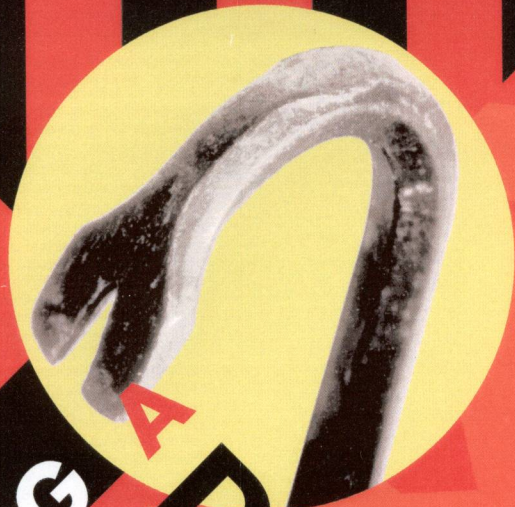


BUILDING A DECONSTRUCTION COMPANY

A training manual
for facilitators
and entrepreneurs



DENNIS LIVINGSTON, COMMUNITY RESOURCES
MARK JACKSON, INSTITUTE FOR LOCAL SELF-RELIANCE

Produced by the Institute for Local Self-Reliance (ILSR)
with funding provided by the Materials for the Future Foundation

Institute for Local Self-Reliance

The Institute for Local Self-Reliance (ILSR) is a nonprofit research and educational organization that provides technical assistance and information to city and state governments, 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 towards 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.

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2425 18th Street, NW
Washington, DC 20009-2096
Phone: 202-232-4108
Fax: 202-332-0463
E-mail: ilsr@igc.org
website: www.ilsr.org



1313 5th Street SE, Suite 303
Minneapolis, MN 55414-4513
Phone: 612-379-3815
Fax: 612-379-3920
E-mail: ilsr@igc.org
website: www.ilsr.org

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Community Resources' focus is on building the capacity of low-income communities to remediate residential, environmental problems.

Community Resources seeks to develop technologies based on the interrelatedness of environmental problems (lead poisoning, asthma, and Carbon Monoxide poisoning) and the inextricable nature of their solutions, and that provide economic opportunities for the citizens of low-income communities, leverage neighborhood resources with the economy and the environment, and that reverse dollar drain.

"There are no poor communities, only communities whose human, economic, natural and infrastructure resources are drained. The mitigation of environmental problems is one way to reverse the dollar drain and restore the health of communities."

COMMUNITY RESOURCES
1601 Guilford Avenue, #45
Baltimore, MD 21202
Phone: 410-727-7837
Fax: 410-727-4242
E-mail: dlresource@aol.com

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Mark Jackson
Chief Researcher
Deconstruction Program
Institute for Local Self-Reliance

BUILDING A DECONSTRUCTION COMPANY

A TRAINING MANUAL FOR FACILITATORS AND ENTREPRENEURS

Written By

Dennis Livingston, Community Resources
Mark Jackson, Institute for Local Self-Reliance

Illustrations By

Dennis Livingston, Community Resources

Page Layout

Mark Jackson, Institute for Local Self-Reliance

Cover and Graphic Design By

Kelly Bell

Produced By

Institute for Local Self-Reliance (ILSR)
Project Director
Neil Seldman

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BUILDING A DECONSTRUCTION COMPANY

A TRAINING MANUAL FOR FACILITATORS AND ENTREPRENEURS

This manual is designed to assist interested entrepreneurs, community development organizations, and governmental agencies interested in starting a deconstruction business. It is designed to help facilitators and entrepreneurs decide what business or organizational structure best suits their needs. It will provide you with assistance in setting up and operating a deconstruction enterprise. It will help you decide what buildings to deconstruct and what skills and techniques are required to manually dismantle a building, and it will also help you with managing and marketing salvaged materials

This manual is a work in progress, and we would appreciate any comments, additions, or questions you may have which we can use to expand and refine training opportunities for use in future editions.

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BUILDING A DECONSTRUCTION COMPANY

A TRAINING MANUAL FOR FACILITATORS AND ENTREPRENEURS

The following symbols will be found throughout this document:



Danger: Remain aware of these items in order to prevent injury, poisoning or death.



Material: Ideas on the handling, grading, or reuse of material.



Tip: Useful information.



Respiratory Risk: Workers must wear respiratory protection and use “engineering controls” (methods to minimize dust) during this operation.



Thought: A thought that you should keep in mind.



Tool Tip: A tool that may be of use for a specific operation.



Research: Research is needed for information about a specific trades procedure (the trades include: HVAC, electrician, plumber, demolition mechanic, roofer, etc.).

A. INTRODUCTION

According to the U.S. Environmental Protection Agency, in 1996 the U.S. produced an estimated 136 million tons of building-related construction and demolition (C&D) debris. The EPA estimated that only 20 to 30 percent of this debris was recovered for reuse or recycling. Although the construction and demolition industry has made great strides in the recovery of C&D debris, the demolition of buildings continues to destroy valuable building materials, consume scarce landfill space, and expose workers, neighborhoods and the environment to toxic and hazardous waste. Developers and construction companies typically look at buildings located on property slated for development as a costly, unavoidable annoyance. Developers and construction companies are offered little choice when it comes to removing these buildings.

Deconstruction – the planned and systematic disassembly of buildings – provides developers and construction companies with another option. Deconstruction companies use mostly manual labor and hand tools in much the same manner as construction companies, although instead of installing building components, they remove them. Most deconstruction companies disassemble buildings and supply salvaged building material. Many companies also provide additional services such as job development, skills training, "value-adding", reconditioning, and re-crafting of material.

Deconstruction can provide many opportunities and benefits for companies, individuals, communities and the environment.

- ☞ Deconstruction requires little capital for companies and organizations which already have construction or demolition tools and vehicles.
- ☞ A deconstruction business can be developed easily within the administrative structure of a Community Development Corporation (CDC) or an existing construction/demolition company, or by workers in the construction, demolition, renovation, and building-maintenance field, who already have many of the skills needed to perform deconstruction.
- ☞ Deconstruction is optimal for rebuilding local economies. Deconstruction can promote the recycling of dollars spent in a local economy by providing local salaries, channeling salvaged materials through local building material reuse stores, and by supplying material to local remanufacturing operations and local housing renovation projects.
- ☞ Deconstruction can help workers advance into professional construction-related careers and into other careers and entrepreneurial opportunities of land reclamation, historic restoration, remanufacturing, brownfields remediation, and lead hazard remediation.

- ⇒ Deconstruction allows for the preservation of valuable architectural artifacts.
- ⇒ Deconstruction can save substantial amounts of precious landfill space.
- ⇒ Deconstruction protects workers, the neighborhood and the environment from toxic and hazardous material.

Demolition generates and spreads toxic dust – airborne during demolition, in the water used to wet the site, and in the contaminated site left behind. The dust contains lead and other heavy metals, molds and other organic irritants, and in some cases asbestos; for asthmatics, the dust itself is toxic.

- ⇒ Deconstruction can produce large amounts of reusable building materials which can save resources by:
 - lowering energy costs by replacing virgin material processing with used material reconditioning and remanufacturing, avoiding mining costs, including the degradation of land and water,
 - minimizing raw material transportation, and
 - saving forests, reducing the depletion of native forest resources.

B. SETTING UP THE COMPANY

COMPANY FOCUS

A deconstruction company can take a variety of forms such as an individual or small commercial deconstruction operation, a joint venture between a demolition business and a deconstruction company, or a community-based, non-profit deconstruction/reuse operation. There is plenty of room for expansion and new business developments in the market for deconstruction, given the vast amount of building material stockpiled in obsolete and abandoned buildings across the United States.

Prior to the use of heavy machinery and tight timetables, deconstruction was the way buildings were removed. This is still true in most of the world. Some demolition companies are increasing recycling and reuse. They are combining deconstruction techniques with demolition, and joint-venturing with deconstruction companies, and non-profit and government deconstruction training programs.

Deconstruction entrepreneurs have realized the economic potential of dismantling buildings for the material they contain. For many years, salvagers and savvy demolition companies have recovered the more valuable elements from buildings before they were destroyed. Deconstruction companies are removing additional material, such as wall studs, floor joists, bricks, roofing, siding, windows, doors, roof rafters and trusses. Some companies have been able to compete against demolition companies for building removal projects simply by providing a lower bid due to reduced disposal fees, revenue from material sales, lower overhead and marketing an environmental focus.

Deconstruction companies have also risen from building material reuse stores as a means to increase their supply of used building material. These companies can compete further with demolition companies by offering tax-deductible donations for material recovered through deconstruction. This setup provides the opportunity to operate deconstruction separately from reuse while still providing a secure outlet for the deconstructed material; a vital component for the operation of an effective deconstruction company. It also allows for the companies to share overhead expenses.

Specific choices that need to be made at start-up in order to adequately structure, staff, and equip the company include the following.

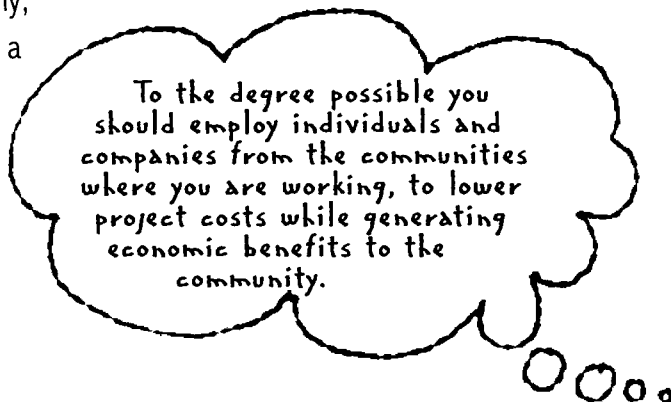
⇒ Three main company objectives

Beyond the company operating in the black, the three key objectives/benefits of a deconstruction company should be:

- Lowering the environmental impact of demolition, processing, or harvesting of new material.
- Making high-quality building material available for construction, renovation, and restoration.
- Providing administrative and trades training which leads to careers and locally-owned businesses.

Other objectives might include:

- setting up a community-oriented wholesale/retail facility;
- developing a deconstruction, renovation, and restoration-training program, through an "in-house" contracting company;
- integrating salvaged material into a construction, renovation, and restoration program;
- processing material and using it for the "value-adding" remanufacture of new products such as furniture;
- performing land reclamation work ranging from the simple filling of foundations and landscaping to brownfields remediation;
- consulting and training in the areas of deconstruction, material processing, sales, and remanufacturing; and
- educating the public in the feasibility and benefits of resource conservation.



⇒ Building Types

- Free-standing, low-rise (one to three stories), wood-frame structures. This is the least capital-intensive market for deconstruction as no heavy equipment is required and the framing material is potentially reusable (as opposed to just recyclable).
- Masonry row (town) house structures. These require masonry skills as adjacent buildings are put at risk by in-row deconstruction and supporting walls may need to be built. Brick and cement block walls are highly variable in their ability to be profitably disassembled, leaving bricks and blocks clean and intact.
- Mid-rise, multifamily residences, warehouses and industrial spaces. Unless these buildings are frame and masonry construction, they are usually beyond a start-up company's capacity.

- Purchasing or renting equipment used for deconstructing multifamily, commercial, light industrial and warehouse buildings, such as staging, a "cherry picker," or light crane will drive up capitalization costs. This document will not address steel and reinforced concrete buildings, as they require a far higher skill level, expensive capital equipment and greater risk.



Choosing to deconstruct simple buildings, at start-up, can lower capital needs and risks.

⇒ Level of Deconstruction

- Pre-demo "Architectural" Salvage – This operation is the simplest and involves the least risk and expense, as it does not include structural deconstruction. Its focus is on historically- and architecturally-significant components (sashes, panel doors, mantels, hardwood flooring, fixtures, built-in cabinets, etc.) and the salvaging of valuable recyclables such as copper pipes and wire, aluminum, and brass.
- Structural deconstruction would include removing the above items plus all of the other building components, except for the foundation.
- Land reclamation involves removing the foundation walls and basement slab, filling in the basement, implementing basic land grading, and possibly landscaping.
- Material handling includes processing, grading, bundling, and wholesaling and retailing of salvaged building material.
- Remanufacturing includes using salvaged material in the creation of new products.

⇒ Customer Base

- private sector single- or multifamily-building owners
- private-sector builders
- federal government projects such as military-base closings
- HUD-funded projects including public housing
- Community Development Corporations (CDC's)
- historical reclamation and restoration projects
- municipal government agencies

Administrative structures, labor rates, insurance requirements, certifications (such as for lead paint) and bidding procedures will differ with each customer.

2

MARKET ANALYSIS

Decisions on company purpose and structure are informed by knowledge of existing and potential markets. Market analysis for deconstruction includes researching demand for deconstruction services and demand for the salvageable and recyclable material recovered from deconstruction. It requires understanding area tipping fees for construction and demolition debris, performing a demolition survey, and creating an area building-type database.

⇒ **Markets for Deconstruction Services**

There must be sufficient annual need to remove buildings in order for a deconstruction company to be successful. Even a deconstruction training enterprise requires buildings to deconstruct. Deconstruction taps into the demolition market, focusing on the building types mentioned above. Markets for deconstruction include, but are not limited to the following.

- **Building owners**

Owners looking to remove vacant or abandoned buildings may require the services of a deconstruction company.

- **Construction companies**

Construction or development companies are often tasked with the removal of structures before new construction can begin. Deconstruction companies can bid for the contract to remove these structures. In some cases the deconstruction company can gain an advantage if only partial building takedown is required, such as the removal of interior building components.

- **Demolition companies**

Demolition companies can use the services of a deconstruction company to remove all or parts of a building such as architecturally significant items, flooring, siding, and roofing.

- **Government agencies**

Many government agencies such as the Department of Defense and housing authorities can be an excellent market for deconstruction depending on the services offered by the deconstruction company. Not only do these agencies require the removal of a substantial number of buildings but also often support training and employment programs.

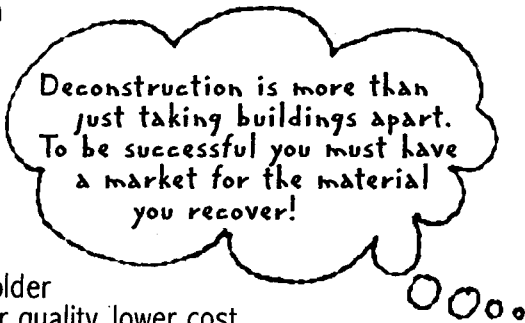
⇒ **Markets for Salvageable Material**

One of the most critical, beneficial and complicated tasks of deconstruction is finding a viable market for all the salvaged building material. Without an outlet a deconstruction company would have to store, or even worse landfill, all the recovered material from its projects, losing an important cost avoidance and/or environmental responsibility advantage over demolition. Before deconstructing you must analyze the local market capacity for the sale of salvaged building material. It is a planning prerequisite to identify and determine the available

markets for salvaged building material, or you may literally be sitting on your material. Unless you have a secure single outlet for your material, such as a neighboring building material reuse store, you will want to identify and hopefully secure a wide-range of markets for your material. This will help you move the great array of material acquired from your deconstruction projects, and help overcome any variances in the market demand for salvaged material.

Markets for salvaged building material may include the following.

- Companies that renovate and maintain historic buildings and buildings within historic districts. These companies require high-end architectural components that can only be found in existing buildings or through companies that specialize in after-market replacement items. Contact your local historic preservation agencies for a listing of companies that specialize in historic renovation.
- Renovation contractors, "do-it-yourself" building owners, and property management companies often choose older material over new material for its higher quality, lower cost, and/or replacement value (oftentimes building renovators eliminate the need to retrofit by purchasing original components).
- Re-manufacturers that convert old building material into new products, such as milling reclaimed flooring from wood originally used as structural components in ceilings, floors, and roofs.
- Artists and designers looking for unique items for creative projects.
- General public needing miscellaneous building material.



The markets for salvage building material should grow as architects, builders and customers of building material develop more interest in "green building" strategies. (See Chapter E for additional options for marketing salvaged building material).

Many types of material can be salvaged through deconstruction.

- Architectural components having historic and craft value including:
 - light, water, and gas fixtures,
 - stained/beveled glass,
 - hardwood paneling and trim,
 - door and window units,
 - antique appliances, and
 - staircase systems.

- Millwork including:
 - paneled doors,
 - window units,
 - mantels,
 - built-in cabinets, and
 - trim and molding.
- Fixtures and appliances including:
 - porcelain-on-steel tubs and sinks,
 - radiators,
 - relatively new electric breaker panels and transformers, and
 - relatively new heating systems.
- Remaining reusable material including:
 - roof trusses and beams,
 - high-quality siding,
 - studs, beams, and joists,
 - pressure-treated lumber,
 - sub-flooring and roof decking,
 - tongue-and-groove flooring,
 - bricks, cement blocks, and tile, and
 - trees and mature bushes.

📖 Markets for Recyclable Material

You will need to contact your solid waste department to determine the companies who will accept recyclable material from your deconstruction projects, and compare payment/tipping rates. Contacting these facilities will provide you with the profit or cost of recycling material versus its disposal. You will also be able to determine what demolition companies are paying or making by recycling.

Keep in mind that the recycling facilities in your area may not accept all types of recyclables recovered through deconstruction. Material, which is not recyclable or is contaminated, should be properly disposed of. Source separating recyclable material increases its value. Material that can be recycled from deconstruction projects include:

- un reusable, uncontaminated wood,
- metal: copper, aluminum, cast iron, other mixed metals (usually no drums or tanks),
- dry wall (not plaster),
- asphalt roofing (usually excluding hot tar, built-up and asbestos containing),
- fluorescent lamps,
- white goods (washers, dryers, etc.),
- insulation,

- glass,
- ceiling panels,
- corrugated cardboard,
- carpets,
- vinyl siding,
- windows (no glass),
- clean soil,
- concrete and asphalt (may be ground on site), and
- brick not good enough for reuse.

Once you locate the recycling facilities in your area you will want to ask them the following questions.

- Under what conditions do they purchase material?
- What do they pay or charge for material?
- Under what circumstances or contamination levels do they reject material?
- Do they limit the amount of material accepted?
- Do they have a minimum tonnage requirement?
- Do they supply and/or charge for "drop-off" containers?
- What separation requirements exist?

⇒ **Disposal of Construction and Demolition Waste**

You will also need to answer the following questions about disposal in order to correctly estimate costs and determine the savings achievable through salvage and recycling.

- What material does the area C&D landfill(s) accept or reject? (What material a landfill accepts will vary depending on the hazardousness and toxicity of the material.)
- Do they require separation of any material?
- What are their tipping fee(s)?
- Do they limit the amount of material accepted?
- Do they have a minimum tonnage requirement?
- Do they supply and/or charge for "drop-off" containers?

⇒ **Demolition Survey**

It is critical that you gather all costs relevant to demolition in order to perform an accurate cost comparison between demolition and deconstruction. Be careful not to underestimate the real costs of demolition, which can include:

- securing the site including traffic diversion, fencing, and run-off barriers and filters (particularly when demolition is being hosed down),
- permitting and licensing fees,
- temporary bracing of adjacent buildings,
- labor costs and the capital and operational cost of heavy machinery,
- recycling and disposal tipping fees,
- land reclamation (particularly back fill of basements), and
- permanent wall-buttressing of adjacent buildings.

You should also compile a list of buildings that have been demolished annually over the last few years and those currently slated for demolition. To the degree possible, determine size (number of stories and square feet), structure (frame, masonry face, masonry bearing, etc.), age of structures and, bid statements and final cost of specific jobs. Some sources for this information may be the city planning department, the department(s) within the local government that provides permits for demolition (demolition may be included in a construction permit), the department of planning, the department of the environment, the public housing agency, and CDCs.

⇒ Deconstruction Database

Based on recent and projected demolitions, estimate the potential for deconstructing and recovering material for various building prototypes in your area. Develop prototypes based on building height, construction method, presence of toxic material, easy access to sites, structure and depth of foundation, etc. Developing a deconstruction database is vital for educating policy people, raising funds, selling services and developing a business plan.

3

COMPANY STRUCTURE

⇒ Foundations

To minimize start-up expenses such as administrative systems, capital equipment purchases, facilities development, customer base and professional relations, the start-up can be built within an existing company. Some optimal examples include the following.

- A demolition company: A demolition company would already have capital equipment, personnel, administrative structure, permits, licenses, insurance and markets in place. The disadvantage is that its focus is usually on rapid mechanical site clearance and rarely on job creation, community development or environmental/preservation. A relationship may include a mentoring partnership where the demolition company provides resources to the deconstruction company in exchange for trained workers.

- Construction company: Local construction companies can supply many of the same resources as a demolition company.
- Salvaged material retail and/or wholesale store: This starts the project with an existing functioning outlet with potential for processing and grading capacity.
- A housing development program that focuses on using used materials would supply a market for reclaimed building materials, a history of relations with housing regulatory agencies, and contact with local contractors.
- Trades training center: As deconstruction is so labor-intensive, starting with a trained, supervised and insured work force that is already receiving a stipend would simplify start-up. If the center has a construction program they would already have most of the necessary capital equipment.
- Some combination of the above will multiplies advantages.

⇒ Non-Profit vs. For-Profit

It should not be assumed that a non-profit structure serves the community better than a for-profit. Frequently non-profits absorb far more resources than their contributions in services justify. Often for-profit companies respond to their customers better, pay higher salaries to workers, and are more competitive.

Potential advantages of a non-profit structure include:

- the ability to use grant subsidies to enter or develop markets for deconstruction and reclaimed building material;
- the ability to serve constituencies (at-risk youth, very low-income homeowners, unskilled workers) that would not be fiscally sound for a for-profit;
- the ability to pilot, at a loss, new work procedures, delivery systems or services, serving as the research and development function for subsequent for-profit spin-offs or successors;
- access to foundation money, tax breaks and private sector contributions;
- easier to partner with larger successful for-profits in a mentoring relationship; and
- financial, political, technical and administrative support from a non-profit board.

The board's membership is critical. Some key players are:

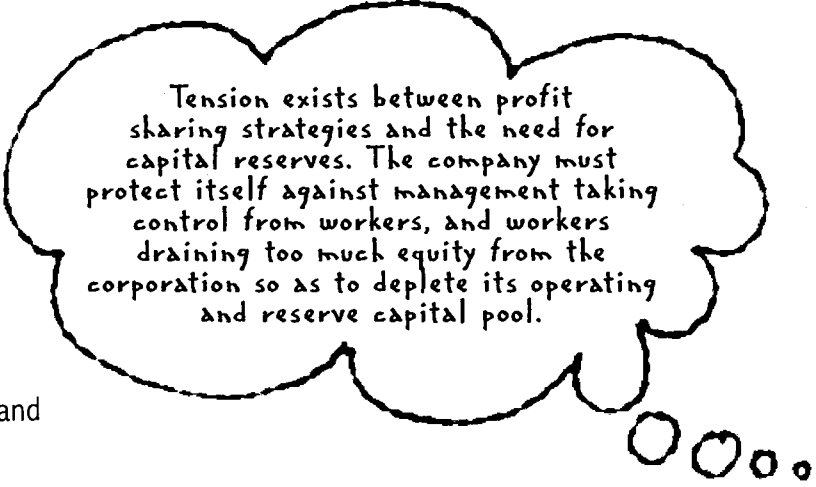
- people with access to private and public funds and/or who have strong fundraising skills,
- people with access to and influence in the municipal government decision-making process,
- participants with a long history in, and knowledge of the local housing market, specific skills in law, the building trades, accounting, demolition, brownfields remediation, etc.,
- community activists and leaders, and
- representatives from the non-profit work force chosen by the employees.

The board is legally responsible for the organization and makes all policy and direction decisions. Non-profits tend to get into trouble if the board also tries to make day-to-day procedural decisions or, at the other extreme, leave everything to the executive director. Putting representatives from the crew on the board can help the board understand field conditions and help the crew understand administrative and management processes.

⇒ A "C" Corporation

One for-profit structure that would fulfill a range of objectives is a "C" corporation. A "C" corporation is formed with a board, which controls the corporation and hires a business manager. In a small start-up company the business manager may work part-time and also take on the duties of the deconstruction supervisor. The board members could include:

- members of the crew – the number of crewmembers could increase over time, eventually becoming a majority,
- someone with strong business/accounting skills and marketing skills,
- a person from a demolition company,
- an architect or building engineer,
- someone with strong government ties,
- a community leader/advocate, and
- a person with environmental/health and safety skills.

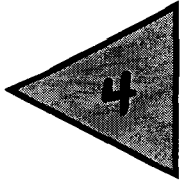


Tension exists between profit sharing strategies and the need for capital reserves. The company must protect itself against management taking control from workers, and workers draining too much equity from the corporation so as to deplete its operating and reserve capital pool.

The board could meet quarterly and separate committees could meet with the manager and workers more often.

After two or three years, or when a predetermined net worth is achieved, the control could be shifted to an ESOP (Employee Stock Ownership Program), at which point the employees would control a majority of the company assets. They may at this point also have a board majority.

Other questions to be addresses about a "C" corporation include: (1) how do new members/employees enter the corporation, (2) how do new members achieve an equity and decision-making position, (3) when employees leave, what equity may they take with them?



GOVERNMENT SUPPORT AND FINANCING OPTIONS

☞ Government Support

Deconstruction is a reversion to an earlier technique of removing buildings and although it's being re-established, in some areas across the country it still faces many challenges. If you are seriously considering starting up one of these companies you must be aware that deconstruction is a building removal technique that builds on the momentum of recycling and reuse, which differs greatly across the United States.

Key to a successful deconstruction enterprise is positive policy support and reinforcement from local and regional governments; local, regional and national economies that favor recycling and reuse; positive environmental and community attitudes; and of course, as in any business venture, lots of planning, hard work, and commitment.

The following are some policies and legislation which directly or indirectly supports deconstruction and the salvage of building material. Before starting up a deconstruction enterprise make sure to review any supporting legislation and financial assistance that may exist federally, state-wide, and in your community.

Several federal government agencies have demonstrated support for deconstruction by providing financial and technical assistance to several pilot projects across the country. The federal agencies include the Department of Defense, Office of Community Services, Department of Housing and Urban Development, and the U.S. Environmental Protection Agency.

● Department of Defense (DOD)

Military bases slated for closure or conversion are a "goldmine" of opportunities for deconstruction companies. Deconstructing buildings on obsolete military bases can provide a rich supply of building material and opportunities for job training. If you are interested in deconstructing buildings on a closing military base you will need to work closely with the military and any local authorities taking possession of the base.

Deconstruction has been performed on many military bases, including the following:

- Presidio of San Francisco,
- Fort Ord Military Reservation,
- Navel Air Station (NAS) Alameda,
- Treasure Island Navel Base,
- Twin Cities Army Ammunition Plant,
- Port of Oakland, Harbor Transportation Center, and
- U. S. Army's Fort McCoy.

- Office of Community Services, Administration for Children and Families, Department of Health and Human Services (OCS,ACF,DHHS)

The Office of Community Services has provided funding for the creation and expansion of deconstruction businesses across the country. To date, OCS has provided funding to the following organizations.

- The Institute for Local Self-Reliance for the creation of deconstruction booklets, providing community-based technical assistance, and developing of "state-of-the-art" conferences on deconstruction.
- The Green Institute in Minneapolis, MN for the creation of its deconstruction enterprise.
- The Materials for Future Foundation and its partners for the development of a sawmill that mills recovered dimensional lumber into flooring and other wood products.
- Action for Bridgeport Community Development Incorporated for the development of a deconstruction program in Bridgeport, Connecticut.
- The Metropolitan Development Counsel for a deconstruction/demolition partnership to deconstruct buildings at the Fort Lewis Army Base in Takoma, Washington.

- Department of Housing and Urban Development (HUD)

In 1998 HUD agreed to allow recipients of HOPE VI grants to re-invest demolition funds for deconstruction of public housing units. This was an important step towards moving public housing residents off welfare and into living-wage employment, which is the second goal of HOPE VI. Thousands of public housing units are slated for removal across the country. Recognizing that deconstruction could provide a unique opportunity to combine building removal with job training/employment, the Hartford Housing Authority (HHA) was the first housing authority in the nation to require deconstruction as part of its HOPE VI Program.

Deconstruction can also meet HUD's Section 3 requirements of promoting job creation and business development for low-income residents. Section 3 states that, "to the greatest extent feasible, the applicant should promote job training and other economic-lift opportunities for low-income residents and businesses, which are owned by and/or employs low- or very low-income residents..." In fact, Section 3 is excellently suited for deconstruction training and business development, because Section 3 urges recipients to use funds to overcome barriers such as the following (as stated in Section 3).

- If a contractor does not have the correct insurance, HUD funds may be used to subsidize the premiums.
- Where crews are not correctly trained, HUD funds may be used to train them.
- Where a small company has insufficient cash-flow to wait for a municipal payment, HUD funds may be used to set up a cash-flow fund.
- Where there are administrative barriers, HUD money may be used for technical assistance.

Some local and regional governmental examples of support include the following.

- The Town of Atherton, California requires that every structure be made available for deconstruction, salvage, and recovery prior to demolition, and that owners and contractors recover reusable material prior to demolition. The city also requires a 50% diversion rate on all construction and demolition projects, and a minimum deposit of \$5,000 or \$50 per ton of estimate C&D debris before issuance of any demolition permit.
- The City of Cotati, California requires that reusable and recyclable material from all structures be made available prior to demolition through advertisements and mailings.
- As of January 1, 1996, the City of Portland, Oregon requires recycling of waste material on all construction sites with a value exceeding \$25,000.
- In 2003, the state of Massachusetts will ban the disposal of unprocessed construction and demolition debris.
- The City of Oakland, California requires construction and demolition contractors develop a Job Site Recycling and Waste Reduction Plan (JSR & WRP) for all city construction and demolition projects exceeding \$150,000 in cost.
- California's AB 939 regulation requires municipalities to reduce their waste by 50%.
- Marion County, Oregon has a 90-percent landfill-diversion goal.
- On April 5, 2000 President Clinton issued an executive order which established the Giant Sequoia National Forest and indirectly supports deconstruction through increasing the markets for salvaged redwood. The City of Berkeley, California has also banned the use of virgin redwood in city projects.

⇒ Financing Options

Building a deconstruction company within an existing institution greatly reduces costs and risks. Deconstruction of single-family homes can be easily done within the framework of a construction, renovation or demolition company. A business loan is far easier to secure for an existing company, particularly if the company has experience and labor/material numbers from a couple of demonstration projects. You should develop the details of seeking private capitalization in a business plan. It is especially prudent that you research federal sources of assistance if you are interested in starting up a community-based, deconstruction training enterprise. Deconstruction projects can also draw down federal, state and municipal funds as well as private foundation awards in at least the following areas:

- entrepreneurial development,
- job and career development,
- health and safety issues,
- community economic development, and
- environmental protection.

Possible federal sources of funding include:

- Office of Community Services, Administration for Children and Families, Department of Health and Human Services (OCS,ACF,DHHS)
 - Job Opportunities for Low-Income Individuals(JOLI) Program
(www.acf.dhhs.gov/programs/ocs)
 - Community Service Block Grants (CSBG)
Community Service Block Grants provide assistance to states and local communities, by working through a network of community action agencies and other neighborhood-based organizations, to reduce poverty, revitalize low-income communities, and promote self-sufficiency of low-income families and individuals.
(www.nacaa.org and www.acf.dhhs.gov/programs/ocs)
 - Urban and Rural Community Economic Development Grants
In its program announcement for FY 2000 (Supplementary) and 2001, OCS specifically mentioned deconstruction. "One business sector that an applicant could consider addressing is that of the construction trades and, within it, the new and growing sub-sector of building deconstruction and material re-use. Building deconstruction offers new opportunities for career and new enterprises and provides an excellent training ground for employment in the wider construction field where there are serious and growing shortages of trained workers throughout the United States. It also offers opportunities for significant, vertically integrated enterprise development through material salvage, recycling, re-use and re-manufacturing."
(www.acf.dhhs.gov/programs/ocs)
- United States Environmental Protection Agency (U.S. EPA)
 - EPA Community Grant Opportunities
(www.epa.gov/livablecommunities/grants)
 - Jobs Through Recycling (JTR)
(www.epa.gov/jtr/index.htm)
- Department of Housing and Urban Development, Community Planning and Development (HUD, CPD)
 - Community Development Block Grants (CDBG)
 - Opportunities for Youth: Youthbuild Program
 - Rural Housing and Economic Development
(www.hud.gov/progdesc/cpdindx.html)
- Department of Housing and Urban Development, Public and Indian Housing (HUD, PIH)
(www.hud.gov/progdesc/pihindx.html)
- Department of Labor, Employment and Training Administration (DOL, ETA)
(www.dol.gov)

- Department of Commerce, Economic Development Administration (DOC, EDA)
(www.doc.gov/eda)
- Department of Defense, Office of Economic Adjustment (DOD, OEA)
(www.usace.army.mil/business.html)
- Department of Education, Office of Vocational and Adult Education
(www.ed.gov)

Many state and local agencies offer loans and grants that are targeted towards the development of recycling- and reuse-based businesses. Some now even specify deconstruction.

Possible local sources of funding include:

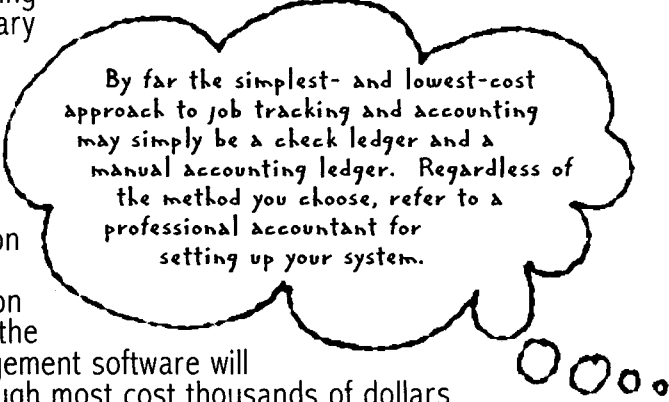
- The Massachusetts Department of Environmental Protection provides both a Revolving Loan Fund (RFL) and a Recycling Industries Reimbursement Credit Grant Program to assist recycling and reuse companies. In FY 2000 the DEP offered \$50,000 to \$300,000 in revolving loans to companies that directly or indirectly recycled construction and demolition material. The DEP also offers Recycling Industries Reimbursement Credit grants of \$50,000 to reuse and recycling companies for processing or remanufacturing of recovered material.
(www.state.ma.us/dep/recycle/recycle.htm)
- Iowa's Department of Natural Resources, Waste Management Assistance Division's Solid Waste Alternatives Program provides low-interest and forgivable loans to qualified projects that reduce that generation and disposal of solid waste. In 2000, the DNR released a Request For Proposals (RFP), Business Opportunity Notice for Construction and Demolition Debris Recycling. The program provided a total of \$450,000 in forgivable loans to "projects that involve the diversion of C&D debris from landfilling or municipal solid waste incinerators by collecting, marketing, processing, or salvaging C&D debris." The RFP specifically listed deconstruction as a suggested method for achieving program goals.
(www.state.ia.us/dnr/organiza/wmad/index.html)
- In early 2000, the California Integrated Waste Management Board (CIWMB) released a funding notice for grants up to \$100,000, which were available to local government deconstruction projects. According to the notification, grants were available for projects which:
 - provided deconstruction training,
 - demonstrated the latest or effective deconstruction technologies,
 - established deconstruction awards and recognition programs,
 - provided technical assistance for deconstruction projects,
 - developed deconstruction guidelines,
 - developed deconstruction case studies and other educational material,
 - expanded or supported existing deconstruction programs, etc.(www.ciwmb.ca.gov/ConDemo)

5

ADMINISTRATIVE ISSUES, FACILITIES, AND EQUIPMENT

⇒ Accounting

A deconstruction company will need at least the basics in administrative and accounting equipment and/or software. There are many excellent accounting and job cost tracking software programs that can be used to track the company's progress, maintain employee records, labor costs, payroll, tax information, and accounts payable. For small startups, a simple spreadsheet program, project management software, and/or business accounting program may be all that is necessary to perform the general accounting duties. More sophisticated programs tailored to construction and demolition companies do exist, although they may not necessarily be appropriate for most deconstruction startups, unless perhaps the deconstruction startup or expansion is very large. A simple search on the Internet under construction management software will reveal many such programs, although most cost thousands of dollars and require annual update payments. These programs do allow for the detailed tracking of both labor and material costs and either come bundled with or can be combined with detailed accounting software.



By far the simplest- and lowest-cost approach to job tracking and accounting may simply be a check ledger and a manual accounting ledger. Regardless of the method you choose, refer to a professional accountant for setting up your system.

You will want to have filing systems for employee paperwork, equipment records, job information, marketing materials, safety records, and other important documents. A simple four-drawer file cabinet should suffice, at least initially, for most business startups.

⇒ Insurance

A deconstruction company needs virtually the same insurance as a contracting company.

- Workers' compensation for a light salvage classification is often 18 to 19 percent of payroll and can run as high as 25 to 30 percent.
- A one to two million-dollar liability insurance policy for a deconstruction operation, which includes coverage for a couple of vehicles, can cost approximately \$5,000 per year in premiums.



An important tip to deconstruction training companies on insurance. A deconstruction-training company may reduce its insurance costs by not hiring trainees prior to training and instead partner with a training organization. Employing trainees and then not hiring them after they complete the training program will increase the company's unemployment and workers' compensation insurance rates. The company could pay the training organization a flat fee based on training hours. The training organization would pay the trainees a stipend and cover all the costs of insurance and benefits. The deconstruction-training company may then choose to hire trainees based on their performance.

⇒ Staffing

A reasonable crew size for deconstructing residential and small commercial buildings is four to six workers. Administrative work for a crew of this size should take about a day per week, so the crew supervisor could do this work, particularly if the crew worked a four-day week of 10 hours per day. This schedule would cut 20 percent from set-up and breakdown time (not to mention giving workers a three-day weekend) and give the supervisor/administrator one day per week of uninterrupted paperwork time. A four-day workweek also provides greater flexibility in dealing with weather-vulnerable work.

The supervisory/administrative skills may include:

- administration,
- job marketing,
- bidding on jobs,
- job costing and accounting,
- site supervision,
- project planning/specification writing,
- environmental evaluation and health and safety monitoring,
- material preparation, organization, grading, estimating, marketing, distribution and sale,
- clerical, and
- skills training and quality control.



Tip: Even with a crew of five, it is difficult for one person to perform all the supervisory and administrative work. Hiring a one-day-a-week administrative person may be very helpful and will free up the field supervisor's time.

Field operations crew skills/responsibilities may include:

- crew on-site supervisor,
- tool monitoring (equipment inventory and maintenance),
- health and safety monitoring (equipment and procedures),
- carpentry (temporary construction as well as deconstruction),
- plumbing/torch cutting,
- roofing (take-down procedures and safety practices),
- masonry (take-down procedures and safety practices),
- material preparation and packaging (such as de-mortaring/palletizing and de-nailing/bundling),
- driver and equipment operator,
- trainer, and
- laborers/demolition technicians in training.



Tip: On crews of four to five, each crewmember will have several responsibilities. For a company that has two or more crews, an on-site crew leader is critical, as the supervisor will have so many responsibilities for setting up other jobs, dealing with regulatory agencies and, if there is not at least a part-time administrator, doing all the administrative work.

☞ Facilities

General facility requirements would include a central location, access to major transportation routes, a loading dock, dry storage capabilities, the necessary security, and an office/meeting space that is capable of holding the entire crew. For a deconstruction company with a single crew, storing and selling many of the salvageable material itself, an optimal facility would be a 1,000 to 3,000-square-foot space with a garage door and 200 to 400 square feet of office space.

Warehouse space requirements would vary considerably, depending on:

- the company's ability or desire to sell material off site,
- the company's choice whether to sell material itself,
- access to a used building material outlet,
- the size of the buildings being deconstructed,
- the composition of the buildings being deconstructed (can bricks and heavy beams be adequately stored outside?), and
- the existence of an effective system for keeping salvaged wood bundled and protected from water damaged.

A centrally located facility makes an excellent crew gathering place to hold meetings, organizing crews at the beginning and end of the day, distribute equipment and safety gear, and hand out any necessary paperwork and, of course, employee paychecks.

☞ Office Equipment

In the office, you will need many of the following items to help with administrative tasks:

- a personnel computer and monitor capable of running at least spreadsheet, word processing, and accounting software, and have e-mail, internet, and printing capabilities;
- a computer printer;
- a image scanner, for marketing materials on the web;
- a couple of tables or desks and chairs;
- a meeting table with chairs;
- a fax machine;

- a small copy machine;
- a file cabinet for records; and
- general office supplies of paper, pencil and pens.

⇒ Other Equipment

The major pieces of equipment that a deconstruction company needs are vehicles capable of transporting material, crews, and equipment to and from the job site. A pick-up truck with a heavy-duty tool lock box, a "stake-body" truck (a "flat-bed" truck with rails), and a van are optimal. However, it is not necessary to purchase all the vehicles upon start-up. Rather, until a heavy volume of work is achieved, it would be more economical to install an "over-the-cab" lumber/ladder rack on a "dual-cab" pick-up truck and use it primarily for deliveries and crew transport. Then, when necessary you can rent larger trucks as needed. Requiring crewmembers to provide their own transportation can also reduce the need for a company van. Sharing a large truck with an existing company can also reduce your overhead.



Tip: Be sure to communicate between jobs when using a truck for material pick-ups and deliveries. A single truck can be shared among many on-going jobs reducing overhead and transportation costs. A truck parked in front of a job site is a constant economic loss.

The second most expensive equipment investment for deconstruction are generators capable of running two or three power tools, plus lights simultaneously. Preferably, you should purchase one generator for each crew and purchase one as a backup. You will also need to purchase many heavy-duty extension cords to connect the power tools and lights to the generators (five or six 100-foot extension cords per crew).



Tip: Where possible, pay a neighbor for power and save the generator. Use a generator when there is no other option— it's less noisy, cheaper, safer, and there is less risk of the generator being broken or stolen (be sure not to overload the neighbor's circuit).

Other equipment that may be required for deconstruction includes:

- power tools (e.g., circular saw, chainsaw, and reciprocating saw) to remove and prepare materials;
- hand tools (e.g., hammers, crow-bars, sawhorses, work lights, shovels, and brooms);

- proper safety gear (see page C9);
- rental tools and machinery (such as a hydraulic jaw spreader and a compressor);
- phones (one for each job supervisor and one for the general supervisor);
- where a warehouse is being used, at least a pallet-jack would be required and eventually a forklift;
- where extensive work is being done over months on a single site, a rented or purchased steel shipping container (line the inside with shelves and bins for tool storage), or a large strong box with a recessed lock bolted to floor joists (be careful not to bolt it just to the floor boards); and
- at some point on larger jobs, a split trailer (one-half office and one-half changing and break space) would be useful.

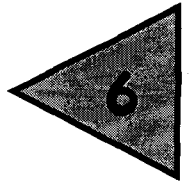
⇒ Personnel Policy

Regardless of the size of an operation, a personnel policy is critical. Although it needs to be comprehensive, the shorter and simpler the better. Use an existing document as a model but have a lawyer review it.

All employees must sign the policy stating they've read, understand and will abide by the personnel policy. Translating it into people's first language or reading it in their first language is absolutely necessary.


Some critical issues to address in the personnel policy are.

- Job descriptions – as cross training in a small company is critical, job descriptions should be broad and flexible. At the same time, minimum responsibilities should be clearly stated.
- Grievance procedure – the lack of a grievance procedure can create destructive power struggles, turn procedural disagreements into personal animosity, stifle constructive criticism, or worse, encourage small acts of sabotage.
- Periodic (monthly or quarterly) evaluations – if management/leadership waits for problems and uses evaluations only as a way to build a case for dismissal, the evaluation process loses all its positive potential and becomes a punitive tool rather than a way to support effective work and/or help improve work and interaction habits.
- Team meetings – in addition to daily meetings for work assignments, weekly team meetings should build in a session for questions, complaints, argument resolution, praise, awards, bragging, and group bonding and re-motivation.



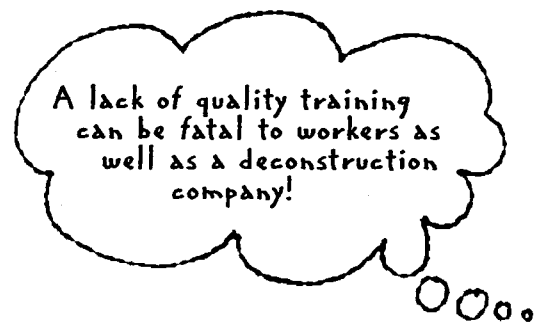
TRAINING AND CERTIFICATION

Deconstruction is not just construction in reverse. It requires skills and safety procedures unique to the trade. Although the following training is expensive and time-consuming, it will more than pay for itself in increased production, avoided injuries and enhanced value of salvaged material.

Some training details are explained in chapters C & D of this manual. Where curricula exist for various aspects of the training, it is noted. A distinction will be made between training for all workers and training for supervisors. (The symbol  signifies training initially recommended for the site and/or program supervisor). Virtually all of this training is valuable for maintenance, renovation and restoration trades, but it will be focused on problems unique to deconstruction. The training should be offered in cooperation with local deconstruction projects, trades training programs, laborers apprenticeship programs and demolition-company mentoring agreements. It is critical that someone with regulatory knowledge, extensive trades experience and strong training skills spend substantial time with the crew on a job site for the first two weeks to a month, then a few days a month for the next six months to a year.

The following is a training strategy that has worked well, minimizes costs and provides a strong professional skill background. The subject matter covered could be organized in other ways, but this design builds on training and certification programs that are in place throughout the country. It has nine phases. Each phase will have a health and safety component. The phases are:

- 1) basic carpentry,
- 2) prerequisite health requirements,
- 3) construction and laborers training program,
- 4) lead supervisor certification,
- 5) inspector/risk assessor certification training,
- 6) asbestos abatement supervision,
- 7) deconstruction training,
- 8) areas of job responsibility, and
- 9) administration.



The total training should extend for about six weeks, including two to three weeks on-site.

1) Basic Carpentry

At start-up it is recommended that the crew already have basic carpentry skills, so participants would either have some trades skills, be drawn from a trades program or sent to one before this training. Even with years of experience, most trades people have some bad habits, so a condensed version, one to two days, of what might be at least a month training is recommended. It would cover:

- basic job-site safety and personal protection issues,
- safe use of power and hand tools,
- measuring, fitting and basic math,
- fasteners and simple joinery,
- how a building works and names of building components, and
- the deconstruction model (how a building is dismantled, what parts are saved, and how).

This training also allows the crew supervisor to evaluate the crew's level of skill, knowledge, learning ability, and dependability. A two-to-four-month carpenter skills training program as a prerequisite for joining a deconstruction crew is an excellent screening opportunity.

2) Prerequisite Health Requirements

Recommended health exam prerequisites include:

- a pulmonary test required for wearing a respirator;
- baseline blood-lead test - this will be followed by a six-month, then annual, test(any on-the-job increase over 10 micrograms per deciliter ($\mu\text{g}/\text{dl}$) should be of concern);
- simple eye exam to determine the need for glasses;
- overall health exam; and
- strong recommendation against smoking, as it will not be allowed on a deconstruction site and raises risks from most environmental exposures.

There are strong arguments for and against drug testing. Either test everyone or no one. Most workers would prefer not working underneath a person who is on drugs.

3) Construction and Laborer Training Program

When available it is suggested that workers enroll in a construction and laborers training program to learn construction basics and job safety.

The Laborer's International Union offers a two-week introductory training program, which can provide deconstruction workers with many of the introductory skills they need. This training is fairly uniform and available nationally. It covers most essential health and safety training plus some work protocols. Key elements of the Laborer's program include:

- personal protection (respirator program, eye and hearing protection, hard hat, shoes and protective clothing),
- safety program (OSHA requirements, injury reporting procedure, stop work order, and weekly safety meeting),
- electric and fire safety (lock-out, tag-out, flammable material handling, and electrical grounding and cord safety),
- confined space training including ventilation requirements,
- hazardous substance communication – reading MSDS (material safety data sheets), hazard identification, corrosives, toxins, carcinogens,
- ladder and scaffold erection and safety,
- fall arrest system,
- oxy-acetylene (procedures, tank and torch maintenance and safety),
- tool safety and maintenance,
- material handling (lifting, moving, rigging),
- break area (potable water toilets, clean-up area, heat, light, shelter, ventilation and personal storage), and
- CPR and first aid.



Tip: In a deconstruction training and job-placement enterprise workers who have participated in a Laborer's training program will be better prepared for future Union employment.

4) Lead Supervisor Certification

All workers must comply with OSHA's Lead in Construction Standards. It is therefore prudent for workers to take, at least, a lead awareness course. Most old buildings contain lead paint. Deconstruction workers should understand how to minimize the hazards of lead paint on the job site for themselves and for their children (without proper safety, workers can bring home high concentrations of lead dust on their clothing and shoes which can endanger their children). A lead abatement supervisor course can provide additional knowledge on lead abatement and safety, and often only lasts one day longer and costs only slightly more than a basic lead-safety course. Hiring a separate company to do lead abatement before deconstruction is unaffordable and unnecessary.

5) Inspector/Risk Assessor Certification Training ☞

At least one supervisor should take a Lead Risk Assessor course and its prerequisite Inspector course and become certified. A Certified Lead Risk Assessor can develop a work protocol that supports the integration of the lead abatement into deconstruction.

6) Asbestos Abatement Supervision ☞

A supervisor would only get this certification if it appeared asbestos removal would be required on a substantial number of jobs and the hiring of a professional asbestos abatement company is not possible.

7) Deconstruction Training

It is suggested initially that workers undergo a one- to two-week deconstruction training program, most of which takes place "on-site." A deconstruction specialist should teach the initial program, with subsequent programs being taught by properly trained supervisors.

Chapters C & D of this document can be used as the course outline for a on-site deconstruction-training program. This type of program implements each aspect of the training, on-site as it is taught – for example, a day in the classroom will be followed up by two days on-site using the information provided in the classroom. Under this training outline, each morning will begin with an hour critique of the previous day's work. Depending on the on-site time due to weather and other interruptions, this training would last one to two weeks and include four classroom days.

8) Areas of Job Responsibility

It is strongly recommended that all crewmembers have at least one area of responsibility. It is impossible for a site supervisor to effectively coordinate a project and also implement each aspect of site supervision. Every crewmember will be assigned at least one area of responsibility, and over the first few months crewmembers will be encouraged to cross-train each other so there is always at least one back-up person. At "start-up" crewmember may need to be responsible for more than one task area. The supervisor will review each person's area of responsibility at the morning meetings.



Tip: A crew of "supervisors in training" is very different from a crew of "employees."

The following seven areas of site responsibility a one way to divide up tasks:

- Site Supervisor Responsibilities
 - Do pre-work site review and write up list of prerequisite work for supervisor to give to owner.
 - Develop contact with neighbors. This includes explaining the project and reporting problems or potential problems to supervisor.
 - Review work orders on-site before a job starts to confirm all special-ordered materials are on hand and all specifications are clear.
 - Set up the job site – containment and isolation, break area, material preparation and sale area (de-nailing station and stacking system), and debris and recycling containers.
 - Assure someone is taking responsibility for all other job assignments.
 - Establish and maintain production schedule. When a production goal is not met the supervisor will, in consultation with the crew, write up a memo on what needs to be done to improve production or change the schedule. This could be included in the site administration area of responsibility.
- Supply/Inventory Responsibilities
 - Review supply list with supervisor to be clear on quantity, specifications, source, and order time of each supply item held in inventory.
 - Maintain a two-day supply of materials on trucks or trailers, and make sure the main storage area has a monthly supply.
 - Make additions, deletions, changes on inventory form as crew requests. If possible, work with administration to computerize a working system that may include inventory software.
 - Maintain on-site weather-protected storage areas.
- Tool & Equipment Inventory and Maintenance Responsibility
 - Train people on use of equipment, particularly ladders, power tools and electrical cords. If equipment is damaged, tag and repair it before use.
 - Keep an inventory of all crew tools and material. Be sure there is a replacement for critical tools in the warehouse. Check inventory of major tools daily.
 - Keep tools clean and sharp. Keep a full supply of replacement blades.
 - Evaluate tools for condition, ergonomic quality, and design for non-destructive salvage, and make recommendations for replacement or additional tools.
 - Make provisions for custom manufacture or modification of hand tools for job-specific needs.
 - This person may also be responsible for vehicle maintenance (checking air, gas and oil) on a regular basis.

- Health and Safety Responsibility
 - Inspect site for any health and safety problems before and during the job. This person may do the pre-work site review rather than the supervisor.
 - Responsible for implementing weekly safety meetings and maintaining injury/accident reports.
 - Maintaining first aid kit, drinking water supply, a safe, clean, well-lit break area, eye-wash station, clean-up station, and clean toilets.
 - Implement respirator maintenance program as required by OSHA.
 - Inspect use of ladders, scaffolding, and power equipment.
 - Monitor tool usage and job-site movement for safe and efficient operation.
- Quality Control Responsibility
 - This position would be circulated throughout the crew on a job-by-job basis. The crew will produce a "punch list" of items and monitor the list's completion at each phase of work.
- Site Administration Responsibility
 - Maintain site log.
 - Record time spent as compared to estimated time. To the degree possible, break work into components such as set-up, windows, clean up, etc. This record is critical for making accurate estimates.
 - Record materials used out of inventory or special purchase.
- Salvaged Material Inventory
 - Based on a distribution schedule, oversee what material gets sold on-site, processed, and warehoused, and assure that material gets bundled, palletized or racked, and that all wood is protected from water damage.
 - Keep quality control and inventory material that will be processed on-site (de-nailed, trimmed, and de-mortared).

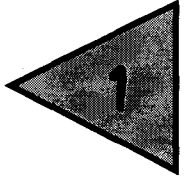
9) Administration ☘

An effective way to gain administrative skills is to visit other deconstruction projects. Pay a staffmember of the other company to review your administrative procedure. Use the experience of existing companies to develop your administrative structure and to choose your software.

An advantage of a crew beginning work as employees of or sub-contractors for an existing company is that they can operate under that company's administrative structure until such time as they wish to form their own company.

C. PREDECONSTRUCTION

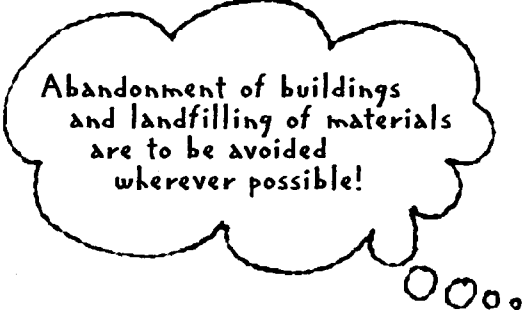
BUILDING REUSE OPTIONS



Consider the following as alternatives to building removal from a preservation and environmental point of view. These alternatives are listed from most to least desirable.

⇒ Restoring, Reusing, and Maintaining

Oftentimes tin ceilings are found above drop ceilings, hardwood floors under linoleum floors and plaster under paneling. Wood windows once restored can outlast vinyl or aluminum many times over. With the exception of lead paint, most early construction material and finishes – particularly those used at the turn-of-the-century – are superior from the perspective of life cycle costing, health, and maintenance. Depending on its maintenance history, removing and returning the building to maximize the amount of original surfaces may be the optimal choice.



Abandonment of buildings
and landfilling of materials
are to be avoided
wherever possible!

To maximize this most desirable alternative, deconstruction companies should work with restoration contractors (preferably at start-up) and/or have skilled restoration carpenters on staff.

⇒ Component Reuse

Where a building will be gutted due to severe internal damage or the need to reconfigure the internal space, component reuse is an option. The exterior, even if it is only the facade, can almost always be preserved. Windows can usually be reconditioned so that they are energy efficient and maintainable. Interior details such as mantels, doors, tile, plumbing, lighting fixtures, and hardwood floors can be kept in place or removed and reinstalled in the same building if it is being renovated.

⇒ Selective Reuse

Where a building cannot be saved and the lot it is on is not in immediate demand, options other than complete deconstruction can be explored. An empty lot among occupied homes is usually not used as "open space." It is more likely used as a garbage dump or is a magnet for trouble.

Making an empty lot into a desirable space and having it adopted unofficially or contractually can turn a liability into an asset. For example:

- Where a row house needs to be removed, the front and rear walls can be saved, even if the building is only one story. The window openings can be barred and a lockable metal grate can be installed. The inside space can be used for a day care play area or basketball court. A neighbor could be paid to maintain the space and control access.

Saving the front and rear walls does not affect future building, meanwhile the facade of the block is kept whole, the empty lot is secured, a community space is created, and a front and rear wall already exist for a future building.

- Where free-standing buildings are taken down, the foundation walls can be used by filling in the foundation and covering the top four inches with top soil for raised garden beds on uncontaminated soil. Architectural elements like the front porch can be saved as a gathering space for neighborhood gardeners.
- Where a building has no immediate reuse options, it can be "mothballed:" cleaned, weatherproofed, and secured. Although "mothballing" requires both preparation and maintenance, it costs a fraction of demolition or deconstruction, maintains the integrity of the neighborhood, and greatly increases a building's resale value. It would include:
 - repairing a roof's membrane, gutter and flashing systems;
 - securing windows and doors with an effective security system (see section 5: [Security](#));
 - setting up a natural ventilation system to keep the building dry;
 - clearing out all trash and removing any water-damaged material such as damaged ceilings; and
 - monthly maintenance visits made preferably by a neighbor, who is paid to call in problems.

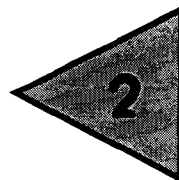
⇒ Deconstruction or Moving

Where the removal of the building has already been determined and selective reuse is not an option. Moving the building or full deconstruction are the next options. Use the following guidelines to determine the best option.

- The more local the reuse the better.
- The more complete the reuse the better.
- The more value added the better such as wood components that are remanufactured as toys, furniture, mantels, etc.

As a last resort material may be recycled. For example, asphalt shingles can be ground up to make new roofing or paving material, broken bricks and concrete blocks can be crushed for fill, and damaged wood can be ground and used as mulch.

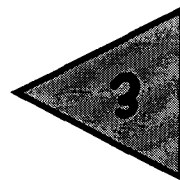
BUILDING EVALUATION



Once the decision is made to deconstruct a building, a cost-benefit analysis should be drawn up before a decision is made to proceed (**this analysis is vital if you intend to submit a bid on removing the structure**). The analysis would include:

- pre-deconstruction costs including permits, bonding, project design, material evaluation, environmental controls, utility termination and lock-out, site securing and site set up (in a bidding situation some or all of the pre-deconstruction costs may be passed on directly to the owner);
- deconstruction costs (labor, material recovery/disposition, project overhead and profit estimates);
- land reclamation costs (again, in a bid submission, some or all of these costs may be passed on directly to the owner);
- salvageable material processing, transportation, storage and sales costs; and
- sales income.

ENVIRONMENTAL ANALYSIS



It is critical that you provide a budget that offers a complete building removal service. Therefore, before bidding a job analyze environmental liabilities. Handled poorly, environmental hazards can double costs. Develop a pool of necessary sub-contractors that perform highly unpredictable work, such as removing underground storage tanks and asbestos abatement. A professional will protect your business from uncertain liabilities and budget fluctuations. Be aware, however, that you increase your liability by putting your company in the middle. Increased liabilities may include:


- exposure to litigation due to worker or environmental contamination,
- the possibility that as a general contractor you will be deemed the "waste generator,"
- a cut into your contract time for an unforeseen delay due to environmental problems, or
- additional environmental problems that could cause cost over-runs leading to the postponing or cancelling of the job, while you still incur the cost of mobilization and site set-up.

It is therefore usually in your interest that the owner contracts directly for the removal of environmental hazards. Make sure that the execution of your deconstruction contract is contingent on the successful completion and inspection of the work performed by the previous contractor. This greatly lowers liability and protects you from running over the contracted completion date because you could not start when scheduled.


To the degree possible the deconstruction crew should receive training to deal with some hazardous and toxic substances such as lead paint. The exceptions are where the hazardous nature of a substance would drive the company's overhead up beyond their ability to recoup costs, such as:

- special insurance and bonding,
- expensive and specialized capital equipment such as negative air machines,
- long-term record keeping obligations such as hazardous disposal manifests, maintenance, and
- expensive certification training such as for asbestos workers.

⇒ Underground Storage Tanks 

Storage tanks need to be drained, cleaned and sometimes cut open for disposal. Unless you are experienced at dealing with underground tanks, the owner should contract with a qualified contractor for the tanks' removal and proper disposal. You could provide the owner with a "turn-key" service by subcontracting with an experienced tank removal service.

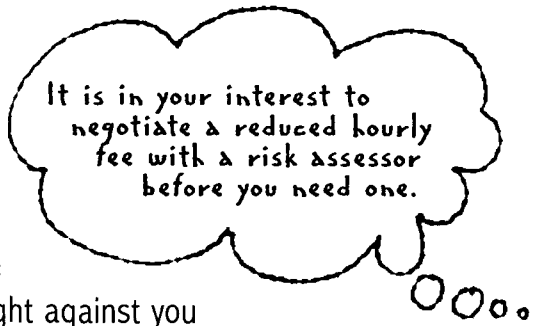
⇒ Asbestos 

Friable asbestos should be fully removed and the site cleared before deconstruction begins. If you are not responsible for sub-contracting out hazardous abatement, make the deconstruction contract contingent on hazardous material removal and the issuance of a certificate of clearance.

The removing of valuables before asbestos work is usually safe and usually permitted. Where the asbestos is not friable – (asbestos shingles and floor-tiles) the deconstruction crew may be allowed to remove it themselves if there is a way to remove it intact. Refer to your asbestos training or to an asbestos professional before attempting to remove even non-friable asbestos.


⇒ Lead 

Unless the building interior had a toxic use (a radiator factory, smelter, paint manufacturing company, body shop, metal plating, etc.) the lead work can be integrated into the deconstruction. You can either assume all exterior paint and most interior paint is lead or you can test it. You can send in soil, chip or dust samples for around a \$5 lab fee each. Or you can spend \$200 to \$300 for a certified person to take samples. If you have reason to fear suit will be brought against you for contaminating the soil, you may want a certified baseline test: a test taken by a certified risk assessor, inspector or sampling technician.



It is in your interest to negotiate a reduced hourly fee with a risk assessor before you need one.


Unless the ground is highly contaminated with lead, ground contamination should not be a concern. Although deconstruction spreads far less dust than demolition, it is strongly recommended that composite soil tests be taken before deconstruction so you have a baseline figure – in other words, so you are not blamed for the contamination that was there before you started.

Pass the results on to you safety supervisor so that he or she can prepare a lead safety plan and reduce workers' exposure to lead hazards. Assuming that all paint contains lead can allow the safety supervisor to use a general lead-hazard safety plan .



A Note on Lead Painted Components: The "jury is still out" on the reuse of lead painted components. Some deconstructors feel that it is best to properly dispose of all lead-painted material removed at deconstruction sites, regardless of its condition. Others feel that lead painted material can be reused wisely, such as reversing baseboard trim so that the lead-painted surface is not exposed. Lead paint can be safely removed from components using power tools designed to be attached to high-efficiency vacuums, such as random orbital sanders and power planers. Hardwood boards can be sent through a stationary shop planer if the machine is fully enclosed and the enclosure is kept under negative pressure by a vacuum drawing air at the cutter head. Detail items can be "wet-scraped" and "wet-sanded," removing all poorly adhered paint and then painted with an encapsulant paint. These methods are approved by both HUD and EPA. Regardless you should refer to your lead training in order to make a safe and educated decision on what to do with lead painted material. When you are developing your bid make sure that you account for your proposal on lead-painted material. It is possible that lead paint will affect a material's resale value.


 Other Hazardous or Toxic Substances  _____


Consult with your state agency on protocol for confining any contaminant to the site as well as any requirements for the remediation of any excavation. Any electrical equipment known or suspected to contain PCB's should be removed by a hazardous abatement professional .

4

UTILITIES

Before deconstruction begins the utility services need to be disconnected and secured in compliance to local building codes.

⇒ Gas 

Call the utility to secure the gas supply at the street shut-off. Do not just shut off the gas where it enters the building. This is extremely dangerous !

⇒ Electricity

Have the electrical company shut off the power at the meter. If power is needed on the job site you may use your generator. It would be preferable to have an electrician install a main breaker and meter in a construction box away from the building. Or you may offer to pay a neighbor's entire monthly electric bill in exchange for using his or her power. In many cases this can be the lowest cost option.

⇒ Water

Install a hose bibcock and shut-off valve at the water entrance for access to water. Otherwise have the water turned off at the meter (note, you may be able to turn the water on and off at the meter shut off yourself with an extension wrench). If the building has a basement and the supply line comes into the basement, and the water supply is protected, cap all water lines at the basement, leaving at least one accessible bibcock, and leave the water on right up to the basement removal.



Tip: To avoid freezing in cold weather it is crucial that exposed pipe be heat taped and insulated.

⇒ Sewer Line

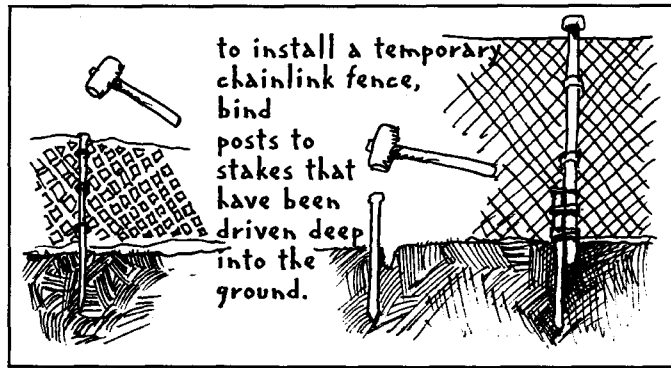
If the sewer will be reused, cap it with a test plug at the main sewer line where it enters the building. If it will not be used again, cap it at the clean out (for a city sewer) or cap it where necessary (for a septic tank or other system).

SECURITY

The two main reasons for site security are to keep theft down and prevent injury to trespassers - particularly children.

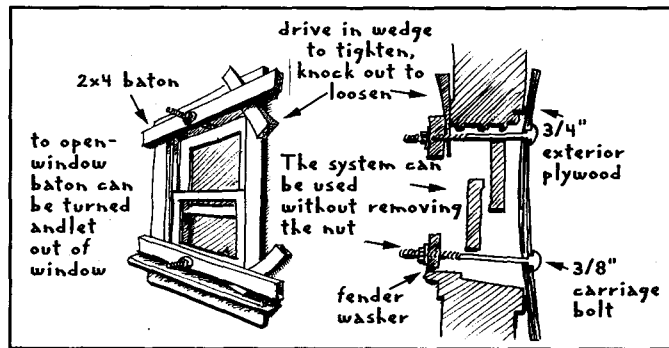
- In a neighborhood setting one effective security method is to pay a neighbor with a phone to watch the site.

- Because fencing is expensive use it sparingly, particularly around the most important areas such as the recovered material area. If razor wire is deemed necessary or if a large amount of fencing is necessary, rent the fencing and use a subcontractor to put it up. However, you can also rent wire "cyclone" fencing and put it up yourself. If you find a constant need for fencing, perform a cost analysis to determine if you should buy fencing as opposed to renting. Don't forget the storage cost you will incur if you have to store it when not in use.



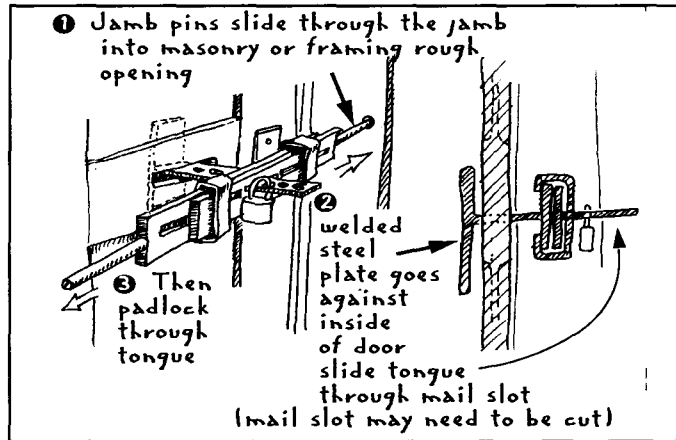
- A dry basement can be an excellent secure space for temporarily storing deconstructed materials.

- Whether the building is used for storage or not, it is important to keep people out. Board-and-baton is a simple window treatment that can be used again and again. Board-and-baton can also be used on non-entrance doors.

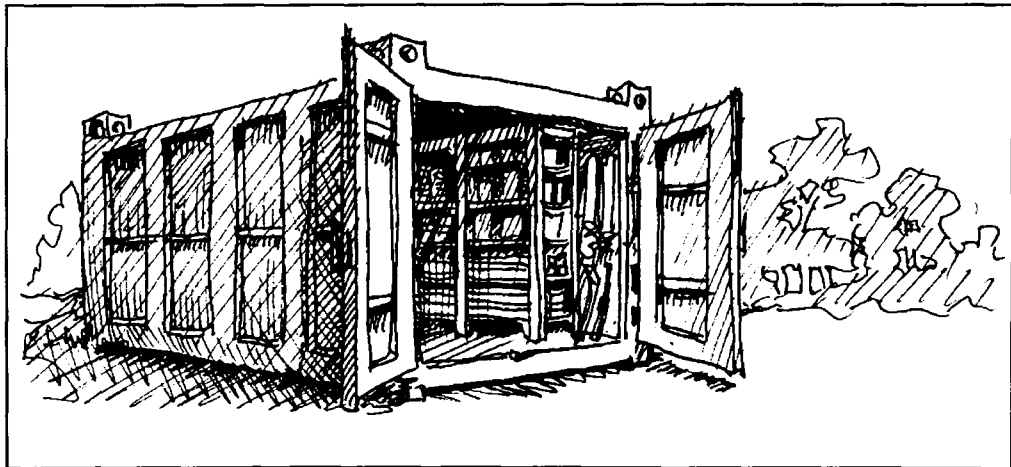
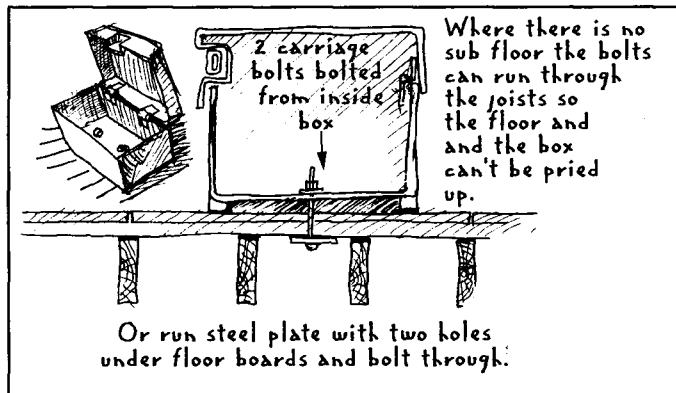


- Lighting is crucial to security. Ideally mount light fixtures on poles to shine on the building. Movement-activated lights will save electricity.

- You can use a "contractor's lock" to lock an entrance door. A hasp is useless against a three-foot crow bar. A "contractor's lock" remains in place even if the doorjamb is pried off.



- A secure tool storage area, that can be used even when the building is almost deconstructed, is a strong box bolted to a floor joist. This can also be used as a storage place for workers personal tools. Ideally, tools should be securely stored in the construction vehicles or better yet at the main building or in a steel container located on site.



WORKER SAFETY, HEALTH, AND COMFORT

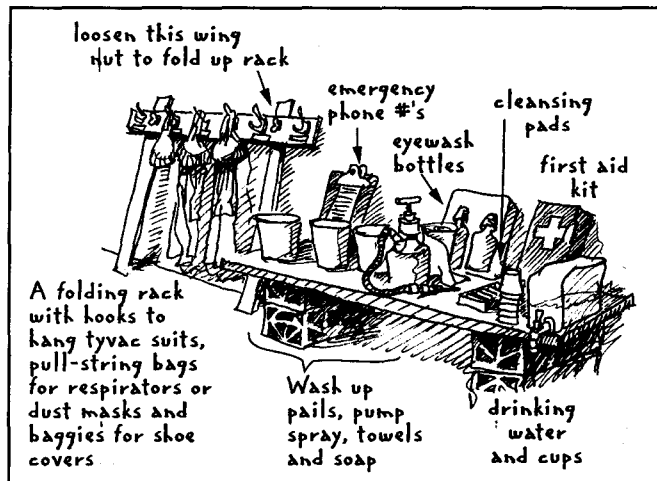


Tip: To a great extent, a job's efficiency, safety and security are determined at set-up.

☞ Clean-up Area

The clean-up area should be located at the entrance/exit area of the job site. Workers will leave and enter the job site through the door at the clean-up area. Workers must wash their hands before eating, drinking, or smoking and clean up thoroughly before going home . Items that should be located at the clean-up area include the following.

- Wash up supplies - rinse buckets, soap, a pump sprayer for final rinse, paper towels, a 2-bottle eye wash station and a first aid kit.
- Worker protection - spare goggles, painter's caps, respirators, tyvac suits and respirator cleaning pads.
- Clothes rack - a place to leave tyvac suits, dusk masks, respirators, and shoe covers. Work clothing can be vacuumed until it can be changed.
- Emergency numbers - local hospital, police, fire, property owner(s), utilities, supervisors, etc.
- Injury report forms (be sure all crew members are trained to fill them out).

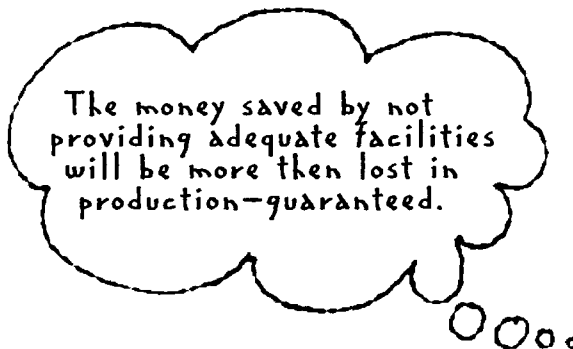


☞ Break Area


Where this is located depends on the site configuration, the size of the job and the weather. It could be under a tree or in a heated construction trailer. It should include at least:

- good air circulation and shade in hot weather,
- safe heat for when it's cold,
- comfortable places to sit,

- a place to store food (preferably refrigerated),
- easy access to clean toilets,
- a private area for men and a private area for women to change clothes, and
- a secure place to park - this might include negotiations with neighbors or a contract with a parking facility.




⇒ Light

Sufficient lighting is critical to efficient and safe work. An effective way to light a job is to run a "String-O-lights" (100' of cord with sockets containing 150-watt bulbs every 10') through the rooms . A specific work area could also use lights on stands or clip-on reflector lamps.


⇒ Ventilation

While the building is closed up, a large commercial box fan blowing out at the top of the building will draw fresh air into the lower floors. While windows are still in place only open the windows in the work area, to increase circulation at that point. Where there is a large amount of dust, particularly if it may contain lead, put a filter over the fan.

⇒ Heat

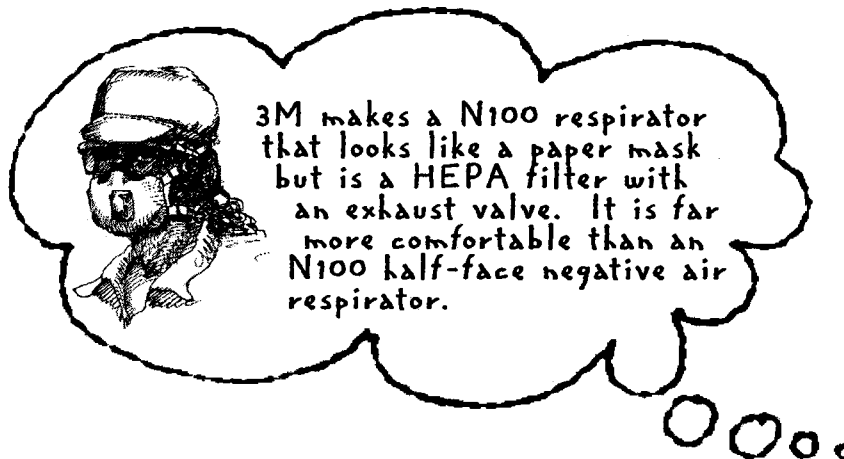
A torpedo propane heater works well on a deconstruction site but the site must be well vented . Be sure to install an "AIM" carbon monoxide (CO) alarm with a digital read out, to monitor CO levels. A closed-in break area is more safely heated with electric heat.


⇒ Dust

Overall, workers should avoid breathing dust as it may contain heavy metals, molds, fibers, coal particles, asbestos, etc. Your goal should be to safely keep workers out of respirators. But when a job creates dust always wear respirator protection regardless of whether lead is present. If there is lead in the dust the workers must wear a N100 respirator if the "action level" is reached, but workers are at risk at far lower lead levels .

- Use engineering controls to minimize exposure.
 - Work damp -this involves misting dust-creating work areas with water during deconstruction. Be careful not use so much water that valuable material is damaged or debris containing water drains off the site.

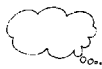
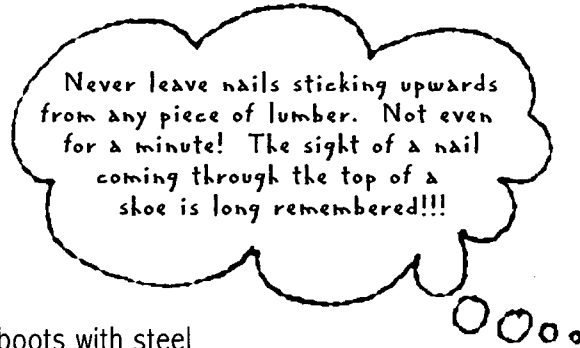
- Clean as work is done - this is important for health, safety and efficiency. Industrial shop vacuums can be used but they will exhaust fine particles such as lead dust. A HEPA or high-efficiency vacuum will contain the fine dust eliminating the need to wear a respirator while vacuuming.
- Use barrel chutes and cover containers with tarps to greatly reduce the spreading of dust. To further reduce the generation of dust dump debris into a chute and mist it with water. Workers dumping dusty debris into chutes and bins should wear a N100 respirator.
- Use safe cutting techniques – workers cutting lead-painted material with power tools either should remove the lead paint from the area to be cut or wear an N100 respirator. When workers use a cutting torch on lead painted surfaces they must wear a combination HEPA/organic filter that protects against both dangerous dust and fumes.
- To the degree possible, cluster all dust-generating activities into two or three brief periods. Have the entire crew wear N100 respirators during these periods, and clean up after each dust-generating period. Dust creating deconstruction activities would include:
 - initial debris removal, including tearing up wall-to-wall carpet,
 - removing casing and baseboards,
 - any work that opens wall cavities,
 - removing drop ceilings,
 - pulling up attic decking,
 - tearing out plaster and lath or dry wall,
 - removing cellulose, fiberglass or rockwool insulation, and
 - removing siding.
- Limit the exposure to unprotected workers by sealing off the dust-generating work areas. Limiting exposure could be as simple as closing and sealing off doors and doorways to rooms where dust-generating activities will occur, or it may require containment of dust-generating areas with 6-mil plastic before any dust-generating work is performed. Each sealed work area should be thoroughly cleaned before doors are opened or plastic is removed, if adjacent areas may be occupied.



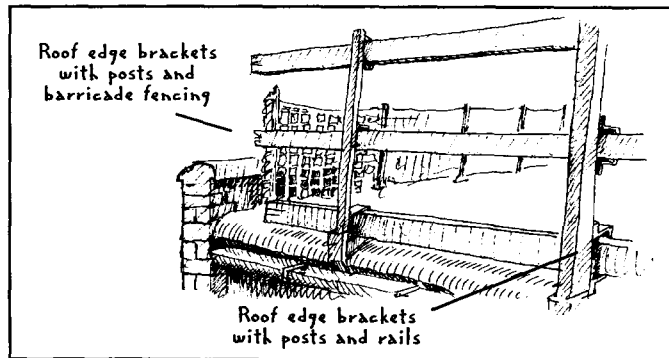
➔ Hazards 

Following safety protocols on deconstruction sites is vital for protecting workers from injuries such as nail-puncture wounds, being hit by falling objects, falling, or becoming trapped or crushed by improperly supported building components. Safety protocols should include the following.

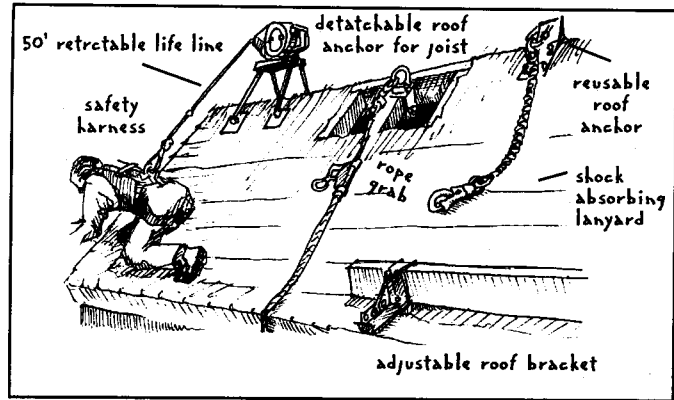
- Developing a safe system of dealing with exposed nails such as:
 - bending over all exposed nails,
 - bundling boards as soon as they are removed,
 - removing nails from lumber as it is removed,
 - restricting passage through the denailing station, and
 - placing all removed nails in a safe container.
- Requiring workers to wear steel-toed boots with steel shanks under the pads of workers feet,
- Separating work areas such as material drop zones, the denailing station, and materials storage area, and debris and recycling containers.
- Because the Office of Health and Safety has not developed safety standards specific to deconstruction, surpass OSHA's construction and demolition standards for worker protection.
- Always use proper support and bracing when deconstructing building components.
- Always have a qualified safety supervisor on every site or at minimum have at least one safety supervisor who monitors all sites.
- Always consult a professional building structural engineer when tasked to deconstruct unfamiliar buildings or building components.
- Requiring workers to constantly clean up the work site.



Note: Deconstructing a building's roof is probably the most hazardous aspect of any deconstruction job. All stages of roof work on a pitched roof must be done from a safety harness with an appropriate lanyard system. Removal of a flat roof must be done with a perimeter safety line, mesh barrier fence, or "Quick-Rail Safety System" with 2-inch by 4-inch rails. There



are specific tools, protocols and dangers unique to each kind of roofing (shingle, slate, standing-seam metal, corrugated metal, hot-tar build-up, etc.). Consult with a roofer for additional safety protocols with any unfamiliar roofing type.



ENVIRONMENTAL PROTECTION

Setting up environmental protection is critical from an environmental, legal and moral point of view. The set-up may include:

- sheet plastic, as well as bale and mesh, storm water run-off barriers,
- 6-mil polyethylene sheeting for ground cover,
- rip-stop plastic for shrouding staging when necessary,
- a hose for misting rubbish and some pump sprayers for misting interior dust, and
- plastic mesh fencing and 6-foot steel fence posts for defining the work area perimeter.

SITE SPECIFIC ADMINISTRATIVE SET-UP

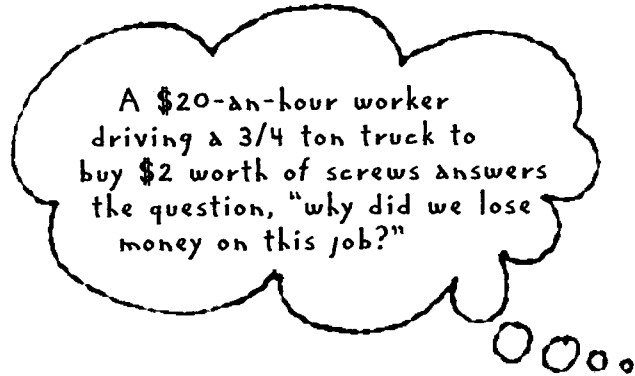
⇒ Permits

Before deconstructing a building you will need a demolition permit (currently permits for building removal are called demolition permits). We suggest that you have the building owner apply for and pay for the permit directly. You may also need to get a permit to place containers (dumpsters) on the building site or in public right-of-ways. You will also need to obtain the proper permits for any other activity, such as on-site sales and site remediation, that is regulated by the local or county government.

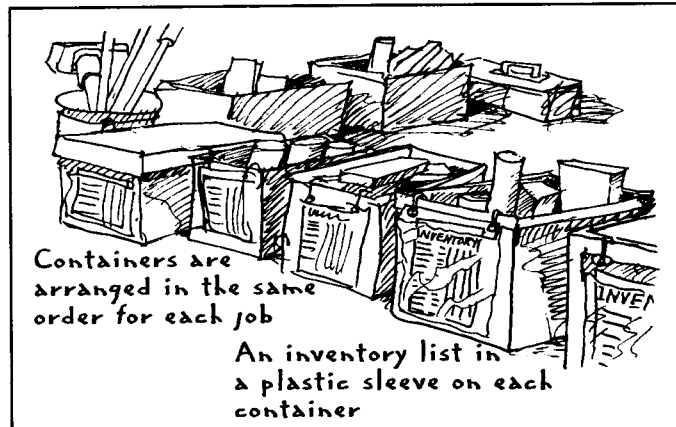
➤ Tool and Supply Inventory System

One of the most wasteful habits on a work site is "short" runs to the hardware store. A fully stocked inventory system can save a lot of time. A few inventory items are:

- bracing hardware,
- ropes,
- light bulbs,
- 6-mil polyethylene sheeting,
- saw blades,
- fuses,
- strapping,
- 6-mil trash bags,
- double headed nails,
- cleaning supplies,
- paper towels, and
- toilet paper.



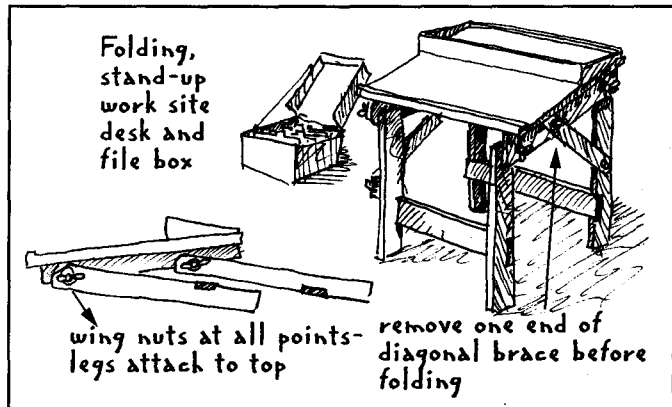
A good way to maintain inventory is to store items in bins or milk cartons which have plastic sleeves attached to their sides. The sleeve would contain a checklist of items, including the current supply. One worker can be assigned to making sure the inventory never drops below a base number.



⇒ Site Administrative Station

Construct an on-site administration station to deal with paperwork such as employee logs and material inventories. It should include:

- a stand-up table,
- a clip board,
- a field telephone (to be used very sparingly),
- a clock,
- lighting
- pencils,
- a pocket calculator,
- a loose leaf binder with critical forms including:
 - time sheets,
 - visitor sign-in log,
 - critical phone numbers (taped to table),
 - an injury form,
 - time and material log,
 - weekly safety meeting record,
 - crew member responsibility chart,
 - job schedule, and
 - job specifications.



PREPARATION, RECYCLING, DISPOSAL, AND STORAGE AREAS

When laying out and designing areas for processing, recycling, disposal, and storage consider the material quantity and type, weather conditions, and site features.


⇒ Material Drop Area

The removal of material from the building can be dangerous. It's therefore critical that the drop area be at a safe distance from other work areas. Throwing material off the roof or out the window can be particularly risky . There can be no passage through the



drop site (both ends need to be blocked by a barrier, such as a mesh fence). A roof mounted beam and pulley system is a safer way to lower material ↵.

The site should be adjacent to containers for recycling and disposal, and the denailing station. For a large job the drop site and the denailing station may need to be moved one or more times during the job.



➤ The Denailing Station 

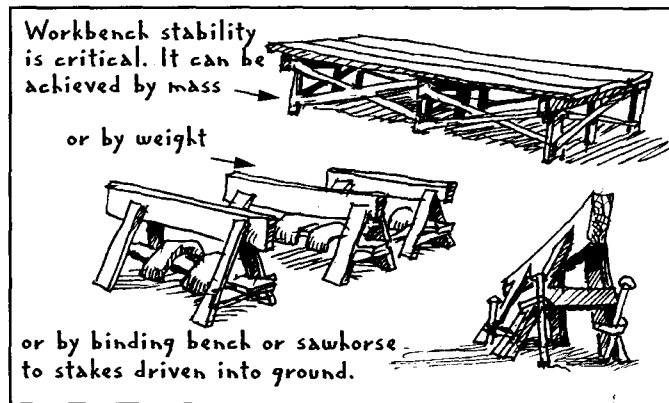
Denailing is vital and an unavoidable aspect of deconstruction. How and where you choose to denail, will determine how efficiently and safely you deconstruct a building. Your denailing options include denailing at the point of take down and using a denailing station.

Denailing at the point of take down can greatly reduce the potential of nail puncture wounds, although it may be too slow and too costly. It may not be prudent to have your more-experienced and higher-paid workers spending their time denailing. It is much easier and faster to denail at a properly constructed station. However, space limitations may require that workers denail at the point of take down or that lumber be denailed off site (not suggested due to increased possibility that someone could injure themselves as they load and unload the material.)

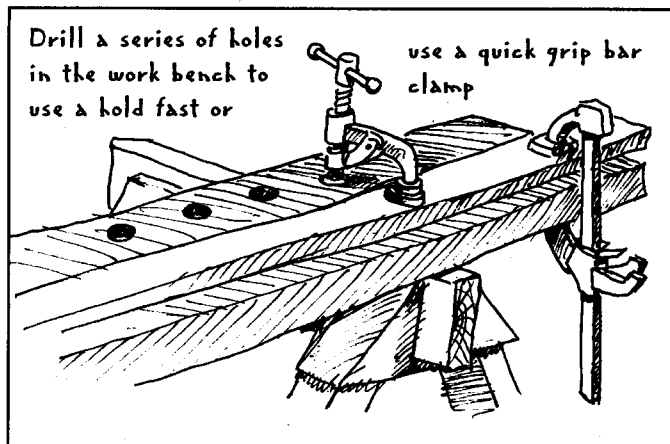


Tip: It is not very efficient to bend over nails and then to straighten them at the denailing station. To increase safety, the shaft of the nails can be driven flush at the removal site and then transported to the denailing station. However, after the nails have been driven flush they may as well be pulled eliminating the need for a denailing station.

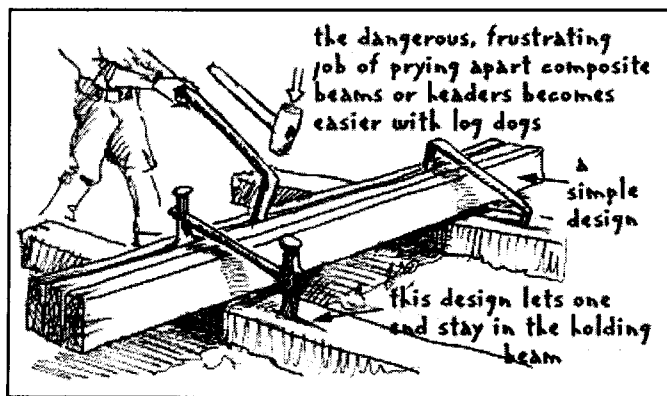
The design of the denailing station is critical to both production and worker safety . It should be made stable and big enough for at least two people to safely use. Wood "sawhorses" work well and can be easily constructed and transported . Workers can then layout the boards with nails across the station with the shafts pointing up. They can then drive the shafts through the board with hammers or the back of a flat crowbar, turn the board over and pull the nails.



Because, an easy-to-use clamping or "hold-fast" setup makes denailing work much safer, the denailing station should also have a clamping system for holding lumber steady during denailing ↵.





Workers can also use a modified log-dog system to take double headers or composite tresses apart at the denailing station ↵. Hydraulic tools such as the "Jaws of Life" can also be used to separate composite beams ↵.

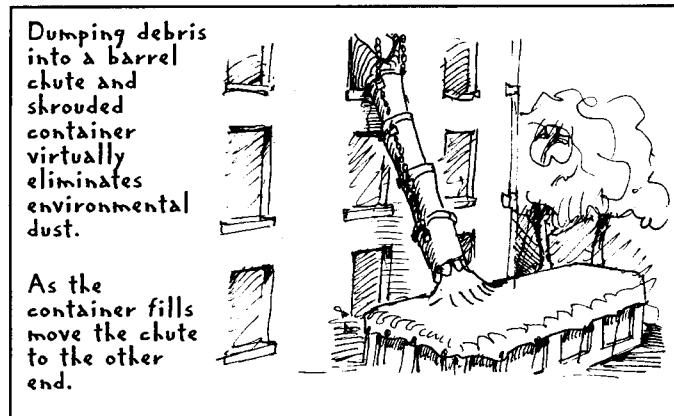


➤ Recycling and Debris Containers

The containers should be located where they can be easily picked up. The doors of the containers should open away from the deconstruction site and denailing station. This will make it easier for workers to access the containers with materials and wheelbarrows without having to go around the doors. There should always be at least one lockable container for debris. Other lockable containers might be used for lead painted wood and recyclables such as asphalt, wood, and rubble. Lockable containers will prevent others from throwing in material that can contaminant your recyclables and increase your tipping fees.

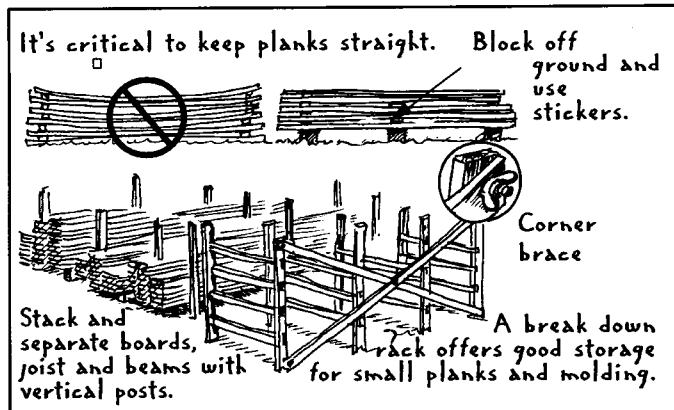
Putting debris into a container should be done with environmentally safe procedures. Material such as roofing, which creates virtually no dust, can be tossed directly into the container. However, try to maintain a 20-foot safety zone around the container when throwing in material . If space is tight you may need to install a trash chute. A barrel chute works best ↵. It is closed, flexible and can be made any length. When dumping plaster, dry wall, masonry and other materials that will generate dust, you need to contain the dust by misting it down with water, using a covered chute and a tarp-covered container. During deconstruction assume all dust is bad to breathe and distribute, because it may contain coal dust, lead dust, molds, etc .

The ground under the work area should be protected from nails and lead chips. Create a ground cover using 6-mil thick plastic sheet. Plastic sheeting is easy to clean but be careful because it may present a slipping hazard. A rip-stop tarp with grommets at the perimeter and tied to stakes will work if the job is on soil. You may not need to cover the ground when working on a concrete slab as long as you clean up daily so that there can be no storm-water run-off.

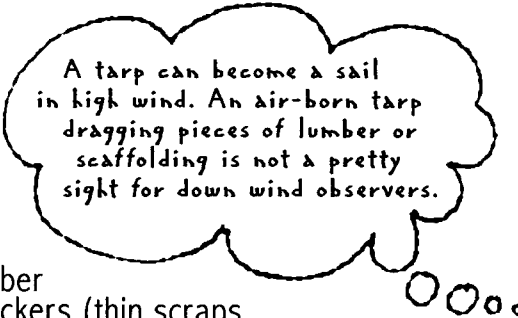


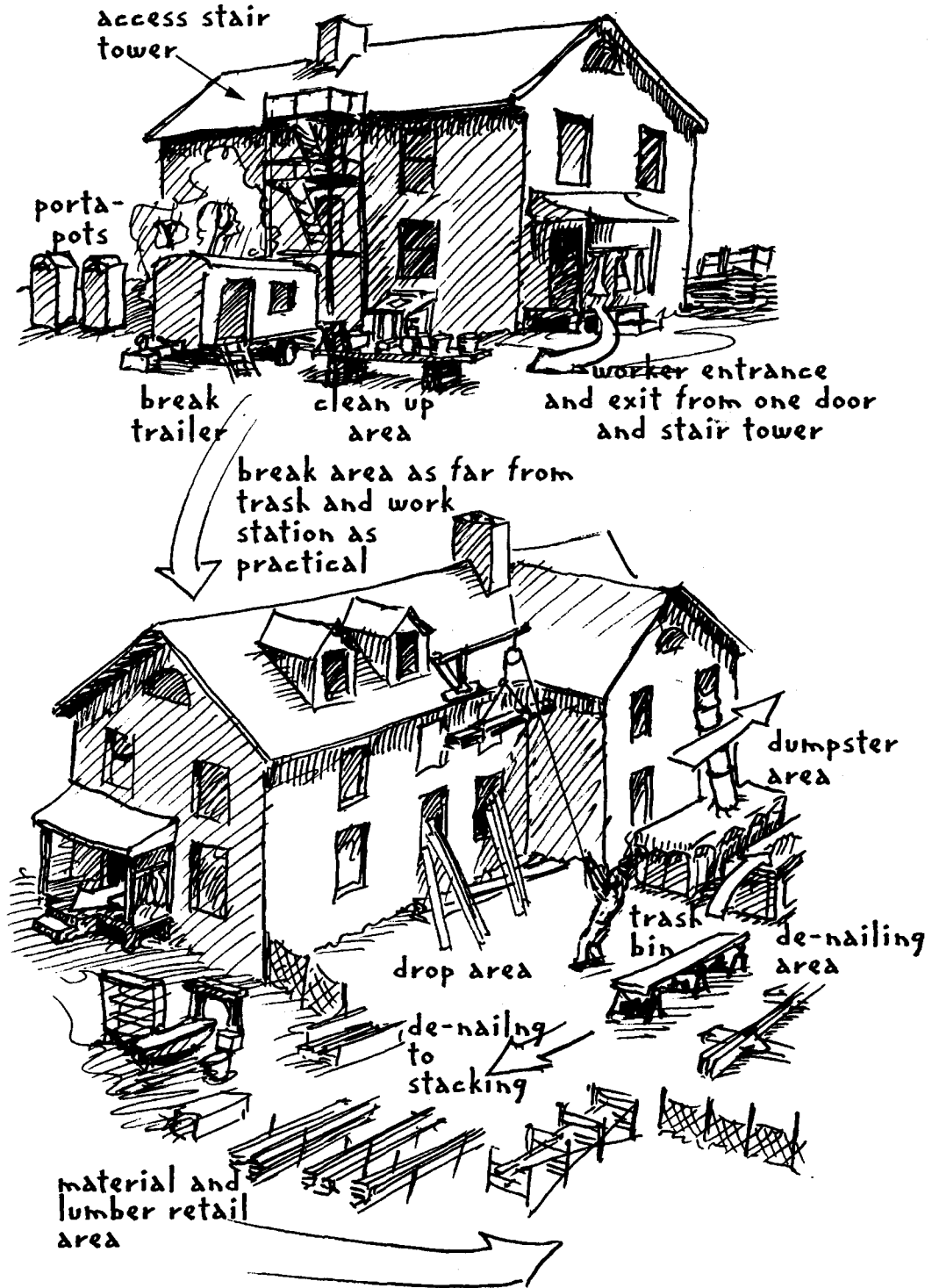
➤ Sorting and Inventory Area

The material sorting and inventory area should be located on the other side of the denailing station and allow easy access. Where material will be transported to a main storage or sale area, it should be sorted and stacked into similar sizes, banded, and taken to the storage/sale area as quickly as possible. Use a large storage container to store material on-sites which are not secure. If weather is an issue, material should be covered until it can be transported off site. If lumber is to be sold on site, a stacking crib can make selling the material easier. Customers can pull lumber from one end without interfering with denailing. Trim and more valuable material can be stored on a separate rack.



Old lumber can act like a sponge so it is critical that you keep it off the ground. Wood tends to take ten times as long to dry as it does to get wet. Unless there is no possibility of rain, keep lumber covered. The racks or pallets on which it is stored should have places to tie rip-stop tarps with grommets so the stack can be covered quickly and securely. If lumber does get wet it needs to be stacked with stickers (thin scraps of wood) until it's fully dry (see chapter E for additional information on sorting and storing material).





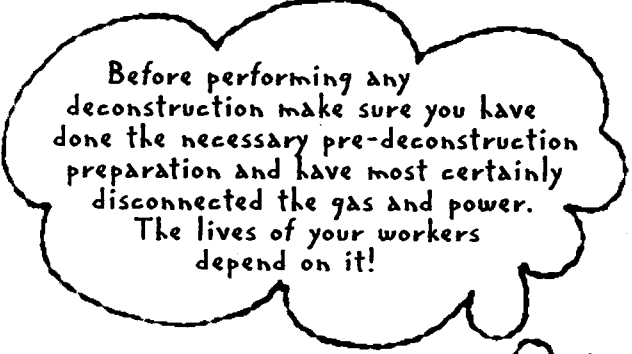
D. DECONSTRUCTION

REMOVAL OF VALUABLES

The urgency of this step is determined by the risk of theft. Homes that are not boarded up can stay vacant and untouched for months in some places, in other places the copper pipes can be gone in hours.

For most neighborhoods it would be prudent to remove valuables as soon as the owners allow. You may need a separate agreement to remove specific items before you sign a full contract. This preliminary agreement should include a hold-harmless clause for the owner. Valuable items that you might remove include:

- stained glass,
- brass hardware,
- light fixtures,
- mantel pieces,
- exposed copper pipe,
- valuable appliances,
- valuable doors, and
- built-in case goods.



Before performing any deconstruction make sure you have done the necessary pre-deconstruction preparation and have most certainly disconnected the gas and power. The lives of your workers depend on it!


CLEAN OUT

Before beginning interior deconstruction, remove as much non-structural material as possible.

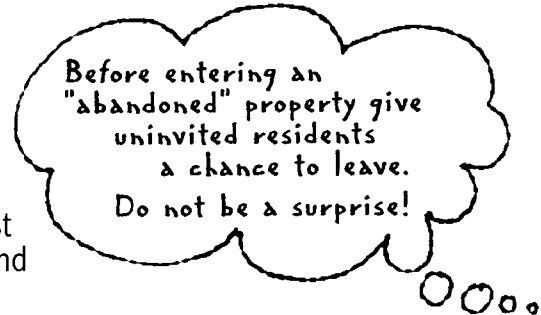


Tip: Before any work is done, a structural review must be done by a highly experienced person. If a building is in such poor condition that rubbish cannot be cleaned out safely, it may not be suitable for deconstruction, or the structure may need to be reinforced to secure worker safety. The structural review would include inspecting:



- the soundness of roof joists,
- the security of any water damaged decks,
- the strength of any posts and beams, especially at their ends and bearing points, and
- the soundness of the foundation.

➤ Rubbish 


Particularly in buildings that have been vacant, use puncture resistant gloves, brooms and shovels to pick up rubbish. Clean away all rubbish as soon as possible because it creates dangerous conditions. Workers should always wear respiratory protection and Tyvac suits to protect themselves from toxins and dangerous dust particles such as lead, molds, coal dust, and fiberglass.




➤ Carpet 


You should have workers wear respirators when ripping up damp and/or dusty “wall-to-wall” carpet, because it can be particularly toxic . Carpet that is damp can weigh double its weight. Workers can easily cut carpet into manageable pieces using a long handled hook knife called a Grundlach stand-up carpet cutter .


➤ Heating and Air Conditioning Equipment (HVAC)   _____

Remove all HVAC equipment that is not behind walls, including furnaces, ducts, and hot water heaters. Insure “before-hand” that all asbestos insulation has been removed in accordance with mandated procedures . You may need to cut some cast-iron furnaces and galvanized pipe with an oxyacetylene torch. Drain hot water heaters before removal.

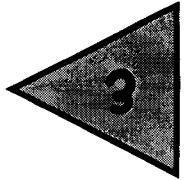
➤ Plumbing and Electrical   _____

After being absolutely sure electrical and water systems are completely disconnected (Not Just Shut Off!) , remove all exposed pipes and wires. At this point, remove electric fixtures and wrap them in paper for transport or place them in boxes. If the fixtures are to be sold on sight, sort the fixtures using categories such as historic value, resaleability, and UL approval.

➤ Appliances and Fixtures 

Remove all appliances such as refrigerators, ranges, washers, dryers, air conditioners as well as sinks, toilets, and tubs. You can more easily remove heavy cast-iron tubs by attaching a block and tackle  to a stud at the top of the staircase and the drain hole of the tub and then easing the tub down the staircase. Protect the staircase if it is to be saved and plug waste pipes for sanitary reasons.

INTERIOR DECONSTRUCTION





Tip: Before beginning the interior deconstruction hold a "job-review" crew meeting that includes a walk-through. This meeting should cover the following:


- work schedule and sequence,
- areas of responsibility,
- deconstruction material storage/inventory system,
- safety systems and responsibilities,
- potential hidden obstacles/hazards/treasures, and
- paper work requirements.

Before removing building components that are unfamiliar to the crew, the crew leader should determine and describe exactly how components will be removed and handled, so that the workers can remove the components safely and efficiently.

This section describes the techniques and issues involved with deconstructing many interior building components. The deconstruction techniques you chose will depend on how you will reuse and market specific components. For example, you must remove material such as marble and finely finished wood with care so that you do not damage its surface and lower its resale value. Other materials may need less care.

➤ Doors, Windows, Glass and Hardware




Remove and box up any valuable door and window hardware such as hinges, locks, and knobs . Do not forget to remove the screws. Remove difficult screws by scratching the paint from the screw's slot and using a brace and bit with a bit extension, or a power screwdriver (however, a power screwdriver may strip an old screw head) . If the hardware is not reusable place it in the recycling bin. You might also want to leave the hardware on and resell the doors and hardware as a single unit.

Remove all the doors except for the exterior doors, which may be kept for security. If you are going to save the window units remove the interior casings and aprons, and then cut the fastening nails using a reciprocating saw with a metal cutting blade . Stack doors and windows in the sorting and inventory area. For wood window that are not salvageable, remove the sash and bring the window to a processing station for glass removal. Be aware that wood assemblies like doorjamb and window casings are susceptible to deformation and splitting if not removed with patience.




Tip: Old glass may be valuable and should be removed and saved. For sashes that are to be saved and stripped, remove the old glass, and re-install it later to save it from breakage. If built-in case goods are worth saving, it may be worth the time to number parts to match a drawing. Number each part in the same location (for example in the top left-hand corner). Chemical stripping removes most marker ink, so unless it is certain that components will not be chemically stripped, use a number punch set.

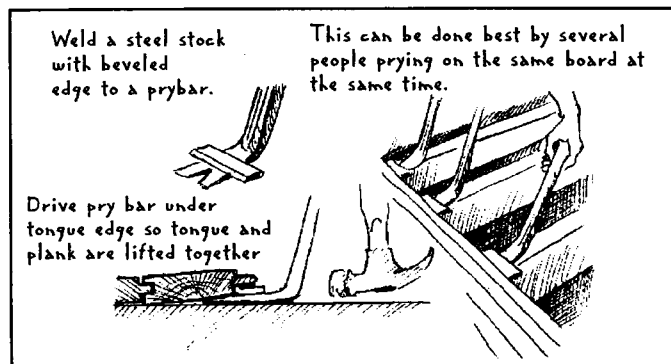
Trim  

Remove trim using small pry bars and transport it to the denailing station. An effective and safe way to transport trim is by looping ropes around a pile of trim . Lay two ropes on the floor and pile the trim onto ropes. When the pile is still manageable, pull one of the rope ends through a loop tied at the other end. Do this with the other rope and carry the trim bundles to the appropriate area. When removing nails from trim boards, protect the face of the board using a small piece of wood as a spacer, or pull finish nails from the back of the board (an eight-inch front end nipper works great for removing these nails). Removal of trim, particularly casing and baseboards will release accumulated dust (lead, coal, mold, and roach dust) in wall cavities . Workers must wear respiratory protection when removing this trim. Dust should be misted and cleaned up. Use care when removing trim boards. Hastily removing the trim can create dings, splits, and breaks, thus greatly reducing its architectural integrity and resale value .

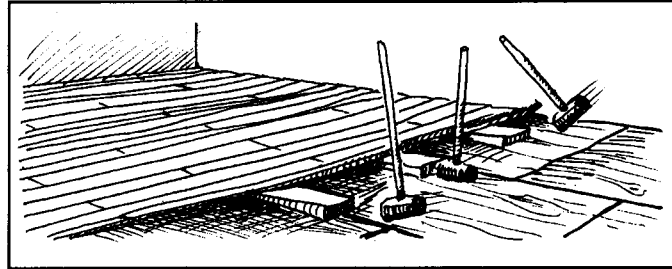
Flooring  

In most cases flooring can be removed before removing partition walls. However, in the case that flooring runs under partition walls you can protect the floor surface with craft paper covered with 6-mil plastic until the walls are removed or you can cut the flooring around the wall partitions. Remove the surface protection after all the plaster and lath or drywall has been removed.

The value of flooring is affected by how little damage is done to it during its removal . Use care when removing flooring. For example when removing tongue-and-groove flooring, pry the floor boards up using a bar under the tongue edge (the first board or two may have to be destroyed to accomplish this). Welding a small bar of steel to the blade



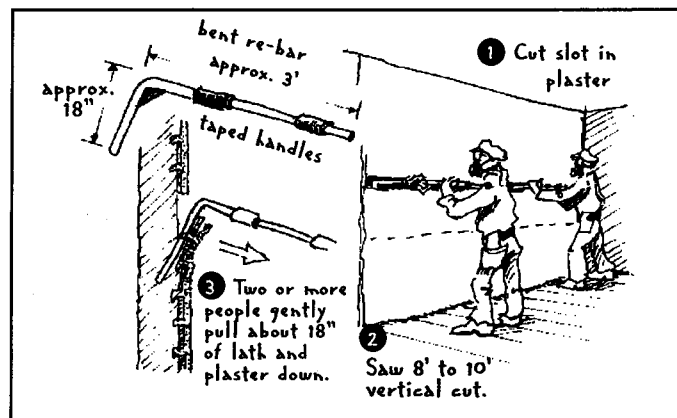
of a pry bar and working in teams (depending on the length and fragility of boards) will help to prevent the nails from splitting the tongue as the board is pried up. The rope method mentioned above for carrying trim boards, also works well for transporting flooring boards.



Where flooring is attached to a sub floor, a series of wedges can be simultaneously driven under the floor boards to lift the flooring from the sub floor. Use as many wedges as necessary to avoid damaging the floor boards.


🔧 Ceiling & Wall Plaster and Lath


The cleanest way to remove plaster and lath is to pull down large wall sections at a time so the lath lands on top of the plaster. This can be done using several "L" shaped tools in tandem. Cut slots through the plaster at the beginning in order to slip the "L" tool in behind. The plaster will separate from the lath as it hits the floor.




The lath can then be collected, laid on a piece of rope with a loop, and rope-bundled. If the studs are to be reused, remove remaining lath nails after cleaning up the plaster. Use large "scoop" shovels and wheel barrels to transport plaster rubble to the rubble container. On large jobs, an effective way to dispose of plaster is by shoveling the plaster into a "300-pound" tilt truck, running it up a ramp and dumping it into a funnel on a barrel-chute.

Respiratory protection is critical during the removal of plaster and lath, as much for what's behind the walls and ceilings as for the plaster and paint dust itself.

The safest way to remove plaster and lath from ceilings is from a rolling platform, such as a "Baker scaffold , " that can be backed away from the rubble pile as work is done. This minimizes the danger of needing to work directly under the ceilings they are being torn down.

 Insulation 


If the attic has loose-fill insulation (cellulose or rockwool) consider contracting a removal company that has a truck-mounted vacuum and the capacity to use industrial paper bags for collection. Fiberglass insulation bats can be stuffed into 6-mil, three-foot by five-foot bags. Wear tyvac suits, caps or hoods, goggles and N100 respirators for this work . After work is completed wash the fiberglass particles off using cold water.

 Concealed Plumbing, HVAC, and Electrical ,  _____

Remove all plumbing, HVAC, and electrical systems behind walls and above ceilings. Some pipes and ducts may need to be cut with an oxyacetylene torch. Wrap wire to be saved on spools and place all other metals in the recycling container.

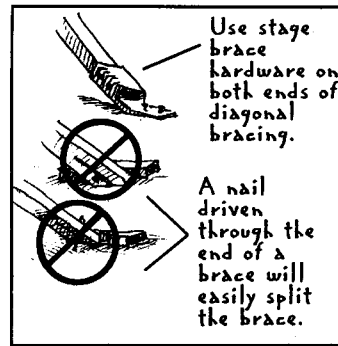
 Partition walls  

You may choose to remove the partition walls after the roof and ceiling joists have been removed. However, one reason to remove partition walls before removing the roof and joists above them is to remove the flooring that runs under partitions. It may be easier to work with partition walls out of the way. Confusing a partition wall with a load-bearing wall can be fatal

. If in doubt, assume the wall is bearing and do not remove it before removing the roof and joists above. An easy way to remove partition wall studs while the joists are in place, and minimize the damage to ends of studs, is to jam a four-foot pry bar with a sharpened foot under the stud and lift the stud and pry it to one side. The nails will usually pull out and bend. Tie the top plate of the partition wall to the ceiling joists before removing the studs, then lower the top plate and pry up the base plate.

Partition walls are frequently held in place by the joists. Standing on a partition wall as joists are removed may be like sawing off the branch on which you sit!

Ceiling joists are sometimes designed to hold up only the ceiling, not people, and are kept structurally sound by partition walls *///*. It may therefore be prudent to leave top floor partition walls in place unless it's clear the joists will hold workers' weight without the partitions.



Always diagonally brace partitions. A stage brace purchased from a theater supply house is adjustable, can be used quickly and securely, and can be taken off quickly and reused *↶*. A stage brace can be purchased complete or the hardware can be bought separately.



*Note: A building structure is an interrelated web of support. Safe and effective deconstruction needs to reflect an understanding of the building process and how material ages *///*. Do not assume "deconstruction is simply construction in reverse." For example:*

- *Gable ends may have been installed with diagonal bracing, which was removed once the decking was installed.*
- *Masonry walls may have supported wood beams whose bearing ends have rotted thereby shifting the bearing weight to partition walls.*
- *The settling of a masonry foundation may have left a wall which is held up by the interior wood structure.*
- *Wall sheathing may be what is preventing a building from collapsing into a parallelogram.*

Use temporary bracing during deconstruction and consult a professional building engineer when tasked to deconstruct a structural situation with which you are unfamiliar.


4

ROOF DECONSTRUCTION

☞ Gutters and Downspouts

Remove the gutters and downspouts, fascias and soffits (if accessible), and siding and sheathing from gable ends.

☞ Roof Surface , 

Before working on the roof, review the safety procedures on page C12 .

● Asphalt Shingles

Starting at the peak, scrape asphalt shingles and tar paper off the roof with square-end shovels and scrapers. If asphalt recycling is available, place the shingles into a recycling container, otherwise put the shingles into the debris container. Having the appropriate container dropped next to the building can allow you to scrape the shingles directly into it.

● Metal Roofing

To remove corrugated metal, remove the roof capping, then find the last metal sheet that was laid on each side of the roof (they will be the sheets with their seems laying atop the others). Starting on one-side of the roof use pry-bars to remove the sheet and its fasteners and lower it off the roof. Use caution as you pry up the metal, because metal roofing can tear easily. Consult a professional standing seam roofer for the best methods and tools for removing a standing seam roof.



To assist with lowering the roofing, build a temporary storage crib on the roof near the lowering pulley, stack and bundle the metal sheeting and lower a bundle of metal sheets all at once. This can save time and minimize damage to the sheets due to over bending.

● Slate Roofing

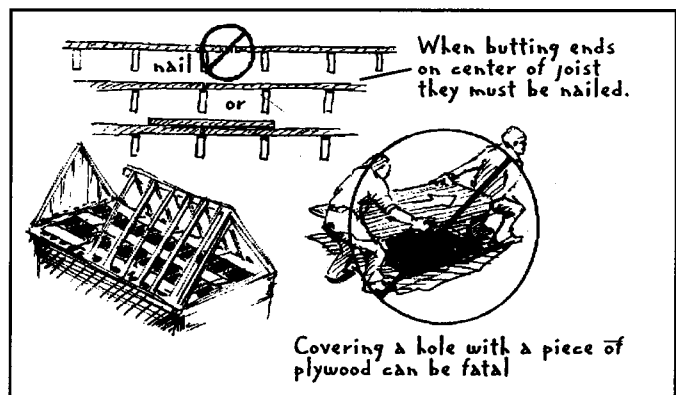
Start at the top of the roof peak with the last slate tile. Lower the tiles in a bucket to prevent breakage. Consult a slate roofing professional for additional slate roof removal techniques.


● Tar or Asphalt Roofing

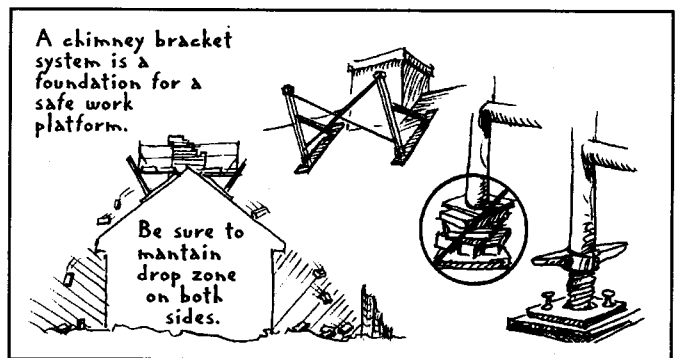
Tar and asphalt roofing may be the most difficult type of roofing surface to remove. This type of roofing often covers flat or slightly sloped roofs and, oftentimes is covered by stones. The stones have to be removed first, before removing the tar or asphalt. Use large "scoop" shovels, wheelbarrows, and a covered chute to remove the stones. Stones can be left on site for fill or may be included in the rubble-recycling container. Using scrapers and square-end shovels, scrap the tar or asphalt off the roof and drop into covered chute for recycling or debris. It may be prudent to sub-contract with a professional roofing company who is experienced in removing tar or asphalt roofing.


⇒ Roof Sheathing or Decking  

Before any work is done on the roof structure from underneath, a safe walkway must be laid and secured over the ceiling joist. Workers can lay four by eight, 3/4-inch thick plywood along the outside walls and down the center of the ceiling joists.




Before removing the roof sheathing or decking from a gable end roof, particularly a gable-end roof made of trusses, it is critical that you check the roof's diagonal stability and brace it if necessary . Although rafters are usually held together by a tie beam, trusses usually are not. In some cases, the roof sheathing or decking may be stabilizing the roof. The entire roof structure including the gable end can collapse as the last row of sheathing is removed. To prevent the trusses from collapsing, connect the top of the trusses together after removing the first row of sheathing and diagonally brace them to the gable ends. You can further brace rafters and trusses with diagonal boards and/or cables with turn buckles. In cases where sheathing is not reusable, rafters/trusses can be removed, one-at-a-time, without bracing by cutting the sheathing between them (up to the last two or three rafters or trusses).



Removing sheathing or decking from a steeply pitched roof is best done with a person on the roof secured to a retractable life line (see page C12)  and a couple of people inside working off a scaffold. The workers below can hammer or pry the sheathing or decking up. Bundle the decking or sheathing and lower it to the ceiling joists or ground.

⇒ Chimney 

Before removing the decking or sheathing around a chimney take the chimney down to the roofline. A chimney that is in good shape above the roofline may be severely degraded at or directly below the roofline. It may be supported by the roof structure and in danger of collapsing . Either take the chimney down completely or take it down in sections before each floor is deconstructed.


Using a hammer, carefully remove the bricks from the chimney, by knocking them loose and dropping them to the floor below. Be careful not to break the bricks when dropping and transporting them. Some bricks may be hard enough to sustain a fall while others may need to be lowered in buckets or with brick carriers.

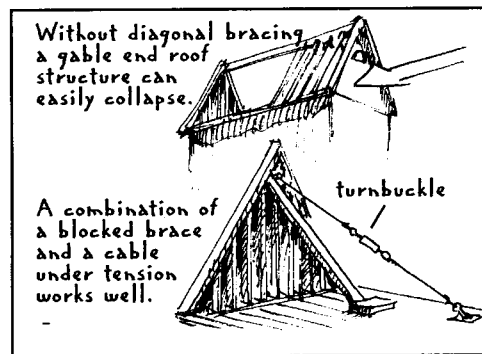
⇒ Roof Structure

Rafters can be cleaned and bundled on the attic joist deck. Lower rafter bundles or unassembled trusses using ropes secured with a couple of wraps around a structural member. Heavy components can be slid down skids propped against the building.

Where trusses or beams are too heavy or the size or location of building makes manual lowering difficult or unsafe, rent a telescoping forklift or crane. Renting a forklift with an 8,000-pound capacity costs approximately \$600 per day, including delivery.

⇒ Gable Ends

Use stage bracing, installed to stabilize the gable ends, to lower the gable ends to the attic deck for disassembly . Use a crane to remove the entire gable end, if necessary.



5

FRAME AND CLADDING

⇒ Exterior Finish and Sheathing



- Exterior trim

Using a flat pry bar with a small block of wood between the pry bar and the exterior building surface, carefully pry up on trim boards at nailing points. Remove nails in the same manner as interior trim.

- Wood or vinyl siding

Remove horizontal wood and vinyl siding starting from the top of the building. Use flat pry bars to pry up the siding at nailing points, and remove the siding as you work your way down the building surface.



Note: Most exterior trim and siding will have been painted using lead-based paint. Use care not to generate dust when removing these materials. If dust is present or generated, workers should wear HEPA N100 respirators . Also, note that some building surfaces may be covered using asbestos shingles . If you discover asbestos siding stop work and have the hazardous shingles removed by an asbestos contractor. Also be aware that buildings might have many layers of siding hiding asbestos shingles.

- Tongue-and-groove siding



Tongue-and-groove siding can be removed with the same technique used for removing tongue-and-groove flooring.


- Brick and stone veneer

Use masonry hammers to knock the bricks or stones loose from the mortar. Be careful not to break them. Use a staging to remove masonry above one story and prevent breakage by lowering bricks and stones using a pulley.

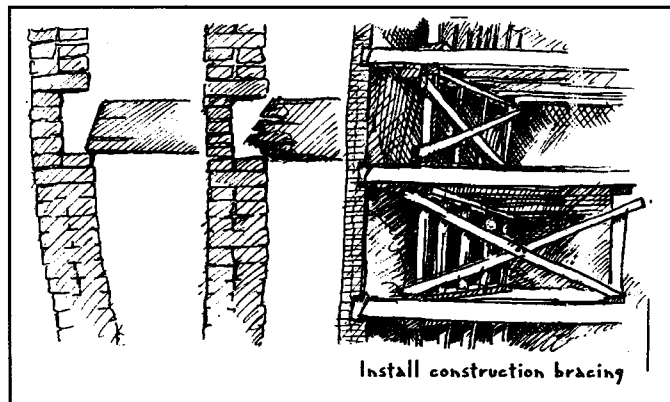
- Sheathing

Once the exterior finish is removed, remove sheathing by prying or hammering it loose from the inside. Make sure exterior walls are properly braced before removing exterior sheathing (see framing below).

 Masonry Side-Bearing Walls 

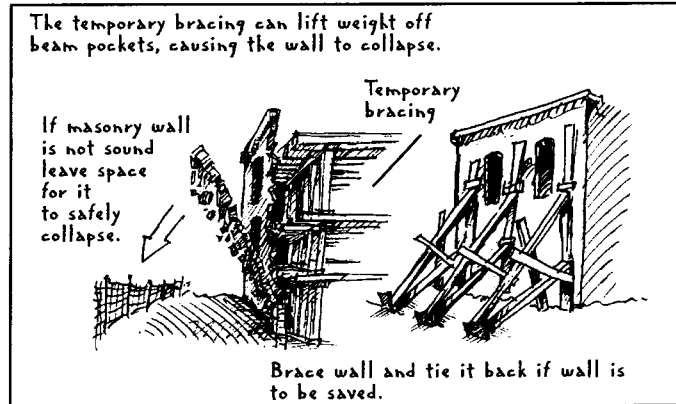
For some structures, such as masonry buildings with joists set in bearing pockets, internal bracing may be prudent even when removing the roof sheathing as the bearing points of the deck joists may be displaced or damaged . Side bearing walls, particularly on Northeastern row house structures, are often only two-bricks thick and can be as thin as a single brick. One or two joists pulling out of the joist pockets can begin a chain reaction that causes the collapse of an outside wall, bringing the entire building down.

When deconstructing buildings with masonry side-bearing walls, install temporary bracing to hold up the decks and prevent their collapse in case the side walls buckle or the joists slip out of the masonry bearing pockets. Build stud walls under the joists, parallel and near the masonry walls. Studs



can be placed four-foot on center and diagonal bracing is critical. Shims can be driven under the joists so that they bear on the stud wall and remove their weight from the joist pockets. Removing weight from the joist pockets can cause the masonry wall to collapse. Keep a fall zone clear at all times until the masonry wall is down *////*. You may choose to consult a structural engineer to verify the stability of your bracing.

Once the bracing stud walls are supporting the decks, the masonry walls can be removed. If you are saving the exterior wall brace it until the wall can be tied to the internal structure.



Workers could allow the wall to fall to the ground as a complete unit, assuming there is a safe fall area *////*.

Allowing all or parts of a brick wall to fall to the ground will produce some combination of three possible outcomes.

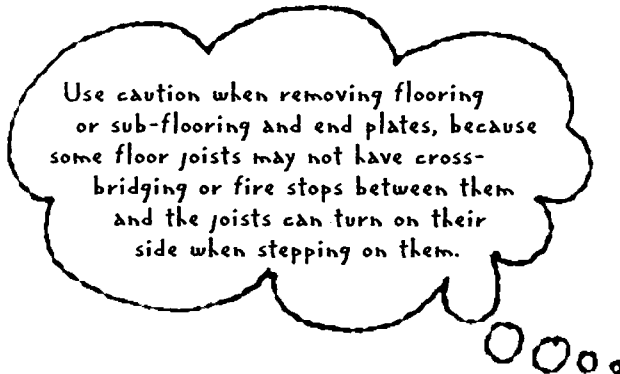
- The wall section falls and remains intact, in which case it may not be cost-effective to chip bricks free one-by-one.
- The wall section falls and the bricks pop loose of the mortar intact, because the mortar is softer than the bricks, in which case the work of salvage is mostly done.
- The wall section falls and some or all of the bricks crumble because the mortar is harder than the bricks.

🔧 Framing *////*

- Balloon Framing

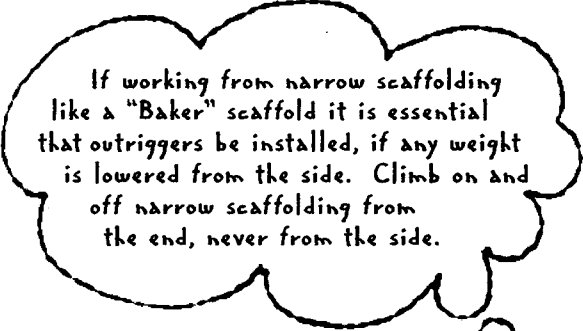
Since, sheathing may be bracing the building, diagonally brace the walls across the entire building before removing sheathing. Brace side walls to the first floor deck or exterior stakes before removing second and third floor decks.

Once the platforms have been removed, pry apart the wall structures at the corners and lower them to the ground using ropes, and then dismantle them.



- Platform Framing

Brace exterior walls to the floor decking so that the wall sections won't fall to the outside as other sections are removed *///*. Then lower each wall to the floor, section-by-section, and dismantle it.



If working from narrow scaffolding like a "Baker" scaffold it is essential that outriggers be installed, if any weight is lowered from the side. Climb on and off narrow scaffolding from the end, never from the side.

- Flooring Platform

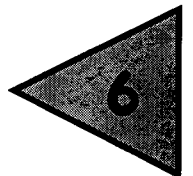
Work off scaffold to pry or hammer up sheathing or decking from below. Once the sheathing or decking has been removed dismantle the floor joists from below.

⇒ Not Addressed

These structures are beyond this manual. They require a different set of skills, protocols, equipment, and tools.

- post and beam
- steel frame
- metal curtain
- cut stone and pre-cast facing
- pre-cast stressed beam
- reinforced concrete slab

FOUNDATION DECONSTRUCTION AND SITE RECOVERY



It may be safer and more cost-effective to subcontract with a demolition company for the removal of slabs, basements, and foundations. However, certain situations, such as limited access for large machinery, or building removal in environmentally sensitive areas, might require that the deconstruction crew remove the entire building.

⇒ Slabs *///*

Break up slabs using jackhammers, hydraulic hammers and digging bars. A gas-powered conveyer belt can be used to carry the rubble to the recycling container. If the slab is in a sub-grade basement it should be broken and removed before the foundation walls are removed in order to avoid the risk of a cave-in *///*. If it appears that the foundation walls are bowing inward, determine whether or not the first floor joists are bracing them. If there is pressure on basement walls, brace them before removing the slab. If a basement slab is to be left, it should have holes punched at frequent intervals for drainage.



Tip: If the job is in a rainy region and/or season, the first floor deck should be left on until the foundation work can be done. It takes a lot of pumping to empty a foundation full of water.

➤ Foundation Walls and Footings *////*

The method used to deconstruct foundation walls and footings depend on whether they are constructed of poured concrete, concrete block or stone. When deconstructing a foundation, brace the walls so they do not collapse *////*. If bracing is necessary you can construct a checkerboard bracing system, in which the walls are divided into eight-foot sections, and every other section is covered with a braced 3/4-inch plywood sheet. As open sections are deconstructed the bracing can be moved to the exposed backfill. If the wall is very unstable, the bottom of the wall can be braced as the top half is removed.

The foundation is holding back "back-filled" dirt, which may be far more unstable than the surrounding undisturbed earth. Use bracing to prevent a "cave-on," which could be fatal!

Use jackhammers, hydraulic hammers, digging bars, and shovels to remove concrete foundations and footings. Remove blocks and stones, one-at-a-time, with masonry hammers, and/or hydraulic or electric hammers. Be careful not to break concrete blocks when knocking them loose.

➤ Backfill

Material and methods used to backfill a basement must comply exactly with local codes. Different methods may be required within the same municipality due to such things as water tables, land configuration, and soil stability.

V. MATERIAL MARKETING

Starting up a deconstruction company requires a focus on both business operation and material sales. Options for moving material include donating the material to non-profit organizations, selling to wholesalers, or selling the material yourself. The material can also be remanufactured into new items, or used in new construction.

DONATING MATERIAL TO NON-PROFIT ORGANIZATIONS

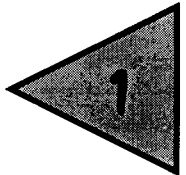
Non-profit community and housing development organizations need building materials for low-income housing. Deconstruction companies can quickly unload many salvaged material by donations. In most cases the property owner can receive the incentive of a tax deduction worth the value of salvaged material donated.

Benefits:

- no cost for material marketing,
- less staff time required,
- in some cases, less material preparation needed,
- tax deductions for property owners offset some of the costs for deconstruction,
- in some cases, minimum or no delivery fees, because some development organizations, and non-profit organizations will pick up materials onsite,
- no storage costs,
- lower accounting and administrative fees,
- attention-getting public education, and
- attracts local government support.

Cons:

- eliminates a potential income source,
- some material may not be able to be donated, making it difficult to estimate tip fees while estimating projects,
- tempts consumers to regard used building material businesses as only social service operations serving a lower-income clientele, and
- leads toward under-valuing of salvaged materials.





2 WHOLESALE SALVAGED MATERIAL

The wholesaling of materials to a reuse store may appeal to deconstruction companies not interested in marketing materials themselves. Unfortunately not all areas have used building material stores. However, many cities do have reuse stores, some are broad-scoped used material stores (they take and sell a little bit of everything), some specialize in architectural salvage (higher-value architectural antiques and detail items), and some are building supply stores and/or wholesalers that carry side-line salvaged building material. For example many wood flooring companies now carry a salvaged flooring option.

Benefits:

- no cost for material marketing,
- less staff time required then selling material directly,
- in some case less material preparation needed,
- no storage needed, and
- less accounting because income is based on only a single overall material income and contract fees.

Cons:

- some material may not be able to be donated making it difficult to estimate tip fees while estimating projects,
- more work and higher costs, at least initially, in locating prospective wholesale buyers,
- every handler in the supply chain takes their cut reducing the income received from the sale of material.



3 SELLING THE SALVAGED MATERIAL YOURSELF

Deconstruction companies may gain additional benefits by choosing to retail the material they salvage from deconstruction projects. Selling recovered building material can be a challenging but rewarding venture. Retailing complicates the administration of a deconstruction company by requiring detailed handling and marketing. The company must have an individual or department in charge of assessing, tracking, marketing, and selling all material from its deconstruction jobs.

⇒ Assessing the Re-salability of Building Material


A deconstruction company planning to sell salvaged building material, to enhance its profits or offset its costs, must carefully consider each deconstruction project to assess the type and value of the material it contains. A material assessor on staff who understands the various types of building material and its value is important. The material assessor can determine which material can be sold, which does not have a market, and which is hazardous and must be removed and disposed of properly. This assessor should be certified in assessing both lead and asbestos hazards.

⇒ Material Inventorying and Storage 

Storage may be essential while a buyer is located. Material recovered should be recorded in order to provide an accurate figure for sale. Material recorded before deconstruction begins can be marketed and possibly sold prior to deconstruction. The material assessor can assist in calculating accurate amounts of material that will be recovered for resale. The assessor should subtract a percentage for breakage, based upon removal of a test section or past experience.

Select a storage facility which:

- is of adequate size to store material,
- has easy access,
- is weatherproof,
- is insect resistant,
- allows for convenient storage,
- is secure, and
- is close to deconstruction activities.

⇒ Preparing Material for Sale 

Many types of material require preparation before they can be sold, shipped or stored.

● Architectural artifacts and antiquities

If a building has not been vandalized, pound for pound, the first material out of it should be the most valuable. It is often worth your time to invest substantial time in preparing samples of these items for display. They can then be displayed with an attached list of the number of similar components in stock.

Some simple cleanup and refinishing ideas include the following.

- Clean and polish one brass hinge as a sample.
- Strip one square foot of a painted mantel or hardwood floor to its substrate and refinish.

- For stained glass, strip one corner of the frame and clean the glass in that corner.
- Strip, repair, sand and refinish a portion of one door as a sample.

- **Dimensional Lumber**

Remove nails and store at least six inches off the ground and separate additional layers by spacers (stickers), especially if the storage area is not completely dry. Lumber should be kept dry and be adequately supported to prevent warping. Stack lumber by type and dimension. Band stacks that are to be shipped.

- **Trusses**

Remove nails and stack them flat at least six inches off the ground, and band for shipment. Stack additional piles of trusses separated by four-inch stickers.

- **Plywood/Sheathing**

Remove nails and stack into like piles two to three feet thick. Use thin stickers between each sheet, if the storage area is not completely dry or if the material will be stored for long periods of time. Begin stacking the first pile six-inches off the ground and separate each additional pile with four-inch stickers. Band piles if they are to be shipped as a unit.

- **Siding**

Remove nails and stack in the same fashion as dimensional lumber. However, it is not necessary to separate siding into various lengths, because oftentimes siding is sold per linear foot. Siding can be planed to increase its resale value. However, do not plane painted siding until you determine if it is painted with lead. If the siding does contain lead, prepare it using lead-safe techniques.

- **Wood flooring**

Wood flooring is typically sold by the linear foot and should be de-nailed and bundled in a fashion similar to siding.

- **Wood molding**

Wood molding, also sold by the linear foot, can be stacked similarly to siding. De-nail and test the paint for lead before planing, stripping, and/or sanding. If the paint contains lead, prepare the molding using lead-safe techniques.

- **Bricks/Concrete blocks**

Bricks and blocks can be cleaned of excess mortar and stacked on pallets in roughly three to four feet high piles. Metal banding can be used to secure the piles for shipping.

- **Ceramic and vinyl tile**

When ceramic and vinyl tile is salvaged, excess adhesive should be cleared from each tile and the tile stacked in small containers. The color, size, and texture of the tile should be recorded on the outside of the container for easy identification.

- Carpet


Old carpet can be a health hazard. Wear respirators when removing and handling used carpet. Remove all staples and tacks and have the carpet professionally cleaned. Recycle old carpet when it cannot be thoroughly cleaned. The color and dimensions of each roll should be recorded on the backside of the carpet for easy identification. The rolls can be stacked upright or flat at least six inches off the ground.

- Grading Salvaged Building Material 


Because grading standards for lumber didn't develop until well into the 20th Century, many older buildings do not contain graded lumber. Most local building codes do not allow the use of ungraded lumber in new building construction for structural purposes. Although researchers are working towards developing a grading system for reclaimed lumber, except for large timbers, grading classifications have yet to be developed. Forming strong bonds with the local building inspectors and a certified grader can greatly increase the salability of salvaged lumber. Local building inspectors can approve the use of salvaged lumber for structural purposes and certified graders can stamp used lumber for structural use without the development of grading classifications.

Factors that will affect the grading of lumber include:

- all factors affecting new lumber, such as knots, warps, splits, etc.,
- size, shape, and location of cutouts, such as holes drill for the passing of electrical wires and water/sewer pipes,
- water damage,
- fire damage,
- termite infestation and other decay, and
- fasteners and fastener holes.

- Pricing Salvaged Building Material 

The price, which can be charged for recovered building material, varies depending upon the quality of the material, the amount, grading, location, and the price of equivalent new material. As a rule of thumb many deconstruction/reuse companies charge 25 to 50 percent of retail value for salvaged building material. Hard-to-replace, classic fixtures, fittings and finishes, and first-growth lumber which have no modern equivalents, may sell for many times the price of their modern functional replacements.

- Marketing Salvaged Material 

A strong marketing plan is critical. The expense of providing space and handling for material for even short lengths of time can greatly reduce the profitability of a deconstruction project.

Strategies for selling material

- General Advertising

Get the word out (prior to deconstruction if possible). Place ads in local newspapers and on the Internet, post flyers, and call local contractors and construction companies.

- Customer-specific advertising

Certain items recovered and remanufactured from deconstruction such as flooring, timbers, and bricks can be advertised directly to end users in trade journals, and web-based material reuse sites. In many cases nothing more is required than contacting the end-users in the area (flooring companies, timber framers, landscape companies) and cataloging your supply of available material.

- Networking/Pre-sales

Networking and pre-sale is key to moving material smoothly off your deconstruction sites. You can call your network contacts (comprised of builders, citizens, government agencies, etc.) and find a buyer well in advance of actual building take-down. In some cases you may even get the contacts to remove the material themselves (assuming that it is safe and practical for you and the buyer).

Shipping/Delivering of Material

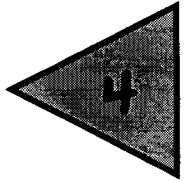
In order to minimize costs and liabilities, the buyer should pick up material as soon as it has been removed and prepared for shipping. In the case of large shipments of bulk items, such as flooring, which may have to be accumulated from many deconstruction sites, the items should be stored in a central location and then shipped once a specific quantity is reached.

Benefits:

- allows the deconstruction company to receive a higher price from material sales, increasing the bottom line of deconstruction,
- gives the company flexibility to store items during market demand fluctuations,
- can increase the demand for deconstruction services due to increased salvaged material requests, and
- facilitates the quick sale of material and reduced need for storage.

Cons:

- adds increased costs of marketing to deconstruction overhead,
- increases costs of material storage and inventorying,
- increases liability and responsibility of providing materials on time and at the specified quantities specified (pre-sales),
- increases the risk of theft if material are not stored properly or not removed from the site quickly, and
- increases paperwork.



REMANUFACTURING MATERIAL FOR RESALE

In order to increase the value of salvaged building material, a deconstruction company can process the material into higher-valued products. This is a new and exciting market open to deconstruction and building material reuse related businesses. A deconstruction company that manufactures an item or items using the material recovered from its deconstruction projects can greatly increase its profitability. One example of value adding is milling salvaged lumber into new products. Items that have been produced include:

- flooring,
- furniture,
- artistic and decorative components,
- exposed structural members, and
- cabinetry.

Benefits:

- increases the resale value of material recovered from deconstruction sites,
- provides another level of industrial skill development,
- creates higher-paying jobs commensurate with the higher-value product,
- creates highly visible, hence educational, artifacts embodying the value inherent in resource conservation, preservation, and restoration,
- increases the embodied energy of salvaged building material, and
- allows for the productive use of smaller salvaged building components that might otherwise be ground or chipped for recycling.

Cons:

- adds additional costs and overhead,
- may require considerable capital investment in machinery,
- may require new manufacturing techniques and tools, and
- increases hazards not realized in deconstruction.

5

REUSING SALVAGED BUILDING MATERIAL IN NEW CONSTRUCTION

Another option for unloading all the material salvaged from deconstruction projects is direct reuse of the material in new construction and rehabilitation projects.

In order to increase the efficiency of material reuse, a deconstruction and construction company can select buildings to deconstruct which contain the specific types of material they need for new construction. Designers can also design new construction projects around material that will be recovered from future deconstruction projects.

Benefits:

- o guarantees an outlet for salvaged material,
- o no marketing costs,
- o lowers transportation costs, and
- o provides optimum energy efficiency.

Cons:

- o possible increased storage costs,
- o stored material may be an inconvenience or hazard during the deconstruction,
- o increases complexity and costs due the need to coordinate the tasks of design, deconstruction, and new construction, and
- o structural lumber needs to be regraded.

6

STARTING YOUR OWN BUILDING MATERIAL REUSE STORE

If no salvaged building material wholesalers exist in your area, you may decide to open your own building material reuse store and sell the material you salvage. This is also a natural expansion for a deconstruction company that is already selling material off its sites. However, starting an official reuse store is much more complex than simply selling the material off of your deconstruction site. Building material reuse stores typically have their own staff and overhead (warehouse space can be quite costly in many areas), and involve more complex inventorying, marketing and sales due to the large volume of material received from various deconstruction sites and/or overflows from construction sites and building material stores.

We suggest that you do not attempt to open a reuse store until your deconstruction company is fully operational. The complications due to starting two businesses simultaneously could seriously threaten the success of both businesses. A better bet is to partner with an existing business or entrepreneur who can start-up and operate the reuse store. That way you guarantee an outlet for your material without the added stress of an additional business. If the partner reuse business is a non-profit entity, then the material you salvage can be donated and a tax deduction passed along to the building owner, increasing the feasibility and competitiveness of your deconstruction business.

Benefits:

- self-contained outlet for salvaged material,
- increases incentive for deconstruction (non-profit reuse store),
- accessible to "walk-in" buyers,
- requires less coordination between supply and demand, and
- encourages the accumulation of a broader, more varied selection of material in inventory, which increase its appeal to both professional and "do-it-yourself" customers.

Cons:

- increases overhead and administrative requirements,
- increases demand for storage space,
- increases staff demands, and
- increases capital costs.

F. BUSINESS PLAN IDEAS

The following is a general outline for a deconstruction business plan which you can use to get started in designing your business. It is advised that you hire a professional business plan writer, take classes or, at least, consult a specialist while creating your business plan. A well thought out business plan can be a valuable asset in effectively designing, starting and operating your deconstruction business. Accurate and realist financial projections will also help you insure the long-term vitality of your business. Refer to Chapter B: Setting Up The Company to assist with developing your business plan.

⇒ Statement of Purpose

State the purpose of the business plan. For example will it be used as an operating guide, a financial tool or both? A business plan is vital when applying for loans or grants, and for leasing warehouse and retail space.



Example: This business plan will be used as an operational guide for the deconstruction company and will be used as a supplement to financial proposals and grant applications.

⇒ Description of Business

Describe the company's goals and objectives, the types of deconstruction services it will offer, the material it will recover and what it plans to do with the material.



Example: The deconstruction company is a building dismantling, construction, and training company, that removes buildings and building components manually though "de-construction", re-constructs certain building components, such as flooring, using salvaged material, and assists in "de-construction" training.

● Location

State the main location of your business, generally a singular building which houses your office, equipment, staff, and other services.

● Business Structure

Describe what business structure you will use, whether the business is a not-for-profit, partnership, employee cooperative, corporation, etc.

⇒ Staffing Needs

Include a list of needed staff and the job descriptions of each position. The following are some examples of staffing positions and their descriptions.

- General Manager

The General Manager is responsible for overseeing job acquisitions and bids, marketing, job-cost tracking and management, material sales and/or donations, and financial accounting.

- Administrative Assistant

The Administrative Assistant will be responsible for administrative duties and general office accounting.

- Crew Supervisor

The Crew Supervisor will be responsible for managing deconstruction activities at the job site and assigning tasks.

- Assistant Crew Supervisor/Safety Captain

The Assistant Crew Supervisor/Safety Captain will assist the Crew Supervisor in his/her duties and be responsible for safety.

- Material Manager

The Material Manager will be responsible for tracking and organizing salvaged material at each job site.

- Equipment/Tool Manager

The Equipment/Tool Manager will be responsible for organizing, tracking, and securing the tools used by the crewmembers.

- Driver

The Driver will be responsible for transporting crewmembers and tools to and from the job site, and for delivering salvaged material to the storage unit and, when necessary, to purchasers.

- Crewmembers

Crewmembers will perform the actual deconstruction of buildings.

⇒ Facility Needs

State the square footage of office space needed for holding meetings, and for performing office-based duties and the square footage for storage and possible resale of used building material.

⇒ Equipment Needs

State the amount and types of equipment that the deconstruction company will require to operate over a specific time period.



Example: *The deconstruction company requires the following list of equipment to operate efficiently over the next three years.*

- 2 large flat-bed trucks for the pick-up and delivery of material;
- 1 van for transporting crew to and from job sites;
- power tools (e.g., circular saw, chainsaw, and reciprocating saw) to remove and prepare material;
- hand tools (e.g., hammers, crow-bars, sawhorses, work lights, shovels, and brooms);
- generators for powering lights and tools;
- 2 storage containers for storing salvaged material;
- rental tools and machinery;
- 2 computers and hardware (includes CPU, monitor, and printer), and software for inventory, scheduling, job cost accounting, and marketing; and
- fax machine, copier, file cabinets, and general office supplies.

⇒ Hours of Operation

State when you plan to do business. Will you be open year-round or seasonally? Consistent and convenient hours of operation are crucial for the sale of salvage material.



Example: *The deconstruction company will operate from 7am to 4pm, Monday through Friday. These hours of operation are subject to change and may be adjusted seasonally. The reuse store will be open year-round from 8am to 8pm, Monday through Friday and Saturday and Sunday from 9am to 5pm.*

⇒ Products and Services

Specifically describe what products and services your company will provide. Examples of descriptions include the following.

● Environmentally Sensitive Building Removal

The deconstruction company provides fee-based, building removal services (traditionally known as demolition) to developers, contractors, and building owners. The company removes buildings by dismantling them by hand, therefore causing minimal environmental disruption. The company uses heavy machinery only when necessary to remove concrete walls and foundations. The company provides a wide-range of building removal services from partial to full removal of material.

- **Salvaged Building Material**

The Deconstruction Company will sell many building materials recovered from deconstructing buildings, including:

- dimensional lumber used for structural framing (floor joists, wall studs, rafters and trusses, plywood, and decking material),
- roofing material (asphalt, tile, wood, slate, paper, flashing, and guttering systems),
- concrete and masonry (concrete blocks, bricks, and stone),
- siding and exterior finishes (wood and vinyl siding, and exterior paint),
- flooring and other interior finishes (wood flooring, linoleum, ceramic tiles, carpet and padding, paneling, drywall, wood moldings, doors, interior paint, and wallpaper),
- plumbing supplies (metal and PVC piping, fittings, and fixtures -tubs, sinks, toilets, and faucets),
- electrical supplies (wiring, circuit boxes and breakers, and fixtures),
- lawn and garden (fencing, gates, decorative tile, plants and small trees, sand, soil, dirt, and stones),
- windows, doors, and insulation (various decorative and insulated glass windows and frames, panel, loose cellulose, and rolled fiberglass insulation),
- decorative components (skylights, mirrors, mantels, shelving, and railings), and
- miscellaneous metals.

- **Installation Services**

The deconstruction company will provide installation services for certain salvaged material (e.g. flooring and windows) which is purchased for reuse.

- **Workforce development**

The deconstruction company will provide fee-based deconstruction, training services to government agencies, non-profit organizations, and businesses starting or operating a deconstruction company.

⇒ **Market Analysis**

Describe a detailed breakdown of the markets and trends in your area that could affect the operation of your company and the sale of material.

- **Description of Markets for Building Removal Services**

The deconstruction company's target markets for the removal of buildings might include construction, demolition, and development companies and contractors, building owners, and government and non-profit agencies. You will need to research local and regional markets and input that data into your business plan

- **Description of Markets for Salvaged Building Components**

The deconstruction company's target markets for salvaged building material may include for-profit and non-profit developers, contractors and builders, architectural salvage companies, manufacturers that use salvaged building material, and "do-it-yourselfers." You will need to research local and regional markets and input that data into your business plan.



Example: The deconstruction company's primary market for selling recovered building materials will be developers, builders, and contractors and architectural salvage companies within the metropolitan area. Manufacturers that use salvaged building material and "do-it-yourselfers" comprise the company's secondary market.

- **Market Trends**

You will need to research trends in construction and demolition and construction and demolition recycling and reuse in your area and nationwide. Used this information to support the need for starting a deconstruction activity in your area. For job training, be sure to research the current employment trends in the construction and demolition industry and unemployment rates in your community.

- **Competition**

Be sure to research and accurately depict your competition within your business plan.

- **Building Removal Services**

Traditional demolition companies will be your primary competition for building removal.

- **Sale of Salvaged Building Material**

The deconstruction company's primary competition for salvaged material sales will come from existing salvage and reuse stores, classified ads, and Internet resale sites. Secondary competition for material will come from existing building material wholesale and retail stores.

- ⇒ **Strategies and Processes**

In your business plan be sure to explain how you intend to perform your essential operations, such as the following.

- **Job Acquisition/Bidding Strategies**

The deconstruction company will primarily acquire jobs through advertising and "word of mouth." The company also plans to respond to Requests for Proposals (RFPs) for building removal contracts, offered by private and public sources.

The General Manager will offer bids for building removals. The bids will account for sale of salvaged material, reduced disposal costs, and tax deductions. In many cases, the deconstruction company should be able to underbid traditional demolition companies. The General Manager, however, must be aware of time constraints for removal and be able to meet required deadlines or be able to convince owners to extend deadlines to accommodate for deconstruction. This is especially important for large projects, such as the removal of public housing units.

- Storage and Sale of Material Strategies

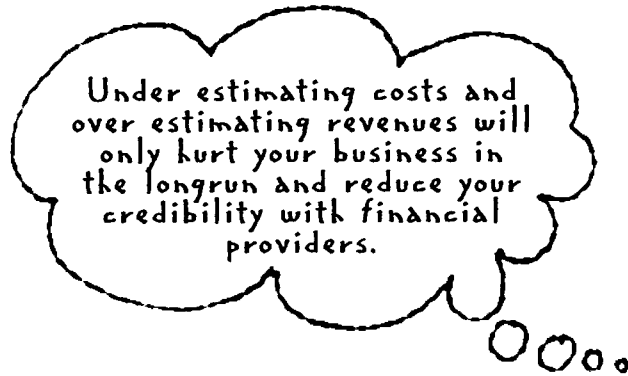
Whenever possible salvaged material will be sold on site to prevent the need for storage. In certain cases, material will need to be stored while awaiting sale. This material may be secured in rented warehouse space or metal storage containers to prevent theft. Storage containers will be either located on the deconstruction site and moved from job to job, or located centrally, and crewmembers will deliver material to the storage containers from each job site.

- Training Strategies

Based on removal contracts, the deconstruction company will have a minimal amount of time to remove buildings and building components. The company, therefore, requires highly-trained deconstructors to efficiently and quickly dismantle buildings. The company will organize training sessions (e. g. on safety, removal and installation methods, and business management) for current workers. When possible the company will hire workers from deconstruction training programs. When no deconstruction trainees are available for hire, the company will provide, formal and informal training to new hires.

⇒ Financial Data

Attach spreadsheets containing your company's budget and cashflow projections. Refer to a professional accountant when setting up your projections to reduce unexpected costs from hindering the success of your business.



F. RESOURCES

- ⇒ Alameda County Waste Management Authority
Alameda County Source Reduction and Recycling Board
777 Davis Street, Suite 100
San Leandro, CA 94577
(510) 614-1699
<http://www.stopwaste.org>

A Builder's Guide to Reuse and Recycling: A Directory for Construction and Demolition Materials. 2000.

- ⇒ Beyond Waste, Inc.
3262 Wilder Rd.
Santa Rosa, CA 95407
(707) 792-2555
<http://www.beyondwaste.com/>

Taking Reuse Seriously: Inner City Development. Pavitra Crimmel.

- ⇒ California Integrated Waste Management Board (CIWMB)
1001 I Street, PO Box 4025
Sacramento, CA 95812-4025
(916) 341-6000
<http://www.ciwmb.ca.gov/>

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Thomas Mueller
Construction/Demolition Recycling Advisor
4330 Kingsway
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808 North Chester Street
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Rhonda Sherman-Huntoon
Extension Solid Waste Specialist
Department of Biological & Agricultural Engineering
NCSU Box 7625, Raleigh, NC 27695
(919) 515-6770
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Kathy Zaumseil
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kz@rafiusa.org
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Julie Rhodes
Executive Director
Indianapolis, IN. 46244
(317) 631-5395
<http://www.redo.org>

Reuse Case Study Manual

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Judy Kincaid, Solid Waste Planning Director
P.O. Box 12276
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Robin L Snyder
Office of Policy, Economics, and Innovation
Urban and Economic Development Division (UEDD)
6406J USEPA Headquarters
Ariel Rios Building
1200 Pennsylvania Avenue, N. W.
Washington, DC 20460
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