NEBRASKA RECYCLING COUNCIL

Construction and Demolition Waste Management and Recycling Guide

For Contractors to Lincoln Public Schools

Lincoln Public Schools

Revised December 2017 by the Nebraska Recycling Council

This guide was originally written in October 2016 by WasteCap Nebraska based on information from WasteCap Resource Solutions, U.S. EPA, Nebraska Department of Environmental Quality, and from experience managing C&D waste during a remodeling project at Irving Middle School in Lincoln, Nebraska.

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Introduction: Why Recycle?

This guide is intended to assist contractors with estimating types and quantities of materials, and with preparing a Construction Waste Management Plan when developing proposals for construction projects. It also provides basic management instructions and educational materials for contractors and subcontractors to make the waste diversion process run smoothly on a construction job site. Not only does salvaging/recycling help create efficient management of materials, it also creates a cleaner, safer job site and has the potential to save money, time and resources.

Lincoln Public Schools requires contractors to submit a waste management plan and achieve a minimum salvage/recycling rate of 75% of total waste by weight.

Environment

The US EPA estimates that 170 million tons of Construction and Demolition (C&D) debris are generated each year, representing more than one-third of the municipal solid waste stream.[1] Five of the top ten largest components of waste in the U.S. are materials found in C&D waste – wood, roofing shingles, cardboard, ferrous metals and rock/concrete brick. In a waste characterization study conducted in 2009 by the Nebraska Department of Environmental Quality (NDEQ)[2], waste not measured by weight and quantity was divided into four categories: construction and demolition debris, e-waste, furniture, and limbs and brush. Construction and demolition debris was sighted in more than 75 percent of the sample loads during the study, the most of any category, including materials that were weighed and measured.

When waste is reduced or reused, it is not generated in the first place, saving money and natural resources. When it is recycled, it saves the energy, raw materials and transportation needed to make that material into a new product.

The U.S. EPA's definitions of Non-Hazardous Materials and Waste Management Hierarchy for sustainable materials management can be found at the end of this guide. [3]

[1] http://www.epa.gov/epawaste/conserve/rrr/imr/cdm/pubs/cd-meas.pdf
[2] State of Nebraska Waste Characterization Study, 2009
[3] https://www.epa.gov/smm/sustainable-materials-management-non-hazardous-materials-and-waste-management-hierarchy

Economics

Construction and Demolition projects produce large quantities of materials with value. Several materials in the construction and demolition waste stream, such as cardboard, metal and concrete, have well-developed markets across the U.S. Contractors often find that they can save up to $100 or more per 30 yard dumpster by recycling rather than landfilling. On a large project, the cost savings from recycling can be significant.

Containers at Irving Middle School during 2015 Renovation

When landfilled, materials are lost for future use, but the same materials can become commodities - raw materials for new products - when recycled. Recycling can provide a new source of revenue for a C&D project. For example, when cardboard is hauled to a landfill, a fee must be paid to the landfill operator (called a tipping fee) to bury the waste, in addition to the hauling fee. When cardboard is separated for recycling, it is a material sought by paper mills from which more cardboard and other paper products can be made. Hauling fees still apply, but savings can occur through avoided costs such as tipping fees, and/or revenue from sales.

Ease

Reducing, reusing and recycling construction and/or demolition debris is a change from the norm in many construction sites. However, if recycling is well-designed, it can save on labor costs by reducing day-to-day cleanup time because dumpsters are often closer to the work site. Additional time should be set aside for management and monitoring of the recycling program.

Containers at Irving Middle School during 2015 Renovation

Public Relations Benefit

Recycling on a construction site provides physical evidence that project owners have a commitment to environmental leadership. Contractors and haulers who reuse and recycle often receive local, statewide and national publicity for their recycling leadership.

Steps to Designing a Construction or Demolition Debris Reuse and Recycling Program

1. **Commit to waste diversion**

Ceiling tiles are reusable and/or recyclable

- Upper management commitment to waste diversion is essential. Lincoln Public Schools (LPS) demonstrated its commitment to stewardship of natural resources by developing a policy for construction and demolition waste management practices. LPS requires a minimum of 75% diversion by weight of all waste generated on a construction project.
- Include recycling specifications in all contracts and subcontracts. LPS specifications are included in their "Lincoln Public Schools Construction Waste Management Guidelines" document.
- Establish one project authority to control all project waste, provide dumpsters and hauling services for the project, and enforce recycling rules with all contractors. Select a coordinator – (typically a construction project manager with the cooperation of the site superintendent) to promote and monitor the recycling program. The coordinator will educate staff and subcontractors.

2. **Start at the planning stage**

- Consider methods to reduce, reuse and recycle waste during construction and put them into contracts.
- Ask suppliers to reduce packaging, use recyclable packaging, or take their packaging back.
- Discuss and encourage reduction, reuse and recycling at pre-construction meetings.
- Plan to order materials just in time, send back extra inventory, and reuse building materials.

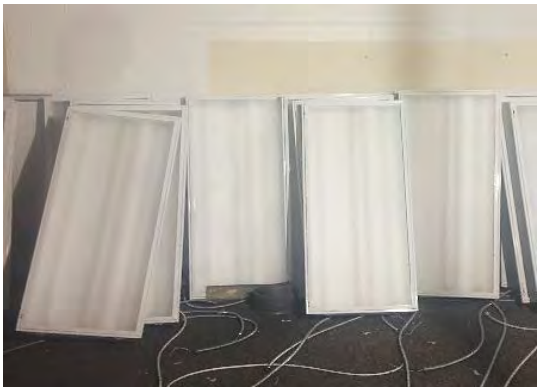
Containers should have explicit labels for a successful program

3. <u>Identify target materials</u>

Identify target materials at the job site that can be recovered from the waste stream, both during construction/demolition and during site preparation. The U.S. EPA estimates that an average of 3.89 pounds of waste is generated for every square foot of non-residential construction projects. WasteCap Resource Solutions estimates 5.44 pounds of waste per square foot of non-residential construction. Determine materials that will be used that are recyclable. Determine the types of packaging those materials come in. Materials that can be recycled include:

- Asphalt
- Bricks and brick flooring
- Cans & bottles (no glass bottles)
- Cardboard (flattened)
- Carpet and pad
- Ceiling tile
- Concrete
- Gypsum Drywall (clean and unpainted)
- Metal
- Metal Doors and Hardware
- Office paper
- Paper
- Reusable trim, counters, doors, hardware, sinks, toilets, fixtures, shelving, lockers, flooring, etc.
- Shingles
- Wood

Metal hardware from doors & windows can be recovered



Light fixtures are reusable and/or recyclable

4. <u>Write a Request for Proposal for waste hauling and recycling</u>

Develop a vendor list for your area. Consider allowing more than one hauler to service your site. (For example, many projects send out a separate request for proposal and have a separate hauler for scrap metal.) Require the following:

- List of materials the vendor accepts and how they must be prepared
- Explanation of what happens to the materials after they are collected - (ask for specifics on location of markets and what your recyclables will get made into)
- Documentation of recycling and trash quantities and weights to be provided monthly

- Training and education of crews
- Dumpster signs
- Allow haulers to bid on (and not bid on) specific materials. For example, not all haulers have access to markets for wood recycling. It can be included as an option in the RFP.

5. **Write a Waste Management Plan**
   - Description of the project and identification of the construction waste management plan manager
   - Goal for the percentage of waste to be reused and recycled
   - Analysis of the projected types of jobsite waste that will be generated, including types and quantities
   - Materials targeted for reuse and recycling
   - Responsible parties for various recycling operations (calling in dumpsters, monitoring, educating, documenting)
   - Select trash and recycling service provider(s)
   - Document end markets for all targeted materials for recycling
   - Education and training plan
   - Waste auditing procedures
   - Documentation procedures

Brick and concrete only dumpster

6. **Site logistics**

   Determine where to place dumpsters on site, how many, what types, and when they are needed. Make sure to put trash container(s) near recycling containers to reduce contamination. If it is a very crowded site, you may only be able to fit dumpsters for the largest quantity materials generated. Throughout the project, consider which scrap materials will be generated during each project phase, and order dumpsters accordingly. Determine how recyclables and trash will move around the site, starting with how materials get into the correct containers, who will be responsible, and how various haulers will be able to maneuver on the site.

7. **Monitor and motivate**

   Periodically check containers to ensure the correct materials are going into them. If problems exist, find the person or persons responsible and instruct them on how to participate correctly. Take photos to show progress or problems on a weekly or daily basis.

8. Educate

- Educate workers before or immediately upon arrival to make sure every person that enters the site knows how to participate correctly in the recycling program. Provide a one-page handout to crews as a reminder of separation requirements.
- Set aside time to explain the program to all of the sub-contractors at the site, and remind them it is their responsibility to ensure that their laborers understand and participate in the program.

Signage on a Brick Only dumpster

- The topic of waste management should be on the agenda at **EVERY JOB SITE MEETING**. Reminders and frequent feedback are important.
- Post explicit signs. It is essential that each dumpster is clearly marked. Your hauler(s) may be obligated to provide signs.
- Create a sign for the perimeter fence that details progress in the program, reminding crews and the public that this is a recycling site. Posting month-by-month diversion rates can help to motivate crews to reach project recycling goals.

Signage on an Aluminum Only dumpster

9. Document

- Track all materials taken off-site for reuse, recycling or solid waste.
- Ask haulers to provide documentation, at least monthly, of how much material is being removed, by weight and volume, and at what cost. You may need to use conversion numbers (included in this manual).
- Provide data to the owner, architect, contractors and others on an ongoing basis throughout the project.

10. <u>Adjust</u>

Communicate with haulers, and obtain contamination reports from them on a regular basis to find out how well work crews are complying with the recycling program. Share this information with crews.

Trash dumpster containing non-recyclable materials

11. <u>Analyze</u>

Evaluate the program as to whether money was saved by recycling, and how many tons and cubic yards of resources were saved. Make it even better next time!

- Were there enough or too many containers?
- Were the containers serviced too often or not often enough?
- Were trash containers conveniently placed next to recycling containers ?
- Was there too much contamination?
- Was education and training adequate?

12. <u>Celebrate</u>

Share the data with managers, subcontractors, clients, and the public, and celebrate success.

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CONSTRUCTION WASTE MANAGEMENT

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01. GENERAL

A. Lincoln Public Schools is committed to being a responsible steward to our natural resources by developing good construction and demolition waste management practices.

B. By engaging in sound construction and demolition waste management practices, the Lincoln Public Schools desires to direct materials from the waste stream that at a minimum:

1. Identify materials to be salvaged.
2. Identify materials to be recycled.
3. Identify manufacturers that reclaim their packaging for reuse or recycling.
4. Maintain procedures for separating hazardous waste by products of construction for disposal in accordance with federal, state, and local regulations.

C. Develop waste management plan that results in End-of-Project rates for salvage/recycling of seventy five percent (75%) minimum by weight of total waste generated by the Work.

D. Salvaging nonhazardous demolition and construction waste.

E. Recycling nonhazardous demolition and construction waste.

F. Disposing of nonhazardous demolition and construction waste.

02. DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

03. EXECUTION

A. LPS requires that this project generate the least amount of trash and waste possible.

1. Practice efficient waste management in the use of materials in the course of the Work. Minimize the generation of waste due to error, poor planning, breakage, mishandling, contamination and other factors.
2. Minimize waste and trash disposal to landfills and incinerators.

B. A waste management plan concept should be discussed during the design and construction stages of the process.

C. Revenue from sale of recycled materials shall be passed on to LPS.

1. Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to LPS.
2. Revenue from sale of recycled materials shall be transmitted by check directly to LPS, unless other procedures are approved by LPS.

D. A waste management plan should be submitted by contractor to Lincoln Public Schools within forty-five (45) days from commencement of Work.

E. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.

2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations.

3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations.

4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept.

5. Disposed Materials: Indicate how and where materials will be disposed of.

6. 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.

F. Required Recycling, Salvage and Reuse: The following shall not be disposed of in landfills or by incineration:

1. Masonry – brick, block.
2. Steel/Metal – piping, hollow metal doors and frames, metal studs, ductwork, lockers, toilet partitions, supports/hangers, conduit, electrical panel boards, etc.
3. Aluminum – storefronts, doors, windows.
4. Copper – wiring, coils, piping.
5. Cardboard.
6. Wood –pallets, lumber.
7. Plastics/PVC.

G. Categories which may or may not have the ability for local recycling. The following shall not be disposed of in landfills or by incineration, unless there is no locally available means of recycling:

1. Acoustic ceiling tile.
2. Carpet.
3. Unpainted gypsum board scrap.
4. Aluminum window frames and glass.

H. The following means of waste and trash disposal are not acceptable:

1. Burning on the project site.
2. Burial on the project site.
3. Dumping or burying on the project, public or private.
4. Other illegal dumping.

I. Waste Management Reports: Concurrent with each Application for Payment, submit report.

1. Use the LPS Monthly and Summary Waste Management Reporting forms. See attachments.

J. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling and disposal as a percentage of total waste generated by the Work.

K. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

L. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

M. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts and invoices.

N. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts and invoices.

O. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

P. Waste Management Manager: Designate an on-site person or persons to be responsible for implementing, monitoring and reporting status of waste management work plan.

Q. Instruction: Provide on-site instruction for workers, subcontractors and suppliers on proper waste management procedures, as appropriate for the Work.

1. Distribute waste management plan to everyone concerned within seven (7) days of submittal return.
2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling and disposal.

R. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated and sold. Provide signs for each container(s).
2. Provide separate storage for any hazardous materials and dispose in manner in accordance with local regulations.

S. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity and location where removed.
3. Store items in a secure area until installation.
4. Protect items from damage during transport and storage.
5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports and miscellaneous materials necessary to make items functional for use indicated.

T. Salvaged Items for Sale and Donation: Permitted on Project site for collection and periodic removal to designated locations.

U. Salvaged Items for LPS use: Salvage items for LPS use and handle as follows:

1. Clean salvaged items.
2. Pack or crate items after cleaning. Identify contents of 3 containers with label indicating elements, date of removal, quantity and location where removed.
3. Store items in a secure area until delivery to LPS.
4. Transport items to LPS storage area on-site as designated by LPS.
5. Protect items from damage during transport and storage.

V. Doors and Hardware: Except for removing door closers, leave door hardware attached to doors.

W. General: Recycle paper and beverage containers used by on-site workers.

X. Recycling Demolition Waste

1. Asphalt Paving: Break up and transport paving to asphalt-recycling facility.
2. Concrete: Remove reinforcement and other metals easily separated from concrete and sort with other metals.
3. Masonry: Remove metal reinforcement, anchors and ties easily separated from masonry and sort with other metals.
    a. Clean and stack undamaged, whole masonry units on wood pallets.
4. Wood Materials: Sort and stack members according to size, type and length. Separate lumber, engineered wood products, panel products and treated wood materials.
5. Metals: Separate metals by type.
    a. Metals need only be separated when it is economically feasible to accomplish such that the cost of separation does not exceed the dollar value of the recycled material.
6. Acoustical Ceiling Panels and Tile (Optional): Stack large clean pieces on wood pallets and store in a dry location.
7. Metal Suspension System: Separate metal members including trim and other metals from acoustical panels and tile and sort with other metals.
8. Carpet (Optional): Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
    a. Store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
9. Carpet Tile (Optional): Remove debris, trash and adhesive.
    a. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
10. Windows (Optional):
    a. Separate aluminum framing members including trim from glass and sort with other metals.

Y. Recycling Construction Waste

1. Packaging:
   a. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
   b. Polystyrene Packaging: Separate and bag materials.
   c. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on site, do NOT break them down. Collect and stack pallets to be reused/recycled through LPS. Coordinate with LPS Waste Management Consultant for transportation.
   d. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

04. ATTACHMENTS

A. Sample copy of Owner's Monthly Waste Management Report

Project Title:

LPS Construction Waste Progress Report

Monthly Totals for MM YYYY

Material Category	Total Weight of Waste	Quantity of Waste Landfilled	Quantity of Waste Salvaged	Quantity of Waste Recycled	Total Quantity of Waste Recovered	Total Quantity of Waste Recovered
	(Tons)					(%)
Wood						
Metals						
Concrete and Masonry						
Drywall						
Acoustical Ceiling						
Mixed Recyclabes (Paper, Bottles, Cans, etc.)						
General Waste						
Other (List)						
Total (all types) to Date	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	%

Ticket	Date	Quantity of Waste (Tons)							
		Landfilled	Salvaged	Wood	Metals	Concrete/ Masonry	Drywall	Acoustical Ceiling	Mixed
Total		0	0	0	0	0	0	0	0

B. Sample copy of Owner's Summary Waste Management Report

Project Title: _____

LPS Construction Waste Progress Report

Project totals through MM YYYY

Material Category	Total Weight of Waste	Quantity of Waste Landfilled	Quantity of Waste Salvaged	Quantity of Waste Recycled	Total Quantity of Waste Recovered	Total Quantity of Waste Recovered
	(Tons)					(%)
Wood						
Metals						
Concrete and Masonry						
Drywall						
Acoustical Ceiling						
Mixed Recyclabes (Paper, Bottles, Cans, etc.)						
General Waste						
Other (List)						
Total (all types) to Date	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**%**

Service Providers for C & D Recycling and Salvage in Lincoln, Nebraska (subject to change)

- **Bottles/Cans (Check to see if your hauler provides residential curbside service)**

Market/Hauler:	Notes:	Contact Info:
Recycling Enterprises	Will drop off tote(s) for plastic bottles and aluminum cans. Will empty on a scheduled or on-call basis.	**Chris Zegar** (402) 421-6655 Recycle_lincoln@msn.com
Von Busch & Sons	Will drop off a roll-off for collection and remove on an on-call basis. **Can provide plenty of roll-offs for large projects.**	**Bruce Von Busch** (402) 475-5197 Bvonbusch@bvonbuschandsons.com
Uribe Refuse Services	Will provide dumpster(s) for collection and remove on scheduled/on-call basis.	**Nick Crow** (402) 580-5780 nick@uriberefuse.com
Capital City Refuse	Will drop off a roll-off for collection and remove on an on-call basis.	**Seth Harms** (402) 770-1195 Harmzy30@hotmail.com
Industrial Services	Will provide dumpster(s) for collection and remove on scheduled/on-call basis.	**Lori Knaub** (402) 467-3581 islori@isnebraska.com
Star City Recycling	Businesses call for a personalized quote.	**Garen Miller** (402) 890-4320 starcityrecycling@neb.rr.com

- **Cardboard**

Market/Hauler:	Notes:	Contact Info:
Recycling Enterprises	Will drop off dumpster(s) for plastic bottles and aluminum cans. Will empty on a scheduled or on-call basis.	**Chris Zegar** (402) 421-6655 Recycle_lincoln@msn.com
Von Busch & Sons	Will drop off a roll-off for collection and remove on an on-call basis. **Can provide plenty roll-offs for large projects.**	**Bruce Von Busch** (402) 475-5197 Bvonbusch@bvonbuschandsons.com
Uribe Refuse Services	Will provide dumpster(s) for collection and remove on scheduled/on-call basis.	**Nick Crow** (402) 580-5780 nick@uriberefuse.com
Capital City Refuse	Will drop off a roll-off for collection and remove on an on-call basis.	**Seth Harms** (402) 770-1195 Harmzy30@hotmail.com
Industrial Services	Will provide dumpster(s) for collection and remove on scheduled/on-call basis.	**Lori Knaub** (402) 467-3581 islori@isnebraska.com
Star City Recycling	Businesses call for a personalized quote.	**Garen Miller** (402) 890-4320 starcityrecycling@neb.rr.com

- **Carpet**

Market/Hauler:	Notes:	Contact Info:
Kelly's Carpet Omaha	Located in Omaha Nebraska. Will take used carpet and pad. Call for cost.	402-592-7072

- **Ceiling Tile**

Market/Hauler:	Notes:	Contact Info:
Armstrong World Industries	The contractor is required to remove and palletize the tiles, Armstrong picks them up at no cost. (Contact Neil @ Armstrong for more detailed directions.) Armstrong also has a **floor recycling program**. **Requires full semi-load.** (http://www.armstrong.com/commflooringna/floor-recycling-program.html)	**Neal McDwyer** clmcdwyer@armstrong.com (717) 396-6420

- **Concrete**

Market/Hauler:	Notes:	Contact Info:
Cather and Sons	Will accept concrete and masonry for recycling.	(402) 466-9300
Constructors Inc.	Will accept concrete. Drop off only	**Ryan** (402) 434-1764

- **Glass**

Market/Hauler:	Notes:	Contact Info:
First Star Fiber	Call for details	**Lee Cornell** (402) 894-0003 #17
Recycling Enterprises	Call for details	**Chris Zegar** (402) 421-6655 Recycle_lincoln@msn.com

- **Gypsum Drywall (will be taken to a local farmer for composting)**

Market/Hauler:	Notes:	Contact Info:
Prairieland Dairy	($15/ton tipping fee [as of March 2015]. Must be clean (no paint) and no metal in it.	**Jacob Hickey** (402) 430-7385 jhickey@pldairy.com

- **Metals**

Market/Hauler:	Notes:	Contact Info:
Alter Metals	All Metals	(402) 476-3306
Sadoff Iron and Metal	All Metals	(402) 217-2149

- **PVC Piping**

Market/Hauler:	Notes:	Contact Info:
Von Busch & Sons	Will drop off tote(s)/roll-offs for collection and remove on an on-call basis.	**Bruce Von Busch** (402) 475-5197 Bvonbusch@bvonbuschandsons.com

- **Rubber Roofing**

Market/Hauler:	Notes:	Contact Info:
First Star Fiber	Check with Lee and he may ask you to acquire spec sheets for the flooring. He may have a market about 50% of the time.	**Lee Cornell** (402) 894-0003 #17

- **Wood**

Market/Hauler:	Notes:	Contact Info:
Hofeling Enterprises	Accept recycled wood from C & D sites. Also accept pallets.	Scott Hofeling (402) 438-8733 scott@hofelingenterprises.com
EcoStores	Call Craig about donating various reusable wood being taken out of buildings.	Craig Steward (402) 477-3606 craig.steward@ecostoresne.org
Habitat Restore	Call about donating various reusable wood being taken out of buildings.	(402) 464-3668 restoremanager@lincolnhabitat.org

Bid Request or Contract Language

Construction Waste Reduction and Recycling

Construction waste reduction and recycling is a priority on this project. Our goal is to minimize the environmental impact of the project and reuse or recycle **[50%, 60%, 75%]** of the waste generated on this project. All successful bidders on this project and their subcontractors are required to participate in the waste reduction and recycling program.

All contractors shall use dumpsters provided by **[Contractor Name]**. All waste and recyclables leaving the site will do so only in containers provided by and controlled by **[Contractor Name]**, or its assigns. In doing this, we will be able to keep track of all the material landfilled or recycled by the project in order to provide needed documentation. Any contractor wishing to remove waste or recyclables may do so only with prior written approval from **[Contractor Name]**.

All waste and recycling containers will be clearly labeled and positioned on the site to provide easy and efficient access for all contractors. Contractors are required to keep recyclables separate from trash, deliver trash and recyclables to these containers, and ensure all materials are placed in the appropriate containers. If a contractor contaminates a dumpster (placing recyclables in the trash or trash in recyclables), **[Contractor Name]** may remove contamination and charge costs to the contractor. This is a joint effort by all contractors and subcontractors.

MATERIALS BEING RECYCLED

At a minimum, this project will recycle untreated wood, scrap metal, cardboard, concrete and stone, cans and bottles from eating areas, and office paper and cardboard from offices. Separate containers will be provided on site for each of these materials, and instructions on their proper use will be provided. All contractors and subcontractors will be required to know the recycling rules and convey these rules to their workforce.

Other recyclable materials may be identified during the life of this project. If other materials will be recycled, containers will be placed on the site and proper recycling instructions provided.
WASTE REDUCTION AND REUSE

Reduce: Contractors are asked to request that their suppliers and vendors provide materials and supplies to the site with minimal packaging.

Reuse: Electrical contractors are specifically requested to find and use suppliers who will allow wire spools to be returned. All contractors are asked to save and reuse large pieces of metal scrap, wood scrap and other building materials for small jobs on the project where large, full dimension materials are not required.

Recycle: If you will be or are generating a large quantity of an item that is not being reused or recycled, please inform **[Contractor Name].** Your ideas are needed and appreciated to come up with markets for these materials.

We want to know of other ways to reduce waste. Notify the site with suggestions. **[Contractor Name, Owner Name]** ask you to follow these requirements and help others follow them. Together we can create a better work environment and help preserve our environment for a better tomorrow.

Construction or Demolition
Waste Management Plan Form
Courtesy of WasteCap Resource Solutions

Project Name: _____

Contractor: _____

Construction or Demolition Waste Management Plan Manager (Contractor's Rep):

_____

Project Location: _____

Estimated Construction Dates: _____

PROJECT SCOPE - indicate type of structure (e.g., steel, concrete, etc), building size, project cost, space constraints, etc.

RECYCLING GOAL - To recycle ____ % of waste generated on the site by weight. (Minimum goal ___%)

Goals and Intent:

Reduce: The Project shall generate the least amount of waste and methods shall be used that minimize waste due to error, poor planning, breakage, mishandling, contamination, or similar factors. Promote the resourceful use of materials to the greatest extent possible.

Reuse: The Contractor and Subcontractors shall reuse materials to the greatest extent possible. Reuse includes the following:

1. Salvage reusable materials for resale, for reuse on this Project, or for storage for use on future projects.
2. Return reusable items (e.g., pallets or unused products) to the material suppliers.

Recycle: As many of the waste materials not able to be eliminated in the first place or salvaged for reuse shall be recycled. Waste disposal in landfills shall be minimized to greatest extent possible.

ANALSYS OF ESTIMATED CONSTRUCTION OR DEMOLITION WASTE TO BE GENERATED

A. Projected waste materials

- ☐ Asphalt
- ☐ Brick
- ☐ Cans and bottles
- ☐ Cardboard
- ☐ Carpet
- ☐ Carpet pad
- ☐ Ceiling tile scrap
- ☐ Concrete
- ☐ Dimensional lumber
- ☐ Glass
- ☐ Gypsum board
- ☐ Insulation scrap
- ☐ Land clearing wood
- ☐ Metal – wire, pipe cutoffs, etc.

- ☐ Pallets
- ☐ Paper
- ☐ Paint buckets
- ☐ Plastics including stretch wrap, plastic bags and Styrofoam
- ☐ Plywood, OSB, particleboard and other engineered lumber
- ☐ Structural steel
- ☐ Vinyl
- ☐ Other (specify) _____

B. Produce a preliminary list of materials that may be targeted for reuse or recycling (based on size and type of construction and other relevant information). Complete the list based on the availability of recycling and waste reduction services and on feedback from key subcontractors who will be working on the project. Focus recycling efforts on high potential materials and practices. Select materials that are generated in greatest volume, that have the most market value, that can be easily separated and that are recycled locally.

C. Estimated quantities of waste materials, by type (use Project estimates or these commercial construction weight estimates below, compiled by WasteCap Resource Solutions based on WI State Averages and commercial construction projects. Actual percentages will vary based on the project and type of construction.)

Material	Estimated % (by weight)	Estimated Tons
Total Estimated		
Trash (25%)		
Cans & Bottles (.02%)		
Cardboard (8%)		
Concrete/masonry (14%)		
Drywall (13%)		
Metal (8%)		
Wood (28%)		
Reuse (4%)		
Other		
Total (100%)		

RECYCLING SERVICE PROVIDERS AND TARGETED MATERIALS
Evaluate Cost and Services Offered Service Provider Agreements in Place

Company #1 _____
Company #2 _____
Company #3 _____

Company #	Material	Haul Fee	Tip Fee	Name & Location of Recipient
	Trash			

	Cans & Bottles			
	Cardboard			
	Concrete/Masonry			
	Scrap Metal			
	Wood			
	Other			
	Other			
	Other			

MATERIALS-HANDLING PROCEDURES

Contractors and Subcontractors will separate and handle materials as stated below.

Example: Cardboard: Separate and flatten clean cardboard and boxboard and place in designated containers on the job site. Do not include waxed cardboard, tissue, paper plates or towels, pizza boxes or any item that is not paper. Separate plastic, Styrofoam and other items which may be stuck to the cardboard boxes. Staples may be left in cardboard. Cardboard that is over 50% covered in mud, paint or other contaminants should be disposed of as trash. The cardboard will be sorted, sold and made into new paper products.

RECYCLING OPERATIONS

Action *** Who

Order dumpsters - oversee delivery _____
Site dumpsters/collection sites for optimum convenience _____
Educate job site personnel on recycling requirements _____
Order signs for dumpsters and other recycling bins_____
Sort or process recyclables on site _____
Take trash and recyclables to the dumpsters _____
Schedule dumpster pickups/drop offs _____
Monitor dumpsters for contamination_____
Document recycling results_____

*** Depending on the service option chosen, these may be the responsibility of the field personnel, construction waste manager, the hauler, a recycling contractor, or the subcontractors.

EDUCATIONAL AND MOTIVATIONAL PLAN – Check all items intended to be used

Actions

- ❒ Complete Construction Waste Management Plan
- ❒ Hold Orientation/Kick Off Meeting
- ❒ Update & Progress in Weekly Job-Site Meetings
- ❒ Encourage Just-in-time deliveries
- ❒ Post Targeted Materials (signage)
- ❒ Distribute tip sheets to job-site personnel
- ❒ Post goals/progress (signage)
- ❒ Use formal agreements committing subs to program
- ❒ Require those who contaminate dumpsters to re-sort

- ❒ Provide stickers, t-shirts, hats or other incentives
- ❒ Public recognition of participating subs
- ❒ Take photos to document progress and share
- ❒ At site visits, discuss waste management with job-site personnel
- ❒ Conduct periodic presentations for job-site personnel on waste issues
- ❒ _____

WASTE AUDITING PROCEDURES – Describe how the recycling program will be monitored so that recycling and trash containers are kept free of contamination. Include frequency of monitoring

DOCUMENTATION PROCEDURES

Who

- ❒ Perform monthly cost and materials tracking (required) _____
- ❒ Perform final evaluation (required) _____

Construction and Demolition Debris Weight to Volume Conversion

	Volume	Weight (pounds)	Weight (tons)
Trash[2]			
Residential waste (uncompacted at curb)	1 cubic yard	150 – 300	.075 – .15
Commercial-industrial waste (uncompacted)	1 cubic yard	300 – 600	.15 – .30
Mixed Waste[1]	1 cubic yard	350	.175
Asphalt[3]	1 square yard 1 inch thick	110 - 115	0.055 – 0.057
Asphalt[3]	1 cubic yard	4,050 – 4,140	2.025 – 2.07
Cans & Bottles[2]			
Aluminum cans (whole)	1 cubic yard	50 – 75	.025 – .038
Glass bottles (whole bottles)	1 cubic yard	500 – 700	.25 – .35
Plastic bottles (soda bottles)	1 cubic yard	30 – 40	.015 – .02
Corrugated Cardboard[1]			
Uncompacted	1 cubic yard	50 – 150	.025 – .075
Compacted	1 cubic yard	300 – 500	.15 – .25
Concrete[4]	1 cubic yard	4,050	2
Rubble[1]	1 cubic yard	1,400	.7
Drywall[1]	1 cubic yard	500	.25
Scrap Metal[1] (loose light iron sheet metal)	1 cubic yard	1,000	.5
Wood – pallets[2]	1 cubic yard	286	.143
Wood – pallets[2] (Each)	1 Unit	30 – 50	.015 – .025
Scrap Wood[1]	1 cubic yard	300	.15

1 US Green Building Council. "LEED Reference Guide for Green Building Design and Construction 2009 Edition, Section 6- Calculations, Table 2- Solid Waste Conversion Factors. Page 360.

2 US Environmental Protection Agency. "Measuring Recycling. A Guide for State and Local Governments." September 1997 Appendix B. Standard Volume-to-Weight Conversion Factors pp. 59 – 62. www.epa.gov/epawaste/conserve/tools/recmeas/docs/guide_b.pdf

3 Asphalt Pavement Association of Michigan (4,050 lbs/yd^3) and LEED EB v. 2.0 Reference Guide (p. 256) Table 2 Volume to Weight Conversions (115 lbs per yd^2 or 4,140 lbs per yd^3).

4 Reade Advanced Materials, Providence RI 401.433.7000 www.reade.com/Particle_Briefings/spec_gra2.html

What WasteCap Nebraska uses:

Material	Volume	Weight (pounds)	Weight (tons)	Cubic Yards Per Ton
Trash	1 cubic yard	350	.175	5.71
Cans & Bottles	1 cubic yard	50	.025	40
Cardboard	1 cubic yard	100	.05	20
Asphalt	1 cubic yard	4,140	2.07	0.48
Rubble	1 cubic yard	1,400	.7	1.43
Drywall	1 cubic yard	500	.25	4
Scrap Metal	1 cubic yard	1,000	.5	2
Scrap Wood	1 cubic yard	300	.15	6.66

Exercise: Calculating Projected Cost of Recycling Vs. Not Recycling Commercial Construction Debris

Questions that assist with calculations:

How much money did you budget for waste for this project?

Do you have an ongoing relationship with a hauler who gives you consistent prices?

If yes, what are those prices for hauling and tip? (Trash price only is OK. Costs for additional materials are helpful.)

1. What are your projected quantities, by weight and volume?

Material	Estimated tons	Estimated cubic yards
Trash	61	535.58
Cans & Bottles	0.05	1.71
Cardboard	19.52	929.54
Concrete/masonry	34.16	68.32
Drywall	31.72	129.42
Metal	19.52	161.43
Wood	68.32	427.00
Reuse	9.76	85.69
Other		
Total	244	2,338.69

2. If recycling, how many dumpsters will you need? (divide volume of each material by dumpster size)

Material	# of dumpsters	Dumpster Size
Trash	18	30 yard dumpsters
Cans & Bottles	2	1 yard dumpster (95 gal cart)
Cardboard	31	30 yard dumpsters
Concrete	6	12 yard dumpsters
Drywall	4	30 yard dumpsters
Metal	13	12 yard dumpsters
Wood	14	30 yard dumpsters

3. If not recycling, how many dumpsters will you need? (divide total volume by dumpster size)

Trash	78	30 yard dumpsters

4. What are the hauling costs?

Material	Haul Rate	Tip Fee	Dumpster Size
Trash	$300.00	$0.00	30 yard dumpsters
Cans & Bottles	$0.00	$0.00	1 yard dumpster (95 gal cart)
Cardboard	$150.00	$0.00	30 yard dumpsters
Concrete	$150.00	$0.00	12 yard dumpsters
Drywall	$185.00	$0.00	30 yard dumpsters
Metal	$0.00	$0.00	12 yard dumpsters
Wood	$150.00	$0.00	30 yard dumpsters

5. Cost if everything disposed as trash*

A. # of dumpsters (from 3)	B. Trash Haul Rate (from 4)	C. Total Project Tons Projected	D. Per ton tip fee	E. Cost of Disposing as Trash (A x B + C x D)
78	$300.00	na	$0.00	**$23,386.91**

* This calculation may not be inclusive of all fees. Fuel surcharge, container rental, other fees may apply and need to be added.

6. Cost if recycling occurs

Material	A. Number of dumpsters (from 2)	B. Haul Rate (from 4)	C. Tons Projected	D. Per ton tip fee	E. Cost (A x B + C x D)
Trash	18	$300.00	na	0	$5,355.80
Cans & Bottles	2	$0.00	na	0	$0.00
Cardboard	31	$150.00	na	0	$4,647.71
Concrete	6	$150.00	na	0	$854.00
Drywall	4	$185.00	na	0	$798.08
Metal	13	$0.00	na	0	$0.00
Wood	14	$150.00	na	0	$2,135.00
				Total	**$13,790.59**

7. Compare hauling cost of disposing everything as trash to hauling cost if recycling occurs

Trash Only (from 5)	With Recycling (from 6)	**Projected Savings (Cost)**
$23,386.91	$13,790.59	**$9,596.32**

US EPA Definitions

Source Reduction and Reuse
Source reduction, also known as waste prevention, means reducing waste at the source, and is the most environmentally preferred strategy. It can take many different forms, including reusing or donating items, buying in bulk, reducing packaging, redesigning products, and reducing toxicity. Source reduction also is important in manufacturing. Light-weighting of packaging, reuse, and remanufacturing are all becoming more popular business trends. Purchasing products that incorporate these features supports source reduction.
Source reduction can:

- Save natural resources,
- Conserve energy,
- Reduce pollution,
- Reduce the toxicity of our waste, and
- Save money for consumers and businesses alike.

Recycling and Composting
Recycling is a series of activities that includes collecting used, reused, or unused items that would otherwise be considered waste; sorting and processing the recyclable products into raw materials; and remanufacturing the recycled raw materials into new products. Consumers provide the last link in recycling by purchasing products made from recycled content. Recycling also can include composting of food scraps, yard trimmings, and other organic materials.
Benefits of recycling include:

- Preventing the emission of many greenhouse gases and water pollutants;
- Saving energy;
- Suppling valuable raw materials to industry;
- Creating jobs;
- Stimulating the development of greener technologies;
- Conserving resources for our children's future; and
- Reducing the need for new landfills and combustors.

Energy Recovery
Energy recovery from waste is the conversion of non-recyclable waste materials into useable heat, electricity, or fuel through a variety of processes, including combustion, gasification, pyrolization, anaerobic digestion, and landfill gas (LFG) recovery. This process is often called waste-to-energy (WTE). Converting non-recyclable waste materials into electricity and heat generates a renewable energy source and reduces carbon emissions by offsetting the need for energy from fossil sources and reduces methane generation from landfills. After energy is recovered, approximately ten percent of the volume remains as ash, which is generally sent to a landfill.

Treatment and Disposal
Prior to disposal, treatment can help reduce the volume and toxicity of waste. Treatments can be physical (e.g., shredding), chemical (e.g., incineration), and biological (e.g., anaerobic digester). Landfills are the most common form of waste disposal and are an important component of an

integrated waste management system. Modern landfills are well-engineered facilities located, designed, operated, and monitored to ensure compliance with state and federal regulations. Landfills that accept municipal solid waste are primarily regulated by state, tribal, and local governments. EPA, however, established national standards that these landfills must meet in order to stay open. The federal landfill regulations eliminated the open dumps (disposal facilities that do not meet federal and state criteria) of the past. Today's landfills must meet stringent design, operation, and closure requirements. Methane gas, a byproduct of decomposing waste, can be collected and used as fuel to generate electricity. After a landfill is capped, the land may be used for recreation sites such as parks, golf courses, and ski slopes.