



## 8. Construction and Demolition Debris

### 8.1 Purpose

The purpose of this chapter is to discuss the situation in Maui County related to construction and demolition debris (C&D). A private landfill currently receives C&D, but the owner has projected approximately six years of permitted life remaining at the facility.

This chapter looks at the legislative requirements for this specific waste stream, the impact of the closing of the private C&D landfill on the County's controlled waste stream, and the goals and tactics to meet those goals for the County.

### 8.2 Legislation

#### 8.2.1 Federal Government

Construction and demolition debris fall under the Non-Hazardous Waste subject to EPA RCRA Regulations.

#### 8.2.2 State of Hawaii

The State promotes recycling of its own projects on construction sites under [§196-9] so that they incorporate principles of waste minimization and pollution prevention, such as reducing, revising, and recycling as a standard operating practice in programs, including programs for waste management in construction and demolition projects and office paper and packaging recycling programs. The State's regulations, however, do not specifically mandate, at this time, that the Counties do the same level of activity in C&D construction. State solid waste laws (HRS 342H) and regulations (HAR 11-58.1) apply to all waste management facilities including C&D recycling and disposal facilities.

#### 8.2.3 County of Maui

Maui County's permit process and estimated timeline for securing such permits for construction, renovation, and demolition projects falls under one of four permit types.

1. "Residential Build" currently takes a minimum of three months to process and receive approval.
2. "Commercial Alteration" currently has a minimum process time of six months before approval.
3. "Demolition" has a normal process and approval time of six months. If the building is older than 50 years the approval time may be extended.
4. "New Commercial Building" is currently a 12-month process before possible approval.



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The County has a requirement that a recycling plan be submitted to the Recycling Section for demolition projects; however, none of these four permits mandates the homeowner or developer to recycle or reuse any of its waste material.

### 8.2.4 Local Ordinances: Examples

Jurisdictions are increasingly making the recycling of construction and demolition waste a part of their permitting process. The following sections describe such ordinances from North Carolina, Illinois, and California. Most of these kinds of regulations provide a cost and/or square footage threshold of the construction and/or demolition project at which the ordinance is to be applied. This helps to limit onerous expense applied to those who undertake small projects. Some of these types of ordinances require security bonds/deposits that the contractor and/or owner will not get back until satisfactory completion of the recycling/reuse requirements.

#### 8.2.4.1 Orange County, North Carolina

In the late 1990s, Orange County officials recognized that the Construction & Demolition (C&D) landfill was going to be filled sometime in 2003. The Orange County Board of County Commissioners agreed to build a new C&D landfill but only if certain bulky materials (those materials that take up the most room in the landfill) were required to be recycled. As a result, the Regulated Recyclable Materials Ordinance went into effect on October 1, 2002. The following highlights elements of this ordinance:

**Table 8-1 - Orange County Ordinance Highlights**

Who It Affects?	What It Does?
Contractors and individual home owners.	Requires the recycling of certain C&D materials: corrugated cardboard, clean wood (that is, wood that has not been painted or treated) and scrap metal. Construction and demolition projects must have a waste management plan in place, waste haulers must be licensed, and these requirements will be enforced.
Solid Waste Enforcement Personnel inspects and cites business and individuals.	Loads going into the landfill that contain wood, metal, pallets, and/or corrugated cardboard will be charged <b>double the tip fee</b> . Individuals found to be conducting building activities without the appropriate Recyclable Material Permit will be issued a civil citation.



### 8.2.4.2 Chicago, Illinois

Chicago initiated an ordinance for construction or demolition site waste recycling. It includes the following:

**Table 8-2 – Chicago Ordinance Highlights**

Who It Affects?	What It Does?
Contractors who fail to meet the recycling percentages identified in subsection (2) shall be subject to the following fines:  For construction projects or demolitions involving 10,000 square feet or more of renovated, newly constructed, or demolished space	\$1,000 for each percentage point of difference between the amount required by this section to be recycled or reused and the amount actually recycled or reused
For construction projects or demolitions involving less than 10,000 square feet of renovated, newly constructed, or demolished space	\$500 for each percentage point of difference between the amount required by this section to be recycled or reused and the amount actually recycled or reuse

### 8.2.4.3 Santa Monica, California

Santa Monica, California implemented a 60 percent recycling plan for demolition and construction projects valued above \$50,000. The table below summarizes the ordinance.

**Table 8-3 – Santa Monica Recycling Plan Highlights**

Who It Affects?	What It Does?
Private Projects \$50,000 and greater	Divert 60%
City-sponsored projects	
All Projects	Waste Management Plan Submitted
All Projects	Only 20% of 60% can be from inert material
All Projects	Must Use City's Conversion Rates
Private Projects	Security Bond of 3% of total or \$30,000

### 8.2.4.4 San Mateo, California

A Waste Management Plan is necessary to demonstrate compliance with San Mateo County, California Ordinance 04099 that requires covered projects to salvage, reuse or recycle 100 percent of inert solids (asphalt, brick, concrete, dirt, fines, rock, sand, soil, and stone) and at least 50 percent of the remaining construction and demolition debris generated by the project.



Table 8-4 – San Mateo Ordinance Highlights

Who It Affects?	What It Does?
Demolition Work Valued at \$5,000 and above	100% recycling of inert solids e.g. asphalt, brick, concrete, dirt, fines, rock, sand, soil, and stone
Demolition Work Valued at \$5,000 and above	50% of remaining demolition debris
Renovation and Remodeling valued at \$250,000 and above	100% recycling of inert solids e.g. asphalt, brick, concrete, dirt, fines, rock, sand, soil, and stone; 50% of remaining demolition debris
Construction of new structure equal to or greater than 2,000 square feet	100% recycling of inert solids e.g. asphalt, brick, concrete, dirt, fines, rock, sand, soil, and stone; 50% of remaining demolition debris

### 8.3 Review of the 1994 ISWMP

The 1994 ISWMP did not speak specifically to this waste stream except to say that 11 percent of the County's waste stream is made up of C&D.

The County has, however, been interested in finding ways to divert the C&D material away from the landfill. One example of such a diversion program was the 'Give-away-Days' where material brought in could be taken by others. This grass-roots marketing helped to divert material away from the landfills.

Another example occurred in 1998 when the Maui Recycling Group (MRG) initiated a demonstration project for an on-site source separation program on construction of 26 housing projects located at Liholani Golf Village. With assistance from the Division, MRG and the contractor, Dilloway Construction Company, implemented a program whereby drywall, cardboard, and plastic were diverted from the landfill.

MRG placed six-yard containers at the construction site to collect the three designated materials. Construction began in 1998 and finished in April 1999. A total of 18 tons of drywall was diverted to a local commercial compost yard as a feedstock to its compost. The project diverted 1,000 pounds of plastic away from the landfill and to Aloha Plastic Recycling in Kahului. The cardboard diverted totaled two tons and was sent to market. In addition, five tons of treated lumber was diverted to over 150 individuals who attended a "Giveaway" day.

The pilot program the County and MRG conducted resulted in a net reduction of 35 percent. In other words, 35 percent of the waste generated by weight was diverted away from the landfill to be reused or recycled. The cost of hauling and disposal was 20 percent less than originally expected creating a net reduction in overall costs.

### 8.4 Private Landfill Capacity

#### 8.4.1 Background

Mr. Chic Decoit owns, manages, and operates the C&D Landfill. The site had been the location of a 150-foot-deep pit that was mined for cinders during World War II. The land the site is on is owned by the Alexander & Baldwin Company (A&B), and Mr. Decoit was in the trucking business and knew of the cinder pit and saw a business opportunity. Decoit approached and negotiated a lease contract with A&B for the 14.8



acres to use, first, for clean fill and, starting in 1996, started using it as a C&D landfill. Effective in 2005, commercially collected C&D was banned from the CML,<sup>1</sup> and Decoit started to receive approximately 200-300 TPD on average, including getting loads from commercial stores. This private facility pulls out metal and ships it to Hawaii Metal Recycling (owned by Schnitzer Steel Hawaii Corporation) on Oahu. The facility also segregates green waste and hauls it to the Maui EKO co-composting operation at the CML.

The facility charges \$40 per ton for mixed C&D and \$20 per ton for inerts loads. The facility gets all the lumber and the drywall from current demolition projects; however, large operations, such as the Marriott, often have the concrete crushed and used on site.

The private landfill allows some customers to stockpile large amounts of metal material from specific demolition projects at the site. This material is cut up and sold to such processors as Big Island Recycling and Hawaii Metal Recycling.

### 8.4.2 Local Current Tonnage at Private C&D Landfill

The Decoit C&D landfill in Maui County receives and buries approximately 50,000 tons per year. The table below compares material going into the private C&D Landfill with that going into the CML. The private landfill takes in approximately 19 percent of what the CML receives. The CML, however, diverts 22 percent of its material, whereas data supplied by the private C&D landfill indicates a diversion of just 1.3 percent of its total.

Table 8-5 – Annual Comparison of Maui Landfill Use, FY2006

	CML	C&D Landfill
Population Served	131,640	N/A
Households Served	46,530	N/A
Total Received (tons)	268,246	49,984(1)
Total Materials Received TPD (Average)	735 (basis: 365 days/yr.)	165 (basis: 300 days/yr.)
Materials Diverted (tons)	60,362	655
Waste Landfilled (tons)	207,884	49,329

(1) Tonnage includes inerts and recyclables; carpets and tires pulled.

The private landfill owner and its consultant believe that it has received 443,000 cubic yards of material over the past 11 years and estimates a site capacity of 407,000 cubic yards remaining. Depending upon the compaction of this C&D material, the site may have as little as six years and as long as ten years of space remaining.

### 8.4.3 Recent Waste Activity

Generation rates depend on the amount of building and refurbishing done. Maui Island has seen significant construction activity over the past five years. In discussions with

<sup>1</sup> Chapter 15-3, Rules for Maui County Landfills (as amended).



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developers, it appears that the rate will continue into the foreseeable future. The Ritz Carlton in Kapalua and the Kobayashi project in Wailea are examples of current large projects that have generated a lot of C&D material.

Aloha Waste Systems, a waste hauler, estimates that they transport 40 roll-offs a day of C&D material to the Decoit C&D landfill.

When Northwest Demolition has had demolition jobs on Maui, it fills its own large, 50-cubic-yard open-top containers and continuously hauls to the Decoit landfill.

Maui Disposal estimates that it sends 20 open-top roll-off boxes, most of which are 30 cubic yards in size, to the private C&D landfill.

### 8.4.4 Future Local Generators

Based on projected development in the County and the recent history of C&D generation, C&D waste is projected to increase from the current 50,000 tons a year. C&D waste is projected to comprise approximately 15 percent of Maui's growing waste generation. Examples of construction projects in the near future are as follows:

A&B Properties has several large projects in the queue, including:

- 150 homes in Haliimaile
- 100-acre parcel for single-family homes in Kihei
- 800-acre development over a 20-year period in Makawao
- 672 acres that would include building up to 2,000 homes, a school, fire station, and golf course on and around the site of the current privately-owned landfill for C&D
- 270 acres near the current C&D landfill
- 710 acres of residential development on the west side of the highway from the C&D landfill up to the mountains



*Photos 8-1 and 8-2. The Ritz Carlton and the Kobayashi project in Wailea*

Of the material currently going into the private C&D landfill, a certain portion of it can be recycled and reused, but because it is currently privately controlled, the percentage is difficult to quantify. The County-sponsored case study performed by the Maui Recycling Group in 1998, however, diverted 35 percent of the new construction material from the landfill to beneficial uses.

Currently, contractors on Maui have no financial or regulatory incentive to separate the inert material from cardboard and metal. The material is tossed together into a roll-off or transfer trailer and sent to the private landfill. If separated, these can be diverted, thereby saving space at the landfill. The pictures below show the material at the privately-owned C&D landfill in Maui.



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*Photos 8-3, 8-4, 8-5, 8-6, and 8-7 (clockwise, starting at top left). Inert material (bricks, concrete, rock) could be pulverized into gravel for new construction. Cardboard could be recycled into new paper. Metal could be recycled into new metal. The plastic pipe could be reused or recycled. Instead, it is currently being buried in Maui at private C&D landfill.*



## 8.5 National Trends

### 8.5.1 C&D Recycling

#### 8.5.1.1 Recycling Rates

Increasingly, states are moving toward capturing a greater percentage of the C&D waste stream. GBB completed a study for the National Demolition Association (NDA) and compiled recycling data from over 100 NDA members nationwide. The data indicated that six states recycle over 70 percent of their demolition waste.

**Table 8-6 – Examples of State Recycling Rates, Demolition Materials**

State	Percent Demolition Material Recycled in the State
CA	90%
FL	90%
WA	86%
MN	77%
IL	74%
NJ	72%
TX	49%
Ave. other 43 States	19%
<b>Total</b>	<b>73%</b> (Nationwide)

#### 8.5.1.2 Processing

A few jurisdictions own and operate their own construction and demolition debris materials recovery facility (CDMRF) as a means of diverting and recycling material away from their landfill and preserving capacity and extending the time before another landfill has to be constructed. Fauquier County, Virginia, developed such a CDMRF that has the ability to process up to 130,000 tons per year of C&D. This facility has 1 spotter/screener to manage incoming trucks and check waste contents before dumping; 3 to 4 equipment operators; 7 to 10 people who pick through the material and sort them into categories; and 1 to 2 roll-off truck drivers depending on volume of material.

The facility uses processing equipment and various machines to move the materials. The main conveyor that feeds the system is 72 inches wide by 56 feet long. The rest of the equipment includes: a finger screen; a picking conveyor 72 inches wide and 122 feet long; a conveyor that transfers “unders” material to another picking stage, 48 inches wide and 16 feet long; a magnetic separator; an inclined conveyor that transfers material to a “star screen” and then to the second sorting belt. To feed C&D to this CDMRF, the County uses a CAT 320 excavator for loading operations with a CAT 312 excavator used for the presorting operation and backup. A rubber tire loader



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CAT 966 class is used for pushing material with another rubber tire loader CAT 950 class for backup.

The processing of this material typically occurs between Monday and Friday of each week. Incoming waste vehicles are weighed and checked. If the material is mixed C&D waste the transport vehicle is directed to dump its contents at the processing facility. As the truck approaches the facility, the spotter directs the vehicle to unload into a specific spot.

At the stockpile point before the material is conveyed up to the picking line, the material that can be reused is pulled from the pile and segregated from the CDMRF process.

An excavator with a large bucket scoops and pushes the material onto the in-feed conveyor where it travels up and dumped onto a primary screen which sorts materials by size. Material that is greater than 6 inches continues along the conveyor. Material smaller than 6 inches falls through the holes in the screen and are sorted by a second screen into a greater or less than 2-inch size. The 6-inch and greater material is transferred up to the sorting conveyor where sorters pick through the material. The sorter picks the material up and drops it into a bunker of like-kind material.

The less than 2-inch "fines fraction" is discharged into a holding bay for eventual use as alternative daily cover. The greater than 2-inch material is conveyed for further hand sorting. Residuals from this sort are combined with the larger sized residuals and are placed in the landfill for burial.



*Photo 8-8. Fauquier County, Virginia, C&D operation ready to process material*



*Photo 8-9. Fauquier County's C&D recovery system in operation*



## 8.5.2 C&D Recycling Examples Seen on SWRAC Tour

Members of the SWRAC made tours of three locations that recover C&D material. Two of these jurisdictions use material recovery facilities (MRF) to take in C&D and separate the material out for reuse or recycling with success.

One of these locations is the Monterey Regional Waste Management District in Monterey, California. It services a geographic area and population that is similar to Maui. In 1996, it built a 95,000-square-foot building to house a system of conveyors and sorting stations where workers recover various materials such as wood, yard waste, sheetrock, carpet padding, metal, bottles, cans, cardboard, paper, reusable items, concrete, asphalt, and other inert materials such as soil and gravel. Built at a cost of \$9.6 million, the MRF was designed to process 600 tons of waste per day: 400 tons of mixed waste from commercial drop-boxes, construction and demolition debris, and self-haul waste; and 200 tons per day of yard waste and wood waste. In FY 2005-2006, approximately 132,262 tons were processed through the MRF, and a 61 percent recycling rate was achieved. This exceeds the original target recycling goal for the facility. Residential garbage and wet commercial waste are not processed in the MRF; they are sent directly to the landfill. The following pictures show Monterey's MRF.



Photo 8-10. Tipping floor spotter



Photo 8-11. Pre-sort items removed on tipping floor



Photo 8-12. Tipping floor showing inclined conveyor



Photo 8-13. Sorting area

## 8.6 Alternatives for the County

The SWD, and the County of Maui as a whole, are faced with a potential of having the CML capacity used up two years earlier than projected if no alternative to C&D disposal is found. Alternatives for the County to consider are:



1. Do nothing. This will use up the County's landfill capacity quicker. On the other hand, it will be a simple initiative to once again incorporate burying C&D waste.
2. Integrate C&D processing to the MRF discussed in Chapter 4. By combining the operations in one facility with a reuse and landfill facility on the same solid waste campus, both capital and transportation costs will be reduced. Reusable construction materials that are recovered could be offered for sale at the reuse facility to citizens for home repair and improvement projects.
3. Once a CDMRF is operational, the County could implement a C&D recycling ordinance similar to the ones reviewed in Subsection 8.2.4 in this chapter.
4. The County could coordinate a meeting of interested private sector parties, e.g., haulers of C&D, developers, contractors, owner of the existing private landfill, for the purpose of planning for the management of C&D waste by the private sector. This may result in a joint effort to conserve capacity in the privately owned C&D landfill, a private C&D separation facility, and a private reuse facility.
5. Implement C&D recycling ordinances to promote and enforce C&D recycling as discussed in Section 8.2.4 of this chapter.

## 8.7 Plan Recommendations

### 8.7.1 Goals

The Division will implement operational and legislative actions to minimize C&D material flowing into the landfill for disposal and encourage recycling.

### 8.7.2 Strategies to Meet Goals

#### 8.7.2.1 Island of Maui

The Island of Maui has a private landfill for C&D that is expected to have six years of capacity left. The Division intends to inquire as to the plans of the owner of the landfill and investigate opportunities to extend private capacity through greater diversion.

##### 8.7.2.1.1 C&D MRF

The Division plans to procure a design, build, and operate facility located centrally and to be operational by the time the private landfill's capacity is completed. This is expected to be a three-acre site to accommodate a 40,000-square-foot, open-air facility is added in the selected scenario for the purpose of processing C&D waste so that reusable and recycled material can be diverted from the landfill. The capital cost of the C&D facility is estimated to be \$8.7 million in 2007 dollars. It is planned to process 170 TPD initially and expand in later years. The annualized capital cost is estimated at \$0.7 million per year (20-year term, 5% interest), and the annual operations and maintenance is estimated at \$2.8 million per year (2007 dollars), as shown in Exhibit 13-4. Revenue from the sale of recovered products is estimated at



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\$40 per ton net of transportation and generates \$1.3 million per year. This results in an estimated cost per ton of \$67.

### **8.7.2.1.2 Local Ordinances**

The County shall pass and enforce an ordinance establishing C&D recycling requirement of 50 percent for all commercial and residential demolition and construction projects. Estimated implementation timeframe is 2013.

### **8.7.2.1.3 Reuse of Material**

The Division will rely on the private and non-profit sector to utilize material that the Division's waste management system diverts to the reuse market place. Grant opportunities from the Division will be made available to assist start-up of such operations and support when needed.

### **8.7.2.1.4 Hana Region**

#### **8.7.2.1.4.1 MRF**

The Division will transport C&D waste under its control to its facility in Central Maui for processing. The material will be loaded into a roll-off container and transported when full to the C&D MRF.

#### **8.7.2.1.4.2 Local Ordinances**

The County shall pass and enforce an ordinance establishing C&D recycling requirement of 50 percent for all commercial and residential demolition and construction projects. Estimated implementation timeframe is 2013.

#### **8.7.2.1.4.3 Reuse of Material**

The Division will rely on the private and non-profit sector to utilize material that the Division's waste management system diverts to the reuse market place. Grant opportunities from the Division will be made available to assist such operations in both start-up and operations as determined on a case-by-case basis.

### **8.7.2.2 Island of Lanai**

#### **8.7.2.2.1 Local Ordinances**

The County shall pass and enforce an ordinance establishing C&D recycling requirement of 50 percent for all commercial and residential demolition and construction projects. Estimated implementation timeframe is 2013.

#### **8.7.2.2.2 Reuse of Material**

The Division will rely on the private and non-profit sector to utilize material that the Division's waste management system diverts to the reuse market place. Grant opportunities from the Division will be made available to assist such operations in both start-up and operations as determined on a case-by-case basis.



### **8.7.2.3 Island of Molokai**

#### **8.7.2.3.1.1 Local Ordinances**

The County shall pass and enforce an ordinance establishing C&D recycling requirement of 50 percent for all commercial and residential demolition and construction projects. Estimated implementation timeframe is 2013.

#### **8.7.2.3.1.2 Reuse of Materials**

The Division will rely on the private and non-profit sector to utilize material that the Division's waste management system diverts to the reuse market place. Grant opportunities from the Division will be made available to assist such operations.

## **8.8 Implementation Plan**

### **8.8.1 C&D MRF**

The Division will procure a C&D processing facility. This facility will be used to process C&D material to diminish the tons of such material going into the landfill. SWRAC had advised the Division that such operations should be procured as a design, build, and operate. Under such a procurement, the Division would work with one entity that is responsible for the overall development and operations of each facility. The Division, however, is expected to provide the land for such a building and have ownership of the building and its equipment at the end of the contract term.

Under such a procurement, a partnership would be developed whereby the Division and the contractor work together to assure completion of tasks. Engineering studies needed for the approval and building of the facilities may be shared by both. The procurement of equipment and erection would be the responsibility of the Contractor and must be equal to or above the standard of quality set by the County.

Essentially, the County must implement the following:

- Create a conceptual design of the facility's operations and purpose with an overall cost estimate to submit to the County Council for funding approval;
- Meet with builders and contractors to obtain input on the conceptual design for inclusion in the procurement documents;
- After funding approval, create procurement documents for design, build, and operate and release them in a request for proposal format;
- After funding approval, earnestly set about to procure needed property;
- After the County has completed the contract with the winning proposer and begin to work together to determine final layout of the site and receiving permitting approvals;

