



5. MSW, White Goods, and Bulky Waste Collection

5.1 Purpose

The purpose of this chapter is to review the history, trends, and operations of solid waste collection in Maui. For those readers who are not familiar with the types of equipment and operational options used for the collection of Municipal Solid Waste (MSW), white goods (appliances), and bulky waste (furniture), then they should read Section 5.2. Terms are described in this section and are used throughout the chapter. If the reader is familiar with the background on this subject, then moving directly to Trends is recommended.

Trends begin with Section 5.3 and summarize what operations, if any, are conducted in the other counties in the state. Section 5.4 then looks at the trends on the Mainland as it relates to operational issues.

Beginning in Section 5.5, pertinent legislation, a review of the 1994 ISWMP recommendations and a summary of what was done since that report are provided.

Sections 5.8 and 5.9 discuss the actual operations of the County and possible alternatives to those operations.

5.2 History

5.2.1 Background

Two complementary trends are apparent in the collection of waste. The profession has evolved its collection equipment from four legged animals to highly technical equipment and from the legs and backs of men to the aptitude and willingness of any worker whether male or female.

Serious changes in the collection of trash began in the 1940s. Progressive companies began to move toward motorized collection vehicles with compactor units powered by something other than human effort. Up to the 1980s, large crews were the norm on collection trucks. Over time, both manufacturers and haulers refined many physical elements of the hauling business. High loading heights, for instance, were the norm before compactors emerged as the collection body of choice. Those high loading heights required workers to extend their bodies as they lifted heavy metal cans filled with garbage. Injuries on duty were extremely high in the waste collection field.

Unloading devices were refined to move the work further away from human effort. The more mechanical this work became, the quicker the truck could be back on the road collecting from more homes. The first effort was a cable netting device to wench



Photo 5-1. Example of a 1940s advanced collection vehicle by Heil



CHAPTER 5 – MSW, WHITE GOODS, AND BULKY WASTE COLLECTION

the material off the bed of the truck. Over time, the mechanics of unloading rested upon two techniques: (1) the hydraulically operated dump body where the bed of the truck raises up to allow gravity to assist in pulling material out of the container and (2) the hydraulically operated movable pusher plate which essentially pushes the material out of the container without raising the bed.

The turning radius of trucks improved, allowing trucks to get closer to the trash being collected. Even today, when a company or jurisdiction tests trucks for possible purchase, they drive the truck into tight cul-de-sacs or alleys with tight turns so as to test their ability to service the specific needs of the community. Getting the truck close to the collection site saves labor and decreases collection time at each stop, thereby being more efficient. Manufacturers have increasingly improved the trucks' turning radius by, in part, placing the cab over the engine.



Photo 5-2. Heil's trailer collection vehicle that allows for tight turns and large loads

Containing the material within the collection body became more of a requirement as urban communities became densely populated and the roads became paved not allowing the spilled liquid to be soaked into the ground hence maintaining the smell for longer periods of time. The welded-steel, fully enclosed collection bodies provided manufacturers with opportunities to contain the trash and its liquid by-product.



Photo 5-3. Cart lifters on the back of a rear-loader

As the collection vehicles became more sophisticated, they also became more dependent upon uniformity, specifically, the uniformity of residential containers. When large collection crews were the norm, employees would jump off the truck and push, pull, or sway a container of trash over to the collection vehicle and, if need be, all of the crew would struggle together to inch the can of trash up into the loading area, called a hopper, of the compactor.

Semi-automated loader trucks are the same as manual collection vehicles with the addition of a cart lifting device on the back of a rear-loading truck. These lifters attach to the mainframe of the truck and have two hooks on the faceplate that, as they lift, latch to the inset and bar on universal carts. The worker on the back of the truck must wheel out this special cart to the lifter and engage the hydraulic system to lift and dump the contents of the cart into the hopper. When the hopper approaches full, the worker on the back engages the hydraulic system that brings the metal blade down and sweeps the hopper full of garbage into the compactor unit.

Uniform containers help collection be more efficient and allow for greater worker safety. The manual crews must be physically capable of performing repetitious lifting of containers, often exceeding 50 pounds, for most of the workday. These manual trucks, with three person crews, can collect 700 or more homes in a day if the homes are clustered together. Under such circumstances, the workers on the back will have lifted between 10 to 15 tons in a day.



The resident's container, in the case of a semi-automated collection vehicle, must fit the lifter in order to work smoothly and not slow up the collection of trash. These lifters on the trucks reduce injuries, prolong an employee's work-life, and reduce Workman's Compensation and absentee costs to the service provider.

5.2.2 Automated Collection Vehicles

Both private and public entities have moved toward automated collection over the past few decades. This section reviews the different collection strategies chosen by communities and private industry.

Semi-automated collection: The concept of the rear-load collection vehicle was described in the earlier section of this chapter. For many jurisdictions, this is an advantageous way to move toward automation because the jurisdiction may already own a fleet of rear-load trucks that, for less than \$10,000 each, can have two lifters placed on the back of the vehicles to make them semi-automated trucks.

Rear-load, semi-automated trucks can also be outfitted with two compactors in the body of the collection vehicle so that two carts containing different items (for example, one for trash and the other for recyclables) can be collected while making the same stop.



Photo 5-4. Rear-loader with two compaction units

Such a collection strategy lowers the cost of collection but, as described in Chapter 4, can cause routing and quality issues if the compactors are not sized proportionately to the commodities being collected.

A benefit to collecting with rear-load trucks is that they are versatile vehicles that can, when needed, collect large loads of brush or storm debris, or bulky waste.

Automated Side-Loaders (ASL): The County has been transitioning from manual rear-load trucks to automated side-loaders (ASLs) for the past few years. These are trucks equipped with an extendable arm that actually wraps its ends around a cart, pulls it closer to the truck, lifts it up and over the hopper of the compactor, turns it upside down to empty the contents, and then sets it back onto the ground. These trucks can do a thousand or more homes in a work day shift provided the homes are clustered together. The work is done with a single crew member who generally does not leave the cab.

ASLs are more expensive to purchase than rear-load trucks but are faster and less costly for overall collection operations because of increased efficiency, and the crew size drops down to one person. Since the trucks are technically advanced, they are costly to maintain. Maintenance schedules, including preventive maintenance, must be followed on these trucks.



Photo 5-5. Drop-frame truck for both automated and manual collection



CHAPTER 5 – MSW, WHITE GOODS, AND BULKY WASTE COLLECTION

Drop-Frame Trucks: Normal operation of an ASL requires the driver to leave behind any refuse not contained in the cart. The drop-frame allows the opportunity for the driver to load material directly into the hopper. This would eliminate the need for a second truck to come behind and collect the material. The risk with this type of collection strategy, ironically, is worker safety. The driver may feel compelled to pick up and throw into the hopper items that the driver should not be picking up at all because of its size and/or weight.

The County of Maui would have to renegotiate its Union agreement if it decided to implement this collection vehicle.

Front-End Loader Commercial Trucks: Front-end loader trucks collect dumpsters from institutions and commercial enterprises. These are collection vehicles with two forks on front arms that unfold to extend out and, after being inserted into the sleeves of the dumpster, hydraulically raise the container up, over, and behind the cab, turning the container upside down, and unloading its contents into the hopper of the compactor.

The crews on these front-end loaders for dumpster collection vary between 1 and 2 people. The second person normally is included if many of the dumpsters have to be wheeled out to the road for the collection vehicle to lift and unload it. If a highly trafficked area has many dumpsters that need to be rolled out along the street for collection, a jurisdiction or private hauling concern will send a crew early in the morning in a pick-up truck to push the dumpsters out before the collection vehicle gets there so it can collect and be on its way to easier collections while the crew rolls the empty dumpsters back to their original locations.

Front-End Loader Residential Trucks: An alternative to ASLs that appears to be gaining in market share over the past few years is the front-end loader with a dumpster and lifting arm on the side of the dumpster. The most prominent manufacturer of this mechanical attachment is the Curotto Can. The Curottos spent nine years in research and development by using different units on their own routes in Sonoma, California. In 2000, the family put the product on the market. Essentially, the product is an attachment that slips over the front-end-loader forks. The attachment is a 4.6 cubic yard container on a metal skid that the forks of the front-end loader insert through to carry the container. Attached behind the container is an automated arm that can grab a cart ranging in size of 32 to 106 gallons and has a lift capacity of 500 pounds. The arm extends out sixty inches and has the ability to not only lift from any place within the sixty inches, making tight collection spots easier, but can lift the cart and roll it back over the container thereby eliminating the problem of filling only one side of the container and minimizing spillage. By evenly distributing the waste into the container, loads are maximized before having to dump its contents into the compactor.

A benefit of using this type of automated residential collection is if the arm mechanism should have a maintenance problem. The Curotto equipment can be dropped off at the shop, the truck can pick up a second one, and back on the route it



Photo 5-6. Front-end loader with a Curotto Can on the front for residential collection



can go. With an arm problem on an ASL, the whole truck is down until fixed.

A second benefit this has over an ASL is its ability to collect bulky waste items without the driver having to step out of the cab. The arm can grab such items as furniture, lift it into the Curotto dumpster and finally into the hopper of the compactor without the driver having to get out.

A third benefit over an ASL is that the driver can inspect the material in front of him for contamination as the material is being placed into the Curotto Can. This is especially helpful when collecting recyclables. In comparison, the dumping of the cart in an ASL occurs behind the driver who has to rely on cameras to see contamination.

There are concerns about the use of the front-end loader residential collection vehicle in certain areas, however. In jurisdictions with narrow streets, the extended length of the collection vehicle, because of the addition of the dumpster, can be problematic. The second concern is the height of the dumpster when lifted to its apex. In an area with many low-hanging wires and tree limbs, that height may be a problem and slow down collection.

5.2.3 Bulky Waste and White Goods Collection

Bulky waste is material too large to be placed into a cart. Examples of bulky waste are furniture and mattresses. White goods are appliances, such as stoves and hot water heaters, which are made primarily of metal and can be easily recycled. Many communities offer collection of these items at the curb. The collection vehicles differ, however, in type and ability.

5.2.3.1 Collection Vehicles

Flatbed Trucks: Communities may use a flatbed truck with stake sides and a hydraulic liftgate on the back. Normally, a crew of two to three people staffs the collection vehicle. When they get to the site, they load the flatbed with the material using the liftgate to raise the heavy material to the bed of the truck. The crew must either lift or “walk” each item onto the liftgate and then in the truck. The benefit of this type of truck is its low cost and multi-use as well as the ability to designate and keep separate items for reuse. Loading, however, takes more time and involves a larger crew than other types of collection vehicles.

The County collects its white goods on the Island of Maui using this type of truck.

Rear-Loader: A rear-loader packer, the same kind used for collecting trash, is a workhorse vehicle for bulky waste. The truck pulls up to the curb, and one to three workers get out and load the material into the hopper and compact it. If the material is too big to put into the hopper and compacted at one time, then it is done in stages. A sofa, for example, will be picked up by the crew and fed into the packer as one pushes a long board through a table saw. The blade of the packer comes down and severs a section off and places it into the compactor.

Stops can sometimes take longer than with a flatbed because of this process, but the rear-loader can pick up many more stops before filling up than a flatbed. Crews have been known to purposely use the blade of the rear-loader to dismantle an object, such as dressers and sofas, more than is necessary because, at the end of the process,



CHAPTER 5 – MSW, WHITE GOODS, AND BULKY WASTE COLLECTION

coins that had inevitably been lost in these pieces of furniture will be left at the bottom of the hopper. This may result in slower than necessary collections and undue burden on the truck's mechanics.

Although not recommended, some jurisdictions collect white goods with a rear-load packer truck for the same reasons it collects the bulky waste, i.e., collect more stops before unloading. One problem with using this method to collect white goods is the high potential of breaking a Freon line and releasing the contents to the air and ground.

Another reason to avoid using this type of truck to collect white goods is that crews have been known to use the blade to shear copper and other valuable metal off of items, such as air conditioners, and then sell them at scrap yards for personal gain. The blade will become pitted, dented, and out of alignment, causing it to not sweep in all the material into the compactor and may, in extreme cases, not compact or move at all. Higher maintenance cost is a result of this practice.

Knuckle-boom Truck: These are trucks with a boom that hydraulically extends out and away from the truck up to twenty or so feet depending upon the design of the model used. At the end of the boom is a clamshell that opens and closes hydraulically. The crew member who operates the device with a joy stick can, essentially, use the boom and clamshell as an extension of their hand and pick-up the material and place it into either a container attached to the bed of the truck or a container on a linked trailer. The crew member has the ability to break the material down, similar to a compactor or segregating material for potential reuse, by using the clam shell to crunch the items into smaller bits.

There are options for the configuration of this type of equipment. The boom and clamshell device can be attached to the cab with one or two trailerized containers. This allows the crew member to fill the first trailer, drop it at the side of the road, and hitch directly to the second trailer so that the boom can keep on loading. A separate transport truck will hitch to the full trailer and take it to the unloading area and bring it back to the knuckle-boom so it can keep loading. This type of system works well to clear large amounts of storm debris.

The truck can also be a unified truck and container where the option of detaching the container from the truck is not available. Once the container is full, the truck takes it directly to the unloading area.

Some communities staff knuckle-boom trucks with two employees. One to drive and work the boom and the other to sweep up around the area the citizen had set the materials. Other jurisdictions have allocated one crew member working the truck since much of the physical stress has been taken out of the loading.

The operator of a knuckle-boom generally becomes adept at picking-up and placing material into specific spots on the trailer. White goods can be collected with Knuckle-boom trucks, but the operator must be trained to avoid pinching lines that may release such items as Freon to the atmosphere.

Front-End Loader: Front-end loader trucks, as described above, can be used to collect bulky waste. A dumpster can be placed on its forks and when the truck gets to the designated location, the crew members (normally two) load the dumpster until it is full and then the dumpster is unloaded into the trucks hopper for compaction.



Front-end loaders are more expensive pieces of equipment than rear-loaders, flat-beds, or knuckle-booms, however, with not any noticeable advantages for the collection of bulky waste and white goods.

5.2.3.2 Bulky Waste and White Goods Operations

There are several methods that communities use to collect bulky waste and white goods. The following describes these methods.

Collection Events: These are published locations and times, generally at a neighborhood school on a weekend, where citizens can bring their bulky waste to the site. The bulky waste items are placed directly into a collection vehicle and when the vehicle is full it is driven to the disposal point while an empty vehicle takes its place receiving bulky waste.

These collection events usually have little chance for reuse, and they tend to work crews on overtime thereby making the collection more expensive to the Division. They also preclude those citizens who cannot transport large items away from their home.

Collecting along Trash Routes: Some jurisdictions collect bulky waste and white goods from existing trash collection routes on a periodic basis. These customers may be notified by a flyer that on, for example, the normal Thursday trash collection the resident can place their bulky waste item out for collection. If the crew normally collects the trash with a rear-load truck then much of the bulky waste can be collected during the same stop. Otherwise, a separate truck follows the route and collects just the bulky waste. White goods should have a separate non-compacting vehicle collecting them.

A variation of this concept is when the trash customer sets out the material on any of their trash collection days. The normal refuse collector will spot the bulky waste or white good item at the address and communicate the location to the base yard. This can be accomplished by a Global Positioning System (GPS) on the truck or by communicating the address by way of radio, phone, or email. A GPS, however, works more efficiently and is becoming a less expensive and more efficient manner by which to designate pickups. A GPS device is on the truck and initiates a microwave signal, using a constellation of medium Earth orbit satellites provided by the United States Department of Defense, to send the location/address back to the base yard. As these data points are received from the trucks collecting household garbage that morning, a route is developed back at Sanitation's headquarters for a vehicle to collect the bulky waste and white goods that late morning and early afternoon.

The latter tactic for collection eliminates much of the driving of the former since it is unlikely that a majority of the customers will have placed material out for collection.

Collection by Appointment: Citizens who wish to have bulky waste and white goods collections are asked to make an appointment either by phone or email. The system then provides them a day that the material must be out at the curb. The collection routing system divides the jurisdiction into sectors and assigns a collection day to each sector. When a citizen calls or emails from that area, the system places the address on the first available pick-up day in that sector by reviewing the truck capacity remaining on the next collection pickup scheduled for that area. If space is



available, then that address is placed on the list. If not, that address is designated to the first available date.

These addresses are computed, either by a person working with a map or using a computerized routing system, to determine the most efficient route a truck can take to maximize collections. This is called point-to-point routing.

This is a controlled collection system and works especially well when the customer is charged by the pickup or only allowed a certain number of bulky waste collections a year. The call-in system also provides tracking of the collections by work order so that reports can be run and the program analyzed for effectiveness.

Mass Collection: A hybrid of the appointment and collecting along trash route systems is the mass collection method. This system divides the jurisdiction into sectors by geographic areas and notifies its residents that, on certain days, collection vehicles for bulky waste will be driving down the street to collect items placed out by the resident. Trucks are sent into the area for the stated period of time to collect the material.

There are a few problems that arise with this system, however. First, the neighborhood fills up with material, some of which may be brought from outside the specific zone and dumped along the side of the road to avoid having to pay a disposal fee. The material may be in any state of condition possibly causing a vector problem and, at the very least, is unsightly. Inevitably, residents place material out after the collection vehicles have passed causing either a confrontation between the resident and manager of the collection system and may result in the collection vehicle having to retrace its route thereby making the collection period longer than publicized and, again, causing confusion among neighbors seeing the truck drive down the street for a second time.

5.2.4 Routing

There is an adage that time costs money. The routing of collection vehicles can either add or decrease time to operate a collection system. The cost of fuel, vehicles, and labor increases every hour a truck operates. Therefore, both the private and public collection systems are looking seriously at fine-tuning their routing capability to eliminate nonproductive time.

Efficient routing has, as its goals, to maximize the amount of time that collection vehicles are actually collecting solid waste/recyclables. It also looks to limit the amount of time that the collection vehicles are involved in non-collection activities. Routing should also balance the routes so that each route takes the same amount of time. A disproportionate amount of the work should not be placed on a few trucks while the remainder finishes their routes early.

As touched on elsewhere in this chapter, there is a difference between developing routes that occur on a regular basis and ones that never occur again. The weekly collection of curbside trash is a route that changes little over time. The appointment collection of bulky waste, on the other hand, will be a unique route each time.

Managers of jurisdictions that did not codify the regular occurring routes often find themselves in difficult situations when a generation of drivers is replaced. These jurisdictions may not have specific driving directions or maps made of the route.



When the driver of that route retired, the next driver would be taught the route by driving it with the previous driver before he retired. In such circumstances, management had to rely on the memory of drivers to preserve the nuances of that specific route. New drivers could not go to a set of maps and driving directions to perform the route competently the first time.

These jurisdictions, generally speaking, never increase efficiencies such as route balancing. Collection crews sometimes resist routing exercises because it develops a new level of accountability as well as a self-satisfying belief that no routing system can really make the system more efficient than the expertise of that specific driver assigned to that specific route.

A case in point is the front-end loader routes for the Metropolitan Government of Nashville and Davidson County. The Division collected dumpsters at government institutions and public housing using seven collection vehicles. The collection crew resisted the routing for such a small number of collection vehicles. After the routing was computed and checked for errors, the number of collection vehicles needed each day dropped from 7 to 5. This reduced the cost of equipment, labor, fuel, overtime, and overall budget. The new routing also eliminated a sizable portion of overtime that certain drivers appeared to share over a year's time.

5.2.5 Transfer Stations

Transfer stations are waste transportation components employed to reduce hauling costs by moving the waste to larger vehicles. These include transfer trailers, railroad cars, or barges which haul from a central point(s) within a jurisdiction to one or more distant solid waste management facilities. The act of transfer includes unloading of collection vehicles at the transfer station, loading solid waste from the transfer station to the transfer vehicles, and hauling it to distant solid waste management facilities.

The construction of a transfer station may take advantage of a natural differential in elevation so that the loading of the top-loading transfer trailer will be more efficient. Photo 5-7 shows the transfer trailer down below and the entrance for the trash trucks on the top level. The collection vehicle goes in through the top door, unloads its material on a concrete floor (tipping floor), and then drives out the other side of the building. A rubber tire loader pushes the waste on the tipping floor to the far end of the building above the trailer seen on the lower right side of the picture.



Photo 5-7. Transfer station in Oklahoma

The waste is pushed into an opening in the tipping floor which is right over the transfer trailer. Often, the trailer being loaded with waste is parked on scales with a meter above the tip floor so the operator of the rubber tire loader knows when the trailer has reached its legal weight limit. When the trailer is filled, a truck takes it straight through the other side of the building and onto a final disposal point with an empty trailer taking its place waiting to be loaded.

For odor and litter control, the best practice is to have the facility enclosed. Solid waste permits generally require that the trash be taken off the floor and into the



trailers at the end of the day. Except for mechanical breakdowns or hazardous road conditions, the transfer station and the transfer trailers are clean of trash at the close of the work day.

5.3 Trends in Hawaii

5.3.1 MSW

The County of Hawaii: The County has no residential or commercial collection fleet. Currently local private haulers collect residential and commercial trash and dump the material at one of two landfills for \$85 per ton. The residential trash haulers have an agreement with the County for a rebate based on the number of residential accounts the local haulers have.

The County operates its network of 21 transfer facilities most of which are staffed with County contractors and supervised by the County. The County owns and operates the transfer tractor-trailers servicing these transfer stations.

The County owns both its landfills but operates one while contracting out the operations of the second. One of these landfills is nearing capacity and the jurisdiction is in the midst of procuring for the development of a Waste-to-Energy facility.

The County of Kauai: The County operates its own rear-loader collection vehicles with three-person crews. There are six collection crews servicing the island Monday through Friday. The County also owns and operates 4 transfer stations. Kauai has a landfill owned and operated by the County and is considering the development of a Waste-to-Energy facility.

The County and City of Honolulu: This jurisdiction operates a system to collect curbside refuse from 160,000 units. Most (130,000) are provided with carts that are collected using automated side-loaders. The remainder is collected using rear-loader trash trucks. Honolulu began a pilot curbside recycling collection program in two communities, Mililani and Hawaii Kai, with a total of 18,000 residences. The pilot program has a cart for green waste and a cart for recycling, including newspaper, cardboard, glass, aluminum cans and plastic jugs (No. 1 and No. 2)

5.3.2 Bulky Waste and White Goods

The County of Hawaii: The County provides no separate collection of bulky waste items. It allows citizens to dispose of bulky waste at its network of transfer stations after which it is taken and disposed of in the County's landfills.

The County of Kauai: The County had not conducted a collection of either bulky waste or white goods for nearly 20 years. A few years ago, it initiated a collection of bulky waste through a contracted firm for collections during certain dates. The total cost of the program was approximately \$600,000. The bulky waste is currently dropped off at two of the County's four transfer stations for disposal.

The County has recently contracted with a firm to handle its white goods. Citizens can drop this material off at all four of the County's transfer stations at no expense. The contractor collects them, extracts CFCs in an environmentally correct manner, and ships the material off island. The cost of this service is approximately \$300 per ton.



There is no curbside collection for bulky waste or white goods currently performed by the County.

The County and City of Honolulu: Beginning in July 2006, this jurisdiction provides monthly collection for bulky waste items using the “Mass Collection” system. The customer does not call in for an appointment but simply has a monthly schedule to abide by. The island is divided into sectors and each sector has a collection period lasting no longer than four days. This jurisdiction considers bulky waste items to also include appliances often referred to as “white goods.” Two different trucks are used for the collection. A flatbed with staked sides and a lift-gate collect the white goods while a rear-loading trash truck collects the bulky waste items such as furniture.

5.4 Trends on the Mainland

5.4.1 MSW

5.4.1.1 Operations

The collection of MSW, on average, amounts to 42 percent of the solid waste budget. Given the tightening budgets of municipalities, collection organizations, both private and public, are continually striving to lower costs. This has caused many such entities to move toward automated collection of containerized garbage once a week and a routing evaluation performed for this transition.

Moving toward automation allows the division to reallocate labor to needed areas. Representative ranges of service stops for various collection system designs are displayed in the following table.¹ Many areas of the country have moved increasingly to semi-automated trucks with a one-person crew or ASLs with a one-person crew. The west coast trend is to automated collection using ASLs and three carts: recyclables, green waste and refuse.

Table 5-1 – Service Stops

Design	Manual 2-Person Crew	Manual 3-Person Crew	Semi-Automated 1-Person Crew	Semi-Automated 2-Person Crew	Fully Automated 1-Person Crew
# of Stops	500 - 700	700-900	400-500	600-800	800-1,100

The move to automation and once-a-week (instead of twice-a-week) collection means the jurisdiction must face the issue of excess trash. Those locations that have transitioned from twice- to once-a-week collection have found that the second collection actually collected significantly less waste. Collection crews, in other words, were often done before 10:00 a.m. during that second weekly collection.

The public outcry over the loss of the second collection is normally displeasure over losing the convenience of having two options to place the trash out at the curb or

¹ H. Lanier Hickman, Jr., Solid Waste Collection & Transfer, American Academy of Environmental Engineers Staff, 2000, pg. 91.



keeping it on the premises for a full week's time. Providing carts, as Maui County is doing, generally mitigates the public concern.

Taking the second weekly collection of waste away from the customers is always a difficult move but more so when automated collection is being implemented. Residents fear that the cart will not hold two collections a week worth of trash. The collection manager wants to mitigate that fear but also wants to hold firm in his belief that the driver of an ASL should stay in the cab. This tension can often result in a flood of calls to the mayor's office. If that mayor is not fully behind the collection strategy, this can result in the driver being instructed to get out of the cab to collect bags of garbage sitting alongside the cart more than is reasonable thereby ruining the collection efficiency.

5.4.1.2 Excess Trash

The fact that household waste is placed in a prescribed container and that it is collected by an ASL brings up the question of what happens when a household has more than the container can hold.

Edmond, Oklahoma, faced this issue when it transitioned from a sanitation department with a workforce of 58 people using 27 rear-loader collection trucks servicing 14,500 homes to 20 people using seven automated side-loaders, one rear-loader all of which collected 45,000 carts from 28,000 homes over a 45-hour work week with each ASL collecting up to 1,200 homes a day.

Edmond solved this tension by introducing a city-coded 30-gallon bag that it sells on demand for \$1.50. Citizens can put only their excess trash into the coded bag. When the weekly trash collection occurs, the driver notes the coded bag alongside the cart, a GPS on the truck initiates a microwave signal back to Edmond's base yard with the address of the coded bag. As these data points are received from the trucks out collecting that morning, a route is developed back at sanitation's headquarters for a rear-load packer truck to collect the coded bags.

Another tactic to solve the problem of extra trash outside the cart is to provide the customer with a second cart. CLM Sanitation, for example, has been servicing residents and municipalities in and near the Atlanta, Georgia, area. It opened its doors in 1987 and is still a family-owned business with a customer base made up of 80 percent from the private market (subscription) and the remaining 20 percent from municipally-contracted customers. Customers who regularly have more than one cart's worth of trash receive a second cart free from CLM. CLM analyzed its costs and realized that the majority of the cost is in the dumping of the first cart with the second being incidental when compared to a driver's time getting in and out of the cab. The City of Santa Monica provides carts in two sizes, 64 and 96 gallons. If a 96-gallon cart is not sufficient, a customer may have two and pay more for the second cart.

Some jurisdictions solve the problem of excess trash outside of the cart by using a second collection vehicle (a rear-loader) following behind an ASL to collect the excess. This results in two trucks burning fuel and two crews to collect from the same households on the same day. This ruins the efficiencies that were first thought to be gained by going to automated collection. This practice should be avoided.



5.4.1.3 Bulky Waste and White Goods Collection Trends

If communities have a commitment to divert material away from the landfill, the bulky waste item collection tends to be done on an appointment basis using either a knuckle-boom or a flatbed truck with a rear tailgate lifter. In this way, the material collected is not destroyed and can be triaged for reuse or recycling back at the collection base yard or disposal point.

If communities have an illegal dumping concern, then this collection service tends to be performed at no direct charge to the resident. The cost, instead, normally resides in either the resident's property tax, solid waste collection fee, landfill tipping fee, or a combination of these approaches.

Jurisdictions that have a history of private-sector collection normally have the private sector collect this material. Portland, Oregon, for instance, franchises out much of its collection, and bulky waste collection is part of the service. The franchise arrangement controls the private-sector services and fees paid by the resident.

As part of its permit arrangement with the City and County of San Francisco, NORCAL provides all residential rate payers two bulky waste and white goods item collections a year. If the customer calls before noon, the appointment will be made for the next day. Multi-family owners and dwellers are allowed one bulky waste item collection per year. The limit on the number of individual items these residents can place out for collection is five.

Because there is little to no size uniformity to the bulky waste items that can be set out, most jurisdictions limit the number of items to less than five. Some municipalities, such as Raleigh, North Carolina, limit the collection to a number of cubic yards. Raleigh provides free bulky waste collection of up to four cubic yards. If there is more than four cubic yards of material set out for collection, Raleigh will charge the resident \$50 for the excess.

The Seattle Public Utilities collects its white goods with the bulky waste. Citizens are asked to request an appointment for collection. The Utility charges the customer \$20 per item collected and \$26 additional if the item contains chlorofluorocarbons (CFCs).

5.5 Legislation

5.5.1 Federal

Collection vehicles are defined as a single or combination of motor vehicles with a gross combined weight (GCW) or gross vehicle weight (GVW) of 26,001 pounds or more, any vehicle that transports 16 or more people as well as vehicles that transport hazardous material that requires USDOT or USEPA placarding. The Commercial Motor Vehicle Safety Act (US Congress 1986) requires, and the U.S. Department of Transportation (USDOT) in 1999 implemented, regulations licensing of and testing of all drivers of commercial vehicles. Through testing, drivers are required to demonstrate driving skills, knowledge of driving rules, and pre-trip inspection skills.² Routine physical examinations are also required.

² Requirements for commercial drivers' licenses are described in the [Commercial Drivers License Manual](#), American Association of Motor Vehicle Administrators.



Every collection organization must have a drug and alcohol abuse program and policies and procedures that define that program. The program must be implemented through employee education, drug testing, and enforcement.

5.5.2 State of Hawaii

Transfer Stations (11-58.1-31): All solid waste transfer stations are subject to permit requirements that require a site analysis, description of equipment list and description, drainage plan, plan to mitigate nuisance, health and safety risks. An operational plan shall also be made part of the application describing materials processed, and how material will be measured. A transfer station operator is also required to provide signage of hours of operation, submit annual reports to the State of Hawaii detailing the daily volume of material received and transported and a yearly report on tonnage handled and transported to specified disposal points.

5.5.3 County of Maui

The County's collection ordinances fall under Chapter 108 "Rules for Refuse Collection." The definitions in Chapter 108 refer to both automated and manual collection but no reference to semi-automated.

Manual collection for garbage and rubbish includes cardboard (old corrugated containers), tree branches, tree trunks and stumps not exceeding 3 feet long and 50 pounds can be set out. [§15-108-9 (b) (1 & 2)]. Refuse containers cannot be greater than 32 gallons and 50 pounds. Citizens can set garbage and rubbish in trash bags as long as they are closed. Manual refuse collection unit means the aggregate of six (6) containers, bags, and bundles (defined in "definitions" under "Manual Refuse Collection Unit.")

Automated collection for garbage and rubbish requires the home owner to use a County-issued container. An automated refuse collection unit is defined as one (1) county-issued cart in "definitions" under Automated Refuse Collection Unit."

Collection (Ord. 2731 § 4, 1998)

To protect the public health, safety, and well-being, to prevent the spread of vectors and to protect environmental resources, the owner, occupant, or other person responsible for the day-to-day operation of every place or premises in the County shall make arrangements for the collection of solid wastes with either the Department of Public Works and Waste Management or a solid waste collector, as set forth in this chapter. This section shall take effect on July 1, 2000.

Lanai Exemption (Ord. 3052 § 9, 2002)

Unless otherwise provided in this section, the provisions of this chapter concerning sanitation collection and landfilling shall not apply to the Island of Lanai. The director is authorized to adopt rules for refuse collection for the Island of Lanai. Monthly charges for refuse collection services shall be imposed and collected with the rates as set forth in the annual budget.



Recommendation (Ord. 3052 § 10, 2002)

Maui ordinances need to be updated to reference the Director of Environmental Management not the public works and waste management director. The Director has the authority to adopt rules regarding refuse collection.

Recommendation

It is suggested that a new ordinance be enacted whereby all household refuse collected by the County shall be placed in a wheeled cart with a lid. Any household or business refuse collected by a commercial hauler should be placed in a wheeled cart or other container with a lid approved by the County. This will help to keep County roadsides and business/commercial neighborhoods clean.

When universal recycling collection is implemented, references to placing fiber material, such as old corrugated material, should be eliminated from garbage and refuse collection in Chapter 108.

5.6 Review of 1994 ISWMP

The 1994 ISWMP reviewed collection as it affects recycling. It looked at the rate charged for collection and how the rate would be charged, e.g., the charge for collection could be based on the amount placed at the curb or collected through property tax assessments. The specific recommendations were as follows:

- Recommendation 6-1: Evaluate the current rate structure by establishing a citizen committee to evaluate alternatives for the refuse collection system. This group was to weigh its opinion on making refuse collection “mandatory” for every resident in the urban areas and charging them directly versus making refuse collection “universal” for the same residents but charging them through their property tax assessment.
- Recommendation 6-2: Develop a system to tabulate illegal dumping incidences by recording annual statistics in order to better assess the problem.
- Recommendation 6-3: Analyze impact of implementing mandatory/universal collection in urban areas.

5.7 Actions Taken since 1994 ISWMP

The County commissioned a study to evaluate a rate study per Recommendation 6-1. Although a citizens’ committee group was never established several advisory groups were established to review the concept of making the waste management system a financially self-sustaining program. Both committees recommended universal, mandatory collection but without charging for the service through property tax assessment.

The County has worked at various times on various issues regarding the problem of illegal dumping. (Chapter 10 discusses this with regards to derelict automobiles.) Community groups, such as Community Work Day through Keep America Beautiful, have assisted the County in trying to assess the best ways to prohibit illegal dumping



incidences. In 2006, the Mayor appointed members to an Anti-Litter Task Force which supported the current campaign to abate litter.

Although there has been much discussion on the issue of implementing mandatory/universal collection in urban areas, the County has not made any specific policy change since the 1994 ISWMP.

5.8 Collection in Maui

5.8.1 MSW and Bulky Waste/White Goods

5.8.1.1 County of Maui

The Division is responsible for collection of single-family residential properties serviced by roads or streets meeting County standards.³ Currently, not all such property receives County service as subscription is voluntary.

In FY 2007, the Division collected from approximately 24,000 of the estimated 51,000 permanent resident households in the County of Maui. In some instances, as noted later, the Division is assisted by the Highway Division. Solid waste collection on the three islands of Maui County operates out of six separate locations or base yards that serve the population of the County. Those locations, listed in order of size, are:

1. Wailuku Base Yard
2. Makawao Base Yard
3. Lahaina Base Yard
4. Lanai Landfill
5. Molokai Base Yard
6. Hana Base Yard

5.8.1.2 Island of Maui

Collection services begin early in the day out of the four base yards on the Island of Maui:

1. Wailuku Base Yard
2. Makawao Base Yard
3. Lahaina Base Yard
4. Hana Base Yard

Each of these base yard facilities is described in the following paragraphs.

Wailuku Facility

The Wailuku Facility is located at 1827 Kaohu Street and is the home base of the Collection



Photo 5-8. Collection base yard in Wailuku has one small office.

³ Commercial collection of communities not meeting County road standards (often gated communities), multi-family and business establishments is not managed by the Solid Waste Division and is outside the scope of this Plan Amendment.



CHAPTER 5 – MSW, WHITE GOODS, AND BULKY WASTE COLLECTION

Section. It is responsible for curbside collection of waste in the most populated areas of the County. The facility has the largest number of collection vehicles (14) and the largest number of employees (23) of all of the collection base yards. As a result, crews for the Wailuku section service the largest number of collection points and collect the largest quantity of solid waste materials, approximately 45,000 tons in FY2006. Wailuku provides service for the Wailuku-Kahului, Kihei-Makena and Paia Community Plan areas. Of the approximately 31,000 households in these Community Plan areas, 13,506 receive refuse collection service from the Collection Section based at the Wailuku facility.

The Wailuku Base Yard is owned and operated by the Highway Division, and the Division Collection Section is essentially a tenant. The Collection Section is assigned one small office, a parking area for its staff, and 14 collection vehicles.

The maintenance facility at the Wailuku Base Yard is operated by the Highway Division and handles all repairs and purchases of sanitation collection vehicles and landfill equipment. Since several other operations other than solid waste collection work out of this site, space is limited. Only equipment for the Wailuku Collection Base Yard is repaired by the Fleet facility located in Wailuku.

All County refuse drivers, as employees of the Collection Section, work under the "task" system as outlined in the Union contract signed initially in the 1970s by the County and Union and effective on July 1, 1993.⁴ The task system in solid waste collection is common throughout the U.S. refuse collection industry, both public and private. If the worker finishes his/her route and corresponding duties before the end of the shift, then he/she can leave work but still be paid for a full day's work. In Maui, this work practice is referred to as "Uku Pau."

As long as routes are equitably distributed, this system can promote efficiencies and good morale. Maui County's agreement with the Union, however, limits the efficiencies to the County by limiting the number of stops per day per route: 350 stops per day for manual collection routes and 1,000 stops per day for automated routes. There is a section in the Agreement that provides additional pay if the number of stops in the Agreement is exceeded.

From the Wailuku Base Yard location, the Collection Section operates the following routes:

- 7 automated routes – 9 trucks total⁵
- 2 rear-loader routes – 3 trucks total; crew size is 3.
- 1 white goods collection truck⁶; crew size is 2.

⁴ Task Work Policies for Refuse Collection Operations.

⁵ One route is assigned one truck and crew; trucks in excess of the number of routes indicated are back-up trucks.

⁶ Bulky waste trucks do not have fixed routes but are routed on a daily basis depending on the location of the residents who call for service.



Collection

From the Wailuku Base Yard, the Collection Section operates two different types of weekly MSW collection routes and trucks, ASLs and manual rear-load, as discussed in the following paragraphs.

Automated Side-Loading (ASL) Routes

The County's ASL vehicles have a one-man crew and collect single-family residential waste set out in wheeled 96-gallon carts twice a week. Residents receiving service provided by automated equipment operating out of the Wailuku Base Yard either receive twice-per-week collection of garbage service on a Monday and Thursday schedule or a Tuesday and Friday schedule.

These automated routes (one truck per route) service between 680 and 960 homes per day and complete their assigned routes generally within a ten-hour day. Drivers on these units are scheduled to work four ten-hour days per week - Monday, Tuesday, Thursday and Friday. Overtime payment is reported to be rare for these routes except when a mechanical breakdown of equipment occurs.

These daily workloads, however, are unbalanced because initial routing of the automated equipment compensated for areas where large growth was anticipated. These routes initially received fewer homes in anticipation of this growth. After more than two years, these route imbalances remain in the automated collection system as indicated in Table 5-2.

Currently, routes continue to grow as a result of housing construction and the annexation of neighborhoods into the County collection system. A system of computerized routing would allow the County to operate fewer routes and optimize the routing to address the growth as it occurs instead of routing fewer stops per truck in anticipation of the housing growth. Routes are currently established based upon the total time to run the route, including the trips to and from the base yard, the times to dump at the landfill, anticipated growth, and the time picking up individual stops. Other key indicators of balance are tonnage for the individual routes (data not available) and the number of stops per day. This is shown for the seven automated routes in Table 5-2.

Table 5-2 – Wailuku-based Automated Routes

Route Area	Number of Stops Per Week ¹	Average Stops Per Day
A-1	3,392	848
A-2	3,748	937
A-3	3,312	828
A-4	3,182	796
A-5	2,928	732
A-6	2,722	681
A-7	3,004	751
Overall	22,288	796

¹Stop is used to describe one curbside pickup of refuse or recyclables from a residence or business. For the Collection Section, which collects from residences, stop equals residence.



Manual Routes

The rear-loading collection vehicles operate five days per week with a three-member crew: one Refuse Collection crew leader and two Refuse collectors. Their scheduled work week is five days at eight hours per day, which are the terms of their Union contract.

These crews collect between 231 and 242 homes per day on a once-per-week collection basis. The terms of their Union contract specify collection of 1,750 homes or less per week (350 homes per day) per crew. Stops collected by a crew over the 1,750 limit are paid at an additional rate of one minute for each account in excess of 1,750 per crewmember as additional compensation.

Refuse is placed in customer-owned, 32-gallon containers (a maximum of six is allowed by ordinance) or 32-gallon plastic bags with a 50-lb. weight limit per can/bag. These routes are not well balanced. In addition, the manual collection routes work primarily in the Makawao area, and these routes require some additional travel time. More detailed information for the two manual routes is shown in Table 5-3.

Table 5-3 - Wailuku-based Manual Routes

Route Area	Number of Stops Per Week	Average Stops Per Day
W-1	1,209	242
W-2	1,153	231
Overall	4,362	236

Makawao Base Yard

Solid Waste Collection crews provide service to the “Upcountry” residents, including Makawao, Pukalani, and Kula out of the Makawao Highway Division Base Yard located at 1295 Makawao Ave in Makawao. The Collection Section has seven trucks and 14 staff members assigned to the Makawao base yard.

The Collection Section employees have no area for meetings, training, or assembly in the facility. There are parking spaces for the seven collection vehicles in the yard.

Of the approximately 8,500 households in the Makawao-Pukalani-Kula (Upcountry) Community Plan area, 6,696 receive refuse collection service on a once-per-week basis. These homes are serviced out of this location by four manual routes daily, where each truck on the route is staffed by a crew of three. An estimated 6,805 tons of waste was collected in Fiscal Year 2006.

From the Makawao Base Yard location, the Collection Section operates the following routes:

- 4 rear-loader routes – 6 trucks total
- 1 white goods collection truck

These crews manually collect between 312 and 368 homes per day on a once-per-week collection basis. Refuse is placed in customer-owned, 32-gallon containers or



plastic bags. Almost all routes require two loads per day to the Central Maui Landfill. More detailed information for the four manual routes is shown in Table 5-4.

Table 5-4 – Makawao-based Manual Routes

Route Area	Number of Stops Per Week	Average Stops Per Day
M-1	1,688	338
M-2	1,609	322
M-3	1,560	312
M-4	1,839	368
Overall	6,696	335

The on-site supervisor at this location reports to the Collection Section supervisor. Highway Division personnel at the Makawao Base Yard perform all maintenance on solid waste collection equipment.

Lahaina Base Yard

The Lahaina solid waste collection operation works out of the Highway Division base yard. This facility is located at 3310 Honoapiilani Highway in Lahaina. The Collection Section has four trucks and six staff members assigned to the Lahaina base yard. There is no dedicated office space assigned to the Collection Section and no specifically assigned parking places for the vehicles.

Of the approximately 7,050 households in the Lahaina Community Plan area, 2,421 receive refuse collection service on a once-per-week basis. These households in Lahaina, Kaanapali, Kahana and Napili are serviced by four trucks on two routes, operated by six employees. This essentially provides two back-up vehicles for four routes. There is no on-site Collection Section supervisor for the Lahaina Crew.

The rear-loading collection vehicles operate five days per week with a three-member crew: one refuse collection crew leader and two refuse collectors. Their scheduled work week is five days at eight hours per day.

These crews manually collect between 138 and 367 homes per day on a once-per-week collection basis. Refuse is placed in customer-owned, 32-gallon containers or 32-gallon plastic bags. These routes are smaller because of the travel time required to go to the Central Maui Landfill when the trucks are filled. More detailed information for the two manual routes is shown in Table 5-5.

Table 5-5 – Lahaina Based Manual Routes

Route Area	Number of Stops Per Week	Average Stops Per Day
L-1	1,224	245
L-2	1,197	239
Overall	2,421	242

On average collection days, two loads are taken from Lahaina to the Central Maui Landfill (CML). On days when waste is extremely heavy, one of the spare trucks is run



CHAPTER 5 – MSW, WHITE GOODS, AND BULKY WASTE COLLECTION

on the route and loaded. Both trucks are then driven to Central Maui Landfill to be dumped with only one operator per truck. This eliminates using one truck which would have to make two trips in one day. Otherwise, one of these trips would be in the middle of the route requiring the full crew to make the trip to CML.

A Highway Division mechanic on site performs collection vehicle maintenance at this location.

Hana Base Yard

The Hana solid waste collection service operates out of the Highway Division facility located in Hana at 35 Hana Highway. There is one collection vehicle operated by three Highway Division staff. Collection Section has no personnel assigned to solid waste collection in Hana.

Of the approximately 670 households in the Hana Community Plan area, 249 receive refuse collection service on a once-per-week basis. This is provided by one truck with three Highway Division employees. Because of the small number of customers, curbside collection is done only on Friday. The route is long and, at times, occurs on narrow roads.

General observations of Hana collection operations are:

- One rear-load manual packer;
- Crew of three people;
- The collection truck is two years old with no spare;
- Truck appears to be clean and well maintained;
- No ability to collect appliances, residents self-haul to the Hana Landfill; and
- Collection operations, including maintenance, appear to be well managed.

Olowalu Convenience Center

The Olowalu Convenience Center is unique among the facilities operated by the County in the services that it provides. As noted in Chapter 2, Olowalu serves as both a recycling center and a waste convenience center. In addition, the facility at Olowalu serves as a transfer station for refuse delivered by residents. Waste delivered by residents is loaded into open-top, roll-off containers or the one stationary compactor and then transferred to the Central Maui Landfill (CML). Green waste and bulky waste are accepted in 40-yard, open-top, roll-off boxes, and transferred to the EKO Compost operation and Central Maui Landfill, respectively. Other materials accepted at Olowalu include tires, lead acid (automobile) batteries, scrap metal, and construction and demolition (C&D) waste from “do-it-yourself” home projects.⁷ Approximately 5,000 tons of refuse and bulky waste items were transferred from Olowalu to the Central Maui Landfill for disposal in FY2006. This material was delivered to Olowalu by “self-haul vehicles;” currently, the County and private collection vehicles deliver waste to Central Maui Landfill. The Olowalu facility is operated for the County by Maui Disposal under a contract which ends in 2010.

⁷ Even though C&D waste is officially not accepted at County of Maui facilities, GBB observed some in the roll-off containers.



CHAPTER 5 – MSW, WHITE GOODS, AND BULKY WASTE COLLECTION

Maui Disposal transfers the refuse and green waste to the Central Maui Landfill as part of their contract. In FY2006, approximately 23 TPD of materials were transferred from the Convenience Center to the Central Maui Landfill six (6) days per week. This included self-haul refuse and self-haul green waste. The recyclable materials were sent to processors not to Central Maui Landfill.

5.8.1.3 Island of Lanai

Lanai Landfill

The Collection Section has no employees on the Island of Lanai. A landfill employee performs curbside collection of waste, and the collection truck is based at the Lanai Landfill located on the Kaunalapau Highway approximately four miles southwest of Lanai City.

Of the approximately 1,300 households in the Lanai Community Plan area, approximately 640 receive refuse collection service on a once-per-week basis. This is provided by one ASL truck operated by one Landfill Section employee. The supervisor of this employee and the operations is the Landfill Manager located at the Central Maui Landfill.

Residents place their refuse in 96-gallon carts which are collected on Monday. An estimated 998 tons of solid waste was collected in FY2006 from Lanai City. The Lanai Landfill has no scale, and the waste quantity was estimated in the Lanai Landfill Annual Operating Report for FY2006 using an average set-out weight of 60 pounds (640 stops X 52 weeks X 60 lbs.) as shown for the Monday route in Table 5-6.

Table 5-6 – Lanai Based Automated Route

Route Area	Number of Stops	Avg. Stops Per Day	Average On-route Time	FY2006 Avg. Wkly. Setout (lbs.)	FY2006 Waste (tons)
L-1	640	640		60	998
Overall	640	640			

General observations of Lanai operations are:

- Collection is made with fully automated vehicle;
- The base yard is at the Lanai landfill where there are minimal facilities;
- The landfill supervisor on the Island of Maui oversees the collection operation on Lanai. The absence of an on-site supervisor means minimal day-to-day oversight; and
- No ability to collect bulk waste or appliances; residents self-haul to the Lanai Landfill.

5.8.1.4 Island of Molokai

Molokai Base Yard

Solid waste collection for Molokai operates out of the Highway Division's facility located off the Maunaloa Highway in Kaunakakai. The Collection Section has no personnel assigned to Molokai; curbside collection and supervision are performed by



CHAPTER 5 – MSW, WHITE GOODS, AND BULKY WASTE COLLECTION

Highway Division personnel. The work is supervised by the Highway Division supervisor for the Island. While collecting waste, these personnel are covered by the Solid Waste Union Labor Agreement.

Of the approximately 2,400 households in the Molokai Community Plan area, 595 receive refuse collection service on a once-per-week basis. This is provided by one rear-load packer truck staffed by three Highway Division employees. There is one spare truck. Because of the small number of customers and the large geographic area, curbside collection is done on Thursday and Friday. The number of collections per day is not known.



Photo 5-9. County's flatbed truck with liftgate

General observations of Molokai collections operations are:

- Highway Division employees perform all collections;
- Collection crew is staffed by three people;
- One rear-load truck in good repair and one spare are on site;
- All equipment appears to be clean and well maintained;
- Employees appear to be well supervised;
- In discussing with GBB, personnel indicated they were receptive to continuing to perform collection operations with Highway Division personnel. It was emphasized that the decision was up to the County.

5.8.1.5 Bulky Waste and White Goods

There is no official program for the collection of bulky waste items in the County by the County crews. However, a de facto operation exists at locations, such as Hana, where the collection crew picks up bulky waste items in a rear-loader as it collects the curbside trash on its routes. There is no separate record for this activity on all three of the County's islands.

The County collects, by appointment, white goods throughout the Island of Maui, but the County does not provide this same service to the residents living in the Hana region. In addition, citizens can take the white goods to the contracted metals processor for no direct fee as discussed in Chapter 10 of this document.

The County collects the white goods in a flatbed truck with stake sides and a liftgate on the back as shown in Photo 5-9. Citizens call the collection office to make an appointment for the collection of white goods. Currently, information related to number of stops, quantity of material, cost of the collection, and number of hours worked per day is not tracked by the County. There is no record of current white good collection activity on the Islands of Lanai and Molokai.



5.9 Possible Alternatives

5.9.1 MSW

The SWRAC has advised the Division of the following recommendations that pertain to this chapter. *The numbers correspond to the order that they were provided in Chapter 1, Section 1.3.2.6.* These recommendations are:

4. Develop systems for Intra-County and Inter-island transportation of solid waste materials.
5. Provide universal curbside collection for all residences served by streets and roads meeting County standards. This would include:
 - Refuse collected once per week in a cart;
 - Single-stream marketable recyclables collected once every other week in a cart;
 - Yard and large green waste collected in cans, paper bags, or bundled, called in by route drivers if within volume and size restrictions and collected every other week;
 - Bulky waste collection on call-in (appointment) basis within ordinance limits; and
 - White goods collection, expanded to include all metals, on a call-in basis.
7. Locate a base yard and convenience center facility at the Hana Landfill site. The Hana Landfill would have landfilling minimized and receive mainly inert materials. This would provide the County with a facility on the east end of Maui, when needed. The waste received each day (four tons) will be transferred back to Central Maui Landfill using two rear-load trucks.
11. Expand Olowalu Convenience Center. This new center would include:
 - Convenience center for residential refuse and recycling drop-offs as currently operated;
 - A new base yard for County Refuse Collection Section operations serving West Maui; and
 - Transfer station for MSW, green waste and recyclable materials collected by the County refuse collection and private collectors.

The SWRAC also foresaw a need to include the infrastructure needed for ingress and egress of the facility.

In reviewing the County's collection system for household waste several possibilities emerge for both infrastructure and services.



Infrastructure: There is a fractured element to the County's collection system that comes, in part, from the splitting of crews and, in part, from the natural geographic situation Maui County finds itself in. The former exists on the Island of Maui and the latter on the islands of Lanai and Molokai.

5.9.1.1 Island of Maui

1. The County has hindered its ability to maximize efficiencies by not consolidating its equipment and personnel into one major location. Currently, there are three base yards outside of the Hana region lacking management, equipment, and space for personnel as detailed in Section 5.8 of this chapter.

Consolidating two (Wailuku and Makawao) base yards into one facility would allow one collection manager to determine the overall work needs of these two areas each day and how best to allocate personnel and equipment to meet those work needs. A central yard also allows the collection manager to more accurately account for work done, care of equipment, and dissemination of information and training important to keeping safety and professionalism at a high level.

2. The combination of these base yards, Wailuku and Makawao, should take place at a central location near the CML, i.e., disposal point. This central location should become a solid waste campus where several collection and non-collection activities are performed.
 - a) All collection vehicles currently operating in Wailuku and Makawao should be placed at this location;
 - b) A maintenance facility with four bays, each a drive-through, and one bay with a service pit should be built at the solid waste campus and operated with mechanics under the management of the collection manager. There should be one mechanic per ten collection trucks and one mechanic to work with the landfill equipment. One bay must have a floor made of a heavier concrete specifically for the heavier landfill equipment. There should be lockers and a changing room as well as bathroom and showers at the fleet facility and an office for the lead mechanic.

The purpose of this facility would be to perform preventive maintenance and minor repairs. The hours of the facility should be offset from the hours the collection crews are operating on their routes. Having the collection vehicles ready for work in the morning is the primary objective of the garage. Sophisticated and technical repairs such as rebuilding transmissions and engines would be performed off site by private shops.

- c) Combined on this campus, as detailed in Chapter 4, is a materials recovery facility (MRF). If the County implements single-stream recycling collection, then having the processing point (MRF) near the base yard saves time in the routes. Locating both, MRF and base yard, near the disposal point for MSW saves time in the routes for collecting household trash. By combining the MRF onto this site, mechanics in fleet maintenance can be trained on routine maintenance of the MRF equipment and assist with its maintenance as well.
- d) This solid waste campus would become the center of solid waste activities on the Island of Maui. As such, administrative offices for diversion, engineering,



CHAPTER 5 – MSW, WHITE GOODS, AND BULKY WASTE COLLECTION

budget and administration should be relocated to this location. Having management at the site where a major portion of the work is being conducted is as important to morale and efficiency as it is for direct and specific understanding by managers of those work duties.

- e) Since bulky waste trucks would be based on campus, the triage of material where items will be siphoned off to a reuse facility should take place on the solid waste campus. A reuse facility, much like the Last Chance Mercantile the SWRAC tour group visited in Monterey, California, could be supplied by both the collections and the landfill operations. Such a facility can be located in a new solid waste campus.
3. The lack of facilities in Lahaina and the transporting of material from that area to the disposal point provide a combined opportunity for a base yard and more economical transportation.

The Olowalu Convenience Center has the natural elevation differential that would allow for a relatively low-cost, enclosed transfer facility to be built that would consolidate loads. The results would be lower cost per ton and less trash trucks on the highway from Olowalu to the disposal point.

A transfer station would serve as a “remote gate” for the Central Maui Landfill to service the far western part of the Island of Maui. Both County and private industry collection vehicles would be encouraged to use this facility to move their waste to the Central Maui Landfill. This facility would diminish the amount of waste collection equipment traffic on the Honoapiilani and Kuihelani Highways.

By providing this facility and charging a tipping fee, revenues from the use of the facility by the private sector can offset the cost of the facility. Table 5-7 shows the FY 2006 quantities of material at Olowalu and the estimated quantities of materials managed by Olowalu after the construction of the new transfer facility. The projected increase in County collection and green waste will result from the County offering universal collection in the Lahaina/Westside region to all qualifying residences. Because waste material is collected at the curb for residences, it is estimated that the quantity of self-haul waste will drop.

Table 5-7 - Olowalu Facility Material Quantities

Material	FY 2006 Quantity (tons)	Projected Transfer Station Quantity (tons)
County Collection Vehicles	3,800 ⁸	7,600
Private Firm Collection Vehicles		9,000
Self-Haul Vehicles	4,763	1,200
Green Waste	2,259	4,000
Scrap Metal	35	35
Drop-off Recycling	117	25
TOTAL	10,974	19,860

⁸ FY2006 refuse taken directly to Central Maui Landfill.



CHAPTER 5 – MSW, WHITE GOODS, AND BULKY WASTE COLLECTION

The one-way trip to Maui Central Landfill is about 25 miles and takes an estimated 45 minutes one way. At seven tons per load, the average cost of transport of the waste is estimated at \$31 per ton. The cost per ton will be lower if more material is in each load.

As shown in the comparison in Table 5-8, the proposed transfer station would move the materials it receives, both waste and recyclables, to the Central Maui Landfill and the single-stream MRF in 53-foot aluminum walking-floor trailers. (The single-stream MRF is discussed in the section on Recyclable Materials Processing Facilities.) Each trailer would be legally capable of carrying 20 to 22 tons of materials per load as opposed to the 5 to 9 tons per load currently hauled. This consolidation would reduce the solid waste traffic on the Honoapiilani Highway to one-third of its current level. Recent proposals by private-sector companies to perform similar work on the mainland have produced proposals with transportation costs of \$15.00 to \$18.00 per ton for hauls of similar length and time. If a \$20 per ton cost is used for the Olowalu transfer operation, the estimated saving is \$11 per ton from the current transportation cost. In addition, the transfer operation reduces traffic and will lower emissions.

Table 5-8 – Comparison of Current and Recommended Facilities

	Current	Recommended
Operation	Convenience Center	Transfer Station
Tons to Central Maui Landfill per Load	5 to 9 Tons	20 to 22 tons
Cost per Ton	\$31.00	\$20.00
Revenue	No	Yes
Traffic, Solid Waste Trips	Increases	Decreases
Personnel Facilities	No	Yes

4. Hana Region: The SWRAC unanimously recommended placing the Hana Landfill on Standby with Permit and transport the waste back to the Central Maui Landfill. The Hana Landfill receives an estimated four tons a day, if that.

It is possible to construct a convenience center at the Hana Landfill where customers place these four tons into the back of a roll off truck and every two days it is taken to the Central Maui Landfill and unloaded.

This convenience center would include space for two rear-load trucks, a small office, restroom facilities, and small meeting area. With this facility in place and the Hana Landfill on "Standby with Permit," rear-load containers should be placed at the facility for resident loading and for use when the rear-loader trucks are on collection routes or are shuttling between the Hana Transfer Facility and the Central Maui Landfill.

When the collection trucks are parked at the facility, citizens can place trash directly into the rear hopper of the rear-load collection truck, which holds three cubic yards of trash. Citizens would load the hopper, and the collection staff would periodically start the truck and compact the trash into the body. The rear-load containers would be emptied into the truck in addition to the route refuse.



CHAPTER 5 – MSW, WHITE GOODS, AND BULKY WASTE COLLECTION

When the truck is full, it would be shuttled back to the Central Maui Landfill and dumped. The servicing and maintenance of the vehicles based in Hana would be at the new solid waste campus located near the Central Maui Landfill. When maintenance would require several days, the Hana-based truck would be replaced with a spare based at the new central base yard.

Major changes would occur at the Hana operations.

- Collection trucks would be small with only a single rear axle to navigate the road between Hana and Central.
- A drop-off facility would be added to the landfill site.

Currently, personnel are required for collection of refuse only one day a week and are provided by the Highway Division. Under the new system, they would collect materials two days per week and be shuttling from Hana to the Central Maui Landfill to dump and to the new central base yard for scheduled maintenance. Because there would still be some un-utilized time, it is suggested that the collection group collect refuse and recyclables from County facilities, schools, administrative offices, parks, etc.

Under the new, universal collection system, it is anticipated that the number of residences serviced would double to about 600.

- Containers (rear-load type) would be placed at the drop-off area for residents to deposit refuse and recyclables when the trucks are on route.
- Employees would drive trucks to the Central Maui Landfill and MRF for the disposal of waste and the processing of the recycling materials collected. The maintenance would be done at the Central facilities and spares would be available to swap out for larger maintenance requirements. This shuttle activity is anticipated to be twice per week for the refuse collection vehicle and once per week for the recycling and green waste collection vehicles.
- The County would provide a cart for refuse collection, which would be collected by a semi-automated, rear-loader vehicle operated by two employees out of the Hana Landfill. This same vehicle, as it is making its refuse collection, would also collect any bulk waste materials that might be placed out for service.
- A vehicle, knuckle-boom or flatbed with a liftgate, should be located at the Hana Landfill also to collect any metals set out for collections.
- On non-collection days, staff not utilized in shuttle activity would be applied to the staffed convenience center at the Hana Landfill. Operation hours and personnel schedules would need to be developed.

Table 5-9 – Hana Universal Collection Routes

Route Area	Number of Stops	Average On-route Time	Projected Quantity (tons)	Weekly Projected Set-out (lbs)
Refuse-1	600	8 Hrs	6.3	42 lbs



5. White goods would be scheduled for curbside collection on an ongoing basis. Trucks collecting white goods would be driven back to the solid waste campus or directly to a processor.

5.9.1.2 Island of Lanai

1. The landfill can be placed on Standby with Permit and have its daily household garbage shipped off island. This can be done with a fixed compactor compressing the garbage into the container to be shipped.

The Lanai Landfill is not equipped with truck scales so the County estimated the total quantity of waste disposed at Lanai Landfill from July 1, 2005 through June 30, 2006 to be 5,127 tons. This is equivalent to 14.0 tons per day (365 day/year basis) or 19.7 tons per operating day (the site is open 5 days a week).

This compacted material will be shipped to a disposal point off island either by Young Brothers or storing the containers before moving them off site at one time.

2. The landfill would become a convenience center where self-hauls place their material into recycling or garbage containers. Each would be shipped off island for processing and disposal respectively.
3. Each landfill would have trained, certified personnel and equipment to perform removal of Freon from white goods.
4. A knuckle-boom truck would be provided to the Lanai crew to perform both bulky waste and white good collection on a regular basis. These items will be triaged at the landfill for possible reuse and recycling on Lanai.

5.9.1.3 Island of Molokai

1. A possible option is to place this landfill on Standby with Permit and have its daily household garbage shipped off island. This can be done with a fixed compactor compressing the garbage into the container to be shipped.
2. Based on current estimates by the County, the average daily volume during calendar year 2006 was 6,421 tons, or 17.6 tons per day on a 365-day/year basis. It is important to note, however, that there is uncertainty in the estimated weights. Although scales are at the site, only commercial waste hauling vehicles (51 percent of estimated volume) are weighed. County collection vehicles, residential self-haul vehicles and bulky waste deliveries are estimated using population and estimated weights of typical deliveries.

This compacted material would be shipped to a disposal point off island either by Young Brothers or storing the containers for a while and moving them off site at one time.

3. The landfill would become a convenience center where self-hauls place their material into recycling or garbage containers. Each would be shipped off island for processing and disposal respectively.



4. A knuckle-boom truck should be provided to the Molokai crew to perform white good collection on a regular basis. These items will be triaged at the landfill for possible reuse and recycling on the island. The remainder will be sent off island to be processed.
5. The landfill would have personnel trained, certified, and equipment to perform evacuation of Freon from white goods.
6. The Landfill can provide the space for a reuse facility.

5.9.1.4 Customer Service Center

A customer call center could be placed on the solid waste campus servicing all three of the County's inhabited islands. It would have people trained in the services, locations, rules and regulations for which the Division is responsible.

Customer service involves both the frontline interaction of crews and also handling resident/citizen calls and requests. The County currently does not have a customer call center or a single number for a citizen to call for information. Seven phone numbers are listed in the phone book. When one calls any of these numbers, there is no assurance that the phone will be answered or the request tracked to completion.

Customer service technicians would be trained to treat residents calling in with the utmost professionalism. The County should want callers to feel that they are a hundred percent satisfied.

The County should obtain an off-the-shelf software system which manages calls, generates work orders, tracks work order status, and closes them out when completed. The County may currently be looking to engage a single call number for all of its services, so the software that is chosen should be agreed to by the project manager of this long-range customer service consolidation and MIS.

To achieve the goal of a hundred percent customer support, the customer service technicians must first be trained in how best to respond. Excellent customer service skills are critical in maintaining and increasing customer satisfaction. It takes skill in making even the most difficult caller feel that the interaction has been a positive one. Such skill in positive interaction will reduce repeated calls.

The supervisor of the customer call center would have to continually motivate the customer service technicians to provide the customer support anyone would want: courteous, helpful, and quick to prevent a problem.

All collection, as well as other, programs shall have the same number publicized on all of the Division's media releases, brochures, radio messages, location signage, and website.

During times when new collection programs are implemented, the number of people available should significantly increase, i.e., double, as should the time during the day the customer call center is operational.

Customer service technicians are as good as the training and the equipment provided to them. The system for the center should have adequate number of phone lines, broadband internet access, and any modifications the off-the-shelf software that is



needed to interconnect operations with the call center. Customer service technicians should have the ability to look up addresses and provide quick information on collection day, white goods collection appointments, and any other activity.

All calls should be tracked by type (work asked for), location, date and route of service. These reports will enhance the County's ability to refine services to the residents.

5.10 Plan Recommendations

5.10.1 Goal

To divert materials away from landfilling and illegal dumping in an efficient and pragmatic manner and to collect all materials in a manner that promotes recycling and cost efficiency.

5.10.1.1 MSW

Manual collection should be discontinued and replaced with automated collection and semi-automated collection where fully automated is not possible.

5.10.1.2 Bulky Waste/White Goods

Citizens meeting the County's requirements should have services available to them for bulky waste and white goods collection.

5.10.2 Strategies to Meet Goal

5.10.2.1 Island of Maui

The SWRAC recommended that the County implement a universal curbside collection. "Universal" collection specifically means for all residences served by streets and roads meeting County standards, and that this collection service includes the following:

- Refuse collected once per week in a cart;
- Bulky waste collection on call-in (appointment) basis within ordinance limits; and
- White goods collection, expanded to include all metals, on a call-in basis.

Implementing this activity so as to minimize cost, the central area on the Island of Maui will require some infrastructural and organizational changes. The latter, of course, will need to be discussed and negotiated with the Union.

5.10.2.1.1 Wailuku

The plan calls for the Division to discuss with the Union combining the Wailuku and Makawao base yards at one centrally-located solid waste campus. This would provide for a greater utilization of equipment and personnel.



5.10.2.1.1.1 MSW

The Division will implement once a week garbage collection using only automated collection vehicles and carts and, if needed, semi-automated collection vehicles with carts. The Division will also transform the existing Olowalu Convenience Center into an enclosed Transfer Station whereby garbage will be consolidated into large solid waste transfer trailers and transferred to the Central Maui Landfill thereby lowering transportation costs. This Transfer Station will be used as a base yard for the Lahaina collection operations.

5.10.2.1.1.2 Bulky Waste/White Goods

Both bulky waste and white goods shall be collected by appointment. The citizen will call in and place a request for collection of a specified number of goods. The Division will inform the citizen of the day of the collection and the manner in which the material is to be placed for collection. A collection vehicle will travel to the address and collect the material. Collection of material will be in one of the following vehicles: knuckle-boom truck can collect both bulky waste and white goods; rear-load compactor collection vehicle collect just bulky materials; flat-bed truck with a liftgate collects both types of materials.

5.10.2.1.2 Makawao

The ISWMP calls for the Division to discuss with the Union combining the Wailuku and Makawao base yards at one centrally located solid waste campus. This would provide for a greater utilization of equipment and personnel.

5.10.2.1.2.1 MSW

The Division will implement once-a-week garbage collection using only automated collection vehicles and carts and, if needed, semi-automated collection vehicles with carts.

5.10.2.1.2.2 Bulky Waste/White Goods

Both bulky waste and white goods shall be collected by appointment. The citizen will call in and place a request for collection of a specified number of goods. The Division will inform the citizen of the day of the collection and the manner in which the material is to be placed for collection. A collection vehicle will travel to the address and collect the material. Collection of material will be in one of the following vehicles: knuckle-boom truck can collect both bulky waste and white goods; rear-load compactor collection vehicles collect just bulky materials; flat-bed trucks with a liftgate collect both types of materials.

5.10.2.1.3 Hana

5.10.2.1.3.1 MSW

The Division will implement once-a-week garbage collection using only semi-automated collection vehicles with carts.

5.10.2.1.3.2 Bulky Waste/White Goods

Bulky waste shall be collected by rear-loading collection vehicles. The number of collection units is small enough to allow citizens the privilege to set out bulky waste on any collection day. Since the garbage collection is and will continue to be performed by rear-loading trucks, bulky waste can be collected simultaneously.



White goods, however, shall be collected by appointment. The citizen will call in and place a request for collection of a specified number of goods. The Division will inform the citizen of the day of the collection and the manner in which the material is to be placed for collection. A collection vehicle will travel to the address and collect the material either in a knuckle-boom or flat-bed truck with a liftgate.

5.10.2.1.4 Island of Lanai

5.10.2.1.4.1 MSW

The Division will continue to collect garbage in a cart using only automated collection vehicles.

5.10.2.1.4.2 Bulky Waste/White Goods

Both bulky waste and white goods shall be collected by appointment. The citizen will call in and place a request for collection of a specified number of goods. The Division will inform the citizen of the day of the collection and the manner in which the material is to be placed for collection. A collection vehicle will travel to the address and collect the material. Collection of material will be in one of the following vehicles: knuckle-boom trucks can collect both bulky waste and white goods; rear-load compactor collection vehicles collect just bulky waste; flat-bed trucks with a liftgate collect both types of materials.

5.10.2.1.5 Island of Molokai

5.10.2.1.5.1 MSW

The Division will implement once a week garbage collection using only semi-automated collection vehicles with carts.

5.10.2.1.5.2 Bulky Waste/White Goods

Bulky waste shall be collected by rear-loading collection vehicles. The number of collection units is small enough to allow citizens the privilege to set out bulky waste on any collection day. Since the garbage collection is and will continue to be performed by rear-loading trucks. Bulky waste can be collected simultaneously.

White Goods, however, shall be collected by appointment. The citizen will call in and place a request for collection of a specified number of goods. The Division will inform the citizen of the day of the collection and the manner in which the material is to be placed for collection. A collection vehicle will travel to the address and collect the material either in a knuckle-boom or flat-bed truck with a liftgate.

5.11 Implementation

5.11.1 Implementation Items

The Division will submit a request for capital funding to Council.

Changes to the ordinances in Chapter 15-108 will have to be made. These should be done prior to implementation. The changes include the following:

- Definition of semi-automated collection;



CHAPTER 5 – MSW, WHITE GOODS, AND BULKY WASTE COLLECTION

- Definition of Bulky Waste that limits material to large, inorganic items, such as furniture and mattresses;
- Eliminate references to manual collection; and
- Eliminate all references to garbage collection of more than once a week. There will be no bags allowed to be set out, but there can be two wheeled carts set out for weekly collection.

The Division will procure the necessary collection vehicles and equipment to provide collection in all areas of the County. These will include automatic side-loaders, knuckle-boom trucks, flat-bed collection vehicles, lifters for existing rear-load collection vehicles, and carts.

Carts need to be provided to all those residents who currently place their MSW in privately-owned trash cans and bags. Place lifters on the rear-load collection vehicles. Implement a work-order system for white good and bulk item collections. Begin collecting bulky waste and white goods in all areas of the universal collection area specified by the SWRAC.

The Division will procure the services of an architect and engineer to assist in the transformation of the Olowalu Convenience Center into an enclosed transfer station. The following tasks will need to be performed:

- The Division will create a conceptual design with cost estimates to provide to Council for funding approval;
- After funding approval, the Division will produce a request for proposals procurement package for the construction of the transfer station;
- After contract negotiations have been completed, the contractor and the Division will work through the permitting process and traffic study; and
- Final construction documents will be developed and implemented.

5.12 Summary

This chapter reviewed the tools and strategies commonly used in the collection of MSW, bulky waste, and white good collections. The Division plans to implement the SWRAC's recommendation to provide universal service for citizens living on streets and roads meeting County standards for once-a-week garbage collection on all islands within the County. The Division also plans to provide white good collection by appointment on all islands in the County. The Division will provide bulky waste collection by appointment in Central Maui and Lanai and during regular MSW collection in Hana and Molokai.