



Construction Waste Management Guide

**for Architects, Designers, Developers, Facility
Managers, Owners, Property Managers &
Specification Writers**



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Resource Venture

Provides **free** environmental consulting services to Seattle-area businesses. We help companies lower their utility costs, obtain rebates, comply with regulations and receive public recognition, all while protecting the environment. Since 1990, the Resource Venture has helped thousands of businesses recycle, use less water, prevent stormwater pollution and build sustainably. We are a program of the Greater Seattle Chamber of Commerce, in partnership with Seattle Public Utilities.

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Thanks to the Portland Metro Solid Waste & Recycling Division for providing some of the content in this guide.

What is construction waste?

Construction, demolition and landclearing debris (CDL) is all non-hazardous solid waste resulting from construction, demolition and landclearing (CDL) activities. CDL waste materials that can be salvaged, reused or recycled include, but are not limited to, the following:

Acoustical ceiling tiles	Drywall	Wood
Asphalt	Fluorescent lights & ballasts	Plastic film from packaging
Asphalt shingles	Insulation	Window glass
Bricks	Landclearing debris	Wood
Cardboard	Metals	Field office waste (paper, cans, glass & plastic bottles, cardboard)
Carpet and pad	Paint	
Concrete	Porcelain	
Dirt		

The Puget Sound area has many recycling companies for all of these materials. For a list of recyclers, see the *Construction Recycling Directory* in the Resources section.

Throughout this guide, we use the term “**waste reduction**” to define waste management practices that will result in less waste going to the landfill. These practices include: waste prevention, salvage, deconstruction and recycling. This guide will explain what these practices are and how to incorporate them into your projects.

Amount of Waste from Construction

Several studies have been conducted on the amount of recyclable waste generated on commercial and multi-family residential construction projects.

Construction of a 5,000-square foot restaurant generated 12,344 pounds of waste, or 2.46 pounds per square foot. This waste included the following recyclable materials:

- Wood 7,440 pounds
- Cardboard 1,414 pounds
- Gypsum wallboard 500 pounds

Construction of a 17-unit apartment complex using pre-cut lumber packages resulted in 28,434 pounds of waste, or 2 pounds per square foot. This waste included the following recyclable materials:

- Wood 16,169 pounds
- Cardboard 917 pounds
- Gypsum wallboard 6,997 pounds

(Source: *Characterization of Construction Site Waste* (1993), Metro Solid Waste Department Portland, OR.)

Why prevent waste and recycle?

Reduce Costs

Recycling, reusing salvaged building materials and minimizing materials and packaging reduces your waste disposal costs and material expenses.

Marketing Opportunity

Your company's experience in waste prevention and recycling can be an essential marketing tool to the growing number of potential clients interested in participating in the LEED™ and BUILT GREEN™ green building programs.

LEED™ and BUILT GREEN™ Certification

Your efforts to prevent waste, reuse salvaged materials and recycle materials on a project can help the project team earn points toward qualifying for these green building certification programs:

- LEED™ (Leadership in Energy and Environmental Design) is a nationally recognized green building rating program sponsored by the U.S. Green Building Council. LEED™ awards a project one, two or three points for achieving a 50%, 75% or 90% recycling rate respectively. A project can also earn one or two points for using salvaged, refurbished or reused materials for 5% or 10% of building materials respectively. For more information, visit www.usgbc.org.
- BUILT GREEN™ is a local residential green building rating program sponsored by the Master Builders Association of King & Snohomish Counties. BUILT GREEN™ awards a project ten points for achieving a 60% recycling rate. Up to an additional 39 points can be achieved for recycling specific materials, 11 points can be earned for waste reduction activities and 12 points for reusing materials. For more information, visit www.builtgreen.net

Tax Deduction

When you hire a deconstruction service to remove reusable building materials, the client can take a tax deduction when they donate the materials to a nonprofit organization.

Reduce the Building's Environmental Impact

Preventing and recycling wastes:

- reduces depletion of natural resources such as trees, oil and minerals.
- creates less pollution by reducing manufacturing and transportation-related emissions.
- uses less energy and water compared to many virgin material product manufacturing processes.
- reduces greenhouse gasses by using less energy for manufacturing and transportation.

What's your role in the process?

Facility managers, property owners and managers and developers

As a property owner, property manager or developer, you are in the best position to create a successful waste reduction program for a project.

- ❑ **Establish requirements for waste reduction.** Begin with making waste reduction a priority from the start of the project and planning for it throughout all phases of design, construction, installation, and occupancy.
- ❑ **Set goals.** Set specific waste reduction goals for each project and assemble a team of qualified professionals experienced in environmentally sound design and construction practices. Include these goals and requirements for experience in requests for proposals and other contract documents. Identify materials that can be salvaged and reused.
- ❑ **Monitor and support the program.** Monitor the progress of waste reduction efforts by requiring contractors to submit the waste management plan and waste management progress reports. Support these efforts by identifying locations to collect and store recyclables on-site.

Architects, designers and specification writers

- ❑ **Identify opportunities for waste reduction.** Work with owners and developers to identify opportunities for waste reduction and public relation benefits.
- ❑ **Select a contractor with proven waste reduction experience.** An experienced contractor will keep the bid the same or may even lower the bid. If the contractor is inexperienced, they may increase the bid.
- ❑ **Use a Construction Waste Management Specification.** A Construction Waste Management Specification written with legally enforceable language is your most effective tool to ensure waste reduction happens successfully on your project.
- ❑ **Monitor the waste reduction program.** The architect and designer play an important role in assuring the contractor's compliance with the waste reduction program by requiring and reviewing waste management progress reports and invoices from recycling and garbage haulers and recycling facilities. Monitor the success of the program and potential barriers by including a discussion about the waste reduction program during the project meetings.

Approximately 92% of all C&D waste is from renovation and demolition.

The biggest opportunities for waste reduction come from remodeling, demolishing and renovating commercial, institutional and multi-family projects and tenant improvement projects.

Source: US EPA, 1998

There are three strategies to reduce a project's waste and this is the order in which you want to address them:

1. **Reduce.** Look for ways waste can be prevented in the first place by identifying potential wastes early in the design process.
2. **Reuse.** After figuring out how to prevent waste, you want to identify waste that can be salvaged for reuse on your current project, on another project or donated.
3. **Recycle.** Lastly, figure out which waste materials can be recycled.

How can you prevent waste from construction?

Waste prevention is more beneficial than recycling. Why? Identifying potential waste early in the design process decreases waste generated during construction. If you don't create waste, you don't have to plan how to reuse or recycle it.

- ❑ **Design with standard sizes for all building materials.** This avoids creating waste when standard sized materials are cut to unusual lengths.
- ❑ **Design spaces to be flexible and adaptable to changing uses.** This avoids creating waste during remodels.
- ❑ **Design for deconstruction.** Some of the principles include: the dis-entanglement of systems, materials bolted together instead of glued, a construction and deconstruction blueprint, built-in tie-offs and connection points for workers and machinery, no hazardous materials and highly recyclable materials. For more information, read the paper *Design for Deconstruction and Materials Reuse* in the Resources section.

How can you salvage and reuse building materials?

To choose the best option for managing a project's waste, consider the value of the various materials. For instance, there may be materials on a project that have a greater value "as is" for salvage compared to their value as material for recycling. Some of these materials may be valuable to reuse on-site; others may be donated or sold to a used building material retailer or charitable organization. The initial costs for deconstruction services may be offset by returns from salvaged materials or reduced purchasing costs. Some deconstruction services also may give a tax deduction for materials that are donated.

In some cases, reused materials may also provide functional or aesthetic features not available in new materials. For example, salvaged wood is often of a quality and a variety of species that is difficult to find in the market place. Refer to the *Construction Recycling Directory* for a list of salvaged and used building material outlets, available from the Resource Venture, see the *Resources* section.

There are two ways to recover materials for salvage and reuse: Deconstruct the building or conduct a selective salvage operation prior to demolition. Deconstruction involves the careful dismantling of a whole structure in reverse order of assembly, usually by hand, to re-harvest materials for reuse. Salvage is the removal of certain valuable reusable building materials before demolition.

Deconstruction

For demolition projects that involve removing a large portion of a structure or an entire building, deconstruction may be the best option. Deconstruction is a specific type of demolition work that is growing in popularity and that poses the greatest potential for waste recovery on a wide range of construction projects. Deconstruction contractors take apart the entire structure, separating out resources that can be salvaged, recycled or reused. Although the early efforts of deconstruction contractors focused on residential projects, a growing number of commercial projects are now being deconstructed.

The feasibility and cost-effectiveness of deconstruction is determined by how the building was constructed and what building materials were used. Deconstruction can be used in most wood-frame and some metal-frame buildings. The building components, their condition and the manner in which they are secured to the structure can affect the cost-effectiveness of salvaged materials.

Another factor to consider is whether site conditions allow for mechanical versus demolition by hand, which will add labor costs. To be cost-competitive with conventional demolition, the added costs of deconstruction (primarily, the extra labor of disassembly and removal) must be offset by the value of the salvaged building material and the avoided cost of disposal. For more information, see the *Guide to Deconstruction* in the Resources section.

The following are tips for making deconstruction happen:

- ❑ Review the “Yes-No” list of materials that are desirable for reuse for what you have to offer from your project. See page 6.
- ❑ Call a salvage company to assess your building. It may not look like much to you, but you’ll be surprised by what still has value in the reuse market. Of course, truckload quantities are most desirable, but even a single cabinet may be worth a pick up. See the *Construction Recycling Directory* for a list of salvage companies.
- ❑ Do call at least two weeks before the project start date (bidders need to schedule an on-site evaluation, complete their responses, and schedule crews to do the work). If you can call earlier, salvage crews may be able to save you time by doing some work before demolition planning is finalized.
- ❑ Keep the scheduler up to date about any changes.
- ❑ Complete any environmental work in advance, such as asbestos tests and abatement.
- ❑ Include a Deconstruction Specification in your bid package. Section 024293 [01736] specifies deconstruction and removal of selected portions of or an entire building for salvage. Written in CSI Section format, this specification is appropriate for all building types. Contact the Resource Venture (help@resourceventure.org or 206-389-7304) to receive the Deconstruction Specification as an electronic Microsoft Word document.

YES —BUILDING MATERIALS COMMONLY REUSED	NO — SORRY, GENERALLY NOT ACCEPTABLE
<ul style="list-style-type: none"> <input type="checkbox"/> Architectural features <input type="checkbox"/> Banisters <input type="checkbox"/> Bath fixtures <input type="checkbox"/> Bathtubs (mainly white or neutral color) <input type="checkbox"/> Bath vanities <input type="checkbox"/> Bookcases, files, library shelves <input type="checkbox"/> Brick and paving stones <input type="checkbox"/> Cabinetry—wood <input type="checkbox"/> Claw-foot or antique tubs <input type="checkbox"/> Columns, pillars, and posts <input type="checkbox"/> Concrete blocks and products <input type="checkbox"/> Corbels <input type="checkbox"/> Countertops, straight, neutral colors <input type="checkbox"/> Displays and display fixtures <input type="checkbox"/> Doors, especially solid wood doors <input type="checkbox"/> Doors, patio and French door sets <input type="checkbox"/> Electrical and HVAC supplies <input type="checkbox"/> Faucets and plumbing fixtures <input type="checkbox"/> Fencing <input type="checkbox"/> Flooring—carpet and vinyl (new) <input type="checkbox"/> Flooring—wood <input type="checkbox"/> Glass, sheet and plexiglass (min. 4 sf) <input type="checkbox"/> Gutters <input type="checkbox"/> Hinges and other hardware <input type="checkbox"/> Insulation, new or gently used <input type="checkbox"/> Kitchen cabinet sets <input type="checkbox"/> Kitchen fixtures <input type="checkbox"/> Lighting fixtures <input type="checkbox"/> Lockers <input type="checkbox"/> Lumber (clean, denailed, min. 4 ft long) <input type="checkbox"/> Mirrors and mirror tiles <input type="checkbox"/> OSB and masonite <input type="checkbox"/> Plywood and chipboard <input type="checkbox"/> Radiators and registers <input type="checkbox"/> Roof tiles <input type="checkbox"/> Sandstone <input type="checkbox"/> Shelving and racking <input type="checkbox"/> Siding and shutters <input type="checkbox"/> Sinks—kitchen/bath (no chips), utility/lab <input type="checkbox"/> Slate, granite and marble <input type="checkbox"/> Stained glass <input type="checkbox"/> Store fixtures <input type="checkbox"/> Tile (most types and quantities) <input type="checkbox"/> Tile board <input type="checkbox"/> Toilets (low flow, pre-40's, no cracks) <input type="checkbox"/> Trim and molding <input type="checkbox"/> Tubs (mainly white or neutral color) <input type="checkbox"/> Windows—wood and vinyl, especially newer energy-efficient windows <input type="checkbox"/> Wood beams 	<ul style="list-style-type: none"> <input type="checkbox"/> Appliances older than 5 years <input type="checkbox"/> Ceiling fans <input type="checkbox"/> Commercial 200 volt electric equipment <input type="checkbox"/> Commercial bath fixtures <input type="checkbox"/> Commercial ducting and vent covers <input type="checkbox"/> Commercial flashing <input type="checkbox"/> Commercial shelving missing parts <input type="checkbox"/> Countertops—L-shaped or dated colors <input type="checkbox"/> Doors—damaged, commercial or hollow <input type="checkbox"/> Electric baseboard heaters <input type="checkbox"/> Fireplace doors <input type="checkbox"/> Fluorescent light fixtures, bulbs <input type="checkbox"/> Gutters: leaking, rotted <input type="checkbox"/> Mini-blinds <input type="checkbox"/> Open bags of cement, mortar, drywall mud <input type="checkbox"/> Room dividers missing parts <input type="checkbox"/> Shower doors, except high-end <input type="checkbox"/> Sinks—wall hung, cultured marble, dated colors <input type="checkbox"/> Tile with heavy grout <input type="checkbox"/> Used carpet <input type="checkbox"/> Windows—aluminum <input type="checkbox"/> Wood: shorter than 4', rotten/bug-damaged, contaminated or nailed <input type="checkbox"/> Wood-burning equipment, unless antique

Source: *The Guide to Used Building Materials Washington State*

Salvage

Salvage is the removal of reusable building materials before demolition. In many cases, it may not be feasible or cost-effective to fully deconstruct a building, but there may be materials on a project that can be salvaged instead of recycled or discarded. This is also a very good cost-saving strategy for a remodeling or tenant improvement project. Most demolition contractors are practicing some level of salvage on selected buildings. In many cases, demolition contractors will sub-contract with deconstruction contractors or specialty sub-contractors to conduct salvage operations before demolishing specific components or materials.

Strategies for reusing and salvaging building materials:

1. Assess the potential
2. Establish goals
3. Identify materials
4. Develop specification language
5. Allow adequate time
6. Remove barriers to salvage
7. Require a plan
8. Communicate the plan

1. Assess the potential

Advanced planning for deconstruction or salvage before demolition is crucial for success.

- ❑ Conduct a walk-through with the owner's representative and a deconstruction contractor to determine the feasibility and level of salvage possible. Identify materials and job phases where recovery, recycling and salvage opportunities are the greatest. The walk-through also can identify materials that could be salvaged and reused on-site. Contact the Resource Venture for a list of deconstruction companies.
- ❑ To compare costs, require estimates for full deconstruction of the structure, targeted salvage prior to demolition, and traditional demolition.
- ❑ Based on the walk-through and cost comparison, determine if full deconstruction of the structure is an option or if salvage prior to demolition would be more effective.

2. Establish goals

- ❑ Establish goals for deconstruction salvage and recycling and include these goals in specifications. For an example goal, see the Performance Requirements section of the sample Construction Waste Management Specification in the Appendix.

3. Identify materials

- ❑ Based on the walk-through, develop a list of materials to be salvaged.
- ❑ Identify materials to be reused on-site. For materials that will be sold or donated off-site, contact salvage companies that accept reused building materials.

4. Use specification language

- ❑ Use specification language in the construction waste management spec to address deconstruction or salvage prior to demolition. The language should include goals or measurable standards for the level of salvage and/or a list of materials to be salvaged. See the Appendix for a sample Construction Waste Management Specification.

5. Allow adequate time

Deconstruction and salvage prior to demolition are usually more time-consuming than traditional demolition. It is important that sufficient time is allowed to dismantle the building or to salvage reusable items before demolition.

- ❑ Determine in advance how much time is available to complete the demolition phase of the project. The bid and contract process is the best place to assure that adequate time is available. Contracting mechanisms include decoupling demolition from the design/build phase of construction contracts. The demolition aspect of the project can be delayed while the terms of the larger design/build agreement are worked out, thus allowing time for deconstruction and salvage prior to completing demolition.
- ❑ Other alternatives to ensure enough time to complete deconstruction and salvage include issuing an early notice to proceed for the demolition phase of the project or creating a separate request for proposal or bid and contract for deconstruction and demolition.

6. Remove barriers to salvage

- ❑ It also is important for the architect to identify and remove barriers to salvage and reuse by eliminating language in contracts that prohibit rather than control activities such as on-site salvage, storage of salvaged materials, or processing operations that might create noise pollution like on-site concrete crushing.

7. Require a plan

- ❑ Require the contractor to develop a reuse and salvage plan as part of the waste management plan for the project by including this requirement in the specification language.
- ❑ The reuse and salvage plan should include a list of items being reused in place or elsewhere on-site; a list of items for reuse off-site through salvage, resale or donation; a plan for protecting, dismantling, handling, storing and transporting the reused items; and a communications plan describing the salvage plan to all players.

8. Communicate the priorities

- ❑ Require the contractor to provide clear and consistent communication at the job site to be sure the crew is informed of the salvage plans, procedures and expectations.
- ❑ Careful removal and handling of the reuse and salvage materials is crucial to their usability and marketability - the key to success is communicating the priorities, making detailed plans and carefully monitoring the progress to insure success.

How can you recycle construction materials?

After all the options to prevent waste, salvage and reuse materials have been incorporated into the project, the next step is to recycle as much of the remaining debris as possible. Recycling construction materials saves money by cutting disposal costs. It reduces waste going to the landfill, facilitates a cleaner and safer construction site, and improves community relations.

There are four types of facilities where CDL waste is processed:

Landfills – The least desirable method of waste disposal is at a landfill, where waste is buried.

Transfer stations – A transfer station is a facility where waste is moved from collection vehicles to larger trucks for longer distance transport to a landfill, source-separated recycling facility or material recovery facility.

Contractors can self-haul their waste to the City of Seattle’s transfer stations in South Park and Wallingford. Source-separated wood, metal, cardboard and land-clearing are transferred to larger trucks for transport to recyclers.

Material recovery facilities (MRFs) — “Material recovery facility” (MRF) is the general term used to describe a waste-sorting facility where a variety of co-mingled CDL materials are sorted for recycling. At a MRF, a combination of mechanical and hand-separation procedures are used to sort co-mingled recyclables such as wood, cardboard and metals.

We have three MRFs in the Puget Sound area. Recovery 1 in Tacoma is a locally owned MRF that only sorts co-mingled CDL. A virtual tour of how they sort co-mingled material is on their web site at www.recovery1.com. Waste Management sorts co-mingled CDL at their south Seattle and Woodinville facilities.

Source-separated recycling facilities – These recycling facilities take a wide variety of materials that have been separated at the job site for recycling (i.e., cardboard, wood, metal, drywall). They are the most inexpensive disposal option. Depending on the type and quantity, some may even pay for the material. The majority of companies listed in the *Construction Recycling Directory* are source-separated recycling facilities.

Donated materials = tax savings!

Crews from The RE Store deconstructed a home in Magnolia, saving more than a ton of OSB sheathing, 3 tons of dimensional lumber and 16 tons of rare clinker bricks. They also recovered more than a dozens energy-efficient windows, kitchen cabinets, and fixtures. The owner received a tax receipt for more than \$11,000 of donated materials.

Source: The Guide to Used Building Materials Washington State

There are 2 methods of recycling waste:

Source-Separated Recycling: Recyclable CDL materials are collected in separate drop boxes as they are generated. The recycling hauler takes the materials directly to a recycling facility or a transfer station that accepts source-separated materials for recycling. Especially suited for new construction. Can also be used for a remodel or renovation.

Co-mingled Recycling: Recyclable CDL materials are collected in one drop box as they are generated. The recycling hauler takes the materials to a material recovery facility where they are sorted for recycling. Recovery 1 and Waste Management recycle a different subset of CDL materials depending on the capabilities of their facility. All three MRFs recycle wood, metal and cardboard. Visit their Web sites or call them directly to find out what other CDL materials they recycle. Especially suited for demolition, remodel or renovation. Can also be used for new construction.

Pros and Cons of Source-Separated and Co-mingled Recycling

- Source-separated recycling facilities have a 99.9% recycling rate.
- The recycling rate at co-mingled facilities varies between 12% and 99%. Before you choose which facility to have your co-mingled CDL hauled, go to King County's Web site to find out how much material is getting recycled
www.metrokc.gov/dnrp/swd/construction-recycling/comingled.asp#rates.
- An extra step is involved to calculate a project's recycling rate when co-mingled recycling is used because the amount recycled is less than 100%.
- Source-separated recycling facilities are the most inexpensive option as they have the lowest tip fees, they take some materials for free and they pay for some materials.
- More administrative time is required on the job site to educate crew and sub-contractors on which materials to put in which containers; however, most contractors say that the cost of this administrative time is usually offset by the revenue generated by the material or the avoided cost of other disposal options.

$$\text{Recycling Rate \%} = \frac{\text{Recycled Waste [tons]}}{\text{Recycled Waste + Garbage [tons]}}$$

Strategies for recycling building materials:

1. Set a goal
2. Select a contractor with proven recycling experience
3. Use a Construction Waste Management Specification
4. Monitor the waste reduction program

1. Set a goal

- Set a waste reduction goal for the project that establishes a minimum level of performance required. Write this goal in the Performance Requirements section of the Construction Waste Management Specification. For example, the goal may be to “Divert a minimum of 75 percent CDL waste, by weight or volume, from the landfill by one, or a combination of the following activities: salvage, reuse, source-separated or co-mingled CDL recycling”. The goal also may include using recycled or salvaged building materials.

2. Select a contractor with proven recycling experience

- Include a requirement for proven waste reduction experience in requests for proposals and as part of pre-qualification for potential contractors. Determine if they have a track record of past performance by looking at the waste management plans and documentation verifying the recycling rate on past projects.
- Construction companies who are members of the U.S. Green Building Council, the BUILT GREEN program of the Master Builders Association or the Northwest EcoBuilding Guild are probably experienced in waste reduction.
- Ask the construction companies if they have ever been a member of the Construction Works program of Seattle/ King County. Job-sites enrolled in this program receive a one year membership publicizing their achievements to meet the program’s requirements for waste reduction, recycling and educating employees, vendors and the public. You can learn more about the requirements on page 15.

3. Use a Construction Waste Management Specification

A Construction Waste Management Specification written with legally enforceable language is your most effective tool to ensure waste reduction happens successfully on your project. See the Appendix for a sample Construction Waste Management Specification. You can download the specification as a Microsoft Word document, which you can modify to suit your project. Go to the Resource Venture's Web site www.resourceventure.org/rv/issues/building/publications/index.php.

What to include:

- **Specify the co-mingled recycling facility.** Require that if co-mingled recycling is used that the materials are hauled to a material recovery facility with a high recycling rate that you have specified. King County gives the facility recycling rates on their Web site at www.metrokc.gov/dnrp/swd/construction-recycling/comingled.asp#rates.

- **Require a construction waste management plan.** See the sample plan on page 21. Require that the plan your contractor submits includes all of these action items:
 - Restates the project's waste reduction goal
 - Designates a recycling coordinator responsible for implementing the plan
 - Identifies the waste materials expected, their disposal method and handling procedures
 - Defines how the plan will be communicated to the crew and subs

***Review the contractor's construction waste management plan**

Evaluate the waste materials expected, their disposal method and handling procedures to ensure they will achieve your project's waste reduction goal. Staff at the Resource Venture's Sustainable Building Program can review the disposal method and handling procedures section for each material to identify recyclers for materials that were listed as 'garbage' under disposal method; call (206) 389-7304 or email info@resourceventure.org.

- **Require waste management reports.** Require the contractor to submit this report with the application for progress payment. See the sample report on page 21.
- **State the project's waste reduction goal.** See step one "Set a goal" above.
- **Require recycling education.** Require the contractor to obtain copies of the *Construction Recycling Directory* and the *Contractors Guide* for review at the pre-construction conference. See the Resources section.

4. Monitor the program

- Require the contractor to submit a waste management report with the application for progress payment.
- Monitor the success of the program and potential barriers by including a discussion about the waste reduction program during the project meetings.

Resources

Questions and technical assistance

Resource Venture

Provides **free** environmental consulting services to Seattle-area businesses. We help companies lower their utility costs, obtain rebates, comply with regulations and receive public recognition, all while protecting the environment. Since 1990, the Resource Venture has helped thousands of businesses recycle, use less water, prevent stormwater pollution and build sustainably. We are a program of the Greater Seattle Chamber of Commerce, in partnership with Seattle Public Utilities.

- **Hotline** - Call our staff for help with a quick question or an in-depth issue. You'll receive prompt service and solutions tailored to your situation. help@resourceventure.org or (206) 389-7304.
- **Web Site** – Visit our extensive Web site for “how-to” information, LEED™ credit fact sheets for contractors, specifications, plans and local case studies. Find out where to recycle and donate over 200 materials with our online Recycling Database.
- **2 hour project consultation** - Architects and contractors with a project in Seattle can receive a 2 hour project consultation with a sustainable building consultant through a grant from Seattle Public Utilities. The goal of the consultation is to help you implement sustainable building practices and/or use the LEED™ and Built Green™ rating systems. Architects and builders have found the consultation has been valuable in saving them time, money and avoiding frustration. You will receive project specific guidance on natural stormwater management strategies, water conservation, construction waste management and selecting green building materials. The consultation can include the architect, builder and client. This SPU financial incentive, valued at \$105 an hour, must occur before the end of the schematic design phase.
- **Presentations** - Sustainable Design is a one hour presentation at your firm that covers: LEED™ and Built Green™ green building rating systems; local, national and federal policies driving green building; costs and benefits of green building, and free resources to help you. Construction Waste Management is a one hour presentation that covers the architect's role in working with the contractor to divert the maximum waste material possible from the landfill.
- **Email Newsletter** - A brief, monthly e-newsletter to keep building professionals up-to-date on the latest information, tools and workshops related to sustainable building. To sign up, go to <http://www.resourceventure.org/rv/news/email-updates/index.php>
- **City of Seattle Incentives** - We help you identify financial incentive and assistance available to your project that can offset costs and provide technical support.
- **BEST Awards** - Resource Venture annually gives a BEST (Businesses for an Environmentally Sustainable Tomorrow) Award to the project team of a sustainably built building. The companies are honored at a major, public ceremony; promoted to the media and business associations and highlighted on Web sites and in fact sheets.

Publications

The following publications can be downloaded from the Resource Venture's Web site <http://www.resourceventure.org/rv/issues/building/publications/index.php>, or call to be mailed hard copies.

- **Case Study: Making Source-Separated and Co-Mingled Recycling Work Together on Tight Sites** - A Seattle project overcomes the challenges of a tight site and recycles 81% of construction debris by using a combination of source-separated and co-mingled recycling. Compares the costs of the two recycling strategies.
- **Construction Recycling Directory** - A directory to find where to recycle construction waste in Puget Sound from asphalt roofing to windows. You will also find recycling haulers, recycling facilities, building material salvage companies and material reuse exchanges.
- **Contractors Guide** - A step-by-step guide on how to set up a job-site recycling program, write a construction waste management plan, calculate the cost-effectiveness of recycling, select a recycling hauler, set up your site, encourage crew participation and practices to reduce waste and reuse and salvage building materials.
- **Construction Waste Management for LEED™** - This fact sheet provides information to assist Seattle area contractors in achieving LEED™ Materials & Resources Credit 2: Construction Waste Management.
- **Construction Waste Management Specification** – Section 017419 [01524] specifies the project's waste prevention, salvage, reuse and recycling requirements for construction, demolition and landclearing debris. Architects may use this model specification intact or modify to suit your project. Includes: construction waste management plan and waste management progress report.
- **Deconstruction Specification** - Section 024293 [01736] specifies deconstruction and removal of selected portions of or an entire building for salvage. Written in Masterspec format, this specification is appropriate for all building types. Contact the Resource Venture (help@resourceventure.org or 206-389-7304) to receive the Deconstruction Specification as an electronic Microsoft Word document.

The following publications can be downloaded from the Web:

- **Design for Deconstruction and Materials Reuse** - This paper discusses the principles of design for disassembly and lessons learned from deconstruction practice to propose guidelines for design for deconstruction as a form of environmentally responsible architecture. Go to <http://deconstructioninstitute.com> and click on Downloads.
- **Guide to Deconstruction** - A resource for deconstruction training that includes an overview of deconstruction, safety information, checklists and sample forms. Go to <http://deconstructioninstitute.com/> and click on Learning Center.

Appendix A

Construction Works

Recognizing jobsites that recycle and reduce waste



Construction Works

This program provides free assistance and recognition to builders who recycle, reduce waste and use recycled-content building materials. Construction Works is co-sponsored by the King County Solid Waste Division and the Resource Venture, a program of the Greater Seattle Chamber of Commerce and Seattle Public Utilities.

Requirements

Builders are awarded an annual membership in Construction Works by specific jobsite and can apply for multiple awards if more than one jobsite fulfills program requirements.

To be a recognized Construction Works member, a jobsite must:

- Recycle at least 60% of construction debris
- Implement at least 6 waste prevention strategies
- Use 6 or more recycled-content building materials
- Conduct at least 3 public education activities

Benefits

Construction Works members receive:

- One-on-one technical assistance to help set up or increase a recycling and waste-reduction program.
- Media recognition in local business and industry publications.
- Prominent placement of company name and logo on the Construction Works web site.
- Hardhat decals for the crew and a Construction Works banner for the jobsite.

How to Sign Up

For job sites in King County, outside the Seattle city limits, contact the King County Solid Waste Division, (206) 296-4434 or greenworks.swd@metrokc.gov.

For job sites in Seattle contact the Resource Venture, (206) 389-7304 or help@resourceventure.org.

Appendix B

MASTER
SECTION 017419 [01524]
CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes: Administrative and procedural requirements for construction waste management activities.

1.2 DEFINITIONS

- A. Construction, Demolition, and Landclearing (CDL) Waste: Includes all non-hazardous solid wastes resulting from construction, remodeling, alterations, repair, demolition and landclearing. Includes material that is recycled, reused, salvaged or disposed as garbage.
- B. Salvage: Recovery of materials for on-site reuse or donation to a third party.
- C. Reuse: Making use of a material without altering its form. Materials can be reused on-site or reused on other projects off-site. Examples include, but are not limited to the following: Grinding of concrete for use as subbase material. Chipping of landclearing debris for use as mulch.
- D. Recycling: The process of sorting, cleaning, treating, and reconstituting materials for the purpose of using the material in the manufacture of a new product.
- E. Source-Separated CDL Recycling: The process of separating recyclable materials in separate containers as they are generated on the job-site. The separated materials are hauled directly to a recycling facility or transfer station.
- F. Co-mingled CDL Recycling: The process of collecting mixed recyclable materials in one container on-site. The container is taken to a material recovery facility where materials are separated for recycling.
- G. Approved Recycling Facility: Any of the following:
 - 1. A facility that can legally accept CDL waste materials for the purpose of processing the materials into an altered form for the manufacture of a new product.
 - 2. Material Recovery Facility: A general term used to describe a waste-sorting facility. Mechanical, hand-separation, or a combination of both procedures, are used to recover recyclable materials. Take co-mingled containers to **<insert name of approved Material Recovery Facility(s) from the King County Solid Waste Division Report of Co-mingled Recycling Facilities at** www.metrokc.gov/dnrp/swd/construction-recycling/comingled.asp#rates >

1.3 SUBMITTALS

- A. Waste Management Plan: Submit [3] **<Insert number>** copies of plan within [7] [14] [30] **<Insert number>** days of date established for [commencement of the Work] [the Notice to Proceed] [the Notice of Award].
- B. Waste Management Report: Concurrent with each Application for Payment, submit [3] **<Insert number>** copies of report. **[Include separate reports for demolition and construction waste.]**

1.4 PERFORMANCE REQUIREMENTS

- A. General: Divert a minimum of **[50%] [75%] <insert number>** CDL waste, by weight, from the landfill by one, or a combination of the following activities:
 - 1. Salvage
 - 2. Reuse
 - 3. Source-Separated CDL Recycling
 - 4. Co-mingled CDL Recycling

- B. CDL waste materials that can be salvaged, reused or recycled include, but are not limited to, the following:
 - 1. Acoustical ceiling tiles
 - 2. Asphalt
 - 3. Asphalt shingles
 - 4. Cardboard packaging
 - 5. Carpet and carpet pad
 - 6. Concrete
 - 7. Drywall
 - 8. Fluorescent lights and ballasts
 - 9. Landclearing debris (vegetation, stumpage, dirt)
 - 10. Metals
 - 11. Paint (through hazardous waste outlets)
 - 12. Wood
 - 13. Plastic film (sheeting, shrink wrap, packaging)
 - 14. Window glass
 - 15. Wood
 - 16. Field office waste, including office paper, aluminum cans, glass, plastic, and office cardboard.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements: Conduct construction waste management activities in accordance with State of Washington RCW 39.04.13, Seattle Municipal Code Chapter 21.36 and all other applicable laws and ordinances.

- B. Preconstruction Conference: Schedule and conduct meeting at Project site prior to construction activities.
 - 1. Attendees: Inform the following individuals, whose presence is required, of date and time of meeting.
 - a. Owner.
 - b. Architect.
 - c. Contractor's superintendent.
 - d. Major subcontractors.
 - e. **<Insert the appropriate municipality representative. For projects in King County, outside the city of Seattle insert [King County Construction Recycling and Green Building program representative (206) 296-4466]. For projects within the City of Seattle insert [Resource Venture representative (206) 389-7304].>**
 - f. Other concerned parties.
 - 2. Agenda Items: Review methods and procedures related to waste management including, but not limited to, the following:
 - a. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - b. Review requirements for documenting quantities of each type of waste and its disposition.
 - c. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.

- d. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
- e. Review waste management requirements for each trade.
- f. Review and distribution of the following publications and programs (request copies by calling the King County Solid Waste Division at (206)296-4466):
 - 1) Construction Recycling Directory for Seattle/King County.
 - 2) Contractors Guide: Save money and resources through job-site recycling and waste prevention
 - 3) Construction Works program for Seattle/King County.
 - 4) King County Solid Waste Division Report of Co-mingled Recycling Facilities (available at www.metrokc.gov/dnrp/swd/construction-recycling/comingled.asp#rates).
- 3. Minutes: Record discussion. Distribute meeting minutes to all participants within 3 days.

1.6 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste types, quantity by weight, methods of disposal, handling and transportation procedures. Include separate sections in plan for demolition and construction waste.
- B. Organize the waste management plan in accordance with the sample plan included at end of Part 3, including the following information:
 - 1. Types and estimated quantities, by weight, of CDL waste expected to be generated during demolition and construction.
 - 2. Proposed methods for CDL waste salvage, reuse, recycling and disposal during demolition including, but not limited to, one or more of the following:
 - a. Contracting with a deconstruction specialist to salvage materials generated,
 - b. Selective salvage as part of demolition contractor's work,
 - c. Reuse of materials on-site or sale or donation to a third party.
 - 3. Proposed methods for salvage, reuse, recycling and disposal during construction including, but not limited to, one or more of the following:
 - a. Requiring subcontractors to take their CDL waste to a recycling facility,
 - b. Contracting with a recycling hauler to haul recyclable CDL waste to an approved recycling or material recovery facility,
 - c. Processing and reusing materials on-site
 - d. Self-hauling to a recycling or material recovery facility.
 - 4. Name of recycling or material recovery facility receiving the CDL wastes.
 - 5. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

1.7 WASTE MANAGEMENT REPORT

- A. Waste Management Report: Submit a cumulative waste management report on the form included at end of Part 3 with each Application for Payment with the following attachments:
 - 1. A record of the type and quantity, by weight, of each material salvaged, reused, recycled or disposed.
 - 2. Total quantity of waste recycled as a percentage of total waste.
 - 3. Disposal Receipts: Copy of receipts issued by a disposal facility for CDL waste that is disposed in a landfill.
 - 4. Recycling Receipts: Copy of receipts issued by an approved recycling facility.
 - a. For co-mingled materials, include weight tickets from the recycling hauler or material recovery facility and verification of the recycling rate for co-mingled loads at the facility.
 - 5. Salvaged Materials Documentation: Types and quantities, by weight, for materials salvaged for reuse on site, sold or donated to a third party.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT, GENERAL

- A. Provide containers for CDL waste that is to be recycled clearly labeled as such with a list of acceptable and unacceptable materials. The list of acceptable materials must be the same as the materials recycled at the receiving material recovery facility or recycling processor.
- B. The collection containers for recyclable CDL waste must contain no more than 10% non-recyclable material, by volume.
- C. Provide containers for CDL waste that is disposed in a landfill clearly labeled as such.
- D. Use detailed material estimates to reduce risk of unplanned and potentially wasteful cuts.
- E. To the greatest extent possible, include in material purchasing agreements a waste reduction provision requesting that materials and equipment be delivered in packaging made of recyclable material, that they reduce the amount of packaging, that packaging be taken back for reuse or recycling, and to take back all unused product. Insure that subcontractors require the same provisions in their purchase agreements.
- F. Conduct regular visual inspections of dumpsters and recycling bins to remove contaminants.

3.2 SOURCE SEPARATION

- A. General: Separate recyclable materials from CDL waste to the maximum extent possible. Separate recyclable materials by type.
 - 1. Provide containers, clearly labeled, by type of separated materials or provide other storage method for managing recyclable materials until they are removed from Project site.
 - 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - 3. Stockpile materials away from demolition area. Do not store within drip line of remaining trees.
 - 4. Store components off the ground and protect from weather.

3.3 CO-MINGLED RECYCLING

- A. General: Do not put CDL waste that will be disposed in a landfill into a co-mingled CDL waste recycling container.

3.4 REMOVAL OF CONSTRUCTION WASTE MATERIALS

- A. Remove CDL waste materials from project site on a regular basis. Do not allow CDL waste to accumulate on-site.
- B. Transport CDL waste materials off Owner's property and legally dispose of them.
- C. Burning of CDL waste is not permitted.

END OF SECTION

WASTE MANAGEMENT PROGRESS REPORT

MATERIAL CATEGORY	DISPOSED IN MUNICIPAL SOLID WASTE LANDFILL	DIVERTED FROM LANDFILL BY RECYCLING, SALVAGE OR REUSE		
		Recycled	Salvaged	Reused
1. Asphalt (cu yds)				
2. Concrete (cu yds)				
3. Porcelain Plumbing Fixtures (lbs)				
4. Ferrous Metals (lbs)				
5. Non-Ferrous Metals (lbs)				
6. Wood (lbs)				
7. Glass (lbs)				
8. Clay Brick (lbs)				
9. Bond Paper (lbs)				
10. Newsprint (lbs)				
11. Cardboard (lbs)				
12. Plastic (lbs)				
13. Gypsum (lbs)				
14. Paint (gal)				
15. Insulation (lbs)				
16. Other (insert description)				
17. Other (insert description)				
Total (In Weight)		(TOTAL OF ALL ABOVE VALUES - IN WEIGHT)		
		Percentage of Waste Diverted	(TOTAL WASTE DIVIDED BY TOTAL DIVERTED)	

SAMPLE WASTE MANAGEMENT PLAN

Company: Northwest Best Construction
Project: Northwest Bank Building, Kent, WA
Designated Recycling Coordinator: John Doe

Waste Management Goals:

- This project will recycle or salvage for reuse xx% [e.g. 75%] by weight of the waste generated on-site.

Communication Plan:

- Waste prevention and recycling activities will be discussed at each safety meeting.
- As each new subcontractor comes on-site, the recycling coordinator will present him/her with a copy of the Waste Management Plan and provide a tour of the recycling areas.
- The subcontractor will be expected to make sure all their crews comply with the Waste Management Plan.
- All recycling containers will be clearly labeled.
- Lists of acceptable/unacceptable materials will be posted throughout the site.

Expected Project Waste, Disposal, and Handling:

The following charts identify waste materials expected on this project, their disposal method, and handling procedures.

Demolition Phase

Material	Quantity	Disposal Method	Handling Procedure
Asphalt from parking lot	100 tons	Ground on-site, reuse as fill	
Wood Framing	6 tons	Recycle - Wood Recycling Northwest	Separate "clean wood" in clean wood bin
Decorative Wood Beams	300 bd. ft.	Salvage - Timber Frame Salvaging	Remove by hand, store on-site, palletize for pickup
Remaining Materials	8 tons	Landfill - Sound Disposal	Dispose in trash dumpster

Construction Phase

Material	Quantity	Disposal Method	Handling Procedure
Concrete	2 tons	Recycle - Pacific Concrete	Rebar OK
Forming Boards		Reuse as many times as possible then recycle - Wood Recycling NW	Stack next to supply of new form boards for reuse. Recycle clean unusable forms in wood recycling bin
Clean Wood Scrap	12 tons	Scraps reused for formwork, fire breaks, etc. Remaining recycled - Wood Recycling NW	Stack reusable pieces next to saw for reuse. Place unusable clean wood in wood recycling container
Scrap Metal	5 tons	Recycle - Seattle Metals	Deposit all metals in metal container
Drywall	10 tons	Subcontractor will recycle and submit receipt	Either provide container or collect in vehicle for recycling
All other wastes	14 tons	Landfill - Sound Disposal	Dispose of in trash dumpster