SOLID WASTE MANAGEMENT PLAN
Peoria County
September 3, 2013

CONSTRUCTION AND DEMOLITION (C&D) BACKGROUND

Report

Resource Recycling Systems
Sustainable Systems for a Waste-Free Future
CONSTRUCTION AND DEMOLITION (C&D)

OVERVIEW

Construction and demolition (C&D) waste accounts for an enormous amount of the waste stream in the United States. While most of this waste accrues to landfills, estimates are that 90 percent of the waste stream is potentially reusable or recyclable. There are two main approaches and a third emerging practice for systematically addressing the C&D debris cycle.

1. Central Processing Facility: Transporting of mixed C&D waste to a central processing facility where high graded material is sorted from the debris. The mixing of the reusable materials with other debris such as nails, paint, oil or plastic can limit their potential to be recycled due to contamination.

2. Job Site Material Recovery: Separation of selected materials at the job site followed by transporting the materials directly to the markets for those materials. This approach can result in a larger amount of material recovered but is a less common practice due to factors such as lack of experience with this method, lack of on site space and the timeline set for building completion.

3. On-site Material Processing: This emerging method consists of processing selected materials for end of life use at the job site. It takes tactics from the two main approaches and deploys the technology to the site through on-site grinding using a portable residential scale grinder. This technique is inspired by the biological notion that waste equals food. The concept of waste equals food is exhibited by nature every day and human emulation of such concept can enhance nature's abilities.

C&D WASTE MITIGATION AND SALVAGE

Cities and agencies throughout the United States have successfully employed numerous waste mitigation strategies for C&D waste. Contractor strategies, building code specifications, and a practice called “optimum value engineering” can all help to minimize the C&D waste stream. Methods such as deconstruction rather than demolition, “efficient framing” and city adoptions of reduction goals have also shown to greatly reduce the C&D waste stream. Most important perhaps is the policy prospective of the political jurisdiction that operates the landfills.

REUSE AND RECYCLING OPTIONS FOR C&D DEBRIS

There are many options and applications of the recyclable material generated by building sites. These include use as an industrial fuel source, mulch in composting operations, animal bedding, soil amendment and reuse as building materials. Material such as gypsum board (which many landfills are prohibiting from entering) can be grinded up and used in many different ways such as in the making of Portland cement or as recycled content for new drywall. There are also many resale stores that accept building materials and salvaged parts for resale to the public.

C&D DEBRIS REGULATIONS

C&D waste is mainly regulated on a state-by-state basis with requirements and facilities varying widely. Because of growing awareness that C&D debris can contain hazardous materials, some states are in the process of revising their C&D debris regulations to minimize or eliminate the amount entering their landfills. Policies are also being implemented throughout the nation to encourage C&D recycling.
growing threat to C&D debris recycling is the increase in franchise agreements between demolition contractors and municipalities around the country. These agreements result in a decreased flow of C&D waste and other debris to waste recyclers. There are many best practices steps that local and state governments can take to encourage C&D debris recycling including (but not limited to) implementing policy, providing tax incentives, rebates, sales tax exemptions and low interest loans to recycling businesses.

In the State of Illinois, construction and demolition (C&D) debris is nonhazardous, uncontaminated material resulting from construction, remodeling, repair, or demolition of utilities, structures, and roads. These materials include the following:

- Bricks, concrete, and other masonry materials
- Soil (mixed with other C&D debris)
- Rock
- Wood, including nonhazardous painted, treated, and coated wood and wood products
- Wall coverings
- Plaster
- Drywall
- Plumbing fixtures
- Non-asbestos insulation
- Roofing shingles and other roof coverings
- Reclaimed asphalt pavement
- Glass
- Plastics that do not conceal waste
- Electrical wiring and components that do not contain hazardous substances
- Piping
- Metal materials incidental to any of the materials above
- What is clean C&D debris (CCDD)?
- Clean C&D debris includes the following uncontaminated materials:
  - Broken concrete without protruding metal bars
  - Bricks
  - Rock
  - Stone
  - Reclaimed asphalt pavement;
  - Uncontaminated soil (mixed with other clean C&D debris) generated from construction or demolition activities
BACKGROUND

A study conducted for the U.S. Environmental Protection Agency found that 136 million tons of debris was generated in 1996 by construction and demolition (C&D) waste. This remains the most exhaustive national study available. C&D waste in this study was defined as debris from the following structures: both residential and non-residential buildings, roads, and bridges (Franklin Associates, 1998:ES-2). The residential component of those 136 million tons of debris was 43% of the waste or (58 million tons per year). The fact that the non-residential waste stream is larger than the residential should not come as a surprise due to the scale of America’s buildings.

The surprise may come in the distribution of waste across the categories of activity. Demolitions account for 48% of the waste stream and renovation activity accounts for 44%. This leaves a paltry 8% of the waste stream attributable to new construction. In the residential only realm the renovation activity accounts for 55% of the total residential waste stream, demolition 34%, and new construction 11% (Franklin Associates, 1998:ES-3).

Estimates are that up to 90% of C&D waste is potentially reusable or recyclable, depending on project type and the local market for waste materials (Triangle, 1995:1). The National Association of Home Builders (NAHB), in a study done for the EPA in 1997, characterizes the waste stream generated by the new construction of a 2,000 square foot home as being constituted of four tons, or 8,000 pounds of debris (NAHB Research Center, 1997).

WASTE EQUALS FOOD

There are two main approaches for systematically operating the C&D debris cycle, and an emergent third alternative. The first approach is to transport mixed C&D debris to a central processing facility or materials recovery facility where the debris is sorted. The high value material is high graded out and re-enters the materials supply stream or the material enters a scrap or recycling stream. The low value materials are processed further following their rejection from the material supply stream or the scrap and/or recycling stream and transported for interment into a landfill. The second approach is to separate select materials at the job site and then transport the different materials directly to the markets for those materials (FDEP, 2001). The third alternative is the practice of processing selected materials for end of life use at the job site.

The notion of waste equals food is a biological concept. The basic science of ecology knows that waste equals food, and when it does not the natural flow materials becomes imbalanced and ecosystems become compromised. To the extent that systems designed by man mimic this natural law the degree of success enjoyed by the system is much enhanced. Thus, this tactic is relatively new on the national scene and very rare in the Midwest or Illinois. This systems approach can result in a high degree of waste being turned into food on site and elimination of up to 83% of the typical homes waste stream by weight’s contribution to the landfill.

CENTRAL PROCESSING FACILITY

The centralized facility approach is the most common facility arrangement. Typically, mixed C&D debris is tipped at a central facility, and the materials with a high market value, such as large pieces of sawn lumber, are removed. The remaining mixed C&D materials are then processed using one of two primary methods. The mechanized size reduction method uses a crusher, a dozer, or a compactor. The materials are then passed through a series of screens, magnets, and other separation equipment. The
manual labor method relies on human sorters to pick out materials and place them in specific containers. Screens and magnets may also be employed with the human labor method, but the materials are left in their original form rather than crushed so that they can be easily distinguished and sorted. The most common approach is a blend of the mechanized size reduction and the human sorter methods.

A primary success for a C&D recycling operation hinges on the degree of contamination of the C&D materials by other types of waste such as nails, paint, foil, oil or plastic. Some processing facilities that aggressively handle a mixed waste stream may cause contamination of the C&D materials, thereby limiting their potential to be recycled. Table 1 summarizes the methods employed by central processing facilities and also includes the estimated volume of material that is rejected from the recycling stream for each method.

<table>
<thead>
<tr>
<th>Approach</th>
<th>Description</th>
<th>Reject volume</th>
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<tbody>
<tr>
<td>Manual separation only</td>
<td>Waste is tipped. Large identifiable materials with ready markets are removed by hand. The remaining material is land filled.</td>
<td>High (&gt;50%)</td>
</tr>
<tr>
<td>Combination Manual and Mechanical separation (most common approach)</td>
<td>Waste is tipped and screened. Manual labor is used to remove the components on a conveyor belt.</td>
<td>Medium (25-50%)</td>
</tr>
<tr>
<td>Heavy mechanical processing and separation</td>
<td>Waste is tipped and processed (often crushed) and sent through a complex train of mechanical equipment for separating the materials.</td>
<td>Low (&lt;25%)</td>
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**JOB SITE MATERIAL RECOVERY**

The practice of sorting and processing materials at the job site can result in a higher degree of material recovery but is less commonly used in residential C&D practice. To sort C&D materials onsite, contractors need to either arrange for C&D debris haulers to visit the site during the different stages of C&D activity and waste generation or set out different containers for the different waste materials. Some of the factors that have limited this approach are a lack of experience with job site material recovery, a lack of space for different containers on the job site, and the need for rapid completion of many C&D projects. Various types of equipment are available for C&D processing and recycling, either at a central processing facility or at the job site. Table 2 describes some common types of C&D recycling equipment.
### Table 2. Common types of C&D recycling equipment. Source: FDEP, 2001:39

<table>
<thead>
<tr>
<th>Equipment</th>
<th>Materials processed</th>
<th>Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compactors</td>
<td>Drums, pallets, cranes, bulky waste</td>
<td>Compacts waste with over 65,000 lbs. of force &amp; displaces over 175 cubic yards per hour</td>
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<tr>
<td>Pulverizers</td>
<td>Gypsum, industrial trash, soft metals</td>
<td>Punctured pieces of materials are dropped between rotating high teeth then screened</td>
</tr>
<tr>
<td>Loading cranes</td>
<td>Steel, C&amp;D debris, land-clearing debris</td>
<td>Used for the removal of debris in logging operations and construction sites</td>
</tr>
<tr>
<td>Separation systems</td>
<td>All C&amp;D debris</td>
<td>Material is fed onto a vibrating screen in which the trommel sorts and discharges waste</td>
</tr>
<tr>
<td>Balers-horizontal</td>
<td>Cardboard, metal, paper, plastic</td>
<td>Like separation systems, but designed with side-fed units</td>
</tr>
<tr>
<td>Granulators</td>
<td>Plastics, rubber, foam, crates, bins</td>
<td>Materials are broken up into pieces by rotors then reduced into pellets by rollers’ teeth</td>
</tr>
<tr>
<td>Tub grinders</td>
<td>C&amp;D debris, land-clearing debris</td>
<td>Grinds materials from 120-320 cubic yards per hour from a top feeder with dual auger discharge</td>
</tr>
<tr>
<td>Trommels</td>
<td>Yard waste, wood chips, sludge</td>
<td>From a conveyor belt the fed material is screened and dispersed evenly, then outfed and stacked</td>
</tr>
<tr>
<td>Hauling trucks</td>
<td>Solid waste, scrap, bulky materials</td>
<td>Hauls solid waste materials up to 44,000 lbs.</td>
</tr>
<tr>
<td>Trailers (transfer, roll-off, and walking floor)</td>
<td>Solid waste, scrap, sludge</td>
<td>Hauls solid waste materials up to 80,000 lbs.</td>
</tr>
</tbody>
</table>

### ON-SITE MATERIAL PROCESSING

The third approach on-site processing of materials presupposes to take tactics from the two main approaches and deploy the technology to the site and to do what makes sense in terms of processing. In the *On-site Grinding of Residential Construction Debris: the Indiana Grinder Pilot* conducted by the NAHB Research Center in 1999, concluded that 90% of the waste stream is potentially recyclable or reusable on-site.

On-site processing has been evaluated in numerous states and has found to be highly successful in all of the studies conducted regardless of geographic location. The likelihood that this will become the dominant method of processing east of the Mississippi River is very high. The primary element leading to the successful deployment of residential scale on-site materials processing is a portable residential scale grinder capable of handling wood, shingles, drywall, nails, concrete, cardboard, and brick.

### C&D WASTE MITIGATION AND SALVAGE

Numerous waste mitigation strategies exist for C&D waste. Contractor strategies, building code specifications, and a technique called “optimum value engineering” can all help to minimize the C&D waste stream. However, the most important factor is the policy prospective of the political jurisdiction that operates the landfill. The following list offers examples of strategies that different cities and agencies have employed to mitigate C&D waste, (some of the strategies may have been employed in the commercial industrial marketplace but the concept could be transferred to the residential setting).
• For the construction of the EPA’s Research Triangle Park office in North Carolina, the agency incorporated waste separation and recovery into general contractor specifications. Overall, the project had an 80% recovery rate for C&D debris. “As far as recycling is concerned, [contractors] are generally not used to it, but they are capable of doing it,” said Chris Long, EPA Project Manager (EPA, 2003:5).

• Santa Monica, California’s Green Building program includes requirements for C&D waste management, including the following: (1) a requirement to recycle C&D waste is included in construction contracts; (2) the reuse of salvaged building and landscape materials is required; and (3) interior building components are designed for future disassembly, reuse, and recycling (EPA, 2003:6).

• Portland, Oregon’s building codes mandate that all construction projects over $25,000 must recycle materials generated at the job site (EPA, 2003:6).

• In Portland, Oregon and Chicago, Illinois, haulers that charge by the square foot, do not require roll-off containers and recycle more than 50% of the jobsite waste are the normal service that builders can buy. The haulers time their pick-ups to coincide with the different phases of construction, so that the different materials are picked up separately. Such clean-up services have been effective in areas that have high disposal costs and established existing recycling markets for common construction waste materials.

• “Optimum value engineering,” also called “efficient framing,” is an engineering technique from the homebuilding industry that reduces the amount of wood used in the framing process without compromising structural integrity (EPA, 2003).

• King County, Washington, (Seattle), operates the C&D recycling program and has two goals: “First, to assure that job-site material is recycled to the greatest extent possible. And second, to accelerate the adoption of green building practices, technologies, policies and standards in residential and commercial development.” The program is active in the educational and outreach arena and operates cutting edge web based tools to assist contractors in gaining knowledge and information. Of particular note are: case studies section generated by the contractors themselves, a directory of recycling businesses, and a step by step guide on how to recycle construction and demolition waste.

• The City of Los Angeles has formally adopted a 70% diversion goal for the year 2020. To achieve that goal they are actively engaged in the community and in the education and outreach business. One particular innovation which they feel will facilitate reaching their goal is the requirement that all new developments or building expansions must include sufficient space in the building or on the project site to collect and store recyclable materials. This ordinance applies to commercial, mullet-family, and residential construction. (City of Los Angeles Solid Resources Citywide Recycling

• The City of San Diego has formally adopted an immediate 50% reduction goal and has implemented selected demolition permit fee, waste disposal fee Waivers as a method to induce businesses to utilize “acceptable recycling facilities for recycling concrete and bricks (City of San Diego Manager’s Report).

The US EPA recommends that, when contractor bids are initially solicited, that the contractors submitting a bid also be required to submit a plan for reducing, reusing, or recycling the wastes
generated onsite. Contractors may be offered the incentive of allowing them to keep the revenues from recycling and savings from avoided landfill costs due to waste reduction. Although it can be difficult to find recycling or reuse markets for some materials, one resource that contractors can consult is the Construction Materials Recycling Association (CMRA), which is an association of C&D debris generators, haulers, processors, recyclers, and re-manufacturers. The contractor plan should include a discussion of the following items (EPA, 2003):

- Carefully estimate the number of materials that will be needed;
- Identify markets for recyclable materials; and
- Establish recycling systems onsite and make sure that both contractors and subcontractors receive instructions on sorting their own waste.

Deconstruction, rather than demolition, can also maximize the salvage of materials for reuse or recycling by disassembling buildings and removing materials in stages. Items such as flooring, siding, windows, doors, bricks, plumbing fixtures, ceiling tiles, and structural components can be salvaged. Apart from increased C&D material salvage, deconstruction often brings benefits such as job creation. Deconstruction requires more time and manual labor than does demolition, and in some areas deconstruction is used to train at-risk youth and welfare-to-work program participants (EPA, 2003).

**REUSE AND RECYCLING OPTIONS FOR C&D DEBRIS**

**WOOD**

Wood waste by almost all account constitutes 40-50% of the volume of the residential new construction waste stream. The most common reuse option for C&D wood is as fuel in industrial boilers or cogeneration plants. Most wood used for fuel is chipped prior to transport, although wood that has been treated with such preservatives as copper chromated arsenate (CCA), creosote, or chlorophenol should be removed before the wood is chipped. In the case of CCA-treated wood, if it is recycled as fuel, the ash is likely to contain large amounts of heavy metals. Those metals probably are arsenic and chromium. Most likely the metals are present in high enough concentration to render the ash as “hazardous” and require its disposal under the hazardous waste guidelines under the Resource Conservation and Recovery Act (RCRA). Therefore, efforts should focus on the reuse of chemically treated wood. Another alternative is to use the wood as a material in cement. In general, disposal-end practices should include improved sorting of preservative-treated wood at C&D recycling facilities and the institution of proper disposal practices.

Wood can also be reduced in volume and down-cycled to make wood products of a lower economic value such as plywood, oriented strand board, and wood I-beams. Conversely, the adhesive content of these engineered wood products materials can limit the eligibility for future recycling. The economics of using wood chip waste for engineered wood products depends upon local wood waste markets.

Building materials such as lumber can frequently be reused in their original form. Clean C&D wood can also be laminated with plastic to make a decking material, although this makes the wood almost impossible to recycle later. Wood chips can also be used in compost and animal bedding. Natural woody debris can be ground up and used as horticultural mulch.

The diversity of the wood marketplace is such that a reasonably mature underground economy exists wherein the amount of wood waste that ends up in the landfill is considerably lower than it might be otherwise expected. In part, this economy is fueled by municipalities who have created a marketplace by going into the mulch business as an attempt to mitigate the loss in landfill capacity by creating a
product from the waste. This “waste equals food” business decision allows many of the contractors to contract with builders for one economic rate per cubic yard based upon tipping fees and to then dispose of the material at a mulching operation at a significantly reduced rate and generating a profit margin in between. For some of the larger operators in the H-GAC area this is how they feed their families. In summary, wood waste can be used in the following applications:

- An industrial fuel source;
- Mulch;
- Composting operations;
- Animal bedding;
- Landfill cover; and
- Some building products.

**CARDBOARD**

Cardboard typically represents 11-30% of the C&D waste stream by volume. Corrugated cardboard is the most common building packaging material and is therefore a key component of the C&D waste stream due to the fact that many building materials are shipped to the site in a pre-fabricated, finished state. Cardboard is one of the most readily recycled materials in the C&D waste stream as long as it is not wet. The cardboard recycling market is well developed, and it can be to the benefit of builders to recycle the cardboard because it otherwise takes up considerable space in waste containers. Cardboard is typically processed and recycled into new cardboard containers (FDEP, 2001:27).

**GYPSUM DRYWALL**

Gypsum drywall comprises by volume between 8% and 15% of jobsite waste (FDEP, 2001:1). US manufacturers produced 31.5 billion square feet of gypsum drywall in 2008. Many landfills are prohibiting gypsum drywall from entering their landfill. Clean gypsum board\(^1\) can be ground up and used in the following applications:

- Applied as a soil amendment;
- Used as a raw ingredient in the manufacture of Portland cement;
- Used for animal bedding;
- Used as a bulking agent in composting; and
- Recycled into new drywall.

Wood, cardboard, and gypsum can also be ground on-site and applied to the site before it is seeded or sodded. This practice can keep as much as 65% of jobsite waste from going to the landfill. Most states or localities require evidence that this approach does not harm soil or water quality, so the state and solid waste authorities must be contacted before using this method of disposal.

**ASPHALT SHINGLES**

Asphalt shingles are nearly 60% of the shingle market in the United States. Shingles comprise approximately 6% of the C&D waste stream by volume. Asphalt shingles can be recycled into new shingles, crushed and used as an aggregate in the manufacture of hot mix asphalt, or as a primary material for rural roads (FDEP, 2001). Asphalt shingles also can be successfully ground on-site and utilized as base material for concrete flatwork such as driveways and sidewalks.

\(^1\) Clean gypsum board is free of wood, metal, and plastic, is not asphalt impregnated, and is not coated with glass fiber, vinyl, decorative paper, or any other finish (Design Coalition, 2004).
BRICKS
Bricks represent a material that is widely deployed and which is highly desirable in the diverted waste stream. The marketplace for bricks is strong because it is composed of two elements. The first is the aggregate business that utilizes bricks as a source of crushed material to create fill and/or base of high quality. The second market is the resale of bricks as an architectural element.

CONCRETE
Concrete is one of the most recycled materials in the United States and the world. The primary market for recycled concrete is as a base product for buildings and roads. Crushed concrete and brick can also be used as the primary surface material on rural roads and driveways, in drainage applications, and as borrow pit fill. Local markets for recycled concrete depend on the presence of local construction and road building markets. Markets for recycled concrete also depend on the local availability of such substitutes as lime rock.

METAL
Metal is present in small amounts in residential C&D projects. What metal there is comes in the form of wiring, siding, fasteners, and roof flashing. Rarely is high value metal landfilled. There is an effective market based system wherein copper and aluminum are routinely recycled by the tradesperson(s) performing the work or other tradespersons on the jobsite. This is entirely consistent with the underground marketplace for untreated wood products mentioned earlier. When low value metal is present in sufficient amounts, it can be readily recycled in the scrap metal market.

SCREENED MATERIALS
Other recovered materials typically consist of material left over from screening mixed C&D at a processing facility. The screened material typically consists of mostly dirt but can also contain small fragments of wood, rock, paper, drywall, and plastic. One use for this material is for construction fill (instead of soil) for roads, buildings and landfill construction projects. Another use for screened material is as daily cover for landfills. When large amounts of gypsum are present, however, the hydrogen sulfide content of the landfill gas can increase, creating an odor nuisance for neighborhoods located close to the landfill.

C&D DEBRIS REGULATIONS

FEDERAL REGULATIONS
The Resource Conservation and Recovery Act (RCRA) is the primary federal law governing solid waste. Most C&D waste is considered to be solid waste and is regulated under RCRA. The EPA does not generally single out C&D waste for any special regulatory treatment. An exception does exist when C&D waste contains hazardous materials such as lead-based paint, asbestos, or elements such as lead, mercury, cadmium, PCBs' and arsenic. In hazardous waste cases, RCRA regulations specify particular disposal methods (Clark et. al., 2004).

STATE OF ILLINOIS: REGULATIONS FOR CLEAN CONSTRUCTION OR DEMOLITION DEBRIS (CCDD) (LAST UPDATED AUGUST 30, 2012)
Clean construction or demolition debris (CCDD) is uncontaminated broken concrete without protruding metal bars, bricks, rock, stone, or reclaimed asphalt pavement generated from construction or
demolition activities. When uncontaminated soil is mixed with any of these materials, the uncontaminated soil is also considered CCDD. Uncontaminated soil that is not mixed with other CCDD materials is not CCDD. What constitutes “uncontaminated soil” for purposes of CCDD and uncontaminated soil fill operations is defined in 35 Ill. Adm. Code 1100, which was last amended by the Illinois Pollution Control Board in its Final Opinion and Order dated August 23, 2012. These changes, which begin on page 6 of the Final Opinion and Order, became effective August 27, 2012.

**CCDD Fill Operations and Uncontaminated Soil Fill Operations**

When CCDD is used as fill below grade it is not considered to be a waste as long as: 1) the filled area is not within the setback zone of a drinking water well and 2) within 30 days after filling is complete, the CCDD is covered with uncontaminated soil, pavement, or some type of structure. A current or former quarry, mine, or other excavation where CCDD or uncontaminated soil is used as fill is a "CCDD fill operation". A current or former quarry, mine, or other excavation where uncontaminated soil, but not CCDD, is used as fill is an "uncontaminated soil fill operation". Both of these types of fill operations are regulated under 35 Ill. Adm. Code 1100.

**CCDD Fill Operation Fees**

Owners and operators of CCDD fill operations must pay fees based on the volume of CCDD and uncontaminated soil accepted for use as fill. The CCDD fee rules are located in 35 Ill. Adm. Code 1150. These rules set forth the procedures for the collection of fees, and include recordkeeping requirements, the submittal of quarterly reports to the Illinois EPA, and the time and manner of fee payment.

**CHICAGO CONSTRUCTION & DEMOLITION RECYCLING**

In 2005, the Chicago City Council passed amendments to the Construction or Demolition Site Waste Recycling Ordinance to increase the amount of C&D debris that is recycled in Chicago. The Department of Environment promotes the responsible separation and recycling of construction and demolition (C&D) debris to help contractors and individuals save on costly disposal fees while protecting the environment. Starting with building and wrecking permits applied for March 1, 2006, contractors must keep track of how much waste is generated at project sites and strive to meet the recycling goals set forth in the new ordinance. In 2006, the goal was 25%. Beginning with permits applied for January 1, 2007, contractors must recycle 50% of the C&D debris generated at a job site.

Recycling compliance forms are handed out at the Department of Construction and Permits (DCAP) at the time of permit issuance and may also be viewed and printed by clicking on the link below. Contractors must fill out the form and return it at DCAP at the end of each project, together with an affidavit (also available below) from the waste hauler or recycler, if applicable.

**C&D Debris Defined**

C&D debris is non-hazardous, non-contaminated solid waste resulting from construction, remodeling, repair or demolition operations on pavement, buildings and other structures.

C&D debris includes waste from new construction, renovation, and demolition projects, and may include:

* Bricks, concrete, and other masonry materials
* Rock
* Wood, including non-hazardous painted, treated, and coated wood
* Scrap metal
* Plaster
* Gypsum drywall
* Plumbing fixtures and piping
* Non-asbestos insulation
* Roofing shingles and other roof coverings
* Reclaimed asphalt pavement
* Glass
* Plastics
* Landscape waste

Recyclable construction and demolition debris may be sorted as follows:

a) Sorted on site and separated by C&D debris type into designated containers, in compliance with the Construction Site Cleanliness Ordinance found at Section 13-32-125 of the Code, and all other applicable laws, rules and regulations; or

b) Placed for collection in a designated container for mixed recyclables on site and sorted off site at a properly permitted recycling facility.

Legislation Across the United States

Most C&D waste is regulated at the state level, and the requirements for C&D debris disposal facilities vary widely from state to state. Researchers from the University of Florida and the University of Michigan conducted a survey of the fifty states and confirmed, not unsurprisingly, that C&D waste regulations vary from state to state. Interestingly enough, about half (23) of the states have specific C&D regulations while in the remaining states (27), C&D debris is regulated under the requirements for municipal solid waste (MSW) landfills, non-MSW landfills, general inert debris landfills, or general solid waste facilities (Clark, et. al., 2004:8). Of the 50 states, 27 permit the disposal of general C&D waste into unlined landfills; the remaining 23 states have varying requirements for liner systems.

Because of growing awareness that C&D debris can contain hazardous materials such as lead-based paint, asbestos, or wood coated with CCA (copper chromated arsenate), some states are in the process of revising their C&D debris regulations. These states include California, Colorado, Kansas, Massachusetts, North Carolina, Ohio, South Carolina, and Washington. In the State of Massachusetts, concrete, asphalt, brick, wood, and cardboard were banned from landfills at the end of 2003 although implementation has been delayed (Clark, et. al., 2004:13). California is developing regulations for recycling facilities that would require mixed C&D debris recycling facilities that accept more than 175 tons per day (recycling at least 60% of that) in order to obtain a solid waste permit (Clark, et. al., 2004:14). Increased regulation can cause C&D tipping fees to rise, which can result in increased C&D recycling (Clark, et. al., 2004:13-14).

There are a number of examples of policies that states and cities have instituted to encourage C&D recycling. In San Jose, California, demolition contractors must pay a deposit based on the square footage of their project in order to receive a city building permit. The deposit is refunded if the contractor can demonstrate that the C&D waste was taken to a city-certified recovery facility (FDEP, 2000).
In Portland, Oregon the city requires job-site recycling of rubble (concrete/asphalt), land-clearing debris, corrugated cardboard, metals and wood on all construction and demolition projects with a permit value exceeding $50,000. This is accomplished by requiring a complete site plan prior to permit issuance. Another example is in Florida, where state solid waste legislation established recycling goals for counties, and a certain amount of C&D waste was allowed to count toward those goals. A cap was placed on the amount of C&D waste that could be counted toward that recycling goal, so that counties would have to recycle other types of waste as well (FDEP, 2000).

In October 2002, Orange County, North Carolina, enacted an ordinance regulating recyclable materials, including C&D waste. The ordinance requires the recycling of specific materials and was coupled with plans for an additional C&D landfill. In addition, people requesting building permits are now also required to apply for a “Recyclable Material Permit” that requires the permit holder to state what types of waste they anticipate generating and how they will manage that C&D waste. This ordinance, while making specific demands on the business community, won broad-based support because of the new C&D landfill commitment. It should be noted that the ordinance has resulted in decreased tipping fee revenues. The reduced revenue has been partially offset by sales of recyclable material, for the Solid Waste Management Department, which operates the Orange County landfill and the county’s recycling programs. The important impact on the C&D waste stream was the significant reduction in waste and the increase in the recycling of material, as Table 3 shows (Ghirardelli, 2004).

### Table 3: Construction Waste Disposed and Recycled in Orange County, NC 2001-02 vs. 2002-03.

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<th></th>
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</thead>
<tbody>
<tr>
<td>Disposed (at solid waste facility)</td>
<td>27,729 tons</td>
<td>19,085 tons</td>
</tr>
<tr>
<td>Disposed (elsewhere)</td>
<td>7,352 tons</td>
<td>7,035 tons</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>35,081 tons</strong></td>
<td><strong>26,120 tons</strong> (26% reduction)</td>
</tr>
<tr>
<td>Recycled (at solid waste facility)</td>
<td>1,099 tons</td>
<td>3,311 tons</td>
</tr>
<tr>
<td>Recycled (elsewhere)</td>
<td>0 tons</td>
<td>6,653 tons</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>1,099 tons</strong></td>
<td><strong>9,964 tons</strong> (9-fold increase)</td>
</tr>
</tbody>
</table>

A growing threat to C&D waste recycling is the increase in franchise agreements between demolition contractors and municipalities around the country. These contracts require all solid waste (even that which can be recycled) within a jurisdiction to be sent to one place designated by the local government or hauler, thereby limiting the flow of C&D waste and other debris to waste recyclers. Because even highly recyclable C&D waste such as concrete is designated as solid waste, these franchise demolition contractors are allowed to dump these materials in local landfills.

**BEST PRACTICES**

The Florida Department of Environmental Protection (FDEP) offers a list of C&D regulatory best practices, an excerpt of which is included below. The list provides a summary of the different actions that entities at every governmental level can take to encourage C&D recycling (FDEP, 2001:3-4). Local government can do the following:

- Fund public education and outreach programs designed to educate the public and to create small business opportunities for the municipality;
- Implement a mandatory recycling policy of selected materials prior to permit issuance when the dollar value exceeds a specific threshold i.e. $50,000;
- Implement curbside collection for selected C&D materials;
• Decriminalize the salvaging of building materials from demolition sites;
• Implement Green Building programs;
• Provide tax incentives to businesses that recycle;
• Maintain an open market for C&D debris collection;
• Issue permits to roll-off box haulers but not to franchises;
• Require non-exclusive commercial franchises, and
• Rebate a portion of the franchise fee if recycling occurs.

The public is generally unaware of the extent of the volume of C&D waste. Wood is by far the largest component of waste material generated at residential C&D sites. C&D waste reduction is viewed as an “economics only” issue by the developers and the builders. There are literally thousands of instances of “guys with $900 dump trucks” who are more than willing to haul C&D waste for very little compensation absolving the builder of any responsibility. At commercial/institutional demolition sites, concrete is generally the top waste material generated.

BARRIERS

Abundance of Inexpensive Land
One reason as to why C&D waste is handled in the traditional landfilling method in the state of Illinois is the relative abundance of cheap land. When compared to a state such as Vermont or Massachusetts, Illinois has plenty of open land in which to dispose of its solid waste. The cost then of land filling waste is relatively inexpensive, providing little incentive for builders to seek alternative waste management methods.

Tradition
As mentioned above, the traditional way of handling C&D waste is to haul it off to a landfill. As the old adage goes, “if it’s not broke, don’t fix it”. Cost of landfilling waste in the past years has not risen dramatically, giving no reason for builders to change their methods of dealing with C&D waste. As long as their traditional methods of business continue to function in a cost effective manner, there will be no catalyst to change.

Price and Cost Confusion
There is a difference between price and cost of land filling that is not easily seen in a generic cost statement. The inexpensive price of today’s landfilling fees does not take into account the opportunity cost of land, the loss of materials for recyclers or environmental damages. While builders gain in lower costs, recyclers lose out due to lack of material.

Lowered quality of our water sources and the cost it will take to make this water suitable for drinking in the future is an example of this environmental damage. Environmental damage also has a human factor. Included is also the cost of the loss of productivity of workers who become ill because of polluted water sources. Bottom line, our resources are exhaustible and landfills deteriorate the quality of the land that we might not need for resources today, but will need in the not so distant future.

Uneducated Tradespeople and Builders
Due to the differences of recycling versus landfilling, there seems to be a perceived complexity in recycling. In reality, recycling is no more difficult than landfilling; it just requires a process that is unfamiliar. The industry sees this change as perceived hassles and is wary of approaching it. There is an overall understanding of the concept of recycling but difficulties arise when the concept is translated
into action. There is a large amount of misinformation expressed due to perceived lack of public and private education.

**Lack of communication with political representatives**

Our elected officials are not mind readers and so can only represent legislation they are aware is supported and popular amongst their constituent base. All constituents, from trades and builders to the general public, need to be educated on the topic of C&D waste. Only when an educated public communicates with elected officials to press the issue, will legislation be developed to address the C&D waste issue. Health and safety of their constituents is a primary concern of elected officials. When educated constituents press an issue from a health and safety viewpoint, elected officials respond. Just as a company pursues profitable endeavors to please their stockholders, elected officials pursue legislation that will please their constituents.

**Few positive public models**

The reason for few positive public models ties into the lack of communication with political representatives. If there is no pressure from the public to make a change, there will be no reason to spend time and money pursuing such alternatives. The recent razing of more than 100 single-family houses by the City of Houston in which there was no recycling attempted is a negative example. Another is the fact that limited opportunities exist in state and local purchasing procedures for the reuse of C&D recycled materials.

**Fewer Positive Private Models**

Uncharacteristically protective builders and contractors in the H-GAC area have seen no compelling reason to recycle and there is no regulatory or market based demand thus, until the time that either of these events takes place there is little or no likelihood that large-scale change can take place.

**Lexicon of confusion**

The stock of terms used by professionals focused on sustainability does not always lend itself to understanding by those unfamiliar with the field. Even the definition of sustainability differs within the field creating further confusion and frustration. This creates an unintentional barrier for those who would like to pursue such objectives and are approaching the concepts for the first time.
C&D/BULKY WASTE RECYCLING DRAFT RECOMMENDATION

Peoria County

PROGRAM DESCRIPTION

Licensing haulers and franchising processors would facilitate the development of the infrastructure for the collection and processing of construction and demolition waste for recycling. Property Owners and Contractors for projects over $100k (phased down to $50k over time) would then be responsible for using these licensed haulers and franchised processors to meet recycling requirements for construction, demolition and bulky waste.

PROGRAM DETAILS – PROCESSORS AND HAULERS OF C&D AND BULKY WASTE

- Haulers of construction/demolition waste within the Peoria County would need to be licensed through the County and meet established criteria for the hauling of properly separated C&D materials, record keeping, reporting and payment of annual licensing fees to the County.

- Processors of construction/demolition waste would be franchised (non-exclusive) through the Peoria County, meeting established criteria for pricing, separation, recovery and reporting. Licensed haulers will be required to deliver recyclables (either source separated or commingled) to these franchised facilities, with lower tip fees provided based on higher degrees of material separation following franchisee’s proposed pricing for different levels of separation of the recyclables.

PROGRAM DETAILS – PROPERTY OWNERS AND CONTRACTORS

- A simple checklist style “recycling plan” would be required of all contractors/property owners submitting building permits through the local municipalities or the County (construction or demolition), when the value of such project exceeds $100,000 (eventually dropping to $50k). Following a simple to use "checklist" format, these plans would provide details relating to the separation (at minimum) of non-treated wood (e.g. no paint, ACQ or CCA – but nails/fasteners and engineered lumber ok), cardboard, metals and concrete on the job site.

- The contractor or property owner (permittee) would be responsible for insuring that designated materials are properly separated on-site from the waste for recycling as required by the franchised processing facilities. The designated hauler’s license will require that they not transport C & D materials that are not properly prepared for recycling. Violations of this requirement (per job site) by the permittee and/or hauler will lead to additional technical support provided by the City/County (first violation), monetary fine (second violation) and increased monetary fines (third or more violations).

- The County could establish an exception/exemption process for these recycling requirements for specific job sites based on special circumstances using a checklist matrix format breaking projects down by type (e.g. demolition versus new construction), sector (e.g. residential versus commercial) or by volume (e.g. less than 30 cubic yards of total waste). The application for an exemption would be filed along with the property owner/contractor’s original recycling plan. In addition, the County could facilitate the recovery of waste on-site by providing flexibility on the placement of containers in right-of-ways, etc. (aka "lane closures") as part of the recycling plan approval process and staff are instructed to identify and propose ways to incorporate incentives into the process (e.g. deduct on parking space rental for dumpsters, deduct on permit fee, etc.).
PROGRAM DESCRIPTION –COORDINATION AND TECHNICAL ASSISTANCE

• The County would fund technical support for developers, contractors and haulers to provide ongoing education and insure compliance of County standards, to be funded through annual franchise and licensing fees and penalties (and supplemented with Solid Waste operating fund $$ as needed).

• Outreach materials (hard copy, email PDFs and web) would provide information on how to set up the recycling systems, assign a single point of contact recycling champion, arrange for containers, flyers, posters, etc. and establish on-site procedures for workers.

• Continued email support would be provided through automated outreach/support/technical reminders, with linkage to web based support system.

• Web page based information systems would provide user information including reporting on recycling volumes, converting that to environmental "footprint" and "green business" information (e.g. tons of carbon emissions reduced, trees saves, etc.) and potential for linking to coupon type incentive/reward systems to support participation in program and reward high levels of diversion.

• The County’s franchised processors will be responsible for providing weekly reports to the County summarizing activity by licensed haulers and providing information/photographic evidence of non-complying projects. An “appeals” process would be developed by the County for haulers and contractors/owners to appeal fines or penalties.

• Prior to implementation and enforcement of these requirements, the County would provide a number of workshops/training sessions to developers, contractors and haulers to insure full understanding of the new program.

• The appropriate County ordinances will need to be developed in order to activate and enforce the provisions described above.

• The addition, subtraction or classification of C&D materials required for separation will be subject to periodic change based on market conditions, implementation performance and County goals.

• The County should continue to explore ways to maximize the recovery of bulky waste materials from the commercial (and residential) sectors, particularly at the County’s proposed new drop-off station where it can arrange to recover those materials as “County tons” to gain added recycling revenue.

USER EXPERIENCE OF PROGRAM COSTS

• Services would be paid for by each project, just as they are now. The program would strive to achieve lower costs by reducing the amount being landfilled and providing efficient and effective as well as convenient processing/recycling services. Typical 30 yard dumpster cost right now is $350 per pull, with the target of reducing these costs by 10% to 15% by recycling.

• The County would have some costs to administer the program. These would be covered in part by licensing and franchise fees as well as the County millage.
PROPOSED PHASING

• Program design/procurement begins with ordinance development, solicitation of franchisee proposals from interested processors, development of administrative procedures and outreach materials and implementation of hauler licensing system – all targeted at a specified program implementation date.

• Soft startup with workshops, training sessions, technical assistance that accompanies program startup, with ongoing program coordination and monitoring using reporting systems.

• Continued development of program performance based on monitoring and enforcement reporting. Long term refinement evaluated in context of Solid Waste Plan Update.

HOW RECOMMENDATIONS FIT TO OVERALL GOALS

• Improve overall waste handling services – assuring a "clean community": Additional capacity to handle and recycle bulky waste as well as construction and demolition debris would begin to develop, with more options locally for responsible management of this material.

• Expand recycling and landfill diversion: The recommended program would help projects increase recycling rates to reach 50+% diversion.

• Lower overall costs for the community: The goal for franchised processors of these waste streams would be to offer lower priced services compared to landfill disposal and to provide more local options, resulting in further savings in transportation labor and expenses.

• Enhance quality of life and business opportunities for our community: Recycling results in far more jobs than sending the same amount of material as waste to the landfill, with those jobs being created by companies that have responded to these new business opportunities.