

# Waste Management and Recovery

## A Field Guide for Residential Remodelers



**REDUCE**



**REUSE**



**RECYCLE**

### How to Be Resource Efficient & Save Money

# Acknowledgments

This field guide is the culmination of work of dozens of individuals from several different industries, including remodelers, home builders, waste haulers, and government officials. Although it is not possible to acknowledge all of these people here, many are recognized throughout this guide.

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## How to Use This Guide

This field guide provides remodelers with information on cost-effective and voluntary construction waste management.

- The **First Steps** section helps you determine the approach(es) appropriate for your business.
- The **Options** section discusses the conditions affecting the success of the various options and presents results from builders currently using the techniques.
- The **Marketing** section explains how to take credit for your efforts; and
- The **Appendices** provide supporting information.

The **Remodeler's Field Guide** is a follow up to the **Builder's Field Guide**, completed in January 1997. Although the **Builder's Field Guide** was a model for this document, it was written with a **new home builder** in mind and thus does not address the unique situations confronted by the **remodeler** nor does it focus on the waste management techniques most feasible and cost effective for remodelers. The two guides differ in other important ways:

- The **Remodeler's Field Guide** addresses the unique aspects of remodeling, including differences in waste generation and site and work characteristics;
- **Reuse** is the unique focus of the **Remodeler's Field Guide**, as it represents more opportunities for the remodeler than waste reduction and recycling, which are emphasized in the **Builder's Field Guide**;
- The **Remodeler's Field Guide** addresses the handling of lead-based paint and asbestos; and
- Marketing and green building programs are included in greater detail in the **Remodeler's Field Guide**.

The NAHB Research Center has prepared additional informational brochures in conjunction with the **Remodeler's Field Guide** for projects which generate large quantities of a specific waste material such as **asphalt shingles** or **carpet**. In addition, many remodeling projects offer the opportunity for **deconstruction**—the systematic disassembly of buildings for material salvage. See the back cover of this guide for more information.

# Developing a Waste Management and Recovery Plan

Remodelers can manage their waste, just as they do other aspects of their business. The first step is developing a waste management and recovery plan, and the table on the facing page summarizes the options presented in this guide. Because of the diversity of remodeling projects and the size and structure of remodeling firms, not every remodeler will be able to apply every option. However, this guide is designed to provide a variety of ideas and instructions from which it is hoped many remodelers will benefit.

You can develop a general waste management strategy by following the three simple steps below:

### 1. Know what you throw and how much it costs:

A general sense of the **types** and **quantities** of waste materials generated on your job sites and the **dollars** spent to dispose of these materials provides a good starting point. See pages 4 and 5 of this guide for more details.

### 2. Understand the conditions affecting waste management decisions:

Homeowner preferences, size and duration of projects, site conditions, local tipping fees, and availability of outlets affect waste management decisions. Keep in mind that waste management plans are somewhat site specific—a *plan that works at one job site may not work as well at others*.

### 3. Establish a plan:

Note that different options will involve working with different partners. For example, waste reduction through efficient framing may involve carpenters and possibly the architect or estimator. Building material reuse, alternately, may involve the homeowner and a building materials reuse center.

### A few additional suggestions:

#### EVALUATE

Assess the job before work begins. When you measure for new materials, 1) estimate the waste you will generate so you can assess your need for containers and waste removal and can select appropriate and cost-effective waste management options (*see table on page 4 for average waste generation rates*), and 2) list reusables that will be removed.

#### DELEGATE

Assign responsibility for waste management to an employee who is interested in waste reduction, reuse, and recycling. Leadership, particularly on site, is key to a successful waste management program. It may also be necessary to support this with memos or announcements so that crews understand the commitment comes from the corporate level, i.e., “from the top down”.

#### COMMUNICATE & EDUCATE

Talk to your employees and subs about how they should handle waste on the job site. Just as you instruct them to keep a client’s home neat and free of debris, tell employees where waste should be placed and how it should be sorted. Persistence and consistency are key.

#### INNOVATE

Experiment with different reuse and sorting techniques and options. Encourage workers to make suggestions.

#### COMPENSATE

Reward worker efforts. If your company saves money on materials purchases or disposal expenses because of your waste management plan, reward employees with bonuses or a social event.

# Waste Management at-a-Glance

Option		Description	Advantages	Challenges
Waste Reduction Through Efficient Framing		<ul style="list-style-type: none"> <li>• Design: modular dimensions, detailed framing/sheathing plans</li> <li>• Construction: in-line framing, stud/joist spacing &gt; 16", header sizing, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Significant savings in framing material purchases and wood disposal costs</li> <li>• Savings on construction time</li> </ul>	<ul style="list-style-type: none"> <li>• Can require architect, building inspector, framer involvement</li> <li>• "Cost-cutting" perception, i.e., less wood = inexpensive construction</li> </ul>
Waste Reduction Through Structure of Contracts		<ul style="list-style-type: none"> <li>• Requires subcontractors to dispose of their own waste</li> <li>• Can include a cleanup policy limiting the time and location of waste on site</li> </ul>	<ul style="list-style-type: none"> <li>• Significant disposal savings</li> <li>• Promotes efficient use of materials</li> <li>• Improves appearance of site (no large containers)</li> </ul>	<ul style="list-style-type: none"> <li>• No guarantee of material recovery</li> <li>• Risk of hazardous waste disposal liabilities</li> <li>• Requires written contract and recommended legal review</li> </ul>
Reuse	On Site Reuse	• Materials are reused in another location in the home, garage, or yard	<ul style="list-style-type: none"> <li>• Homeowner retains value of materials</li> <li>• Contractor saves on disposal costs</li> </ul>	• May require temporary storage
	Salvage Area	• Materials are placed at a regular spot for salvagers	• Leads to reuse of many marginally reusable materials	• Neighbors or authorities may object to waste or traffic
	Building Material Reuse Center	• Materials are donated to a used building materials retail store	• Donation to non-profit reuse center is tax deductible	• Separate trips may be necessary to drop off reusables and landfill waste
Recycling: (In order of increasing remodeler involvement)	Job Site Clean-up Service	• Remodelers and subcontractors place all waste in designated area/container, hauler handles the rest	<ul style="list-style-type: none"> <li>• Little to no remodeler involvement</li> <li>• Costs established up-front</li> <li>• Small or no container on site</li> <li>• May limit drive-by contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Material recovery done by hauler - does not promote waste reduction or recycling among waste generators</li> <li>• Availability: cleanup services currently uncommon</li> </ul>
	Commingled Recovery	• Separation of mixed waste and recovery of recyclables done at an off-site facility. Material collected in conventional container.	<ul style="list-style-type: none"> <li>• Little to no remodeler involvement</li> <li>• May limit drive-by contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Material recovery done by hauler - does not promote waste reduction or recycling among waste generators</li> <li>• Availability: commingled recovery less available where tipping fees &lt; \$50/ton</li> </ul>
	Job Site Separation	• Remodelers and subcontractors place waste and recycled materials in separate containers	<ul style="list-style-type: none"> <li>• Highly visible system</li> <li>• May be available from conventional haulers</li> </ul>	<ul style="list-style-type: none"> <li>• More containers on site</li> <li>• Requires compliance of subcontractors to control contamination</li> </ul>
	Self Haul	• Remodeler handles, transports, and tips all materials	<ul style="list-style-type: none"> <li>• Eliminates the need for a container on site</li> <li>• Reduces opportunity for drive-by contamination</li> </ul>	<ul style="list-style-type: none"> <li>• Requirements: labor, vehicle, knowledge of recycling markets/outlets</li> </ul>
Cutting Edge/New Ideas	Inventory Management	<ul style="list-style-type: none"> <li>• Leftover supplies are stored &amp; used in future projects</li> <li>• Computerized or written catalogue of materials</li> </ul>	<ul style="list-style-type: none"> <li>• May improve take-off estimation</li> <li>• Greatly reduces or eliminates product waste</li> </ul>	• Material must be accurately tracked and someone must manage the system
	Take-back Policies (carpet padding, carpet, drywall, vinyl)	• Waste is returned to place of purchase or manufacture for recycling into new product	<ul style="list-style-type: none"> <li>• Individual trade/sub assumes responsibility for single waste material</li> <li>• Cuts down on separation and transportation costs</li> </ul>	<ul style="list-style-type: none"> <li>• May only be available for large-volume customers</li> <li>• Requires relatively high-value materials and low contamination</li> </ul>

## FIRST STEPS

# Remodeling Waste Basics: Types, Quantities, and Costs

### A Tip on Waste Generation Rates

	# of Projects/Year*	Pounds/Sq. Ft.	Cubic Yards/ Sq. Ft.	Percent of Recyclable Material**
Addition	1,250,000	4-12	0.01-.03	15-65%
Kitchen	2,500,000	4-67	0.02-.06	10-90%
Bathroom	3,050,000	5-70+	0.04-.15	5-60%
Roof	4,850,000	3-5+	0.01-.02	5-90%
Deck	na	3-8	0.01-.02	50-90%
Whole House	na	7-11+	0.01-.03	5-25%

na not available

\* Source: American Housing Survey, 1995.

\*\* Average range based on pilot remodeling projects and waste audits. Actual diversion rates will vary depending on specific wastes generated during a project.

## Types and Quantities

The following generalizations can be made about residential remodeling waste:

- By both weight and volume, wood, drywall, and cardboard make up 60 to 80 percent of waste from projects involving new construction such as additions.
- Cardboard waste is increasing on most job sites as more components—e.g., windows, doors, appliances, cabinets, and siding—are shipped over long distances.
- Demolition waste is more difficult to recycle or reuse because:
  - 1) waste may be contaminated with hazardous or non-recyclable materials such as lead paint or adhesives, 2) materials may be damaged from water or rot, or 3) readily separating waste into individual materials may not be possible.
- The largest share of new construction or remodeling waste that could be considered hazardous is generated by painting, sealing, staining, and caulking. Special remodeling hazards – lead-based paint (LBP) and asbestos-containing material (ACM) – are associated with pre-1978 structures (*see Appendix B for more information*). These hidden hazards may only be detected by testing.

## Costs

Waste management is composed of four costs:

### OVERSEEING

Oversight of waste management can be as simple as ordering a dumpster from a hauler or as extensive as running a worker training program and making multiple phone calls for each project to identify reuse or recycling outlets for waste items/materials. A waste management system that is clear and understandable to workers will be easiest to administer.

### HANDLING

It takes about 2.4 hours per ton to gather and carry construction waste from a house to a dumpster/waste pile. This number, however, can vary widely based on the type of waste material, the distance from the job site to the dumpster/waste pile, and whether it is handled mechanically or manually. *Note:* Handling costs are often neglected when calculating total waste management costs.

### TRANSPORTING

Trucking costs include ownership, operation & maintenance, and the driver's labor. For more information on transportation costs, see the self-hauling section on page 14.

### TIPPING

This is the fee charged by the facility that receives waste material. Landfills and recycling outlets may charge by volume (cubic yard) or by weight (ton). Use the conversion table on page 5 to convert from one measurement unit to the other. In many areas, clean loads of recyclables, e.g., source separated wood waste, can be tipped for less than mixed loads.

### A Tip on Future Costs

Your disposal costs are largely dependent on local landfill capacities and state/federal solid waste regulations. Developing new approaches to waste management may pay off in the long run even if current conditions do not warrant a change.

## Conditions Affecting Decisions

Other than waste material types and disposal costs, the following aspects of a remodeling project should be considered.

### PROJECT TYPE

The project's duration and sequence of tasks affect the cost and efficiency of storing, hauling, and removing waste. The phase during which most of the scrap will be generated (demolition or new construction phase) and the total amount of waste to be generated may affect how waste can be stored and sorted.

### JOB SITE CHARACTERISTICS

The availability and location of outside open space (for containers or piles), door and window placement (for chuting or moving scrap materials), and road access (large truck or small) determine which storage and sorting activities can be used on site. The amount or type of landscaping and interior space not being remodeled (or otherwise undisturbed) may also affect where waste can be stored and sorted and how it is moved through the house and over the site.

### HOMEOWNER'S PREFERENCES

The homeowner's preferences regarding waste sorting and storage on site, containers versus piles of waste, and frequency of waste removal affect your choice of options. In some cases aesthetic concerns over large piles/dumpsters may overshadow the environmental benefits of material recovery. For example, neighbors' feelings about visible waste piles or temporary storage of reusables may require more frequent pick ups or off-site sorting of wastes. However, as discussed in the Marketing section (page 15), job site signs promoting your recycling activities can be helpful with these concerns.

### LOCAL GOVERNMENT

Local ordinances or community rules may restrict waste container placement or waste materials storage on site. Or the same rules may support recycling or reuse through recyclables drop-off locations or site pick up of reusables as part of a bulky items pick up service for community residents.

#### A Tip on Volume-Weight Conversions

Waste Material	Volume to Weight (lbs/cubic yard)	Weight to Volume (cubic yards/ton)
Mixed Waste	350	5.7
Wood	300	6.7
Cardboard (loose)	30-100	20-50
Drywall	400	5
Plaster	1000	2
Rubble	1400	1.4
Metal	500-1500	1.3-4

#### A Tip on Fee Structures

Haulers cover the costs of transporting and tipping by charging remodelers based on one or more of the following:

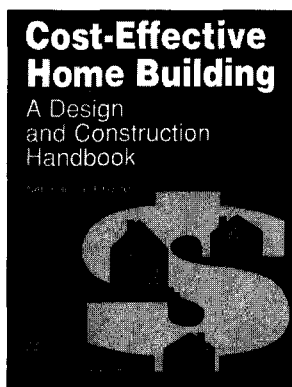
- time- a daily or monthly container rental fee;
- weight- a per ton charge;
- volume- a cubic yard or "pull" charge.

Alternately, clean-up services (described on page 12) may charge by the square footage of a project.



# Waste Reduction

Efforts to reduce waste can occur during several stages of a remodeling project including design, estimation, construction, and even the structuring of contracts with specialty trades. Be prepared to implement changes with your architect, your estimator, and your construction crew(s) and subcontractors. In addition, some cases may require consultation with your local framing inspector.



***Cost Effective Home Building***  
by the NAHB Research Center  
provides detailed descriptions of  
framing techniques which  
reduce material requirements yet  
maintain structural integrity.

## Reducing Framing Waste

Waste generated during the framing stage can be reduced through value-engineered design, the efficient use of building materials during construction, and the reuse of cut-off scraps. *Cost Effective Home Building* by the NAHB Research Center provides detailed descriptions of framing techniques which reduce material requirements yet maintain structural integrity. The *Builder's Field Guide* to construction waste also provides an overview of techniques and case studies of builders — including cost savings. See the back cover and *Appendix C* of this guide for information about obtaining these guidebooks.

In room additions and basement/attic finishing projects, framing lumber can represent both one of the largest material expenditures and the largest component of the waste stream. You can not only reduce the amount of material required but also decrease disposal costs by keeping scrap cutoffs to a minimum through efficient design and framing. The framing waste reduction techniques listed below offer the potential for significant savings.

- **Excessive waste factors and take-off tools**—in many cases, the combination of waste factors and take-off tools results in estimates with excessive overages. As you know, material delivered to the site is normally used up regardless of the waste factor assumed in the order. In particular, historically based estimating, i.e., a “what was used last time” strategy, often results in inaccurate estimates.
- **Increased spacing of joists and studs**—this technique can reduce the amount of framing material required by 30 percent.
- **Corner details**—the stud/block/stud detail is commonly used for framing many corners. The use of two-stud/1x backer and ladder framing reduce the number of studs required to frame outside corners and intersecting walls.
- **Source separation of reusable lumber**—cutoff 2x wood waste can be used for bridging, stakes, bracing, shims, drywall nailers, and blocking where interior walls run parallel to joists or trusses. Similarly, cutoff sheathing waste can be used for drywall stops and furring. A centralized cutting area and a commitment to reuse can be successful.



Ladder framing reduces the number of studs required to frame intersecting walls.



- **In-line framing**—aligning framing members such as trusses, studs, and joists to bear directly over each other is the most efficient way to transfer loads from the roof to the foundation. This technique allows the use of a single top plate regardless of the spacing of the framing members.
- **Header sizes**—it is simple to value-engineer the headers over openings by following the header tables included in most codes. Headers in non-loadbearing walls can be eliminated entirely.
- **House configuration and roof design**—a house plan with overall dimensions on a two-foot module permits the optimum use of floor and wall materials. Modest changes to either the pitch of the roof or the width of the overhang can reduce the amount of material required or the amount of waste generated.

## Contract Structure

While you may frequently take responsibility for waste generated by subcontractors, an alternative approach is to require subcontractors to remove their own waste. Although such an approach does not guarantee the reuse or recycling of material, it can offer several of the benefits listed below. *Contracts and Liability* by NAHB helps remodelers manage risks and protect against liability with well-written contracts.

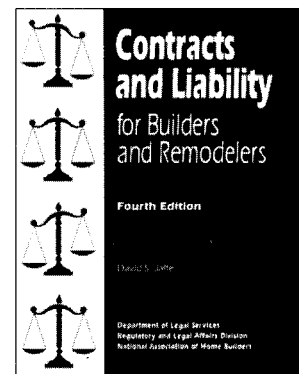
- **Be more cost-effective than conventional disposal.** Admittedly, some subcontractors will increase their contract price to include disposal. Nonetheless, the elimination of containers from the job site eliminates the additional costs you typically absorb as a result of drive-by contamination. Where no containers are used, labor savings results from not handling subcontractors' waste.
- **Promote the efficient use of building materials.** Establishing a direct link between installer and disposer can reduce waste.
- **Create the opportunity for easier recycling by subcontractors.** Immediate waste removal prevents the commingling of waste and maintains a "clean" waste stream which is easier to recycle.
- **Improve the job site's appearance.** Many clients associate a clean job site with quality and attention to detail.

## Potentially Hazardous Waste

Establishing subcontractor responsibility for waste disposal does not relieve you of all waste disposal liabilities. The liability issue is particularly important with subcontractors generating potentially hazardous waste. For more information on waste disposal statutes, including an example of contract language and a list of potentially hazardous materials, see *Appendix A*.

### A Tip on Contract Language

In order to assure that subcontractors change their normal practices and meet contract requirements for waste handling, a job site supervisor must both **provide guidance and enforce the contract language.**



*Contracts and Liability* by NAHB helps remodelers manage risks and protect against liability with well-written contracts.

# OPTIONS – REUSE

## Key Elements of an Inventory Management System

- commodity items ("supplies")
- location convenient for picking up/dropping off materials
- manageable size (minimum 250 square feet) with designated areas for specific materials
- frequently updated inventory list: written, computerized, or both (enough information must exist in the list of materials to make visual verification of stock unnecessary)
- responsibility for inventory control limited to one person
- inventory list is used when ordering for new jobs

*"We save approximately \$1,500 in avoided disposal costs and material purchases every year."*

*- Jim Ellington*



Ellington Woodworks' inventory shed

## Reuse

A lot of the finished items that you remove during remodeling projects have not yet exhausted their useful life and could be reused either on site or through transfer to others. Reusability of items depends in part on their inherent utility and condition, but also on the care with which they are removed and handled both on the job site and in transport to end users.

## Inventory Management

Many remodelers have a shed or storage area that becomes a "tomb" for leftover building materials such as half sheets of plywood or drywall and reusable items such as sinks or cabinets. An alternative to this is an inventory management system in which you catalogue, track, and access the building materials contained within an organized storage area.

**Materials:** Surplus items, as opposed to reusables, are the most logical materials to store in this way. Reusable items, although functional, will tend to clutter a storage area—unless you know of a use for it, it probably should not go into your standard inventory.

**Management:** Essential to any inventory system is accountability—having one person completely responsible for the organization and contents or having a sign-in/out system. This ensures that materials are stored, added, and removed in an orderly fashion and an accurate list of the stock is maintained.

If stock is accurately accounted for and damage is prevented through orderly storage, the inventory list can be used when ordering materials for new projects and your inventory becomes *a resource instead of a liability*.

### Profile: Inventory Management

**Remodeler:** Jim Ellington, Ellington Woodworks

**Location:** Raleigh, North Carolina

**Projects:** Residential remodeling of all types

**Approach:**

- 240 square foot shed is used for storing construction materials
- lumber, trim, shingles, paint, and insulation are cataloged in a spreadsheet
- metal trim is reused or delivered to local recycling facility
- spread sheets regularly updated, and used when material orders are prepared for every job

**Inventory:** approximately \$2,000 value

## Building Materials Reuse Centers

Reuse centers accept and then resell used salvaged materials and misordered or slightly damaged new materials. Materials come from building material retailers, local manufacturing or shipping operations, remodelers, do-it-yourselfers, and new home builders. In addition to reducing disposal costs, donations to *non-profit* reuse centers are **tax-deductible** and may enhance a company's image as a good neighbor. *For-profit* reuse centers may pay reduced prices for items. Reliability and timeliness of donation pick-up, for centers that offer this service, will affect the success and feasibility of this option in a waste management program.

<b>Profile:</b>	<b>Building Materials Reuse Center</b>
<b>Reuse Center:</b>	Habitat for Humanity ReUse Center (non-profit 501(c)(3))
<b>Location:</b>	Raleigh, North Carolina
<b>Approach:</b>	<ul style="list-style-type: none"> <li>• retail of used &amp; overstocked building materials including doors, windows, cabinets, appliances, plumbing &amp; lighting fixtures, miscellaneous building supplies, &amp; lumber</li> <li>• pick-up service offered within 12 mile radius of retail store</li> <li>• deconstruction service salvages old building materials for resale, including disassembly of entire houses</li> </ul>
<b>Results:</b>	<ul style="list-style-type: none"> <li>• 550 tons diverted from disposal in 1998</li> <li>• The ReUse Center provides donors with a tax-deduction and can maintain a list of donations made by contractors.</li> </ul>



Habitat for Humanity ReUse Center

## "Free Tree"

Some reusable materials may be of interest to others if they are available at no cost. Establishing a regular location where leftover, salvaged building materials, or finished products can be placed for individuals to take free-of-charge can be an effective way to reduce disposal. A desirable location would have adequate drive-by traffic, easy access and visibility, minimal liability risks, and neighbor acceptance.

<b>Profile:</b>	<b>Reuse via a "Free Tree"</b>
<b>Remodeler:</b>	Dave Dewey, Crystal Home Improvements
<b>Location:</b>	Vernon, Connecticut
<b>Projects:</b>	Window & door replacements, siding, and 3-season patio additions
<b>Local Tip Fee:</b>	\$65.00 per ton
<b>Approach:</b>	<ul style="list-style-type: none"> <li>• places waste doors and windows next to tree at end of his driveway and taken free-of-charge by individuals</li> <li>• saves aluminum storm screens &amp; windows for recycling</li> <li>• saves and recycles cardboard</li> </ul>
<b>Diversion Rate:</b>	• Approximately 80-90% (including 100% of windows and doors)
<b>Savings:</b>	• Approximately \$1000 per year (in avoided disposal costs)



*"In addition to securing window jobs from customers of the free tree, everything disappears... no matter the condition it's in."*

- Dave Dewey

## OPTIONS – REUSE

### Scrap House Construction

Building part or all of a new home, addition, or other structure from scraps is possible given the unending variety of materials generated by remodeling and construction activities. “Scrap house” construction, as described below, can help make housing affordable, but does not mean quality has to suffer. For example, remodeling “waste” may include items such as solid wood kitchen cabinets, like-new bath fixtures, or double-paned windows. Leftover lumber can be manufactured into studs, beams, or joists. “Waste” materials can be used in construction training programs or in youth-oriented community programs such as building a Boy Scout club house.

*“It always bothered me, seeing the amount of good building material that we discarded. This type of project allows use of almost everything.”*

*- Danny Lipford*



*Scrap House built by Lipford Construction, Mobile, Alabama*

#### Profile: Scrap House

**Remodeler:** Danny Lipford, Lipford Construction

**Location:** Mobile, Alabama

**Approach:**

- Reusable construction materials are salvaged from remodeling projects and stored in a 1,750 square foot warehouse
- wood floor system, wall studs, and ceiling joists & rafters are built from pieces of 2x6 and 2x4 lumber
- laborers build studs from scraps (2x4s doubled into 4x4s) as training; employees and subcontractors work on scrap house for fill-in work

**Results:**

- Approximately 60-70% of house consisted of salvaged material, including: cabinets, windows, doors, siding, fascia, soffits, plumbing and electrical fixtures, shelves, carpet, drywall and appliances
- Home appraised at \$16,000 above total building expenses; house is currently a rental unit
- Danny Lipford has built three scrap houses since 1989.

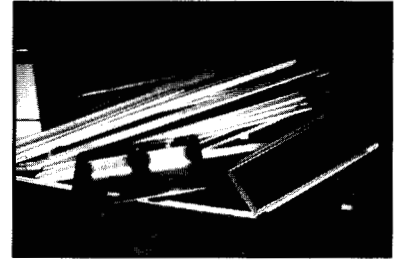
### On-Site Reuse

Many kitchen and bathroom remodels generate finished building products such as cabinets, sinks, and plumbing and lighting fixtures that are reusable on-site. The homeowner may be able to use these items in another area of the home. As examples, reinstalling cabinets in a garage or basement can create new storage or hobby areas, plumbing and lighting fixtures can be used in utility areas or unfinished spaces, and bricks can be used as landscaping material.



## Rental Units

Landlords faced with regular repair and maintenance of rental properties may be interested in low-cost sources of items such as paint, carpet, plumbing fixtures, appliances, doors, and locks or knobs. Establishing a relationship with an individual landlord or property management firm can provide a regular or volume outlet for reusable items and, in the process, reduce disposal costs.



## Landfill Salvage

Landfills can be an effective location for salvage and diversion programs because waste and recovery becomes a “one-stop” operation. Whether drop-off areas for recoverable material are located near the scales – at a reduced tip fee – or on the landfill face as described below, landfills can do double duty for remodelers and their haulers.



*Reusable items such as sinks, windows, doors, and fixtures can be recovered in landfill salvage programs such as those at the Orange Regional Landfill.*

<b>Profile:</b>	<b>Landfill Reuse &amp; Salvage Program</b>
<b>Landfill:</b>	Orange Regional Landfill
<b>Location:</b>	Orange County, North Carolina
<b>Tipping Fees:</b>	\$38 per ton
<b>Approach:</b>	<ul style="list-style-type: none"> <li>• Working near the face of the C&amp;D landfill, a one person operation salvages reusable and recyclable materials for donation and resale.</li> <li>• Equipped with a pick-up truck and a skid-steer loader (with grapple attachment, bucket loader and forks), the operator takes household items to a storage trailer and places building materials that do not need weather protection in a working yard.</li> <li>• Salvaged materials are either donated to non-profit organizations and schools, or resold to repeat customers.</li> <li>• Reusable materials are donated to non-profit agencies, including Habitat For Humanity of Wake County ReUse Center, Vietnam Veterans, PTA Thrift Stores of Carrboro Chapel Hill Schools, school drama/shop classes, SEEDS (an urban gardening program in Durham), the People's Channel (local public television station), and the Salvation Army.</li> </ul>
<b>Results:</b>	<ul style="list-style-type: none"> <li>• Diverting 50 tons per month from landfill, including mixed metals, reusables (fixtures, furniture and lumber), and pallets;</li> <li>• Generating \$8,800 in first 8 months of program through sales of salvaged material (despite the revenues, building material sales open to the general public were labor-intensive and costly to advertise);</li> <li>• High level of cooperation from small local contractors, i.e., separation of materials prior to tipping at landfill face;</li> <li>• Each truck load of materials picked-up by the Habitat ReUse Center generates approximately \$500-1000 in store retail income.</li> </ul>

## OPTIONS - RECYCLING

### Recycling

#### A Tip on Recycling Savings

The savings resulting from recycling is determined in large part by the difference between the landfill's and recyclers' tip fees.

<u>If local landfill tip fees are:</u>	<u>Your approximate savings through recycling can be:</u>
\$0-30 per ton	-5 to +5%
\$30-75 per ton	+5 to 25%
Over \$75 per ton	Over 25%

The cost-effectiveness of recycling will depend on the market value for waste materials, local tipping fees, and how numerous and convenient recycling outlets are for you or your hauler. For materials with strong markets, such as aluminum, recyclers will pay a premium. However, for materials with weaker markets a tip fee may be charged, although it is usually lower than that charged for mixed remodeling waste.

For information on local recycling opportunities, contact your city or county Recycling Coordinator for a list of outlets or ask your local home builder association or building industry association for assistance. A list of state-level government contacts and other resources is contained in *Appendix C*.

### Job Site Clean-Up Service

Under this system, your crews and subcontractors move waste to the area or container set up by the hauler. The hauler designates an area or places a container and then separates, transports, and tips the material. Fee structures are often based on the square footage of the project, making waste management costs easy to predict. Clean up services take advantage of the natural separation of wastes, i.e., wood, drywall, and siding are generated during discrete stages of construction.

*"We no longer have to work around piles of waste on our job sites because Construction Waste Management travels throughout our developments systematically collecting materials."*

*- William Sherman & Co.  
Custom Homes N.W.*



*Small trucks used by Construction Waste Management*

#### Profile:

**Hauler:**

**Location:**

**Approach:**

#### Clean-Up Service

**Construction Waste Management**

**Woodinville, WA**

- waste removal designed with client on site-by-site basis
- use of small trucks and containers, enabling placement of bins close to the work areas
- visits multiple lots collecting a specific material from each site, returning for other materials
- coordinates service schedule with the construction schedule to improve recovery rate
- hand-loading and general site cleaning also available
- recovers wood, drywall, metal, cardboard, asphalt and concrete rubble, and land-clearing debris

**Diversion Rate:** 50 - 90%

**Savings:**

Based on the reduced tipping fees, ranging from \$15-80/ton. In addition, pay-back from metal and cardboard given directly to builder.

## Commingled recovery

Commingled processing facilities accept mixed waste and recover materials such as wood, metals, or cardboard mechanically and/or manually from the waste stream. This method of recovery is appealing to many remodelers because the daily job site practice doesn't change - your crews and subcontractors gather all the waste as you normally would for landfill disposal. One disadvantage to commingled recovery is that the value of reusable items will decrease, i.e., reusables will likely be damaged in mixed loads.

<b>Profile:</b>	<b>Commingled Waste Recovery</b>
<b>Processor:</b>	ROE Refuse/Roll-Off Express
<b>Location:</b>	Finksburg, Maryland
<b>Type of Operation:</b>	permitted construction and demolition waste processor, construction waste hauler
<b>Local Tip Fees:</b>	\$30 - 45 per ton
<b>Approach:</b>	<ul style="list-style-type: none"> <li>• remodelers and builders pay a standard container/pull charge</li> <li>• equipment spreads waste out on sorting floor and workers hand-pick recyclables</li> <li>• cardboard is separated and baled in a vertical baler</li> <li>• clean wood is separated and chipped on site and sold for landscaping uses</li> <li>• aluminum, copper, and ferrous metals are separated for recycling; aluminum is baled on site</li> <li>• reusable items are selectively separated depending on need</li> </ul>
<b>Diversion Rate:</b>	70% percent by volume



Roll-Off Express recovery facility in Finksburg, Maryland

## Job site separation

Under this option, remodelers take responsibility for separating wastes and scheduling waste removal. Waste management firms transport and tip the material. Although the fee structures are often the same as for disposal, savings can be achieved from lower tip fees for separated materials. Ultimately the success of a job site separation program depends on your commitment level and that of your subcontractors and haulers.

<b>Profile:</b>	<b>Job Site Separation</b>
<b>Remodeler:</b>	Greg Isenhour, IE, Inc.
<b>Location:</b>	Chapel Hill, NC
<b>Projects:</b>	Custom homes and major remodels/additions
<b>Approach:</b>	<ul style="list-style-type: none"> <li>• wood, metal and cardboard are source-separated by subcontractors, and tipped in designated areas at landfill.</li> <li>• drywall is removed by drywall subcontractor for \$1 per sheet, for example, removal for a 100 sheet job = \$100</li> <li>• sorted and mixed wastes are self-hauled to the county landfill in dumptruck</li> </ul>

*"In addition to improving safety, clean and organized job sites are a part of my everyday marketing effort."*

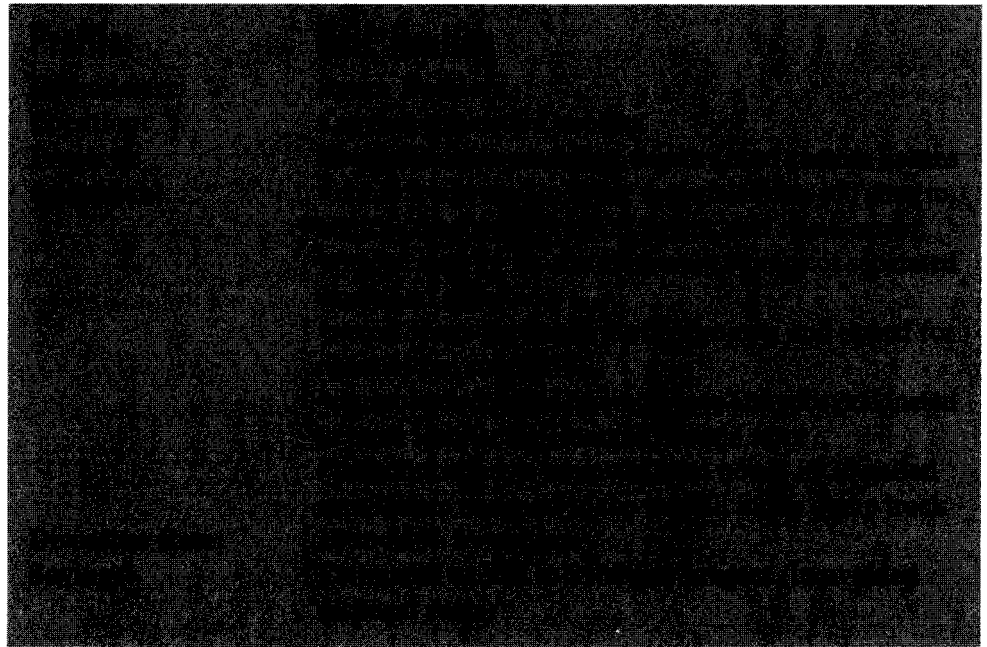
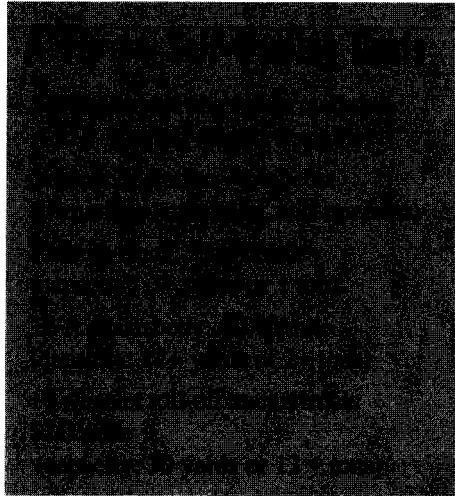
- Greg Isenhour, IE, Inc.



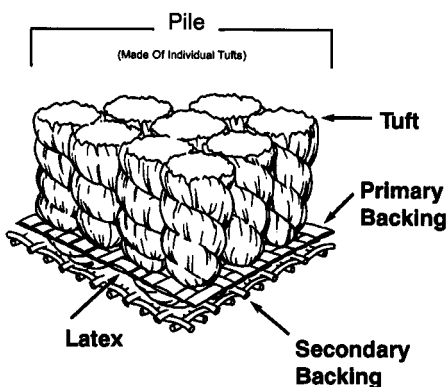
# OPTIONS - RECYLING

## Self Haul

As a self-hauler, you eliminate the middleman and gain first-hand knowledge of how efficiently materials are used. Among the information you will need to acquire are outlets' policies and locations, and your own vehicle and personnel costs. This practice requires the most commitment from you and your crew in terms of time, effort, and information gathering—you will oversee all phases of waste management: separation, management of containers, identification of outlets, loading and transport, and tipping. Self hauling works best when it becomes an integral part of the construction process.



## Residential Carpet Profile



## Take-Back Programs

The most efficient way to handle the recovery of some waste building materials may be for the supplier/distributor or even the manufacturer to take back clean, separated waste. This program is usually only available to large generators of waste and may be offered and promoted as a customer service. The key to the take-back approach is to back-haul waste/scrap in vehicles that are empty after new materials have been delivered, effectively eliminating transportation costs. Take-back programs may work for materials such as cardboard, carpet, drywall, or vinyl siding - contact your supplier or manufacturer to identify any take-back services. The carpet-recycling brochure cited *on the back page* lists a number of take-back references for carpet waste.

### Profile: Take-Back Program

Company: DuPont Flooring, Partnership for Carpet Reclamation

Approach: • commercial carpet (tile and broadloom) is collected at 70 sites across the U.S. and shipped to a central processing facility in Thomson, Georgia  
• customers pay for removal (as with regular carpet replacement)  
• carpet is sorted by fiber; nylon is recycled into nylon products

Diversion: Over 10 million pounds in 1997

# Remodeler Marketing

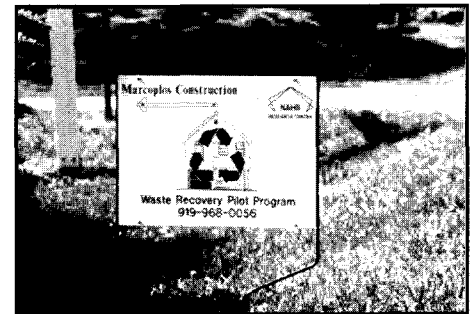
A major benefit of improving your management of construction waste is the opportunity it presents for marketing your company as resource-efficient. Ways to do so include:

## Referrals

Since word-of-mouth is a key way in which you acquire new business, it is worthwhile to inform clients of your environmental activities so that they are able to tell friends and neighbors about this aspect of your service. Providing clients with a list of reuse and recycling options that can be used on their project helps keep them informed, involved, and motivated about your activities.

## Job Site Signs

Site signs which display your company logo can include language such as "This remodeler recycles," "I minimize waste," or "Habitat for Humanity Reuse Center benefits from this project", to let the client and community know about your waste management program. Some remodelers have shared the cost of site signs with their waste hauler/recycler in an effort to jointly promote the two companies.



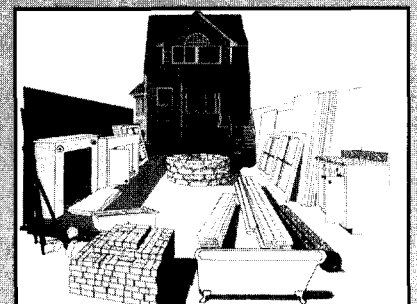
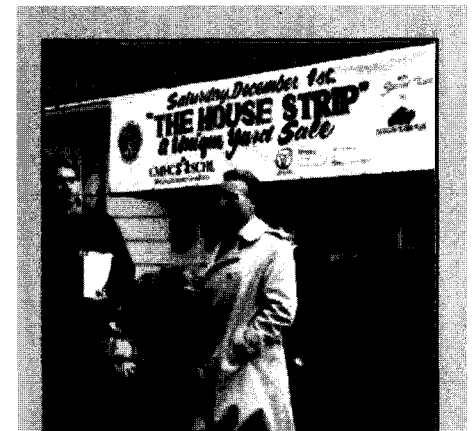
Job site signs can promote both the remodeler and the hauler/recycler.

## HBA Outreach

Your local home builder or remodeler association can serve as the focal point for compiling information resources, identifying outlets, bringing together related businesses to discuss waste management options, and getting the word out on builder and remodeler waste management practices.

### Profile: HBA Outreach

<b>Project:</b>	<b>"THE HOUSE STRIP" - A Unique Yard Sale</b>
<b>Project Partnership:</b>	Greater Toronto HBA, Design Team Plus (the remodeling firm), and the Mulocks (client home owner)
<b>Approach:</b>	<ul style="list-style-type: none"> <li>•Event: Saturday morning community site sale, proceeds donated to Institute for the Prevention of Child Abuse</li> <li>•Pre-Event Publicity: an area wide press release, one radio interview, ads in 2 Toronto newspapers, neighborhood signs, and a house banner</li> </ul>
<b>Results:</b>	<ul style="list-style-type: none"> <li>•Salvaged &amp; Sold Materials: 2.5 tons (windows, doors, cabinets, fixtures, shutters) NOT sent to the landfill</li> <li>•Post-Event Exposure: Event covered in more than 25 newspapers and magazines in the US and Canada</li> </ul>



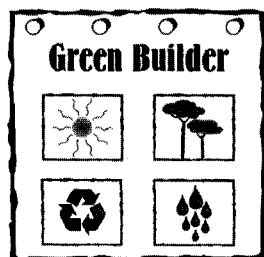
The Greater Toronto HBA's "House Strip"

## Green Builder/Remodeler Programs

Across the US, there are a growing number of programs to help formalize 'green' or resource-efficient building efforts. These programs integrate waste management, energy efficiency, indoor air quality, and building materials selection into a certification and marketing program for resource-efficient builders or remodelers. Member builders and remodelers are taking advantage of their local green programs to market the following values to their clients:

- increased comfort
- reduced operating costs
- reduced maintenance
- greater resale value
- improved air quality – indoors and out

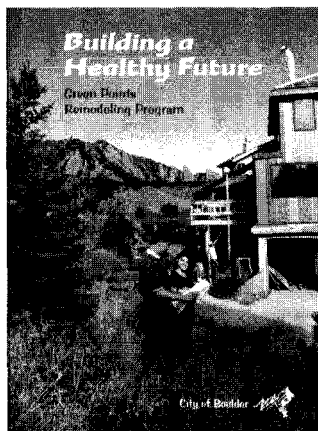
There are currently three local programs that have modified their green builder programs to include or feature remodelers.



**HBA of Central New Mexico's Remodeling Green Star Program** – Remodeling projects qualify on a point system as One Star (20 points) through Four Star (50 points). Content areas include Solid Waste – Reduction, Reuse, & Recycling; Water Conservation; Materials – Conservation and Content; and Energy Conservation. Checklist items modified for remodelers include: interior dust control, improving existing air-sealing and insulation levels, use of salvage building materials, installing water heater blanket/wrap. [www.hbacnm.com](http://www.hbacnm.com)



**Kitsap County (WA) HBA's Build a Better Kitsap REMODELER Program** – Based on a 3-star rating system, the Kitsap program has one set of point requirements for "small" remodel projects—less than 500 square feet OR a kitchen/bath/basement finish OR no major changes required to: mechanical, electrical, water/sewer system. Only large-greater than 500 square feet-remodel projects can qualify for a three-star level rating. Program orientation for the remodeler and education kits for the homeowner are both requirements for any green remodeling project. [www.KitsapHBA.com](http://www.KitsapHBA.com)



**City of Boulder (CO) Green Points Remodeling Program** – In Boulder, any remodeling project over 500 square feet must meet the Green Points Guidelines of the Resource Conservation Ordinance. The voluntary Remodeling program has two parts: green points guidelines for "small" remodeling projects in a polished homeowner education booklet "Building a Healthy Future" and a training/education program that certifies green remodelers rather than their individual projects. [http://environmentalaffairs.ci.boulder.co.us/residential/gp\\_rm\\_options.html](http://environmentalaffairs.ci.boulder.co.us/residential/gp_rm_options.html)

# Appendix A

## GUIDELINES FOR REQUIRING SUBCONTRACTORS TO REMOVE WASTE

This appendix summarizes some of the key issues in requiring subcontractors to remove their own waste (in particular potentially hazardous waste). Contractors should be aware that the complexity of federal environmental statutes makes it difficult for a contractor to shift potential liability for "hazardous" waste materials generated on their job sites. However, steps can be taken to provide a contractor with protection against charges of violating local and/or state solid waste regulations.

### Potentially Hazardous Materials in the Residential Construction Waste Stream

The largest sources of residential construction materials that could be considered hazardous under state and federal statutes are waste solvents, paints and coatings, and adhesives. Examples of potentially hazardous materials include (but are not limited to):

- adhesives
- sealers
- paint stripper
- asphalt
- paint/lacquer
- resins/epoxies
- waterproofing agents
- coatings
- antifreeze
- shellac
- solvents
- caulking

Projects including demolition could involve other hazardous materials including:

- lead paint
- asbestos

### Options

Given the remodeler's exposure under federal law (outlined below), it is prudent to require subcontractor documentation of disposal methods for hazardous wastes or for the general contractor to oversee the waste disposal to ensure that such disposal is lawful. Other options include the following:

- Seek written contractual arrangements with subcontractors likely to generate hazardous waste materials, for example:

*{The subcontractor shall at all times keep the building and the premises broom clean of debris and any other waste materials generated from the performance of this contract. The subcontractor is responsible for the removal from the site and proper disposal of all the debris created by its work.}*

- Strictly manage a Material Safety Data Sheet (MSDS) reporting system to help identify potentially hazardous substances.
- Encourage or require subcontractors to employ less toxic substitute materials as a way of reducing both parties' potential liability for hazardous waste material.
- Identify conditions affecting contractor liabilities. In some cases, the "generator" of the waste may be the property owner and not the contractor. Builders hired to construct new homes on owners' or developers' sites should be aware of contract provisions that may expose them to increased liability.

### Applicable Solid and Hazardous Waste Regulations

Two federal programs affect home builders and remodelers by regulating the treatment and disposal of solid and hazardous wastes. They are described as follows:

- 1) The Resource Conservation Recovery Act (RCRA) governs present and future activities that generate solid wastes (including hazardous wastes). Under RCRA, generators are responsible for determining if their wastes are hazardous; in most cases, the builder would be

considered the generator. A generator is considered "conditionally exempt" if less than 220 pounds of hazardous waste is generated in one calendar month and less than 2,200 pounds of hazardous waste is stored on site. Based on waste assessments conducted by the Research Center in 1994, most builders could be categorized as conditionally exempt small quantity generators (CESQG) under RCRA depending on the amount and type of hazardous waste they generate.

However, a new federal rule passed in July 1996 (effective 1998) requires construction and demolition (C & D) landfills either to stop accepting loads containing CESQG waste or to meet new location and ground water monitoring requirements. Builders using landfills no longer able to accept CESQG waste, will be required to separately dispose of CESQG waste in an approved municipal solid waste landfill. Builders using landfills that have upgraded to continue accepting CESQG waste will almost certainly face higher tipping fees.

- 2) The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as Superfund), is designed as a cleanup or response program to deal with already existing hazardous waste sites. Under CERCLA, a contractor could be liable at a later date as a "generator" or "transporter" of any amount of potentially hazardous substance found at a Superfund site, whether defined as a product or a waste.

Two NAHB publications offer additional information: *The Regulation of Solid and Hazardous Wastes: A Builder's Guide*, and *Contracts and Liabilities for Builders and Remodelers*. Both are available from NAHB by contacting the Home Builder Bookstore at (800) 223-2665.

# Appendix B

## LEAD AND ASBESTOS HANDLING

Two potentially hazardous materials sometimes encountered in repair and remodeling projects are asbestos and lead. The primary risk of lead exposure is from lead-based paint, whereas exposure to asbestos may come from numerous products including insulation, siding and roofing products, or flooring materials. *Note:* This appendix is meant to introduce the reader to the basic hazards of lead and asbestos and to encourage the reader to pursue further guidance. This appendix is not designed to be a definitive technical resource.

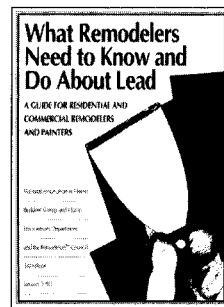
### LEAD

In 1978, lead-based paint (LBP) was banned from use in housing by the federal government, but any homes built prior to that may contain LBP. LBP was used in both interior and exterior applications. **Lead dust is released when lead-based paint is dry scraped, dry sanded, or heated. If paint is chipping, peeling, chalking, or cracking, there is a greater potential for release of lead dust.** The best thing to do as a remodeler is obtain a copy of the following:

*What Remodelers Need to Know and Do About Lead—A Guide for Residential and Commercial Remodelers and Painters* by NAHB's Energy and Home Environment Department and the Remodelers™ Council, 3<sup>rd</sup> Ed., January, 1995. This is the best resource for residential remodelers because it covers **ALL** of the topics a remodeler needs to consider:

- regulations and liability
- worker protection
- activity-specific recommendations
- remodeler client information
- occupant protection
- permanent abatement
- lead detection
- waste disposal
- historic houses

NAHB staff will publish the updated 4<sup>th</sup> edition of this publication by summer, 1999, to reflect new rules and heightened OSHA involvement on residential remodeling projects.



### ASBESTOS

Asbestos is the name applied to a group of six different minerals that occur naturally in the environment and are made up of long, thin fibers that are somewhat similar to fiberglass. Asbestos has fire-retardant properties, but also has been shown to present significant health risks with prolonged exposure. Asbestos can be dangerous to people when “friable” — meaning that the material can be crumbled, pulverized, or reduced to powder by hand pressure — and airborne. Chronic (long-term) exposure to asbestos via inhalation can result in a lung disease termed asbestosis characterized by shortness of breath and cough, lung cancer, and possibly gastrointestinal cancers.

The main uses of asbestos in building materials included insulation, asbestos-cement products, roofing, siding, flooring, and mastics and compounds. Friable products include sprayed- or troweled-on materials and insulation on pipes, boilers, tanks, ducts, and other equipment. Asphalt roofing shingles, siding, and vinyl/asphalt floor tiles are typically **non-friable unless cut, drilled, sanded, or broken during repair or remodeling activities.**

#### Handling and Disposal

For technical information on rules regarding worker exposure to lead and asbestos, contact the Occupational Safety and Health Administration—look in the Blue Pages of your telephone directory under U.S. Government, Dept. of Labor, OSHA. For information on local disposal guidelines, call your local solid waste management authority or state solid waste agency (see Appendix C) for disposal requirements and a list of landfills that accept lead or asbestos wastes.

#### Information Resources:

- The National Association of the Remodeling Industry (NARI) offers a training program on safe practices for repair and remodeling in a home that may contain lead-based paint. Call (703) 575-1100.
- The National Safety Council operates the National Lead Information Center/Clearinghouse which provides the general public and professionals with information about lead poisoning and its prevention. Call (800) LEAD-FYI or visit the on-line site at <http://www.nsc.org/ehc/lead.htm>.
- The U.S. Environmental Protection Agency operates the Asbestos Hotline, which answers questions related to asbestos, and distributes EPA documents. Call (202) 554-1404. On-line asbestos information is available at: <http://www.epa.gov/region04/air/asbestos/asbestos.htm>.
- The NAHB Research Center operates the HomeBase Hotline which offers technical information about new home building and residential remodeling. The HomeBase Hotline can also answer questions about lead-based paint and asbestos. Call (800) 638-8556.

#### Publications:

*Reducing Lead Hazards When Remodeling Your Home*, U.S. Environmental Protection Agency, EPA 747-R-94-002, April 1994.

*Protect Your Family From Lead in Your Home*, U.S. Environmental Protection Agency, EPA 747-K-94-001, May 1995.

*Guidance for Controlling Asbestos-Containing Materials in Buildings*, U.S. Environmental Protection Agency, EPA 560/5-85-024, June 1985.

*Asbestos In The Home: A Homeowner's Guide*, U.S. Environmental Protection Agency, Region 4, Atlanta, Georgia. For copies, call (404) 347-2904. Also available on-line at <http://www.epa.gov/region04/air/asbestos/homeasb.htm>.

# Appendix C

## NATIONAL AND STATE INFORMATION SOURCES

### RESOURCES

#### *Cost-Effective Home Building*

NAHB Research Center, Inc.  
400 Prince George's Boulevard  
Upper Marlboro, MD 20774  
(800) 638-8556

NOTE: A handbook compiling material-saving methods of efficient design and construction.

#### *Resources for Environmental Design Index (REDI) Guide*

Iris Communications, Inc.  
P.O. Box 5920  
Eugene, OR 97405-0911  
(800) 346-0104  
<http://oikos.com>

#### *The Harris Directory*

Stafford Harris, Inc.  
522 Acequia Madre  
Santa Fe, NM 87501  
(505) 995-0337  
[bjharris@igc.apc.org](mailto:bjharris@igc.apc.org)

#### *Guide to Resource Efficient Building Elements (GREBE)*

Center for Resourceful Building Technology  
P.O. Box 3866  
Missoula, MT 59806  
(406) 549-7678

NOTE: The *REDI Guide*, the *Harris Directory*, and *GREBE* all provide useful information for specifying or procuring resource-efficient building materials. For example, information on the recycled-content of building materials can be found in these guides.

#### *Environmental Building News (EBN)*

RR1 Box 161  
Brattleboro, VT 05301  
(802) 257-7300

NOTE: EBN is a bi-monthly newsletter on environmentally sustainable design and construction.

#### *Environmental Resource Guide (ERG)*

American Institute of Architects  
1735 New York Avenue, NW  
Washington, DC 20006  
(202) 626-7331

NOTE: The ERG compiles information about the environmental aspects of building materials including life-cycle analyses and application profiles.

#### *WasteSpec*

Triangle J Council of Governments  
P.O. Box 12276  
Research Triangle Park, NC 27709  
(919) 549-0551

NOTE: Provides model specifications for construction waste reduction, reuse and recycling - particularly useful in commercial construction.

### NATIONAL ASSOCIATIONS

The Carpet and Rug Institute  
(706) 278-3176  
FAX: (706) 278-8835  
R. Carroll Turner  
[www.carpet-rug.com](http://www.carpet-rug.com)

Carpet Cushion Council  
(203) 637-1312  
Bill Oler  
[www.carpetcushion.org](http://www.carpetcushion.org)

National Roofing Contractors Association (NRCA)  
(847) 299-9070 or (800) 323-9545  
FAX: (847) 299-1183  
Tom Shanahan, Assoc. Exec. Dir.  
[www.nrca.net](http://www.nrca.net)

Used Building Materials Association (UBMA)  
(204) 947-0848  
<http://ubma.pangea.ca>

Construction Materials Recycling Association (CMRA)  
(630) 548-4510  
FAX: (630) 548-4511  
Bill Turley  
e-mail: [turley@xsite.net](mailto:turley@xsite.net)

### STATE AGENCIES

**ALABAMA**  
Dept. of Environmental Management  
Solid Waste Division  
1751 Congressman W.L. Dickenson Drive  
Montgomery, AL 36130-1463  
Russell Kelley  
(334) 271-7761

**ALASKA**  
The Alaska Dept. of Environmental Conservation  
Division of Environmental Health  
Solid Waste Management Program Offices  
410 Willoughby Avenue, Suite 105  
Juneau, AK 99801-1795  
(907) 465-5280  
Fax: (907) 465-5362 or -5164

**ARIZONA**  
Dept. of Environmental Quality Program Division  
Solid Waste Section  
3033 North Central Avenue  
Phoenix, AZ 85012  
(602) 207-4134 (800) 234-5677 (Arizona)  
Solid Waste Hotline: (602) 207-4132

**ARKANSAS**  
Dept. of Pollution Control and Ecology  
8001 National Drive  
Little Rock, AR 72219  
Fax: (501) 682-0798  
Solid Waste Division: Mike Hood  
(501) 682-0601

### CALIFORNIA

California Integrated Waste Management Board  
Market Development Division  
Construction & Demolition Materials  
Management Program  
8800 Cal Center Drive  
Sacramento, CA 95826  
Steve Austrheim-Smith  
(916) 255-2472  
Fax: (916) 255-2573

### COLORADO

Colorado Dept. of Health & Environment  
HMWMD-B2  
4300 Cherry Creek Drive, South  
Denver, CO 80222-1530  
Solid Waste: (303) 692-3450  
Fax: (303) 759-5355

### CONNECTICUT

Dept. of Environmental Protection  
Waste Management Bureau  
Engineering & Enforcement Division  
165 Capitol Avenue  
Hartford, CT 06106  
(860) 424-3366

### DELAWARE

Dept. of Natural Resources and Environmental Control  
Solid Waste Management Branch  
P O Box 1401  
Dover, DE 19903  
(302) 739-3820

### FLORIDA

Dept. of Environmental Protection  
Solid Waste Section  
Twin Towers Office Building  
2600 Blair Stone Road  
Tallahassee, FL 32399-2400  
Kathy Anderson  
(904) 488-0300

### GEORGIA

Georgia Dept. of Natural Resources  
Land Protection Branch  
Commercial & Industrial Solid Waste Unit  
4244 International Parkway, Suite 104  
Atlanta, GA 30354  
(404) 362-2696  
Fax: (404) 362-2693

### HAWAII

State of Hawaii, Dept. of Health  
Solid and Hazardous Waste Branch  
919 Ala Moana Boulevard, 3rd Floor  
Honolulu, HI 96814  
(808) 586-4245  
Fax: (808) 586-7509

### IDAHO

Dept. of Health & Welfare  
Division of Environmental Quality  
1410 N. Hilton  
Boise, ID 83706  
(208) 373-0502  
Fax: (208) 373-0417

### ILLINOIS

Environmental Protection Agency  
Solid Waste Management  
200 Churchill Road  
P O Box 19276  
Springfield, IL 62794  
(217) 524-3300  
Fax: (217) 524-3291

INDIANA  
Dept. of Environmental Management  
Office of Solid and Hazardous Waste Management  
100 N. Senate Avenue  
P O Box 6015  
Indianapolis, IN 46206-6015  
Fax: (317) 232-3403  
Solid Waste Compliance:  
Leah Foutty, Section Chief  
(317) 232-4536

IOWA  
Iowa Dept. of Natural Resources  
Environmental Protection Division  
Wallace State Office Building  
502 East 9th Street  
Des Moines, IA 50319-0034  
Marion Burnside  
(515) 281-8443  
Peter Hamlin, Director  
(515) 281-8852  
Fax: (515) 281-8895

KANSAS  
Kansas Dept. of Health and Environment  
Bureau of Waste Management  
Solid Waste Section  
Forbes Field, Building 740  
Topeka, KS 66620-0001  
Solid Waste: (913) 296-1594

KENTUCKY  
Natural Resources and Environmental  
Protection Cabinet  
Division of Waste Management  
Solid Waste Branch  
14 Reilly Road  
Frankfort, KY 40601  
Charlie Richie  
(502) 564-6716  
Fax: (502) 564-6716

LOUISIANA  
Dept. of Environmental Quality  
Solid Waste Division  
P O Box 82178  
Baton Rouge, LA 70884-2178  
(504) 765-0249  
Fax: (504) 765-0299

MAINE  
Dept. of Environmental Protection  
Bureau of Remediation & Waste Management  
17 State House Station  
Augusta, ME 04333-0017  
Allan R. Ball, Director  
(207) 287-2651  
Fax: (207) 287-7826

MARYLAND  
Dept. of the Environment  
Field Operations & Compliance Division  
2500 Broening Highway  
Baltimore, MD 21224  
(410) 631-3424 or 631-3364  
Fax: (410) 632-3321

MASSACHUSETTS  
Dept. of Environmental Protection  
Division of Solid Waste Management  
One Winter Street, 4th Floor  
Boston, MA 02108  
(617) 292-5960  
Fax: (617) 556-1049  
Jim Roberts  
(617) 292-5983

MICHIGAN  
Dept. of Environmental Quality  
Waste Management Division  
P O Box 30241  
Lansing, MI 48909  
Waste Management (517) 373-9523  
Fax: (517) 373-4797

MINNESOTA  
Pollution Control Agency  
Solid Waste Section  
520 Lafayette Road North  
St. Paul, MN 55155-4194  
(612) 296-7340  
Fax: (612) 296-9707

MISSOURI  
Dept. of Natural Resources  
Solid Waste Management Program  
P O Box 176  
Jefferson City, MO 65102-0176  
(573) 751-5401  
Fax: (573) 526-3902

MONTANA  
Dept. of Environmental Quality  
Permitting & Compliance Division  
Solid Waste Program  
Metcalf Building  
P O Box 200901  
Helena, MT 59620-0901  
(406) 444-1430

NEBRASKA  
Dept. of Environmental Quality  
Integrated Waste Management Section  
P O Box 98922  
Lincoln, NE 68508-8922  
(402) 471-4210  
Fax: (402) 471-2909

NEVADA  
Nevada Division of Environmental Protection  
Bureau of Waste Management  
Solid Waste Branch  
333 West Nye Lane  
Carson City, NV 89710  
(702) 687-4670 ext. 3003  
Fax: (702) 687-5856

NEW HAMPSHIRE  
Dept. of Environmental Services  
Solid Waste Management Division  
6 Hazen Drive  
P O Box 95  
Concord, NH 03302-0095  
(603) 271-3710  
Fax: (603) 271-2867

NEW JERSEY  
Dept. of Environmental Protection  
Division of Solid Waste Management  
CN 414  
401 E. State Street  
Trenton, NJ 08625-0414  
(609) 292-3131

NEW MEXICO  
State of New Mexico Environment  
Solid Waste Bureau  
1190 St. Francis Drive  
P O Box 26110  
Santa Fe, NM 87502  
(505) 827-0155  
Fax: (505) 827-2902

NEW YORK  
Dept. of Environmental Conservation  
Bureau of Solid Waste  
50 Wolf Road  
Albany, NY 12233-7258  
(518) 457-1859

NORTH CAROLINA  
Dept. of Environment, Health,  
and Natural Resources  
Division of Solid Waste  
P O Box 27687  
Raleigh, NC 27611-7687  
(919) 733-0692  
Fax: (919) 733-4810

NORTH DAKOTA  
Dept. of Health  
Division of Waste Management  
1200 Missouri Avenue  
Room 302  
P O Box 5520  
Bismark, ND 58506-5520  
(701) 328-5166  
Fax: (701) 328-5200

OHIO  
Environmental Protection Agency  
Division of Solid and Hazardous Waste Management  
1800 Watermark Drive  
Columbus, OH 43266-0149  
(614) 466-2000

OKLAHOMA  
Dept. of Environmental Quality  
Solid Waste Management Compliance &  
Inspection  
1000 N.E. 10th Street  
Oklahoma City, OK 73117-1212  
(405) 745-7100  
Fax: (405) 745-7133

OREGON  
Dept. of Environmental Quality  
Solid Waste Division  
750 Front Street, NE  
Suite 120  
Salem, OR 97310  
(503) 378-8240 ext. 252  
Fax: (503) 378-4196

PENNSYLVANIA  
Contact your Regional Office of the:  
Dept. of Environmental Protection  
Bureau of Land Recycling and  
Waste Management

RHODE ISLAND  
Dept. of Environmental Management  
Office of Waste Management  
255 Promenade Street  
Providence, RI 02908  
Solid Waste:  
(401) 277-2797

SOUTH CAROLINA  
Dept. of Health and Environmental Control  
Bureau of Solid and Hazardous Waste  
Management  
2600 Bull Street  
Columbia, SC 29201  
(803) 896-4000  
Fax: (803) 896-4002

SOUTH DAKOTA  
Dept. of Environment and Natural Resources  
Waste Management Program  
523 E. Capitol Street  
Pierre, SD 57501-3181  
(605) 773-4217  
Fax: (605) 773-6035

TENNESSEE  
Tennessee Dept. of Environment and  
Conservation  
Division of Solid Waste Management  
401 Church Street  
L & C Tower, Fifth Floor  
Nashville, TN 37243-1535  
(615) 532-0780  
Fax: (615) 532-0886

TEXAS  
Texas Dept. of Natural Resource  
Conservation Commission  
Municipal Solid Waste Division  
P O Box 13087  
Austin, TX 78711-3087  
Construction Waste: (512) 239-6781  
Fax: (512) 239-6717



UTAH  
Dept. of Environmental Quality  
Division of Solid and Hazardous Waste  
P O Box 144880  
Salt Lake City, UT 84114-4880  
(801) 538-6170  
Fax: (801) 538-6715

VERMONT  
Agency of Natural Resources  
Solid Waste Management  
103 South Main Street  
Waterbury, VT 05671-0407  
(802) 241-3444  
Fax: (802) 244-5141

VIRGINIA  
Dept. of Environmental Quality  
Division of Waste Operations  
P O Box 10009  
Richmond, VA 23240-0009  
Waste Division: (804) 698-4147  
Fax: (804) 698-4234

WASHINGTON  
Dept. of Water and Waste Management  
Solid Waste Division  
921 Lakeridge Drive  
Building 4, Room 100  
Olympia, WA 98502  
Jeff Fiermhagen  
David Merrell  
(360) 786-5136  
Fax: (360) 754-4682

WEST VIRGINIA  
West Virginia Environmental Protection  
Office of Waste Management  
Solid Waste Section  
1356 Hansford Street  
Charleston, WV 25301  
Paul Benedum  
(304) 558-6350  
Fax: (304) 558-1574

WISCONSIN  
Dept. of Natural Resources  
Bureau of Waste Management  
P O Box 7921  
Madison, WI 53707-7921  
(608) 266-2111  
Fax: (608) 267-2768

WYOMING  
Wyoming Dept. of Environmental Quality  
Solid and Hazardous Waste Division  
Herschler Building  
4th floor  
122 West 25th Street  
Cheyenne, WY 82002  
(307) 777-7752

# Other waste management publications offered by the NAHB Research Center:



## **Residential Construction Waste Management: A Builder's Field Guide**

Written for new home builders, the 30-page field guide presents several methods that builders can use for construction waste management, and provides real case studies to support the recommended actions. The field guide is based on numerous waste assessments, workshops, and pilot projects involving builders and waste haulers. Included in the pilot project profiles are framing waste reduction exercises, jobsite recycling strategies, and marketing strategies from several regions of the United States.



## **From Roofs to Roads... Recycling Asphalt Roofing Shingles into Paving Materials**

Written for waste generators, processors, and regulators, the brochure characterizes the waste stream, presents benefits of recycling, lists potential end uses for recycled shingles, summarizes the issues which face recyclers, and lists resources and equipment manufacturers. Two profiles of recyclers are included.



## **Carpet & Padding: Reuse and Recycling Opportunities**

Also written for waste generators, processors, and regulators, the brochure characterizes the waste stream, the recycling process, benefits of recycling, issues which recyclers face, and current industry programs. A summary table compares the characteristics of padding and carpet waste as they relate to recycling.



## **Deconstruction: Building Disassembly and Material Salvage**

Written for building/property managers and practitioners, the brochure explains the benefits of deconstruction, favorable building characteristics, planning steps, and references. A case study and a cost comparison to demolition are also included. A comprehensive report on deconstruction is available from the Research Center or on the Internet at [www.smartgrowth.org](http://www.smartgrowth.org).



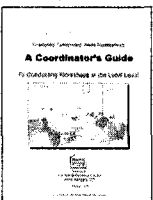
## **How to Clean-Up in the Construction Waste Business**

Written for entrepreneurs or existing waste hauling businesses interested in modifying their current service, the brochure explains how a clean-up service operates, why builders are interested, the required equipment and personnel, and lists other helpful resources.



## **On-Site Grinding of Residential Construction Debris: The Indiana Grinder Pilot**

A recently completed pilot project in Indianapolis, Indiana, determined that grinding and reusing the wood, drywall and cardboard components of the waste stream can save builders money. Written for new home builders, the 35-page report describes servicing construction sites with a mobile grinder and reusing the processed material on-site as erosion control and as a soil amendment.



## **Residential Construction Waste Management: A Coordinator's Guide To Conducting Workshops At the Local Level**

Written for Home Builder Associations, the guide outlines all the key steps required to host a construction waste management workshop in your community. The guide includes: individual modules on waste reduction, waste recycling and developing a directory of outlets; and a floppy disk containing sample agendas, handouts, invitation lists and mailings.

*All publications have been developed in cooperation with EPA's Office of Solid Waste and Office of Policy.*



*For more information about these publications, call the*

**HOME BASE HOTLINE**

**(800) 898-2842**