be affordable. Building material reuse operations are often operated by charitable organizations such as Habitat for Humanity and Saint Vincent de Paul. However, for-profit reuse businesses such as Urban Ore in Berkeley, California, which grossed \$1.4 million in sales in 1997, are also thriving.

Deconstruction and reuse go hand-in-hand, as has been demonstrated in programs operated by the Loading Dock (Baltimore, Maryland), the Green Institute (Minneapolis, Minnesota), Building REsources (San Francisco, California) Saint Vincent de Paul (Eugene, Oregon), and the numerous Habitat for Humanity ReStores.²⁶ Reusable windows, doors, fixtures, flooring, and a variety of other materials are removed from homes and commercial structures through deconstruction and find their way as useful components into new construction or renovation projects.

The potential for reuse operations is vast. The U.S. EPA estimates appliances, furniture, carpets, and other miscellaneous durable goods (not including construction and demolition waste) comprise 15 percent of the municipal solid waste stream, or nearly 32 million tons,

The Reuse Development Organization

The need to build a national reuse infrastructure prompted the creation of the Reuse Development Organization, Inc. (ReDO) in 1996. ReDO's mission is to promote reuse as an environmentally sound, socially beneficial, and economical means for managing surplus and discarded materials. ReDO is a national, tax-exempt, nonprofit organization accomplishing its goals through general education, training, networking opportunities, technical assistance and assistance in replicating successful reuse operations and expanding new reuse efforts. ReDO also plans to provide materials brokering assistance in the coming year. ReDO's membership is made up of not-for-profit and for-profit reuse operations, government agencies, businesses and others interested in "making more reuse happen faster." ReDO publishes a quarterly newsletter, and manages ReDO's Reuse Forum, an online forum to discuss reuse issues, get answers to questions, and communicate with others working on reuse efforts. For more information, contact the ReDO office at (317) 631-5395, e-mail at info@redo.org, or visit ReDO on the web at www.redo.org.

with a recycling rate of only 17 percent. Even after recycling, nearly 26 million tons of durable goods are landfilled or incinerated each year.²⁷ These materials, combined with those salvaged through deconstruction, result in a wealth of material resources available for small business enterprises.

After office furniture and appliances, used building materials are the most commonly handled materials by the growing reuse industry. According to a report by EarthWorks Environmental, at least 50 Canadian and 130 U.S. operations participate in the collection, processing, or resale of used building materials. Nineteen of these are retail operations in the U.S.²⁸ A study of 67 reuse operations conducted by the Institute for Local Self-Reliance²⁹ in 1995 revealed that the average reuse facility employs the full-time equivalent of five people at an average wage of \$9.75 per hour. While the fair market value of materials handled annually averaged \$700,000 per operation, goods are frequently sold at bargain prices, resulting in average savings of about \$250,000 in avoided purchasing costs for the recipients or buyers of goods. According to the study, each reuse facility saved the donors of materials an average of \$100,000 in avoided disposal costs each year. When the reuse facility is operated by a nonprofit organization, donors of materials often enjoy a reduced tax burden as well.

The advent of several trade and networking associations for reuse operations is a sign of the field's growth. The need to build a national reuse infrastructure prompted the creation of the Reuse Development Organization, Inc. (ReDO). ReDO's mission is to promote reuse as an environmentally sound, socially beneficial, and economical means for managing surplus and discarded materials. ReDO will accomplish these goals through general education, industry training, replication of successful reuse operations, and materials brokering. ReDO is developing a national database of reuse operations that will be completed in 1999.

The Used Building Materials Association (UBMA) is a nonprofit membership-based organization representing companies and organizations in Canada and the U.S. involved in the acquisition and/or redistribution of used building materials. UBMA was formed to help companies gather and redistribute used building materials in a financially sustainable way, and to overcome the external barriers that hamper their business.

B. Value-Added Manufacturing Enterprises

While most building materials yards sell products as is, opportunities exist to increase the value of these materials through repairing and remanufacturing products. In addition to building materials yards, deconstruction feeds manufacturing enterprises as well. Manufacturers can use recycled materials exclusively or substitute recycled materials for some of the virgin materials in their manufacturing processes. Nail holes and other signs of wear on deconstructed wood are often the wood's greatest selling point. These character marks provide a rustic look desired by many furniture and interior designers. For example, Crate & Barrel advertised a 60" by 53" table made from wood salvaged from a deconstructed building, with many visible knots and nail holes, for \$1,499.³⁰

Several small businesses are using wood recovered through deconstruction to make products like flooring, siding and cabinetry. For example, Pioneer Millworks of Shortsville, New York, specializes in remilling large salvaged timbers into products such as flooring, trim, dimensional lumber, and cabinetry. Most of the salvaged timbers come from early 1900 industrial buildings. The mill obtains used timbers from both demolition contractors and companies specializing in deconstruction. Pioneer Millworks has been in business for over 7 years, and operates 90 percent of its manufacturing using old timber and only 10 percent using virgin timber. Architectural Timber and Millwork, Inc. of Hadley, Massachusetts, began reusing and remanufacturing recovered wood in 1972. They use old timbers, siding, flooring and other wood from old barns and other large buildings for architectural and structural purposes in new buildings. The company obtains many wood types from the Northeast and elsewhere and remanufactures it by pulling out old metal and remilling it. The mill also reuses wood obtained from old structures in restoration projects.

In addition to these enterprises, a wide range of products can be manufactured from smaller dimensional wood, such as cutting boards, planter boxes, furnishings of all sizes, bird houses, toys, and more. The East Bay Depot for Creative Reuse in Oakland, California, is manufacturing functional art items and household furnishings made from scrap wood. The items are painted and decorated with other scrap materials including tiles, textiles, and metals. Building REsources, another San Francisco Bay area nonprofit, has designed several products out of used building materials, such as cabinets constructed from scrap wood with multi-paned windows used as the cabinet door. They also developed a holder for compact discs using scrap wood and pieces of antique picture frames as trim. The Saint Paul Neighbor-

Wood Reuse Working Group, San Francisco, California

Cost-efficient and profitable deconstruction depends upon the availability of markets for salvaged building materials. As several organizations pursued the deconstruction of large wood-frame warehouses at closing military bases in the San Francisco Bay Area, it quickly became evident that existing markets could not absorb the quantity of salvaged lumber being produced. Thus, the Wood Reuse Working Group was formed, bringing together nonprofit social service agencies performing deconstruction, for-profit deconstruction businesses assisting them, and deconstruction advocates and technical assistance providers. Members include Alameda County Supervisor Wilma Chan's office, Beyond Waste, Building Opportunities for Self-Sufficiency (BOSS) Enterprises, East Bay Conversion and Reinvestment Commission, Materials for the Future Foundation, National Economic Development and Law Center, Treasure Island Homeless Development Initiative, and Youth Employment Partnership.

The Wood Reuse Working Group commissioned a study of the markets for reused lumber and concluded that a retail outlet and value-added manufacturing were the answer. To that end, the Group proceeded to develop a business plan for an integrated wood mill using exclusively salvaged lumber. The mill would serve as a recycled lumber retail yard and would remill dimensional lumber and manufacture products such as tables and architectural millwork. The Wood Reuse Working Group is currently raising the funds required to start up the enterprise and was recently awarded a \$500,000 grant from the Department of Health and Human Services for the project.

A report entitled *Overview of the Market for Reclaimed Lumber in the San Francisco Bay Area* is available. For more information, contact Lisa Geller of the Materials for the Future Foundation at (415) 561-6530 or visit www.materials4future.org



Cal Forte of BOSS Enterprises' crew removing a door at Naval Air Station, Alameda.
Photo courtesy of the East Bay Conversion and Reinvestment Commission.

hood Energy Consortium is developing a project to manufacture planter boxes out of scrap wood as well.

In the San Francisco Bay Area, a group of deconstruction organizations coordinated by the Materials for the Future Foundation (MFF) is embarking on the creation of a much larger enterprise: an integrated reclaimed wood mill and retail yard. (For more information about the formation of this group, see the sidebar.) MFF recently received a grant of \$500,000 from the Department of Health and Human Services' Office of Community Services to establish the mill, which will support local community-based deconstruction enterprises by purchasing reclaimed wood for remanufacturing and resale. The groups are currently recovering hundreds of thousands of board feet annually from deconstructing military buildings. The recovered lumber is sold for thirty-five to fifty cents per board foot. If the mill remanufactures the wood into new products like flooring, dimensional lumber, or door and window trim, it could receive as much as \$2.50 per board foot.

As discussed earlier, the success of deconstruction is tied to revenue from the sale of reclaimed material, but in many cases, weak local markets, high material handling costs, and a poor distribution network for reclaimed wood make deconstruction an expensive proposition. Developing a mill and retail yard addresses these concerns by providing several critical services to the local deconstruction and reclaimed wood industry. By acting as the central hub in a network of local deconstruction and reuse enterprises and projects, the mill will strengthen local reclaimed wood markets and support the sustainability of local deconstruction and wood reuse enterprises. In addition, the mill will also help to stabilize the local supply of remilled reclaimed wood. This will facilitate the development of enterprises that use reclaimed wood, as well as encourage the use of reclaimed wood in construction applications.

IV. Emerging Government Support for Deconstruction

Recognizing the environmental and economic benefits of deconstruction, government agencies at all levels are endorsing deconstruction by passing legislation, issuing contracts for projects, and providing financial support to pilot projects.

A. Local Government Support

Several local government agencies, including the cities of Berkeley and Cotati and the Castro Valley Sanitation District in California, have issued Requests for Proposals for deconstruction. Others have established citywide policies to promote deconstruction, ranging from voluntary incentives to mandated requirements. For example, the City of Los Angeles distributes voluntary, incentive-based guidelines for reusing and recycling construction and demolition debris for all Board of Public Works contracts. The city also requires contractors to submit a solid waste management plan, including reuse and recycling to the greatest extent feasible, and to submit progress reports during the course of the contract.³¹ Since 1993, the City of Cotati has required that reusable and recyclable materials from all structures to be demolished be made available for salvage prior to demolition. The policy applies to both public and private sector projects and requires public notice of the intent to demolish and the availability of potentially salvageable materials.³² The City of Berkeley has banned the use of virgin redwood in city projects, creating a market for redwood salvaged through deconstruction.

The Hartford Housing Authority (HHA) is the first housing authority in the nation to fully embrace deconstruction through the creation and support of a resident-owned deconstruction business. In September 1998, the Hartford Community Deconstruction Service Company was formed as a unique, resident-owned, stock company with the HHA and Manafort Brothers Inc. The City of Hartford is committing \$17 million in state grants for deconstruction of abandoned housing units, thus creating a ready market for the new deconstruction company.

B. Federal Government Support

Several federal government agencies have also demonstrated support for deconstruction by providing financial and technical assistance to pilot projects across the country. The U.S. EPA supported the full documentation of the deconstruction of a 2,000 square-foot, 4-unit residential building in the Riverdale Housing Project in

Communities can employ policies and practices to promote deconstruction:

- Pass ordinances requiring deconstruction to be considered in conjunction with or as a replacement for demolition through the use of building assessments.
- Inventory and assess abandoned buildings and those scheduled for removal to identify good candidates for deconstruction projects and make the database of information available to the public.
- Require redevelopment projects to review building components in structures scheduled for removal to assess their reuse potential.
- Use government contracting processes, such as Requests for Proposals (RFPs), by including materials recovery requirements, requiring a salvage and reuse plan, and/or awarding points in bidding processes for high recovery rates.
- Require the complete removal of hazardous materials, and separate bids for this work, for all demolition and deconstruction projects, to level the playing field on this expensive issue.
- When reviewing bids, allow a price preference for hitting deconstruction targets (e.g. low bid plus 10 percent).
- Tie approval of and fees for local demolition permits and environmental reviews to maximized materials recovery (i.e. more recovery, lower permit fee).
- When reviewing requests for demolition permits, do not allow "negative declarations" to take the place of an environmental impact review that considers the environmental impacts of demolition and how those could be mitigated with deconstruction.
- When possible separate the permitting, contracts and/or financing for site clearance from the design/build phase of construction projects to allow adequate time for deconstruction.

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Baltimore, Maryland, by providing grant funding to the National Association of Home Builders Research Center. U.S. EPA also awarded a Sustainable Development Challenge Grant to the Green Institute for their deconstruction program described above and, using global climate change funds, awarded the Materials for the Future Foundation a grant to facilitate deconstruction on closing military bases and in public sector projects. The U.S. EPA is also providing technical assistance to a number of community-based deconstruction projects and has posted deconstruction resources on its Smart Growth website, www.smartgrowth.org.

The Department of Health and Human Services' (HHS), Office of Community Services provided funding to the Green Institute to start its deconstruction enterprise. HHS also provided funds to the Institute for Local Self-Reliance to prepare a deconstruction training manual and to develop business plans and attract capital to deconstruction ventures throughout the U.S. As described earlier, HHS awarded the Materials for the Future Foundation and its partners a \$500,000 grant towards the development of a recycled lumber mill, which will use wood recovered through deconstruction.

The Department of Defense, Office of Economic Adjustment (OEA), which provides support to communities with closing military bases, is encouraging deconstruction as a means of removing outdated structures from closing bases. OEA awarded a grant to the East Bay Conversion and Reinvestment Commission (EBCRC) for a deconstruction pilot project at the Naval Air Station Alameda (NAS Alameda) in the San Francisco Bay Area. The EBCRC used these and other funds to develop a methodology for using deconstruction in the military base conversion process and to examine issues such as project financing, job training, and contracting.

EBCRC also conducted a technical assessment of the structures on NAS Alameda for inclusion in a pilot deconstruction project that occurred in September, 1998. The deconstruction project at NAS Alameda resulted in the creation of several documents and procedures that can be used at other facilities, such as a building survey, a rating system in spreadsheet format, a sample Request for Proposal, and an amendment to the master lease between the local reuse authority and the Navy which allows deconstruction of buildings leased to the reuse authority. A similar building assessment protocol was developed using funds from the City of San Francisco for the Treasure Island Homeless Development Initiative, an organization seeking to deconstruct buildings on a former Naval base in the San Francisco.³³ Deconstruction at military bases may increase further with the recently adopted goal of a 40 percent reduction in solid waste

generation at military bases.³⁴

The U.S. Department of Agriculture's Forest Products Lab (FPL) conducts research on the recovery, reuse, and recycling of paper and wood as a way to extend our nation's forest resources. The FPL has worked with two closed military bases to evaluate the lumber and timber from military deconstruction projects. The FPL worked with the Twin Cities Army Ammunition Plant in New Brighton, Minnesota on the feasibility of recycling old timbers from large industrial buildings. Also the FPL is working with Fort Ord in Marina, California, to evaluate lumber from residential and light industrial military buildings. The FPL has been evaluating the grades and strength characteristics of this used lumber and timber. Working cooperatively with lumber grading agencies, their goal is to develop grading criteria and grade stamps specific to reclaimed lumber and timber. Establishment of this technical information is essential if widespread markets are to be developed for recycled lumber and timber.

On February 1, 1999, President Clinton announced the annual budget. He included a new federal initiative for abandoned housing that adds \$50,000,000 for demolition and/or deconstruction of abandoned buildings in urban America. Preference will be given to communities that link existing youth training programs with the property's redevelopment.

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- Publicly acknowledge the training benefits associated with deconstruction and be willing to pay for them.
- Support used building materials yards and other end markets for materials salvaged through deconstruction.
- Assist deconstruction service providers with resolution of issues surrounding lead paint and asbestos remediation.
- Develop a network of deconstruction service providers and advocates who can work together to overcome local barriers to deconstruction.
- Convert HUD public housing demolition program funds (HOPE VI) to deconstruction program funds focusing on community enterprise development.
- Require a minimum content of used building materials in local government construction and renovation projects.
- Train and license deconstruction firms to perform hazardous material abatement and/or develop parallel specialized abatement enterprises.

Federal Agencies Supporting Deconstruction

Department of Agriculture, Forest Products Lab
Department of Defense, Office of Economic
Adjustment and branches of the military
Department of Health and Human Services,
Office of Community Services
Department of Housing and Urban Development,
Deconstruction Taskforce
Environmental Protection Agency, Office of Solid
Waste and Office of Policy

V. Conclusions and Recommendations

Deconstruction experts in the U.S. estimate the industry is growing by about 200 percent per year. In Canada, where deconstruction has been underway for more than five years, the industry experienced similar growth early on and is now experiencing steady growth of about 20 percent per year.³⁵ If deconstruction were to become standard practice, it could have profound implications for communities across the country.

In the San Francisco Bay Area alone, over \$5 billion in construction projects will be implemented in the next two years, and yet a shortage of trained construction workers exists.³⁶ Deconstruction can help meet this need by providing both materials and trained workers. In fact, the Institute for Local Self-Reliance estimates that deconstruction has the potential to create the equivalent of at least 100,000 jobs and recover \$500,000,000 in building materials annually if deconstruction is fully integrated into the demolition industry on a cost-effective basis.³⁷

In addition to the policies and practices discussed earlier, several actions and policies at the national level could help make these projections a reality, such as:

- The Department of Housing and Urban Development could require deconstruction of suitable public housing under its HOPE VI Program. This would help HUD achieve its goals under Section 3, which calls for maximizing HUD expenditures in the communities where projects are wanted.
- The successful deconstruction of obsolete buildings at several military bases could be extended to all Department of Defense facilities, to all federal facilities, and to buildings taken down with federal dollars.
- Federal procurement guidelines or an executive order could require the use of reused building materials by federal agencies and their contractors, much like existing policies for recycled products.
- A National Deconstruction Training Institute could be established to train participants in government, industry, unions, and communities to deconstruct buildings and sell the recovered material.

Deconstruction can serve as the basis for collaboration among diverse groups of stakeholders, attracting support from many different areas and providing a wide array of community benefits. Given the enormous potential benefits to communities, successful pilot projects and partnerships to date, and the existing and anticipated need for the removal of structures and for job training and employment, deconstruction is a compelling alternative not to be ignored. Every building demolished without consideration given to deconstruction represents an economic and environmental opportunity squandered.

Appendix A. Deconstruction Contacts and Organizations

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Rhodes, Julie. Reuse Development Organization (REDO), P.O. Box 441363, Indianapolis, IN 46244. Phone (317)631-5395, Fax (317)631-5396, Email: info@redo.org URL: <http://www.redo.org>

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- Fishbein, Bette K. *Building for the Future: Strategies to Reduce Construction and Demolition Waste in Municipal Projects*. INFORM, Inc. New York, NY. June 1998.
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- ⁷ Based on conversations with John Hannum, United States Navy, Department of Recycling, Hazardous Materials, and Solid Waste Policy.
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- ¹⁴ For more information on deconstruction on closing military bases, see the publications referenced in notes 16, 33 and 36.
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- ¹⁹ Sources include the Smart Growth Network website, Youth Employment Partnership's Final Report on the Deconstruction of Building D-733, press clippings from the Green Institute, Philip Kreitner (see note 13), and the Reuse People newsletter. Does not include wood that was chipped for fuel or mulch.
- ²⁰ Dennis Livingston, Community Resources, Inc., Memo on Hartford training program, October 1998.
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- ²² Conversation with Andrew Cuomo, Secretary of Housing and Urban Development.
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- ²⁵ Conversations with Gregory Davis. International Representative Construction, Maintenance and Service Trades Division, International Laborers Union of North America, February 1998.
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- ²⁸ Rick Penner, *Building Materials Recycling/Reuse Centre Survey Report*, EarthWorks Environmental, Winnipeg, Manitoba, November 1994.
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- ³⁰ Crate & Barrel advertisement in the *San Francisco Examiner Magazine*, March 22, 1998.
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- ³⁵ Based on conversations with several industry experts in the U.S. and Canada.
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