



PINELLAS COUNTY, FLORIDA 2014 WASTE CHARACTERIZATION STUDY

January 2015



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Pinellas County

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Pinellas County, Florida 2014 Waste Characterization Study

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Pinellas County, Florida

2014 Waste Characterization Study

Executive Summary

Pinellas County Solid Waste (County) contracted Kessler Consulting, Inc. (KCI) to conduct a Waste Characterization Study (WCS) of the municipal solid waste delivered to the County's Bridgeway Acres facility. The purpose of the WCS is to assist the County in developing future solid waste programs and, more specifically, to meet the following objectives:

- To characterize the Class I waste and overall materials received by the County at Bridgeway Acres.
- To compare the waste streams of municipalities with universal, carted single stream recycling to those without it.
- To determine the amount of organics in the waste stream, in particular the commercial waste stream, to evaluate the feasibility of an organics recycling program.
- To characterize the non-processable (bulky) waste that is landfilled in order to determine if any components of it could be processed and utilized as fuel in the waste-to-energy (WTE) plant. The goal is to maximize the life of the landfill and enhance WTE energy production.

KCI conducted a 10-day sampling and sorting event at Bridgeway Acres from August 18-22 and August 25-29, 2014. Representative samples from 80 loads of waste were collected and sorted into 34 defined material categories. An additional 54 loads of bulky waste were visually audited.

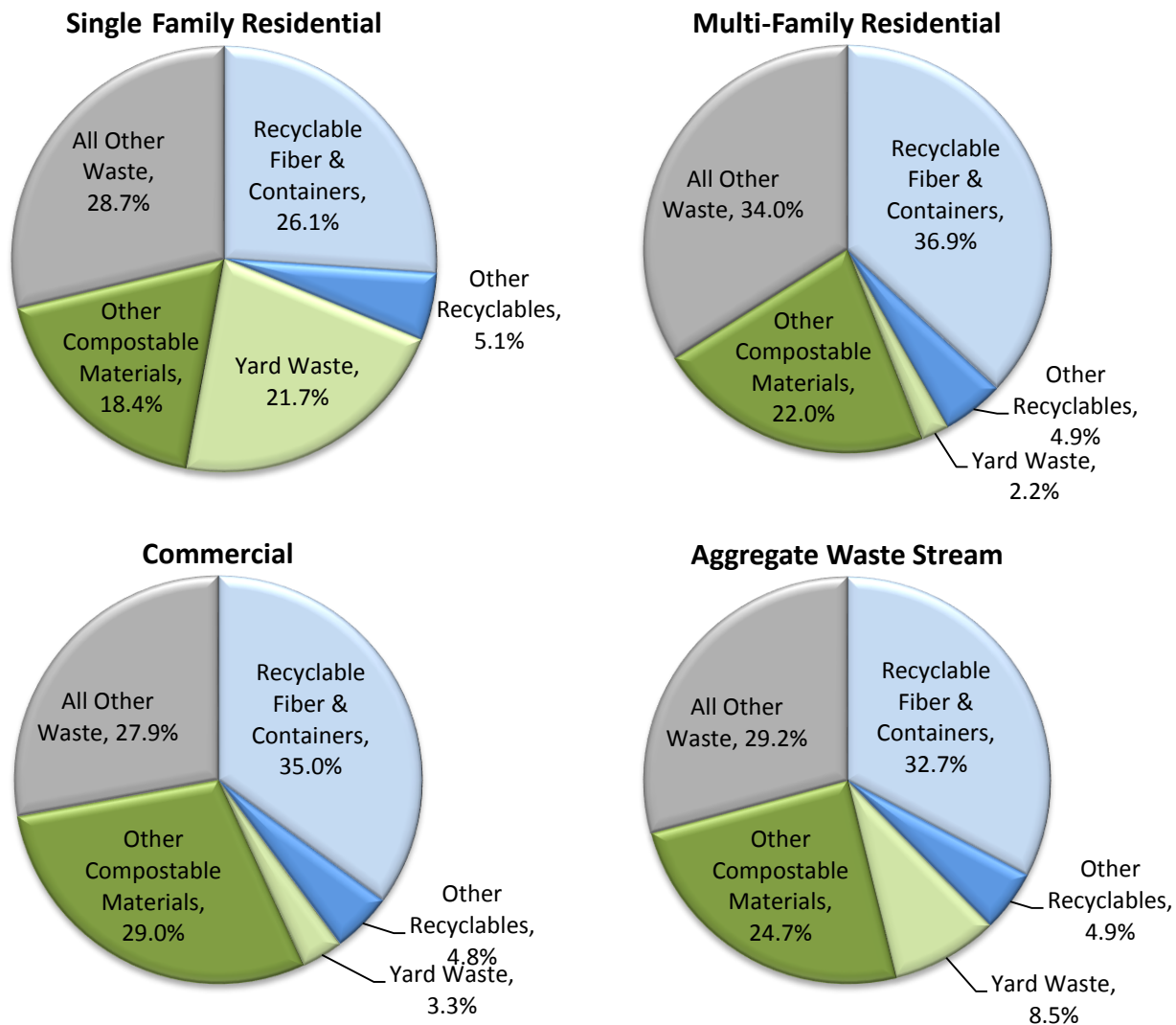
Table ES.1 and Figure ES.1 provide the composition of the waste disposed by the three main waste generator sectors included in the WCS (single-family residential, multi-family residential, and commercial), as well as the combined composition of the three sectors (Aggregate Waste Stream). The table is organized by the potential for the various material types to be diverted from disposal for recycling or composting. Key findings of the WCS are as follows:

- Nearly one-third of residential and commercial waste currently disposed consists of recyclable fiber and containers. These recyclables make up 26 percent of single-family residential waste, 37 percent of multi-family residential waste, and 35 percent of commercial waste that is disposed. Other types of potentially recyclable materials comprise an additional 5 percent of the waste stream.
- Yard waste, which could potentially be composted or mulched, constitutes 8.5 percent of the Aggregate Waste Stream. The highest percentage is found in the single-family residential waste stream, where yard waste comprises nearly 22 percent of the waste disposed.
- Food waste, which also has the potential to be composted, contributes more than 16 percent to the Aggregate Waste Stream. It contributes 12.2 percent to single-family waste, 16.5 percent to multi-family waste, and 18.5 percent to commercial waste that is disposed.

Table ES.1: Characterization of Class I Waste Disposed (% by weight)

	Material Category	Single-Family Residential	Multi-Family Residential	Commercial	Aggregate
1	Newspaper	2.0%	3.0%	2.2%	2.3%
2	Corrugated Containers	5.0%	5.9%	10.5%	8.1%
3	Office Paper	0.8%	0.8%	1.1%	1.0%
4	Other Recyclable Paper	9.3%	11.8%	11.3%	10.8%
6	Aseptic Containers	0.3%	0.6%	0.4%	0.4%
	RECYCLABLE FIBER	17.3%	22.1%	25.5%	22.5%
7	PET Bottles	1.4%	2.4%	1.5%	1.6%
8	HDPE Bottles	0.7%	1.4%	0.8%	0.9%
9	Non-Bottle Plastics #1 and #2	0.8%	1.2%	0.9%	0.9%
10	Other Plastic Containers (#3-#7)	0.8%	1.0%	1.0%	0.9%
15	Tin/Steel Cans	1.0%	1.4%	1.0%	1.1%
18	Aluminum Cans	0.7%	1.1%	0.7%	0.8%
20	Glass Containers	3.4%	6.3%	3.7%	4.0%
	RECYCLABLE CONTAINERS	8.7%	14.8%	9.5%	10.2%
11	Bulky Rigid Plastics	1.9%	1.7%	1.6%	1.7%
16	White Goods/Small Appliances	0.0%	0.0%	0.0%	0.0%
17	Other Ferrous	0.9%	1.0%	1.3%	1.2%
19	Other Non-Ferrous	0.3%	0.4%	0.3%	0.3%
24	Electronics	2.0%	1.8%	1.6%	1.7%
	OTHER POTENTIALLY RECYCLABLE MATERIALS	5.1%	4.9%	4.8%	4.9%
5	Low Grade Paper	5.2%	5.2%	6.9%	6.1%
26	Clean Wood Waste	1.0%	0.2%	3.5%	2.2%
30	Yard Waste	21.7%	2.2%	3.3%	8.5%
31	Food Waste	12.2%	16.5%	18.5%	16.3%
	POTENTIALLY COMPOSTABLE MATERIALS	40.1%	24.2%	32.3%	33.2%
12	Non-Rigid Plastic Film	4.3%	5.1%	6.2%	5.5%
13	Expanded Polystyrene	1.0%	0.8%	1.0%	0.9%
14	All Other Plastics	0.5%	0.9%	0.7%	0.7%
21	Other Glass	0.2%	0.2%	0.3%	0.3%
22	Textiles	5.4%	4.5%	2.3%	3.6%
23	Special Wastes	0.4%	0.1%	0.1%	0.2%
25	Household Batteries	0.1%	0.1%	0.1%	0.1%
27	Treated Wood Waste	3.5%	0.5%	2.8%	2.6%
28	C&D Debris	2.1%	5.7%	4.2%	3.8%
29	Tires and Rubber	1.2%	0.3%	0.5%	0.7%
32	All Other Garbage	9.5%	14.2%	7.8%	9.4%
33	Liquids	0.6%	1.4%	1.2%	1.0%
34	Grit	0.1%	0.2%	0.6%	0.4%
	ALL OTHER MATERIALS	28.7%	34.0%	27.9%	29.2%
	TOTALS	100.0%	100.0%	100.0%	100.0%
	PERCENTAGE OF WASTE STREAM	29.5%	17.1%	53.4%	100.0%

Figure ES.1: Potentially Recyclable or Compostable Materials (% by weight)



Note: For the purpose of these charts, the following material categories have been combined:

- Recyclable Fiber includes Newspaper, Corrugated Containers, Office Paper, Other Recyclable Paper, and Aseptic Containers.
- Recyclable Containers include PET, HDPE, Non-Bottle Plastics #1 and #2, Other Plastic Containers (#3-#7), Tin/Steel Cans, Aluminum Cans, and Glass Containers.
- Other Recyclables includes Bulky Rigid Plastics, White Goods/Small Appliances, Other Ferrous, Other Non-Ferrous, and Electronics.
- Other Compostable Materials includes Low Grade Paper, Clean Wood Waste, and Food Waste.
- All Other Waste includes Non-Rigid Plastic Film, Expanded Polystyrene, All Other Plastics, Other Glass, Textiles, Special Wastes, Household Batteries, Treated Wood Waste, C&D Debris, Tires and Rubber, All Other Garbage, Liquids, and Grit.

Figure ES.2 provides a comparison of the average amount of eight commonly recycled material types found in waste disposed by single-family residents without and with universal carted collection of single stream recyclables. It provides both the weighted average and the 90 percent confidence intervals for the following material types: newspaper (ONP), corrugated cardboard (OCC), other mixed paper (OMP), PET bottles (PET), HDPE bottles (HDPE), aluminum cans (AL), steel/tin cans (Tin), and glass containers (Glass). Key findings of this comparison are as follows:

- For seven of the eight types of recyclables, the weighted average was lower in waste from areas with carted single stream recycling. The exception to this is mixed paper, which has a higher weighted average in the carted single stream areas. Mixed paper typically includes junk mail, magazines, paperboard boxes, chipboard, file folders, etc. Most single stream programs likely include this type of material in the program; however, residents might not be aware that it is accepted.
- Most of the confidence intervals overlap at least somewhat, with the interval for communities with carted single stream recycling shifting somewhat lower than those without, with the exception of mixed paper as noted above. The confidence intervals for steel/tin cans and glass containers do not overlap, with those for communities with carted single stream recycling being lower. This suggests that carted single stream programs are diverting more recyclables from disposal, most notably glass containers and steel/tin cans.
- It should be noted that this is a very preliminary comparison. Because of the relatively small sample size (seven samples) for areas with carted single stream recycling, the resulting analysis shows fairly wide confidence intervals for some of the materials categories. In addition, the effectiveness of any recycling program depends in large part on the education and outreach efforts by the local government, the maturity of the program, the types of materials accepted, and other factors.
- The results demonstrate that opportunities exist to divert more recyclables from disposal in communities with and without carted single stream recycling programs.

**Figure ES.2: Material Percentages in Areas without and with Carted Single Stream Recycling
(% by weight; 90% confidence interval)**

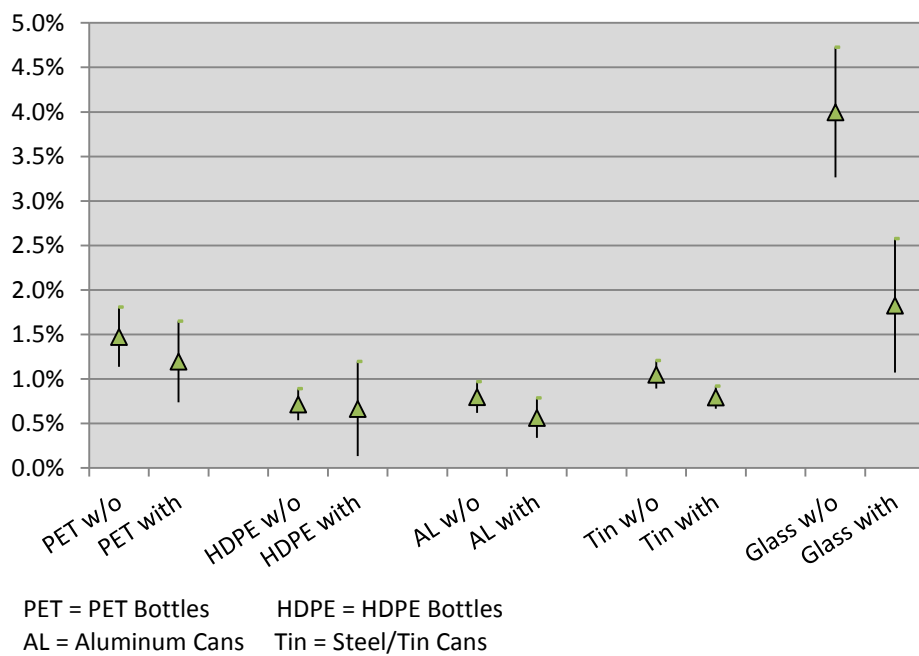
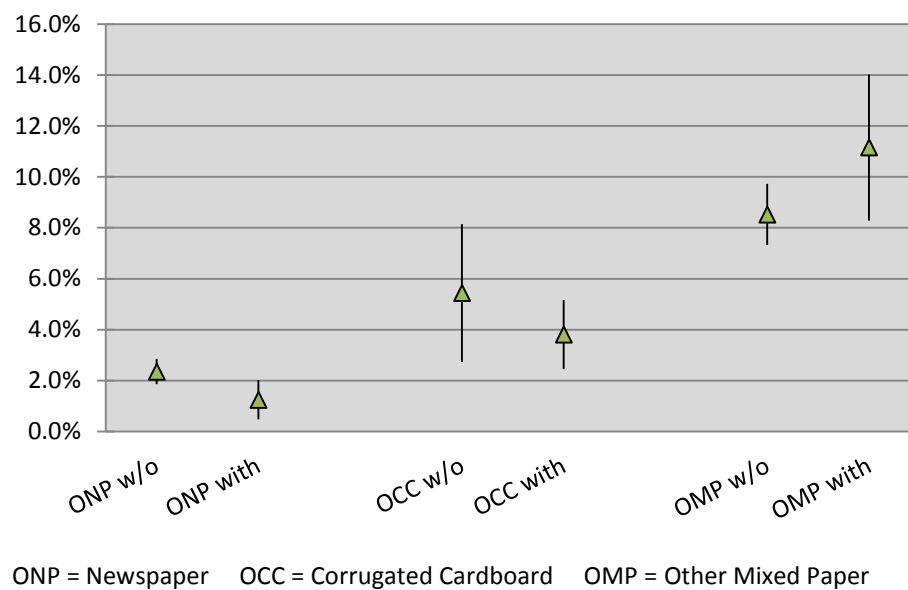


Figure ES.3 depicts the aggregate composition of the Large Organic Waste Generator samples that were collected. Figure ES.4 depicts the composition results for these three individual subsets of this sector: supermarkets, restaurants, and institutions. Key findings for the Large Organic Waste Generator sector are as follows:

- Food waste comprised approximately 31 percent of the Large Organic Waste Generator samples. On average, the supermarket and restaurant samples contained 38 percent food waste, whereas the institutional samples contained only 10.7 percent. Because of the relatively small sample size for the three subset business types, additional research is warranted to further explore whether some institutions might generate a larger percentage of food waste.
- Recyclable fiber makes up more than 27 percent of the waste disposed. On average, it comprised 24 percent of the restaurant samples, 25 percent of the supermarket samples, and 36 percent of the institutional waste samples.
- Recyclable containers contributed 10 percent to the Large Organic Waste Generator waste stream. As anticipated, the percentage of recyclables containers was greater in restaurants (14 percent) and institutions (11 percent) than in supermarkets (5 percent).

Figure ES.3: Composition of Large Organic Waste Generator Waste Disposed (% by weight)

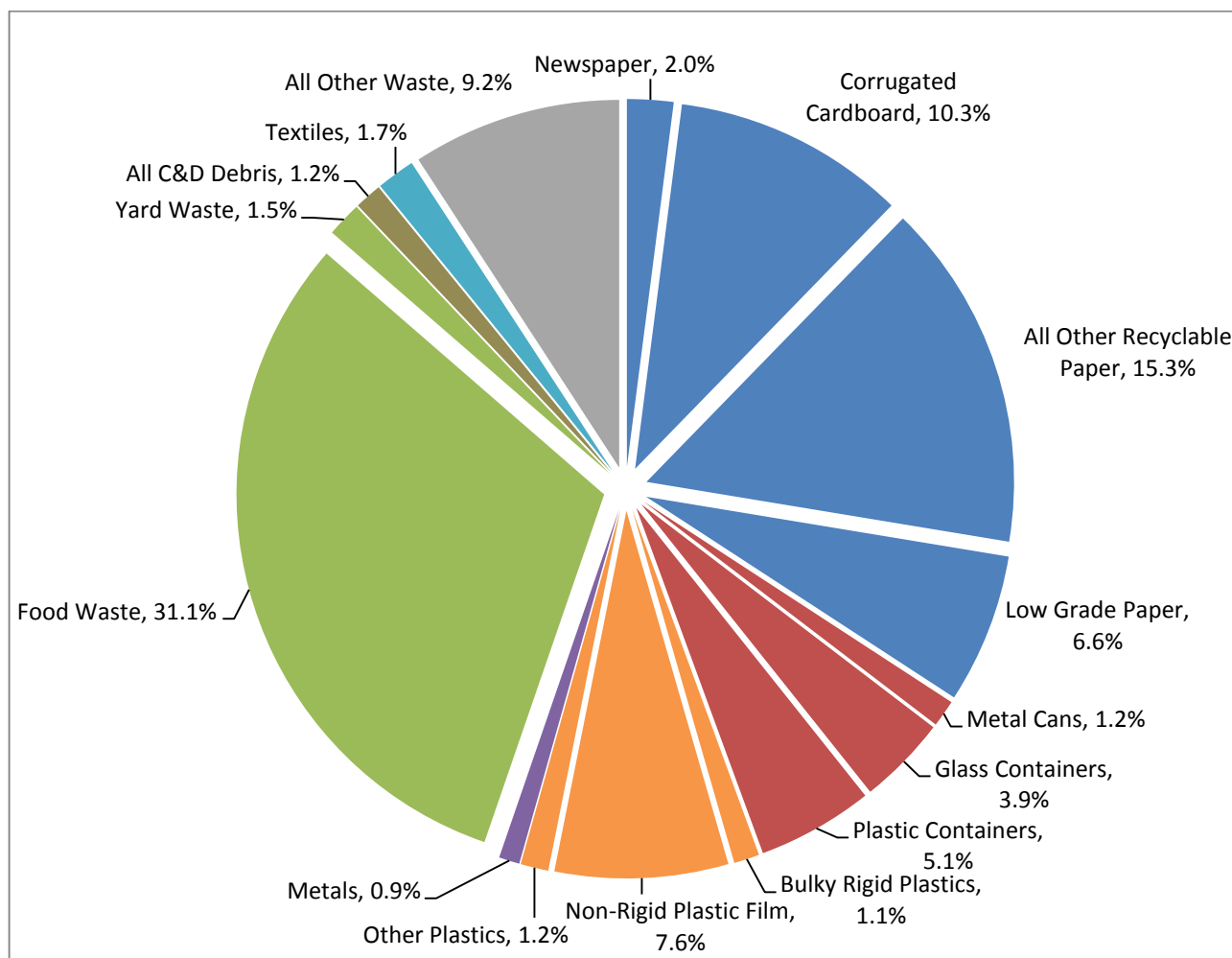
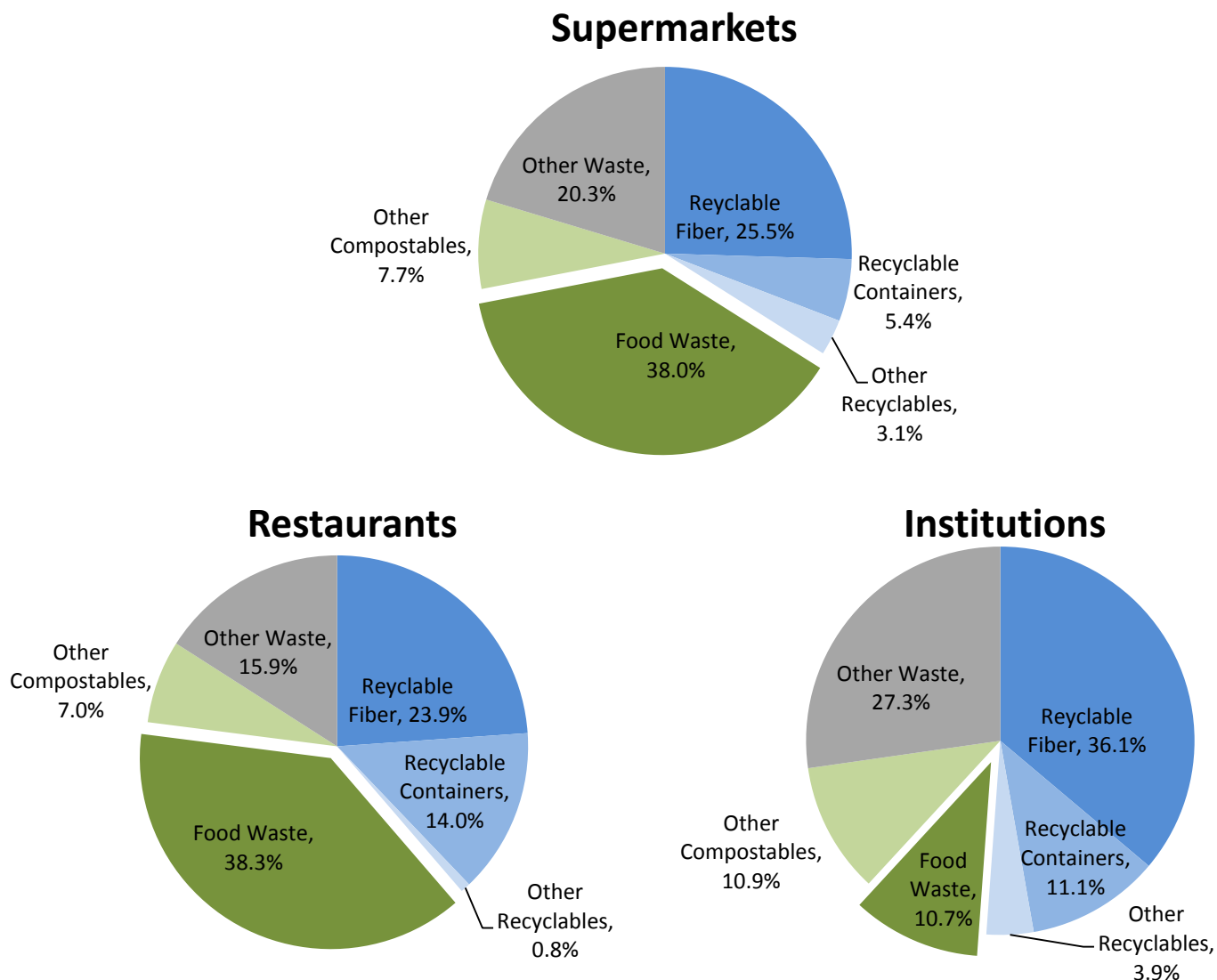


Figure ES.4: Composition of Waste Disposed by Supermarkets, Restaurants and Institutions
(% by weight)



Note: For the purpose of these charts, the following material categories have been combined:

- Recyclable Fiber includes Newspaper, Corrugated Containers, Office Paper, Other Recyclable Paper, and Aseptic Containers.
- Recyclable Containers include PET, HDPE, Non-Bottle Plastics #1 and #2, Other Plastic Containers (#3-#7), Tin/Steel Cans, Aluminum Cans, and Glass Containers.
- Other Recyclables includes Bulky Rigid Plastics, White Goods/Small Appliances, Other Ferrous, Other Non-Ferrous, and Electronics.
- Other Compostables includes Low Grade Paper, Clean Wood Waste, and Yard Waste.
- Other Waste includes Non-Rigid Plastic Film, Expanded Polystyrene, All Other Plastics, Other Glass, Textiles, Special Wastes, Household Batteries, Treated Wood Waste, C&D Debris, Tires and Rubber, All Other Garbage, Liquids, and Grit.

Table ES.2 presents the results, as a percentage by volume, of the bulky waste visual audit, as well as the conversion to percentage by weight using industry-accepted conversion factors. Table ES.3 provides the heat value, expressed in British Thermal Units (BTUs) per ton, for each material category and also estimates the potential annual tonnage for each material category based on the quantity of bulky waste received at Bridgeway Acres in FY 2014. Figure ES.5 depicts both the percentage by volume and by weight of the potentially combustible and non-combustible materials in the bulky waste stream.

Based on this analysis of bulky waste, observations during the visual audit, and additional research, the following potential diversion options were identified:

- Potentially combustible materials comprised approximately 49 percent by weight and 75 percent by volume of the loads that were audited. Materials identified as most viable for incineration based on heat value and potential to be size-reduced are Treated and Untreated Wood, Yard Waste, Rubber, and Rigid Plastics. In addition, Other Paper, Corrugated Cardboard, Carpet and Padding, Polystyrene/Insulation, Plastic Film, and Roofing Shingles could be separated for incineration.
- Fiberglass boats, if reduced in size, also have the potential to be incinerated; however, the resulting ash may contain pollutants requiring further processing before landfilling and the small glass fiber spares may cause problems to the dust filter devices. The County should further assess their system to ensure the ability to process this material.
- Yard waste could be diverted for energy conversion, or alternatively composted.
- Bulky waste also contains a substantial amount of non-combustible materials that could potentially be diverted for beneficial use.
 - Rock and gravel could potentially be used as construction aggregate.
 - Sod and dirt could potentially be added to compost or used as fill material.
 - Crushed concrete and concrete aggregates could be used for road base, ready mix concrete, asphalt pavements, soil stabilization, pipe bedding, and landscape materials.
 - Drywall, when incinerated, produces sulfur dioxide gas, which in high quantities may limit alkaline scrubbers in incinerators and reduce their ability to remove other acidic gases. However, the County's current WTE facility operator, Convanta, has indicated that small quantities of drywall mixed with other municipal solid waste is acceptable. To our knowledge, no recyclers in Florida are currently accepting post-consumer drywall for recycling. The County could explore the feasibility of incorporating drywall into its composting operations. The additional gypsum would result in a calcium- and sulfur-rich compost that is beneficial to some crops.
 - Ferrous and non-ferrous metals are readily recycled if extracted from other bulky waste.

To divert bulky waste materials for incineration or other beneficial use would require some form of sorting and processing system. Some of the material would need little more than a loader and operator to separate materials for incineration. Items larger than four feet in size would need to be mechanically processed for size-reduction to accommodate the WTE infeed. Commercial equipment capable of shredding bulky waste such as boats, mattresses, railroad ties, and carpet is available. Due to the capital investment required for a bulky waste processing system, a more detailed financial analysis is warranted to further evaluate the economic and operational feasibility.

Table ES.2: Characterization of Bulky Waste

Material Category	Weighted Average (% by volume)	Estimated Volume (cy)	Average Density (lbs/cy)	Estimated Weight (lbs)	Weighted Average (% by weight)
Corrugated Cardboard	1.6%	14	50	705	0.2%
Other Paper	1.3%	11	363.5	3,971	1.0%
Other Non-Ferrous	0.8%	7	150	1,012	0.3%
Other Ferrous	0.6%	5	150	793	0.2%
Plastic Film	1.0%	8	23	193	0.1%
Polystyrene/Insulation	1.4%	12	17	209	0.1%
Rigid Plastics	11.4%	97	50	4,869	1.3%
Yard Waste	19.5%	166	300	49,888	13.1%
Treated Wood	14.0%	119	400	47,718	12.5%
Untreated Wood	15.5%	132	400	52,844	13.9%
Carpet and Padding	0.9%	8	84.4	644	0.2%
Drywall	7.3%	62	600	37,477	9.8%
Roofing Shingles	0.4%	3	731	2,360	0.6%
Rock/Gravel/Grit	6.5%	56	1500	83,510	21.9%
Tile	0.6%	5	1214	6,121	1.6%
Concrete	4.2%	36	860	30,613	8.0%
Sod	3.6%	31	667	20,385	5.3%
Furniture	0.6%	5	145	754	0.2%
C&D Debris Bagged Waste	0.5%	4	150	632	0.2%
Glass	0.2%	1	600	810	0.2%
Other Glass	0.0%	-	-	-	-
Textiles	0.1%	1	175	114	0.0%
Rubber	1.4%	12	1350	15,795	4.1%
Dirt	0.3%	2	929	2,054	0.5%
Porcelain	0.2%	1	860	1,142	0.3%
Fiberglass	0.8%	7	17	122	0.0%
MSW	2.0%	17	225	3,934	1.0%
Boats ^a	3.5%	30	416	12,480	3.3%
	100.0%			381,146	100.0%

Note: Columns might not appear to add correctly due to rounding.

^a The density of a boat can vary greatly. The density used is based on the actual weights of boats or boat forms disposed during the week of the visual audit.

Table ES.3: Heat Values for Bulky Waste

Material Categories	Heat Value (million BTU/ton) ^a	Waste Composition (% by weight)	Estimated Annual Tonnage	Calculated Annual Heat Value (million BTUs)
Plastic Film	38.0	0.1%	20	800
Rigid Plastics	38.0	1.3%	380	14,400
Polystyrene/Insulation	35.6	0.1%	20	700
Rubber	26.9	4.1%	1,240	33,400
Corrugated Cardboard	16.5	0.2%	60	1,000
Carpet and Padding	15.2	0.2%	50	800
Textiles	13.8	0.0%	10	100
Roofing Shingles	12.0	0.6%	190	2,300
Treated Wood	10.0	12.5%	3,760	37,600
Untreated Wood	10.0	13.9%	4,160	41,600
MSW	10.0	1.0%	310	3,100
Boats ^b	8.6	3.3%	980	8,428
Fiberglass ^c	8.6	0.0%	10	86
Other Paper	6.7	1.0%	310	2,100
Yard Waste	6.0	13.1%	3,930	23,600
Other Non-Ferrous	0.0	0.3%	80	0
Other Ferrous	0.0	0.2%	60	0
Sod	0.0	5.3%	1,600	0
Glass	0.0	0.2%	60	0
Other Glass	0.0	0.0%	0	0
Dirt	0.0	0.5%	160	0
Porcelain	0.0	0.3%	90	0
Furniture	Varies	0.2%	60	Varies
C&D Debris Bagged Waste	Varies	0.2%	50	Varies
Drywall ^d	NA	9.8%	2,950	NA
Rock/Gravel/Grit	NA	21.9%	6,570	NA
Tile	NA	1.6%	480	NA
Concrete	NA	8.0%	2,410	NA
TOTALS		100.0%	30,000	170,014

NA = Not Available

^a Sources: Energy Information Administration, Methodology for Allocating Municipal Solid Waste to Biogenic and Non-Biogenic Energy, March 2007, pages 9-10.

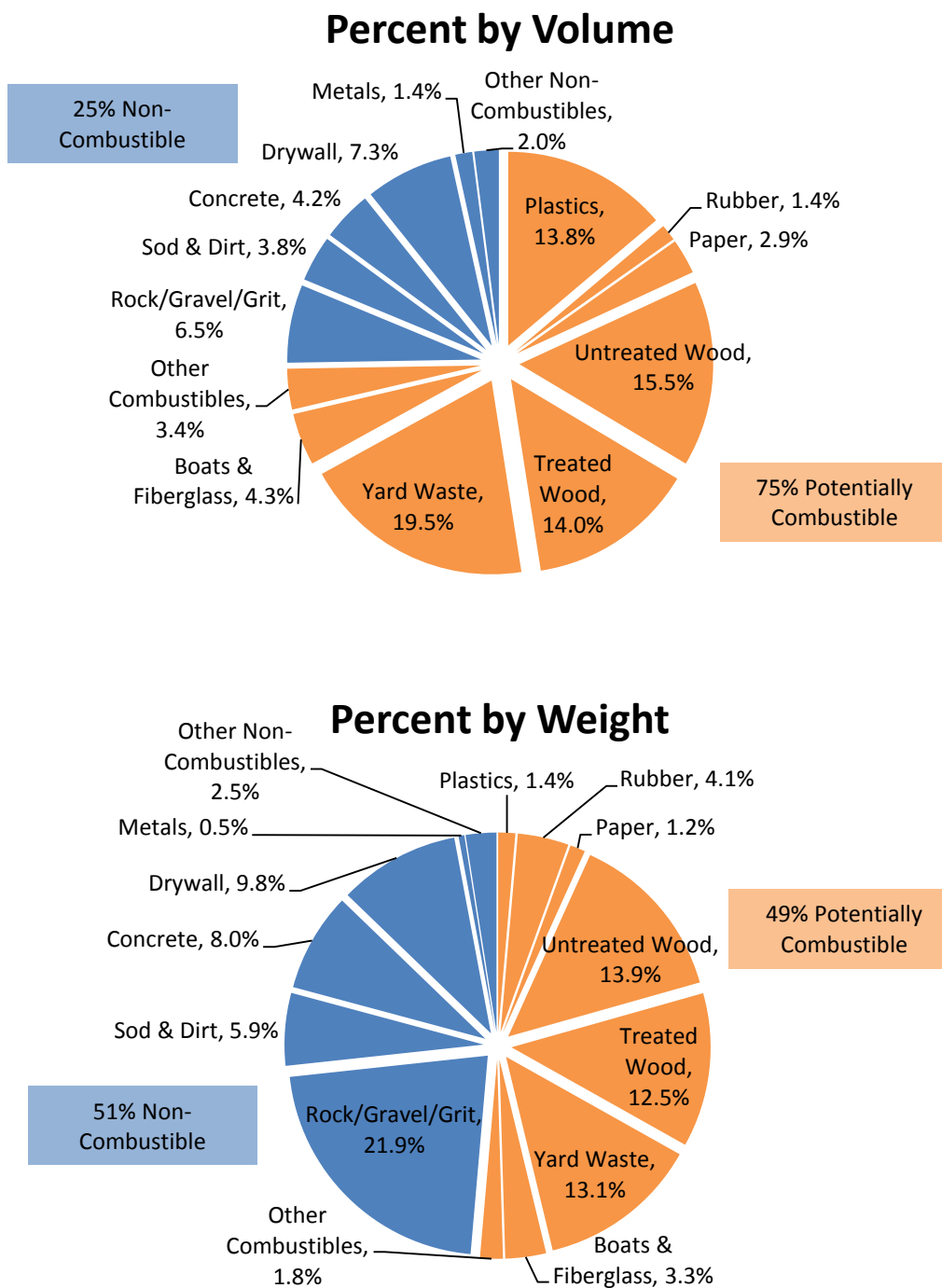
Nikolas J. Themelis and Charles Mussche, 2014 Energy and Economic Value of Municipal Solid Waste Currently Landfilled in the Fifty States, Earth Engineering Center, Columbia University.

^b Per M. Davalio, et. al. ("Mechanical Properties of Unsaturated Polyester Resin"), boat composition determined to be unsaturated polyester resin. Per "Developments in the Science and Technology of Composite Materials" (ECCM4), material has estimated heating value of 8.6 BTU/ton.

^c Category consisted primarily of jet skis and fiberglass molds; therefore, same BTU value as for boats is used for estimation purposes.

^d Drywall, when combusted, produces sulfur dioxide gas, which in high quantities may limit alkaline scrubbers in WTE facilities and reduce their ability to remove other acidic gases. Therefore, for purposes of this analysis, recovery of drywall for incineration is not recommended.

Figure ES.5: Potentially Combustible and Non-Combustible Materials in Bulky Waste



Additional details regarding the 2014 WCS are provided in the full study report. Results of the study are intended to assist the County in developing future solid waste programs, including focused and cost-effective resource recovery initiatives.

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Section 1

Introduction

1.1 Purpose

Pinellas County Solid Waste Department (County) contracted Kessler Consulting, Inc. (KCI) to conduct a Waste Characterization Study (WCS) of the municipal solid waste delivered to the Pinellas County Bridgeway Acres facility. The County's previous waste characterization study was completed in 2007. A number of changes have occurred since that time that have the potential to impact the composition of the waste stream, including implementation of carted single stream recycling by a number of municipalities and a decrease in tonnage received at Bridgeway Acres that began in 2007 as a result of the recessionary economy. In addition, the previous study focused solely on Class I waste.

The purpose of the 2014 WCS is to assist the County in developing future solid waste programs. Specifically, the County's objectives include the following:

- To characterize the Class I waste and overall materials received by the County at Bridgeway Acres.
- To compare the waste streams of municipalities with universal, carted single stream recycling to those without it.
- To determine the amount of organics in the waste stream, in particular the commercial waste stream, to evaluate the feasibility of an organics recycling program.
- To characterize the non-processable (bulky) waste that is landfilled in order to determine if any components of it could be processed and utilized as fuel in the waste-to-energy (WTE) plant. The goal is to maximize the life of the landfill and enhance WTE energy production.

1.2 Background

The County has a population of approximately 926,610 living within 274 square miles, making it Florida's most densely populated county.¹ About 29 percent of residents live in the unincorporated county, 27 percent in the City of St. Petersburg, and 44 percent in the other 23 municipalities within the County.

Located on a peninsula, with the Gulf of Mexico to the west and Tampa Bay to the south and east, more than 5.4 million people visited the County in 2012.² More than 40,000 businesses are located in the County. The top business sectors are health services, tourism services,

¹ Florida Bureau of Economic and Business Research, University of Florida.

² Research Data Services, Inc. (<http://www.tampabay.com/news/business/tourism/pinellas-county-tourism-enjoyed-record-visitors-economic-impact-in-2012/2111388>).

manufacturing, and financial services.³ All of these factors have the potential to influence the composition of the County's solid waste.

Current waste diversion efforts also influence the waste stream composition. Since the 2007 study, the private sector has invested in recyclables processing capacity in the Tampa Bay area, including two single stream processing facilities. Several cities, including Clearwater, Largo, and Dunedin have initiated universal collection of single stream recyclables in roll carts. In addition, some of the private sector haulers operating in the unincorporated county's open market system now offer carted single stream recycling. All 24 municipalities operate or contract for some form of curbside collection of recyclables, and more than 60 drop-off sites operated by local governments also accept recyclables.

Class I waste generated within the County is delivered to the Bridgeway Acres facility for disposal. The facility also receives bulky waste, yard waste, and construction and demolition debris, although these materials can also be delivered to private facilities for processing and disposal.

³ <http://www.pinellascounty.org/facts.htm>.

Section 2

Methodology

2.1 Class I Methodology

2.1.1 Generator Sectors

The Class I WCS focused on residential and commercial waste delivered to the Bridgeway Acres facility. The three main generator sectors evaluated during the Class I WCS included:

- Single-family residential
- Multi-family residential
- Commercial/institutional

One objective of the WCS was to evaluate organics in the commercial waste stream that might feasibly be recovered for processing; therefore, a subset of the commercial/institutional sector was also included. This subset consisted of the following types of commercial/institutional entities that might be expected to generate a significant amount of organic waste (Large Organic Waste Generators):

- Restaurants
- Supermarkets
- Institutions

2.1.2 Material Categories

KCI worked with County staff to develop a list of 34 material categories into which waste would be sorted (see Appendix A). To develop and define these material categories, KCI reviewed the following information:

- Previous County studies, to ensure that comparisons can be made between the results of each study.
- Several city recycling guidelines, to ensure that materials aligned with recyclables accepted in these programs.
- FDEP Annual Solid Waste Management Report, to ensure that all of the material categories used in the WCS can be correlated to those required by FDEP in the annual reporting by counties.

2.1.3 Sampling and Sorting Protocol

Field work was conducted from August 18-22 and August 25, 2014 at the Bridgeway Acres facility. KCI provided all sorting equipment, safety gear, a scale calibrated to 0.02 pounds (and backup scale calibrated to 0.05 pounds), and two staff people to oversee all sampling, sorting, weighing, and data recording during the two-week event. The County provided a loader and operator to gather samples and to remove waste upon completion of sorting activities. All sort labor was provided by KCI.

KCI prepared and the County reviewed and approved a site safety plan that was followed throughout the sorting event. KCI worked closely with the County staff to coordinate and set up a sort location that would ensure worker safety. Each morning of the event, sorters were given thorough safety instructions by one of KCI's Supervisors to ensure safety and proper sorting.

Sample selection was organized by generator sector to ensure a sufficient number of samples would be sorted for each generator sector to achieve statistically valid results. KCI reviewed tonnage data and worked with the haulers to develop the sampling schedule. Table 2.1 provides the total number and geographic distribution of samples pulled and sorted for each generator. A total of 80 representative samples were sorted during the 10-day study.

Table 2.1: Class I WCS Sampling Schedule

Municipality	Single-Family Residential		Multi-Family Residential	Commercial		Organic Waste Generators	TOTAL
Geographic Area and Number of Samples	% of Res. Waste	25	14	% of Com. Waste	30	11	80
Clearwater	16.9%	3		2.0%	2		5
Belleair	0.5%						0
Dunedin	2.4%	1	1	5.0%	2	1	5
Gulfport	1.5%	1					1
Indian Rocks	0.8%						0
Largo	3.6%	1	2	16.5%	5		8
Madeira	0.5%						0
Safety Harbor	1.3%			1.9%	1		1
St. Petersburg	22.6%	6	4	39.6%	12	5	27
Treasure Island	1.4%						0
WMI Residential Franchise Areas	11.3%	3					3
Progressive Residential Franchise Areas	3.1%	1					1
Republic Residential Franchise Area	1.6%	1					1
Unincorporated	32.5%	8					n/a
American Hauler	0.2%			0.1%			0
County Sanitation	9.5%	1		3.3%	1		2
DisposAll	3.0%	1		1.1%			1
Solar Sanitation	7.6%	1		2.7%			1
WMI	23.0%	2	4	8.0%	3	3	12
Waste Pro	6.9%			2.4%			0
Progressive	39.2%	3	1	13.7%	3	2	9
Republic	10.6%		2	3.7%	1		3
TOTALS SAMPLES	100.0%	25	14	100.0%	30	11	80

KCI worked with each hauler to identify specific single-family residential and commercial routes that represent a cross-section of each hauler's service area. For the multi-family residential and commercial Large Organic Waste Generators, KCI requested that each hauler identify roll-off compactors to ensure that all waste was generated by the targeted generator sector. All pre-selected routes were provided placards for easy identification by the scalehouse and sorting crews. In addition to the preselected routes, some vehicles were randomly selected onsite by KCI's Study Supervisor for inclusion in the study.

KCI's Study Supervisor interviewed incoming drivers to confirm the generator sector and origin of the waste. Once a load was selected for sampling, the Study Supervisor noted the following information on the data recording form: the recorder's name, hauler name and area of County, date and time, type of vehicle, sample number, and any visual observations about the load. The vehicle driver was then directed to the sampling area to tip. The load was visually divided into six sections and, based on a die roll, one of the six sections were selected. A representative sample of at least 200 pounds was pulled, placed on a tarp, labeled, and stored until sorted.

Selected samples were placed on KCI's customized sorting table and sorted into the previously defined material categories. After the entire sample was sorted, the Sorting Supervisor weighed and recorded the net weight of each material category on a data recording form.

2.1.4 Analytical Procedures

After field work was completed, KCI calculated the weighted average of each material category for each generator sector. Data analysis followed industry-accepted standards for statistical sampling, as outlined in the *ASTM Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste (D5231-92; reapproved 2008)*. Where appropriate, 90 percent confidence intervals were calculated, using a standard statistical t-test, for each material category.

The following additional procedures were followed during the data analysis:

- At the request and expense of the City of Largo, extra samples of the city's single-family residential waste were sorted during the two-week sorting event. Based on the sampling schedule developed for the County, only one sample was targeted from the City of Largo; therefore, KCI calculated the weighted average of the city's seven samples for each material category and utilized the resulting weighted averages as the single city sample in the County WCS data analysis.
- In the case of Large Organic Waste Generators, four supermarket samples, four restaurants samples, and three academic institution samples were sorted. So as not to unfairly weight the contribution of these Large Organic Waste Generators to the overall composition of commercial/institutional waste, KCI calculated the weighted average of each material category for the three generator subsets and utilized the resulting data sets in the overall commercial/institutional analysis to represent a single sample for each of the three subsets (supermarkets, restaurants, academic institutions).

To obtain the combined composition of waste received at Bridgeway Acres for disposal, the three waste generator sectors (single-family residential, multi-family residential, and commercial) were combined based on the amount of waste each generator sector

contributes to the overall waste stream. To estimate the percentage that each contributes, KCI utilized the County's 2013 Annual Report submitted to the FDEP.

- Single-family residential – 29.5 percent
- Multi-family residential – 17.1 percent
- Commercial – 53.4 percent

2.2 Bulky Waste Methodology

Because of the heavy, unwieldy, and highly irregular nature of the bulky waste stream, manual sorting is not feasible; therefore, visual audits were performed.

A five-day visual audit of bulky waste was conducted from August 25 through August 29, 2014 at the South Landfill. KCI provided a single staff person trained in visual waste auditing. The same person was assigned during the five-day period to ensure continuity of results.

Visual characterizations were made of as many loads of incoming bulky waste as possible without interfering with landfill operations. As each vehicle entered the working face of the South Landfill, KCI staff conducted the following procedures:

1. Recorded the following information on the data form:
 - a) Recorder's name
 - b) Date and time
 - c) Sample number
 - d) Vehicle Type and Origin of Waste
 - e) Any initial visual observations about the load
2. Recorded the size of the roll-off container or vehicle and determined the volume of waste present within.
3. Directed the driver to tip the load of waste in a specified area, if applicable.
4. Inspected the load to determine which material types were present in the load. If necessary, directed the loader operator to broaden load for easier identification of materials.
5. Visually dissected the load and recorded the percent by volume of the material classes present on the visual audit data form provided in Appendix B.
6. Visually estimated the volume of material types in each material class. When applicable and allowable, KCI opened bagged waste to determine contents.
7. Ensured each material class estimates and the sum of all material classes totaled 100%.

Ninety-one loads were audited; however, after discussion with County staff, 37 loads were eliminated from the analysis because they consisted of excavated material from Toytown Landfill (which was undergoing drainage work), street sweepings, filter cake, or other items considered to be special waste by the County. In total, 54 visual audits were included in the bulky waste analysis, which represented approximately 46 percent of the bulky waste loads and 49 percent of the bulky waste tonnage received at the facility that week.

The data was then analyzed to calculate the volumetric weighted average of each material category, as well as the confidence interval using a standard statistical t-test. The percent by

volume of each material type present in the samples was then converted to percent by weight using industry-accepted conversion factors.

Once the percent by weight was estimated, the heat values of each material (expressed as million BTUs per ton) were identified and attributed to identify the materials that offer the greatest value for processing at the County's WTE plant.

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Section 3

Results and Findings

3.1 Introduction to Results

Unless otherwise stated, all results presented in this section are expressed in percentage by weight. The percentages included in the tables and figures are the mean values for each material category. Where appropriate, the tables also provide the 90 percent confidence intervals for each material category. The confidence interval indicates that, with a 90 percent level of confidence, the actual arithmetic mean is within the upper and lower limits shown.⁴ This provides an understanding of how much variation occurred in the quantity of that material category found in the samples sorted. Generally, the more homogeneous the waste stream and the greater the number of samples sorted, the higher the level of accuracy achieved and the narrower the margin between the upper and lower bounds of the confidence interval.

The percentages in the tables and figures are rounded to the nearest tenth of a percent; therefore, when added together, they might not appear to total correctly.

3.2 Single-Family Residential Waste

Figure 3.1 depicts the composition of waste disposed by single-family residents within the County and Table 3.1 provides a more detailed breakdown by material category and the 90 percent confidence intervals. Individual sample data for the Single-Family Residential sector can be found in Appendix C.

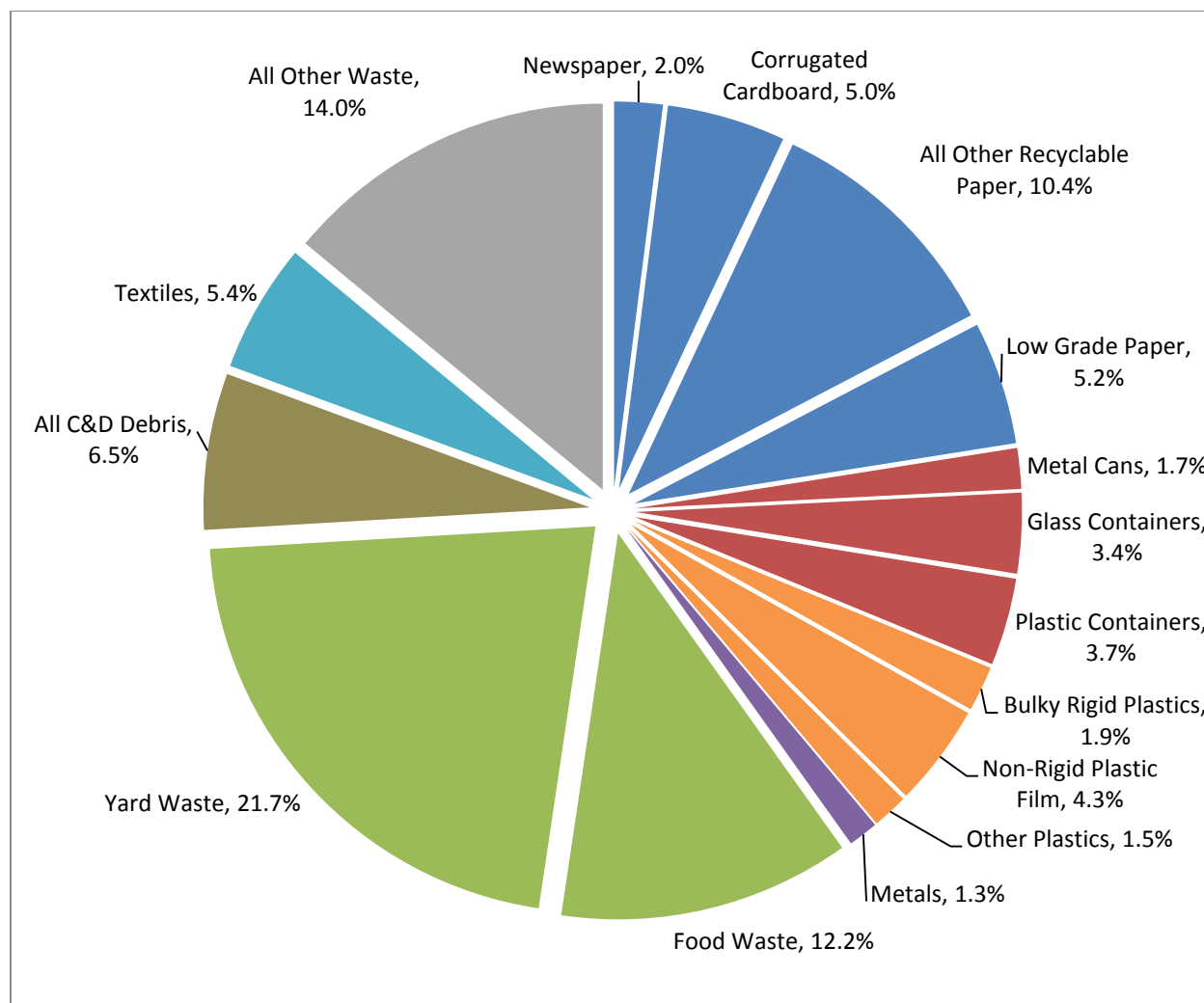
Key findings of the Single-Family Residential sector are as follows:

- Recyclable fiber represents 17.3 percent of single-family residential waste disposed, with Other Recyclable Paper contributing the greatest quantity (9.3 percent).
- Recyclable containers contribute 8.7 percent to the single-family residential waste stream, with plastic and glass containers contributing the greatest percentage.
- Yard waste comprises 21.7 percent of single-family residential waste disposed. This is a high percentage compared to other recent WCSs conducted by KCI, but fairly normal for a county that utilizes WTE.⁵ Because yard waste is not banned from WTE facilities in Florida, separate collection of yard waste generally does not appear to be as high of a priority in counties that utilize WTE than in those that landfill waste.
- Food waste contributes 12.2 percent to the single-family residential waste stream.

⁴ Because this is a statistical analysis, the lower end of the confidence interval may be a negative number.

⁵ In the 10 WCSs conducted by KCI for Florida jurisdictions in the last 5 years, the single-family waste stream was comprised of 2.4 to 27.4 percent yard waste (2.4 to 15.2 percent in counties that landfill waste and 9.7 to 27.4 percent in counties that utilize WTE).

Figure 3.1: Composition of Single-Family Residential Waste Disposed (% by weight)



Note: For the purpose of this chart, the following material categories have been combined:

- All Other Recyclable Paper includes Office Paper, Other Recyclable Paper, and Aseptic Containers.
- Metal Cans includes Tin/Steel Cans and Aluminum Cans.
- Plastic Containers includes PET, HDPE, Non-Bottle Plastics, and Other Plastic Containers (#3-#7).
- Other Plastics includes Expanded Polystyrene and All Other Plastics.
- Metals include Other Ferrous, Other Non-Ferrous, and White Goods/Small Appliances.
- All C&D Debris includes C&D Debris, Clean Wood Waste, and Treated Wood Waste.
- All Other Waste includes Other Glass, Special Wastes, Electronics, Household Batteries, Tires and Rubber, All Other Garbage, Liquids, and Grit.

Table 3.1: Composition of Single-Family Residential Waste Disposed (% by weight)

	Material Category	Weighted Average	90% Confidence Interval	
			Lower Bounds	Upper Bounds
1	Newspaper	2.0%	1.6%	2.5%
2	Corrugated Containers	5.0%	3.1%	6.9%
3	Office Paper	0.8%	0.4%	1.2%
4	Other Recyclable Paper	9.3%	8.2%	10.4%
5	Low Grade Paper	5.2%	4.4%	6.0%
6	Aseptic Containers	0.3%	0.1%	0.4%
7	PET Bottles	1.4%	1.1%	1.6%
8	HDPE Bottles	0.7%	0.5%	0.9%
9	Other Non-Bottle Plastics #1 and #2	0.8%	0.6%	0.9%
10	Other Plastic Containers (#3-#7)	0.8%	0.7%	1.0%
11	Bulky Rigid Plastics	1.9%	1.4%	2.3%
12	Non-Rigid Plastic Film	4.3%	3.8%	4.7%
13	Expanded Polystyrene	1.0%	0.5%	1.4%
14	All Other Plastics	0.5%	0.4%	0.6%
15	Tin/Steel Cans	1.0%	0.9%	1.1%
16	White Goods/Small Appliances	0.0%	0.0%	0.0%
17	Other Ferrous	0.9%	0.6%	1.3%
18	Aluminum Cans	0.7%	0.6%	0.9%
19	Other Non-Ferrous	0.3%	0.2%	0.4%
20	Glass Containers	3.4%	2.7%	4.0%
21	Other Glass	0.2%	0.1%	0.3%
22	Textiles	5.4%	3.7%	7.1%
23	Special Wastes	0.4%	-0.2%	0.9%
24	Electronics	2.0%	1.1%	2.8%
25	Household Batteries	0.1%	0.0%	0.1%
26	Clean Wood Waste	1.0%	0.5%	1.6%
27	Treated Wood Waste	3.5%	1.4%	5.5%
28	C&D Debris	2.1%	0.9%	3.2%
29	Tires and Rubber	1.2%	-0.3%	2.6%
30	Yard Waste	21.7%	17.1%	26.3%
31	Food Waste	12.2%	10.3%	14.1%
32	All Other Garbage	9.5%	8.0%	11.0%
33	Liquids	0.6%	0.4%	0.8%
34	Grit	0.1%	0.0%	0.3%
TOTALS		100.0%		

Note: Columns might not appear to add correctly due to rounding. In addition, the confidence interval is a statistical calculation; therefore, the lower bounds may be a negative number.

One objective of the WCS was to evaluate the composition of waste disposed by single-family residents in areas with and without universal, carted single stream recycling. Municipalities with such a program included Belleair, Clearwater, Dunedin, Largo, Oldsmar, Safety Harbor, Seminole, and Treasure Island. While other municipalities have implemented single stream recycling programs, they continue to use recycling bins rather than the larger roll carts that have had demonstrated results in increasing participation and recycling tonnage. Seven samples were identified as coming from areas with carted single stream recycling; the other 18 single-family residential samples came from areas without single stream recycling carts.

Table 3.2 provides a comparison of waste disposed by single-family residents without and with universal carted collection of single stream recyclables. Figure 3.2 compares the 90 percent confidence intervals between the two data sets for eight material types that are commonly included in recycling programs: newspaper (ONP), corrugated cardboard (OCC), other mixed paper (OMP), PET bottles (PET), HDPE bottles (HDPE), aluminum cans (AL), steel/tin cans (Tin), and glass containers (Glass).

Key findings of this comparison are as follows:

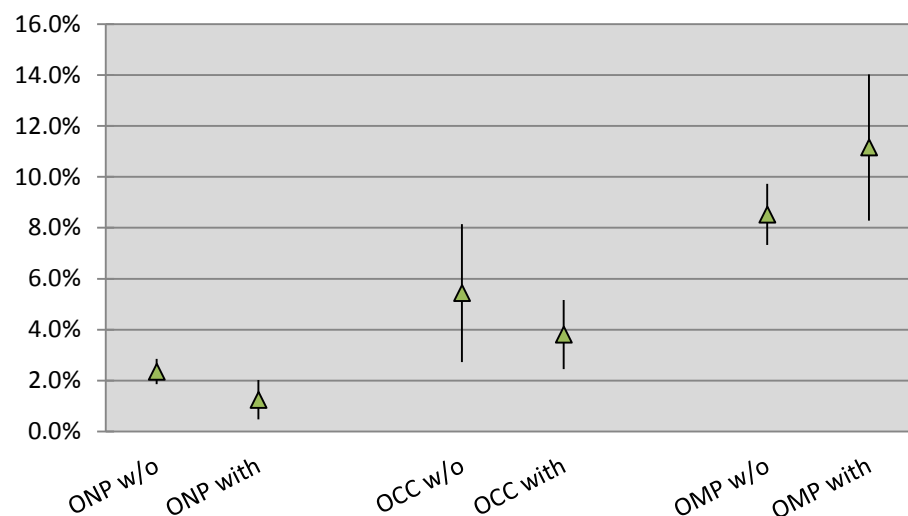
- For seven of the eight types of recyclables, the weighted average was lower in waste from areas with carted single stream recycling. The exception to this is mixed paper, which has a higher weighted average in the carted single stream areas. Mixed paper typically includes junk mail, magazines, paperboard boxes, chipboard, file folders, etc. Most single stream programs likely include this type of material in the program; however, residents might not be aware that it is accepted.
- Most of the confidence intervals overlap at least somewhat, with the interval for communities with carted single stream recycling shifting somewhat lower than those without, with the exception of mixed paper as noted above. The confidence intervals for steel/tin cans and glass containers do not overlap, with those for communities with carted single stream recycling being lower. This suggests that carted single stream programs are diverting more recyclables from disposal, most notably glass containers and steel/tin cans.
- It should be noted that this is a very preliminary comparison. Because of the relatively small sample size (seven samples) for areas with carted single stream recycling, the resulting analysis shows fairly wide confidence intervals for some of the materials categories. In addition, the effectiveness of any recycling program depends in large part on the education and outreach efforts by the local government, the maturity of the program, the types of materials accepted, and other factors.
- The results demonstrate that opportunities exist to divert more recyclables from disposal in communities with and without carted single stream recycling programs.

Table 3.2: Composition in Areas without and with Carted Single Stream Recycling (% by weight)

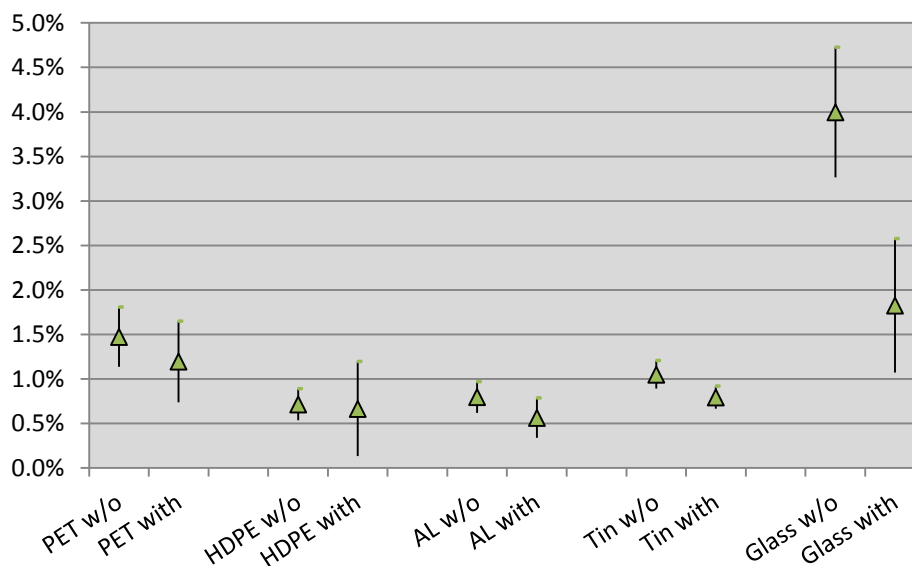
		Without Universal Carted Single Stream Recycling			With Universal Carted Single Stream Recycling			
Material Category		Weighted Average	90% Confidence Interval		Weighted Average	90% Confidence Interval		% Difference
			Lower Bounds	Upper Bounds		Lower Bounds	Upper Bounds	
1	Newspaper	2.3%	1.9%	2.8%	1.2%	0.5%	2.0%	-47.0%
2	Corrugated Containers	5.4%	2.7%	8.1%	3.8%	2.4%	5.2%	-30.0%
3	Office Paper	0.5%	0.2%	0.9%	1.5%	0.2%	2.7%	178.8%
4	Other Recyclable Paper	8.5%	7.3%	9.7%	11.2%	8.3%	14.0%	30.9%
5	Low Grade Paper	4.6%	3.7%	5.6%	6.4%	5.0%	7.9%	38.2%
6	Aseptic Containers	0.2%	0.1%	0.3%	0.3%	-0.1%	0.8%	61.3%
7	PET Bottles	1.5%	1.1%	1.8%	1.2%	0.7%	1.6%	-18.9%
8	HDPE Bottles	0.7%	0.5%	0.9%	0.7%	0.1%	1.2%	-7.0%
9	Other Non-Bottle Plastics #1 and #2	0.8%	0.6%	1.0%	0.7%	0.4%	1.0%	-11.8%
10	Other Plastic Containers (#3-#7)	0.7%	0.6%	0.8%	1.1%	0.6%	1.6%	52.8%
11	Bulky Rigid Plastics	1.5%	1.2%	1.8%	2.9%	1.4%	4.3%	92.8%
12	Non-Rigid Plastic Film	4.0%	3.6%	4.4%	5.1%	3.8%	6.4%	28.3%
13	Expanded Polystyrene	1.1%	0.5%	1.7%	0.7%	0.3%	1.2%	-35.3%
14	All Other Plastics	0.4%	0.3%	0.5%	0.7%	0.2%	1.2%	61.0%
15	Tin/Steel Cans	1.0%	0.9%	1.2%	0.8%	0.7%	0.9%	-24.5%
16	White Goods/Small Appliances	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	Other Ferrous	1.0%	0.5%	1.5%	0.8%	0.3%	1.2%	-25.9%
18	Aluminum Cans	0.8%	0.6%	1.0%	0.6%	0.3%	0.8%	-29.2%
19	Other Non-Ferrous	0.3%	0.2%	0.3%	0.5%	0.1%	0.8%	73.0%
20	Glass Containers	4.0%	3.3%	4.7%	1.8%	1.1%	2.6%	-54.3%
21	Other Glass	0.1%	0.0%	0.2%	0.3%	0.0%	0.6%	174.4%
22	Textiles	5.2%	3.2%	7.2%	5.8%	1.5%	10.2%	11.7%
23	Special Wastes	0.5%	-0.3%	1.2%	0.1%	0.0%	0.1%	-86.7%
24	Electronics	1.7%	0.7%	2.6%	2.7%	0.3%	5.1%	63.6%
25	Household Batteries	0.1%	0.0%	0.1%	0.1%	0.0%	0.2%	57.0%
26	Clean Wood Waste	1.1%	0.4%	1.9%	0.7%	-0.1%	1.5%	-37.5%
27	Treated Wood Waste	4.1%	1.2%	7.0%	1.9%	0.4%	3.4%	-54.2%
28	C&D Debris	2.5%	0.8%	4.2%	1.0%	0.0%	2.0%	-60.2%
29	Tires and Rubber	1.4%	-0.7%	3.5%	0.7%	0.0%	1.3%	-52.7%
30	Yard Waste	21.9%	16.2%	27.6%	21.3%	11.2%	31.4%	-2.8%
31	Food Waste	11.9%	10.0%	13.9%	12.9%	7.0%	18.8%	7.9%
32	All Other Garbage	9.3%	7.4%	11.2%	10.0%	7.1%	12.9%	7.6%
33	Liquids	0.5%	0.4%	0.7%	0.8%	0.4%	1.1%	41.8%
34	Grit	0.2%	0.0%	0.4%	0.0%	0.0%	0.0%	-96.7%
TOTALS		100.0%			100.0%			

Note: Columns might not appear to add correctly due to rounding. In addition, the confidence interval is a statistical calculation; therefore, the lower bounds may be a negative number.

**Figure 3.2: Material Percentages in Areas with and without Carted Single Stream Recycling
(% by weight; 90% confidence interval)**



ONP = Newspaper OCC = Corrugated Cardboard OMP = Other Mixed Paper



PET = PET Bottles HDPE = HDPE Bottles
AL = Aluminum Cans Tin = Steel/Tin Cans

3.3 Multi-Family Residential Waste

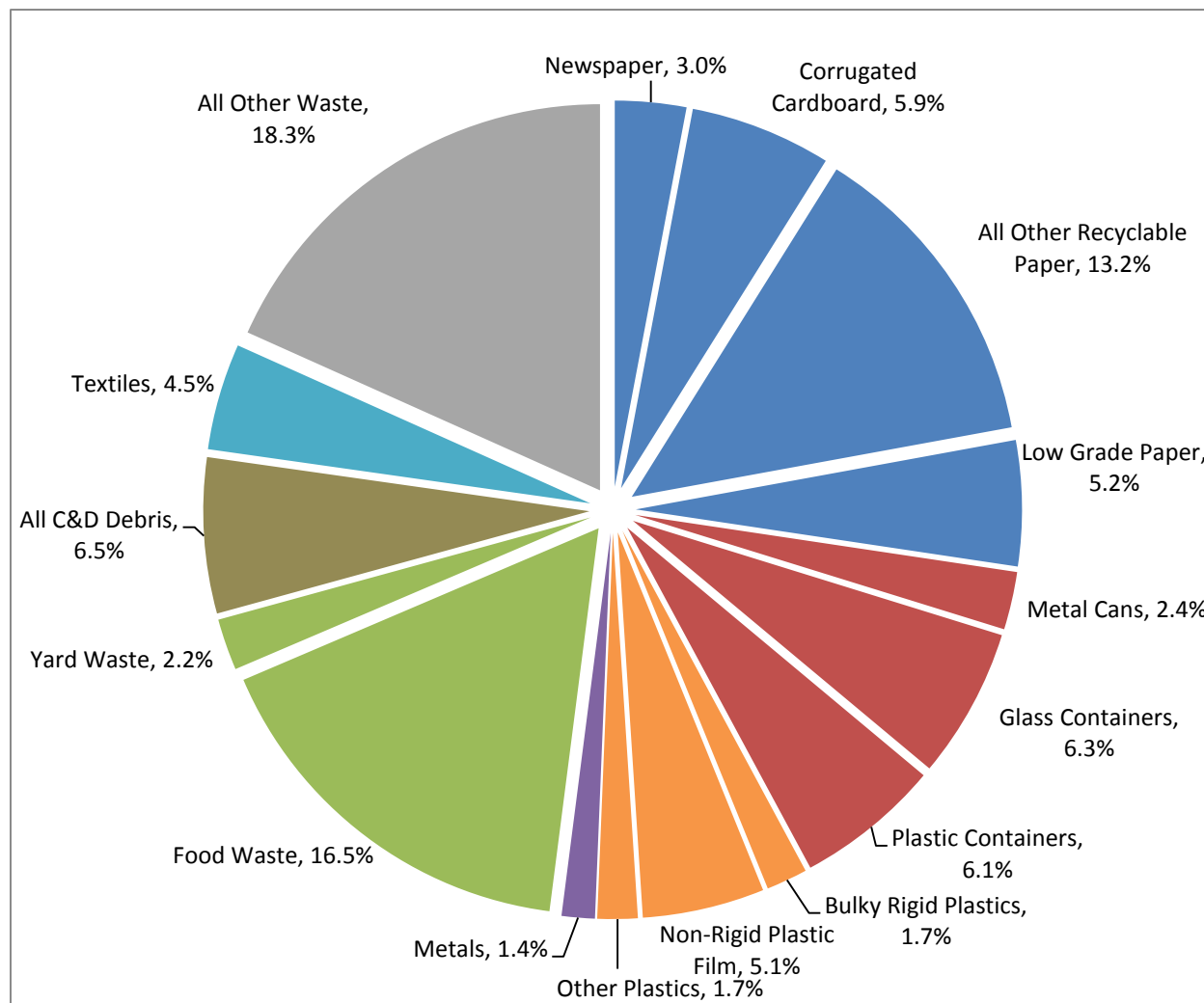
Figure 3.3 depicts the composition of waste disposed of by multi-family residents and Table 3.3 provides additional details and the 90 percent confidence intervals for each material category. Individual sample data for the Multi-Family Residential sector can be found in Appendix D.

As expected, multi-family residential waste contained a larger percentage of recyclable materials than the single-family waste stream. Establishing effective recycling programs at multi-family complexes can be challenging; whereas, curbside recycling for single-family residents is more the norm.

Key findings of the Multi-Family Residential sector are as follows:

- Recyclable fiber makes up 22.1 percent of multi-family waste that is disposed. About half of this is Other Recyclable Paper (11.8 percent).
- Recyclable containers comprise 14.8 percent of multi-family waste, with plastic and glass containers having the highest percentage.
- Very little yard waste (2.2 percent) is disposed in multi-family waste. Many complexes either generate very little yard waste or manage it through a landscape contractor.
- Food waste comprises 16.5 percent of the multi-family residential waste stream that is disposed.

Figure 3.3: Composition of Multi-Family Residential Waste Disposed (% by weight)



Note: For the purpose of this chart, the following material categories have been combined:

- All Other Recyclable Paper includes Office Paper, Other Recyclable Paper, and Aseptic Containers.
- Metal Cans includes Tin/Steel Cans and Aluminum Cans.
- Plastic Containers includes PET, HDPE, Non-Bottle Plastics, and Other Plastic Containers (#3-#7).
- Other Plastics includes Expanded Polystyrene and All Other Plastics.
- Metals include Other Ferrous, Other Non-Ferrous, and White Goods/Small Appliances.
- All C&D Debris includes C&D Debris, Clean Wood Waste, and Treated Wood Waste.
- All Other Waste includes Other Glass, Special Wastes, Electronics, Household Batteries, Tires and Rubber, All Other Garbage, Liquids, and Grit.

Table 3.3: Composition of Multi-Family Residential Waste Disposed (% by weight)

Material Category		Weighted Average	90% Confidence Interval	
			Lower Bounds	Upper Bounds
1	Newspaper	3.0%	1.8%	4.2%
2	Corrugated Containers	5.9%	3.9%	8.0%
3	Office Paper	0.8%	0.4%	1.3%
4	Other Recyclable Paper	11.8%	10.3%	13.2%
5	Low Grade Paper	5.2%	3.9%	6.5%
6	Aseptic Containers	0.6%	0.3%	0.9%
7	PET Bottles	2.4%	2.1%	2.6%
8	HDPE Bottles	1.4%	1.0%	1.8%
9	Non-Bottle Plastics #1 and #2	1.2%	1.0%	1.5%
10	Other Plastic Containers (#3-#7)	1.0%	0.9%	1.2%
11	Bulky Rigid Plastics	1.7%	1.1%	2.4%
12	Non-Rigid Plastic Film	5.1%	4.4%	5.8%
13	Expanded Polystyrene	0.8%	0.6%	1.0%
14	All Other Plastics	0.9%	0.4%	1.4%
15	Tin/Steel Cans	1.4%	1.0%	1.7%
16	White Goods/Small Appliances	0.0%	0.0%	0.0%
17	Other Ferrous	1.0%	0.5%	1.4%
18	Aluminum Cans	1.1%	0.7%	1.4%
19	Other Non-Ferrous	0.4%	0.2%	0.6%
20	Glass Containers	6.3%	4.3%	8.3%
21	Other Glass	0.2%	0.0%	0.3%
22	Textiles	4.5%	2.7%	6.2%
23	Special Wastes	0.1%	0.0%	0.2%
24	Electronics	1.8%	0.6%	3.1%
25	Household Batteries	0.1%	0.0%	0.3%
26	Clean Wood Waste	0.2%	0.0%	0.5%
27	Treated Wood Waste	0.5%	0.1%	0.9%
28	C&D Debris	5.7%	1.8%	9.6%
29	Tires and Rubber	0.3%	0.0%	0.5%
30	Yard Waste	2.2%	1.1%	3.2%
31	Food Waste	16.5%	13.8%	19.3%
32	All Other Garbage	14.2%	10.9%	17.4%
33	Liquids	1.4%	1.0%	1.7%
34	Grit	0.2%	-0.1%	0.5%
TOTAL		100.0%		

Note: Columns might not appear to add correctly due to rounding. In addition, the confidence interval is a statistical calculation; therefore, the lower bounds may be a negative number.

3.4 Commercial Waste

Figure 3.4 depicts the composition of commercial waste delivered to Bridgeway Acres for disposal and Table 3.4 provides additional details and the 90 percent confidence intervals for each material category. Individual sample data for the Commercial sector can be found in Appendix E.

Key findings for the Commercial sector are as follows:

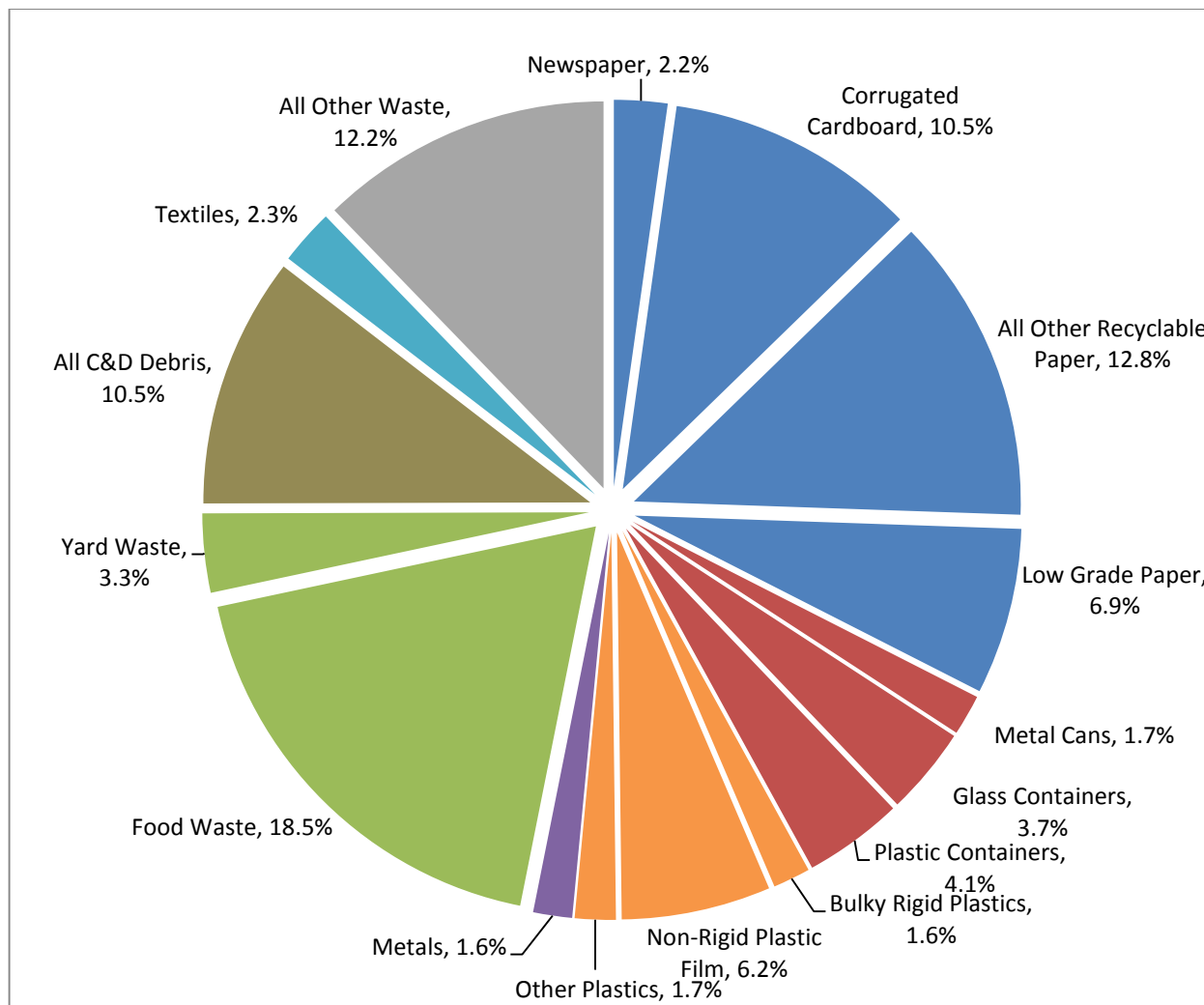
- Recyclable fiber comprises more than a quarter (25.5 percent) of waste disposed by businesses and institutions.
- Recyclable containers contribute an additional 9.5 percent to commercial waste.
- Yard waste contributes only 3.3 percent to commercial waste, likely for the same reasons that it contributes a small amount to the multi-family waste stream.
- Food waste makes up 18.5 percent of the commercial waste that is disposed.

Another objective of the WCS was to evaluate the percentage of food waste in the commercial Large Organic Waste Generator sector. Figure 3.5 depicts the aggregate composition of the Large Organic Waste Generator samples that were collected. Table 3.5 provides additional details and the 90 percent confidence intervals of this aggregate composition, as well as the weighted average of the supermarket, restaurant, and academic institution samples. In addition, Figure 3.6 depicts the composition results for these three individual subsets of this sector. Individual sample data for the Large Organic Waste Generator sector can be found in Appendix F.

Key findings for the Large Organic Waste Generator sector are as follows:

- Food waste comprised approximately 31 percent of the Large Organic Waste Generator samples. On average, the supermarket and restaurant samples contained 38 percent food waste, whereas the institutional samples contained only 10.7 percent. Because of the relatively small sample size for the three subset business types, additional research is warranted to further explore whether some institutions might generate a larger percentage of food waste.
- Other waste diversion opportunities also exist in this Large Organic Waste Generator sector. Recyclable fiber makes up more than 27 percent of the waste disposed. On average, it comprised 24 percent of the restaurant samples, 25 percent of the supermarket samples, and 36 percent of the institutional waste samples.
- Recyclable containers contributed 10 percent to the Large Organic Waste Generator waste stream. As anticipated, the percentage of recyclables containers was greater in restaurants (14 percent) and institutions (11 percent) than in supermarkets (5 percent).

Figure 3.4: Composition of Commercial Waste Disposed (% by weight)



Note: For the purpose of this chart, the following material categories have been combined:

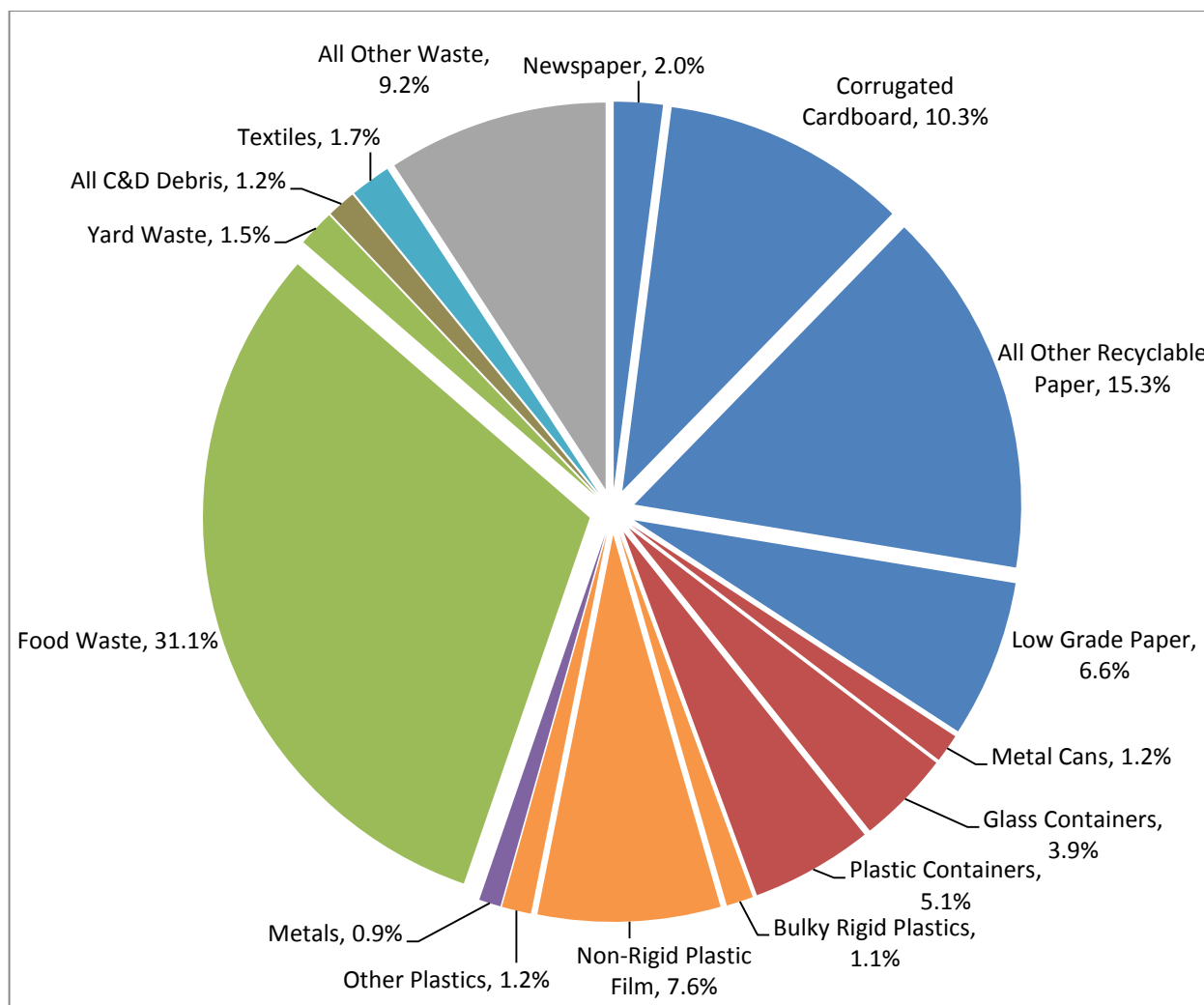
- All Other Recyclable Paper includes Office Paper, Other Recyclable Paper, and Aseptic Containers.
- Metal Cans includes Tin/Steel Cans and Aluminum Cans.
- Plastic Containers includes PET, HDPE, Non-Bottle Plastics, and Other Plastic Containers (#3-#7).
- Other Plastics includes Expanded Polystyrene and All Other Plastics.
- Metals include Other Ferrous, Other Non-Ferrous, and White Goods/Small Appliances.
- All C&D Debris includes C&D Debris, Clean Wood Waste, and Treated Wood Waste.
- All Other Waste includes Other Glass, Special Wastes, Electronics, Household Batteries, Tires and Rubber, All Other Garbage, Liquids, and Grit.

Table 3.4: Composition of Commercial Waste Disposed (% by weight)

Material Category		Weighted Average	90% Confidence Interval	
			Lower Bounds	Upper Bounds
1	Newspaper	2.2%	1.6%	2.8%
2	Corrugated Containers	10.5%	8.5%	12.5%
3	Office Paper	1.1%	0.6%	1.7%
4	Other Recyclable Paper	11.3%	9.5%	13.2%
5	Low Grade Paper	6.9%	5.8%	8.1%
6	Aseptic Containers	0.4%	0.2%	0.6%
7	PET Bottles	1.5%	1.2%	1.8%
8	HDPE Bottles	0.8%	0.6%	0.9%
9	Other Non-Bottle Plastics #1 and #2	0.9%	0.8%	1.1%
10	Other Plastic Containers (#3-#7)	1.0%	0.8%	1.1%
11	Bulky Rigid Plastics	1.6%	1.1%	2.0%
12	Non-Rigid Plastic Film	6.2%	5.3%	7.2%
13	Expanded Polystyrene	1.0%	0.7%	1.2%
14	All Other Plastics	0.7%	0.5%	1.0%
15	Tin/Steel Cans	1.0%	0.8%	1.2%
16	White Goods/Small Appliances	0.0%	0.0%	0.1%
17	Other Ferrous	1.3%	0.7%	2.0%
18	Aluminum Cans	0.7%	0.6%	0.8%
19	Other Non-Ferrous	0.3%	0.2%	0.3%
20	Glass Containers	3.7%	2.5%	4.8%
21	Other Glass	0.3%	0.1%	0.5%
22	Textiles	2.3%	1.7%	3.0%
23	Special Wastes	0.1%	0.0%	0.3%
24	Electronics	1.6%	0.8%	2.4%
25	Household Batteries	0.1%	0.0%	0.1%
26	Clean Wood Waste	3.5%	1.5%	5.6%
27	Treated Wood Waste	2.8%	1.0%	4.6%
28	C&D Debris	4.2%	2.2%	6.1%
29	Tires and Rubber	0.5%	0.1%	1.0%
30	Yard Waste	3.3%	1.8%	4.8%
31	Food Waste	18.5%	15.4%	21.6%
32	All Other Garbage	7.8%	5.9%	9.6%
33	Liquids	1.2%	0.7%	1.6%
34	Grit	0.6%	0.3%	1.0%
TOTALS		100.0%		

Note: Columns might not appear to add correctly due to rounding.

Figure 3.5: Composition of Large Organic Waste Generator Waste Disposed (% by weight)



Note: For the purpose of this chart, the following material categories have been combined:

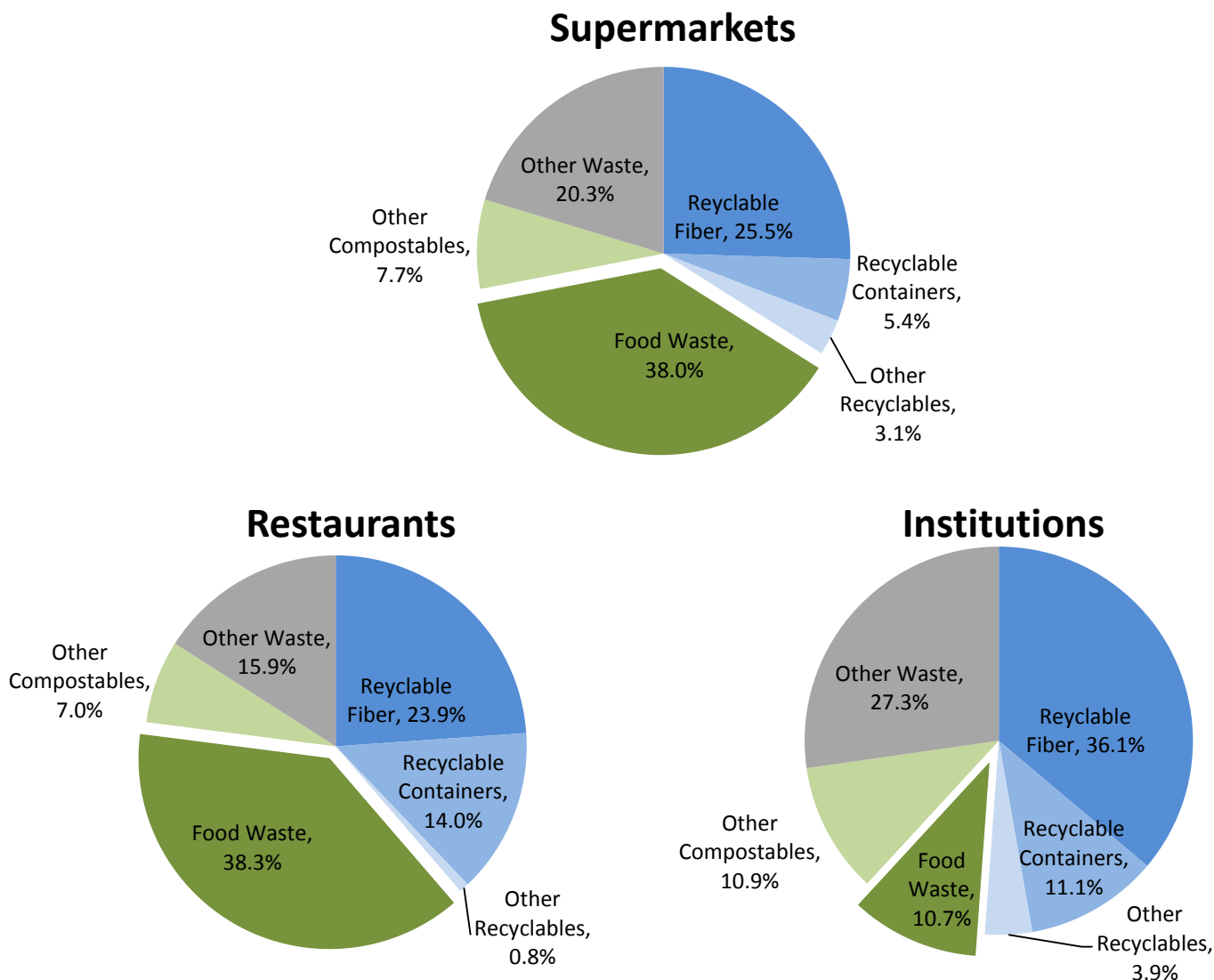
- All Other Recyclable Paper includes Office Paper, Other Recyclable Paper, and Aseptic Containers.
- Metal Cans includes Tin/Steel Cans and Aluminum Cans.
- Plastic Containers includes PET, HDPE, Non-Bottle Plastics, and Other Plastic Containers (#3-#7).
- Other Plastics includes Expanded Polystyrene and All Other Plastics.
- Metals include Other Ferrous, Other Non-Ferrous, and White Goods/Small Appliances.
- All C&D Debris includes C&D Debris, Clean Wood Waste, and Treated Wood Waste.
- All Other Waste includes Other Glass, Special Wastes, Electronics, Household Batteries, Tires and Rubber, All Other Garbage, Liquids, and Grit.

Table 3.5: Composition of Large Organic Waste Generator Waste Disposed (% by weight)

Material Category		Weighted Average			Aggregate Weighted Average	90% Confidence Interval	
		Super Markets	Restaurants	Institutions		Lower Bounds	Upper Bounds
1	Newspaper	1.9%	1.1%	3.7%	2.0%	0.6%	3.5%
2	Corrugated Containers	9.5%	13.2%	6.9%	10.3%	6.6%	13.9%
3	Office Paper	9.1%	0.5%	5.4%	4.8%	0.0%	9.6%
4	Other Recyclable Paper	4.9%	8.9%	19.6%	10.3%	6.0%	14.5%
5	Low Grade Paper	5.9%	5.6%	9.0%	6.6%	4.4%	8.8%
6	Aseptic Containers	0.1%	0.2%	0.6%	0.3%	0.1%	0.5%
7	PET Bottles	1.0%	1.3%	4.1%	1.9%	0.9%	2.9%
8	HDPE Bottles	0.4%	0.5%	0.8%	0.6%	0.2%	0.9%
9	Other Non-Bottle Plastics #1 and #2	1.0%	0.6%	1.8%	1.0%	0.6%	1.5%
10	Other Plastic Containers (#3-#7)	1.1%	2.3%	1.2%	1.6%	0.9%	2.3%
11	Bulky Rigid Plastics	0.9%	0.5%	2.3%	1.1%	0.4%	1.8%
12	Non-Rigid Plastic Film	7.9%	5.2%	10.8%	7.6%	6.2%	9.0%
13	Expanded Polystyrene	0.4%	0.8%	1.4%	0.8%	0.4%	1.2%
14	All Other Plastics	0.3%	0.5%	0.4%	0.4%	0.3%	0.5%
15	Tin/Steel Cans	0.1%	0.7%	0.6%	0.5%	0.2%	0.8%
16	White Goods/Small Appliances	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	Other Ferrous	0.7%	0.1%	0.7%	0.5%	-0.1%	1.0%
18	Aluminum Cans	0.1%	1.0%	1.0%	0.7%	0.3%	1.1%
19	Other Non-Ferrous	0.8%	0.2%	0.4%	0.5%	-0.1%	1.0%
20	Glass Containers	1.7%	7.5%	1.5%	3.9%	1.8%	6.0%
21	Other Glass	0.1%	0.2%	0.0%	0.1%	0.0%	0.2%
22	Textiles	2.2%	1.0%	2.0%	1.7%	0.7%	2.7%
23	Special Wastes	0.1%	0.2%	0.0%	0.1%	0.0%	0.2%
24	Electronics	0.7%	0.0%	0.5%	0.4%	-0.2%	1.0%
25	Household Batteries	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
26	Clean Wood Waste	0.2%	0.2%	0.0%	0.1%	0.0%	0.3%
27	Treated Wood Waste	0.6%	0.3%	0.9%	0.6%	0.0%	1.2%
28	C&D Debris	1.0%	0.3%	0.1%	0.5%	-0.1%	1.1%
29	Tires and Rubber	0.1%	0.4%	0.3%	0.3%	0.1%	0.5%
30	Yard Waste	1.6%	1.2%	1.9%	1.5%	0.4%	2.7%
31	Food Waste	38.0%	38.3%	10.7%	31.1%	23.4%	38.8%
32	All Other Garbage	5.9%	5.5%	8.6%	6.5%	4.3%	8.6%
33	Liquids	1.5%	1.5%	2.6%	1.8%	0.6%	2.9%
34	Grit	0.2%	0.0%	0.0%	0.1%	-0.1%	0.2%
TOTALS		100.0%	100.0%	100.0%	100.0%		

Note: Columns might not appear to add correctly due to rounding. In addition, the confidence interval is a statistical calculation; therefore, the lower bounds may be a negative number.

Figure 3.6: Composition of Waste Disposed by Supermarkets, Restaurants and Institutions
(% by weight)



Note: For the purpose of these charts, the following material categories have been combined:

- Recyclable Fiber includes Newspaper, Corrugated Containers, Office Paper, Other Recyclable Paper, and Aseptic Containers.
- Recyclable Containers include PET, HDPE, Non-Bottle Plastics #1 and #2, Other Plastic Containers (#3-#7), Tin/Steel Cans, Aluminum Cans, and Glass Containers.
- Other Recyclables includes Bulky Rigid Plastics, White Goods/Small Appliances, Other Ferrous, Other Non-Ferrous, and Electronics.
- Other Compostables includes Low Grade Paper, Clean Wood Waste, and Yard Waste.
- Other Waste includes Non-Rigid Plastic Film, Expanded Polystyrene, All Other Plastics, Other Glass, Textiles, Special Wastes, Household Batteries, Treated Wood Waste, C&D Debris, Tires and Rubber, All Other Garbage, Liquids, and Grit.

3.5 Aggregate Waste Stream

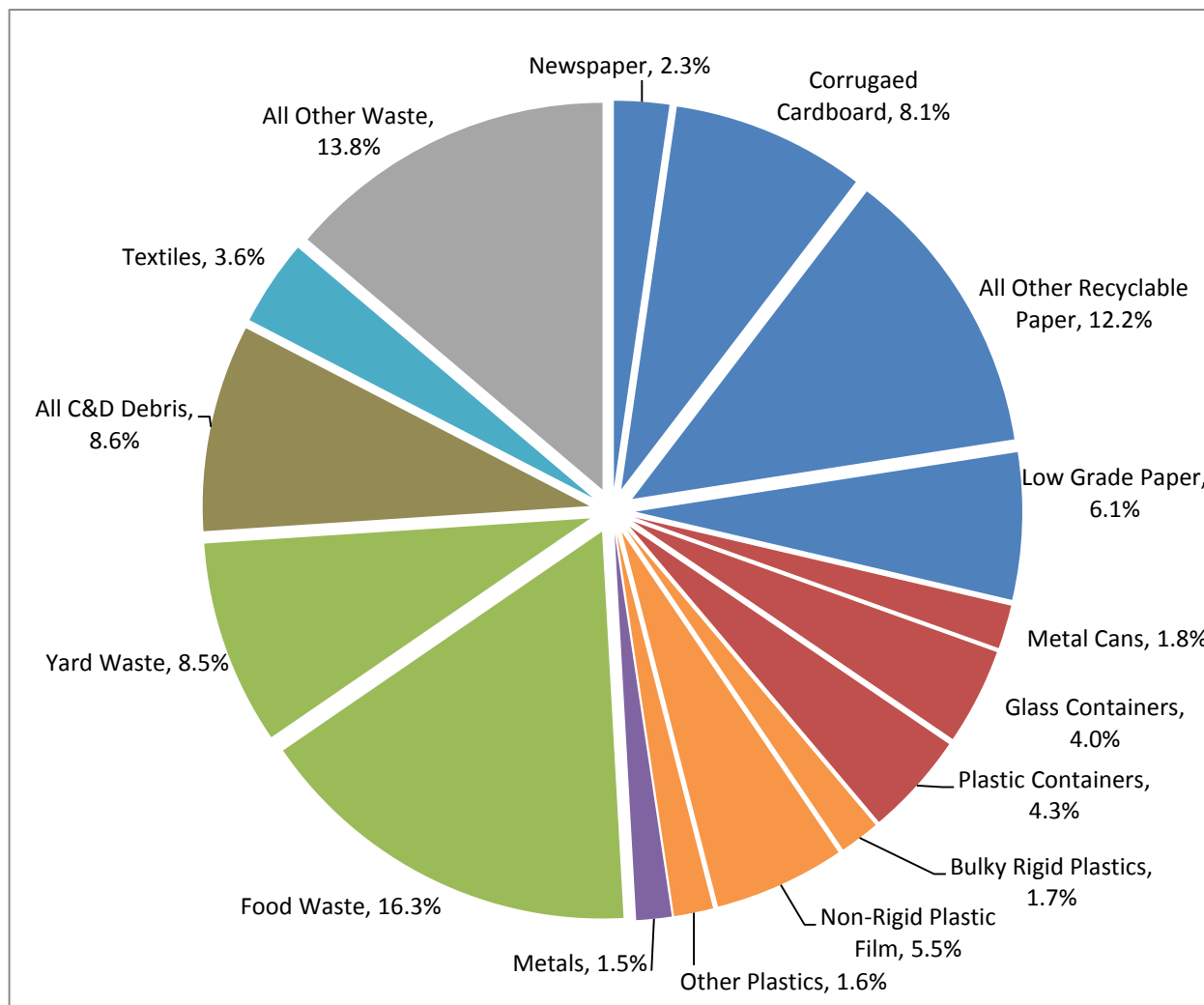
Data for the three waste generator sectors (single-family residential, multi-family residential, and commercial) were combined to calculate the combined composition of processable waste delivered to Bridgeway Acres. This is collectively referred to as the Aggregate Waste Stream.

Figure 3.7 depicts the composition of the Aggregate Waste Stream and Table 3.6 presents the contribution of the three generator sectors to this composition.

Key findings of the Aggregate Waste Stream are as follows:

- Recyclable fiber comprises 22.5 percent of the Aggregate Waste Stream, a substantial portion of which consists of Other Recyclable Paper (10.8 percent) and Corrugated Cardboard (8.1 percent).
- Recyclable containers comprise 10.2 percent of the Aggregate Waste disposed, with various types of plastics containers and glass containers contributing the greatest quantities.
- Yard waste comprises 8.5 percent of the Aggregate Waste Stream, the overwhelming majority coming from single-family residences.
- Food waste contributes 16.3 percent of the Aggregate Waste Stream.

Figure 3.7: Composition of Aggregate Waste Stream Disposed (% by weight)



Note: For the purpose of this chart, the following material categories have been combined:

- All Other Recyclable Paper includes Office Paper, Other Recyclable Paper, and Aseptic Containers.
- Metal Cans includes Tin/Steel Cans and Aluminum Cans.
- Plastic Containers includes PET, HDPE, Non-Bottle Plastics, and Other Plastic Containers (#3-#7).
- Other Plastics includes Expanded Polystyrene and All Other Plastics.
- Metals include Other Ferrous, Other Non-Ferrous, and White Goods/Small Appliances.
- All C&D Debris includes C&D Debris, Clean Wood Waste, and Treated Wood Waste.
- All Other Waste includes Other Glass, Special Wastes, Electronics, Household Batteries, Tires and Rubber, All Other Garbage, Liquids, and Grit.

Table 3.6: Composition of Aggregate Waste Stream, by Generator Sector (% by weight)

Material Category		Single-Family Residential	Multi-Family Residential	Commercial	Aggregate
1	Newspaper	2.0%	3.0%	2.2%	2.3%
2	Corrugated Containers	5.0%	5.9%	10.5%	8.1%
3	Office Paper	0.8%	0.8%	1.1%	1.0%
4	Other Recyclable Paper	9.3%	11.8%	11.3%	10.8%
5	Low Grade Paper	5.2%	5.2%	6.9%	6.1%
6	Aseptic Containers	0.3%	0.6%	0.4%	0.4%
7	PET Bottles	1.4%	2.4%	1.5%	1.6%
8	HDPE Bottles	0.7%	1.4%	0.8%	0.9%
9	Non-Bottle Plastics #1 and #2	0.8%	1.2%	0.9%	0.9%
10	Other Plastic Containers (#3-#7)	0.8%	1.0%	1.0%	0.9%
11	Bulky Rigid Plastics	1.9%	1.7%	1.6%	1.7%
12	Non-Rigid Plastic Film	4.3%	5.1%	6.2%	5.5%
13	Expanded Polystyrene	1.0%	0.8%	1.0%	0.9%
14	All Other Plastics	0.5%	0.9%	0.7%	0.7%
15	Tin/Steel Cans	1.0%	1.4%	1.0%	1.1%
16	White Goods/Small Appliances	0.0%	0.0%	0.0%	0.0%
17	Other Ferrous	0.9%	1.0%	1.3%	1.2%
18	Aluminum Cans	0.7%	1.1%	0.7%	0.8%
19	Other Non-Ferrous	0.3%	0.4%	0.3%	0.3%
20	Glass Containers	3.4%	6.3%	3.7%	4.0%
21	Other Glass	0.2%	0.2%	0.4%	0.3%
22	Textiles	5.4%	4.5%	2.3%	3.6%
23	Special Wastes	0.4%	0.1%	0.1%	0.2%
24	Electronics	2.0%	1.8%	1.6%	1.7%
25	Household Batteries	0.1%	0.1%	0.1%	0.1%
26	Clean Wood Waste	1.0%	0.2%	3.5%	2.2%
27	Treated Wood Waste	3.5%	0.5%	2.8%	2.6%
28	C&D Debris	2.1%	5.7%	4.2%	3.8%
29	Tires and Rubber	1.2%	0.3%	0.5%	0.7%
30	Yard Waste	21.7%	2.2%	3.3%	8.5%
31	Food Waste	12.2%	16.5%	18.5%	16.3%
32	All Other Garbage	9.5%	14.2%	7.8%	9.4%
33	Liquids	0.6%	1.4%	1.2%	1.0%
34	Grit	0.1%	0.2%	0.6%	0.4%
TOTALS		100.0%	100.0%	100.0%	100.0%
PERCENTAGE OF WASTE STREAM		29.5%	17.1%	53.4%	100.0%

Note: Columns might not appear to add correctly due to rounding.

3.6 Comparison with 2007 Study Results

Table 3.7 compares the results of the 2014 WCS with the 2007 study data. This table provides a side-by-side comparison of the two studies for the three main generator types and the aggregate waste composition. The material categories included in the 2014 study were adjusted to break out additional material types with the potential to be recycled or composted; therefore, some materials are combined for comparison purposes.

The following changes in waste composition between the two studies are worth noting:

- The percentage of newspaper has dropped substantially in all sectors. This is expected due to the trend toward electronic news media and the commensurate downsizing of many printed newspapers. It also reflects recycling efforts within the County. Most people recognize newspaper as recyclable; therefore, individuals who participate in recycling likely recycle their newspaper.
- The percentage of office paper also experienced a substantial decline across all sectors. Again, this is likely due to increased use of electronic communications and information management systems.
- The percentage of corrugated cardboard increased in all sectors, most notably in the Single-Family Residential sector. This may be due to the trend in online shopping, which results in substantial amounts of cardboard packaging. This material also represents a significant opportunity to increase recycling.
- Minor changes were seen in the percentages of most plastic categories, with the exception of Other Plastic Containers (#3-#7), which especially increased in the Commercial sector. The trend in product packaging and consumer preferences over the past decade has been toward lighter-weight plastic containers or film packaging; however, this may be offset by the expansion of plastic types (beyond just #1 PET and #2 HDPE bottles) that are now typically accepted for recycling.
- Consistent with the trend toward plastic packaging is the decline in the percentage of glass containers across all sectors. This may also be a result of increased recycling efforts; some communities added glass to their recycling programs since the last study in 2007.
- The percentage of electronics and special wastes also declined in all sectors, possibly in part due to the County's active Household Electronics and Chemical Collection Center (HEC3) program.
- The percentage of yard waste increased substantially in both the Single-Family Residential and Multi-Family Residential sectors. Because yard waste may be burned in WTE facilities in Florida, separate collection of this material might not be a priority for some communities.

Table 3.7: Comparison of 2014 and 2007 Waste Composition Results (% by weight)

Material Category	Single-Family Residential			Multi-Family Residential			Commercial			Aggregate (Combined)		
	2014	2007	% Change	2014	2007	% Change	2014	2007	% Change	2014	2007	% Change
1 Newspaper	2.0%	6.5%	-68.7%	3.0%	7.5%	-60.3%	2.2%	4.1%	-45.7%	2.3%	5.4%	-57.5%
2 Corrugated Containers	5.0%	3.1%	62.0%	5.9%	4.7%	25.8%	10.5%	8.7%	20.6%	8.1%	6.2%	30.3%
3 Office Paper	0.8%	2.1%	-61.0%	0.8%	1.9%	-55.6%	1.1%	5.7%	-80.4%	1.0%	3.9%	-74.9%
4 Other Recyclable Paper	9.3%	11.2%	-17.0%	11.8%	12.2%	-3.5%	11.3%	9.2%	23.1%	10.8%	10.3%	4.9%
5 Low Grade Paper	5.5%	6.1%	-10.9%	5.8%	7.2%	-19.4%	7.3%	8.6%	-15.1%	6.5%	7.5%	-13.2%
6 Aseptic Containers												
7 PET Bottles	1.4%	1.7%	-16.5%	2.4%	2.5%	-5.9%	1.5%	1.3%	14.8%	1.6%	1.6%	0.6%
8 HDPE Bottles	0.7%	1.0%	-30.4%	1.4%	1.6%	-10.6%	0.8%	0.6%	29.5%	0.9%	0.9%	-3.8%
10 Other Plastic Containers (#3-#7)	0.8%	0.6%	31.7%	1.0%	1.0%	3.3%	1.0%	0.5%	92.1%	0.9%	0.6%	54.7%
9 Non-Bottle Plastics #1 and #2												
11 Bulky Rigid Plastics												
12 Non-Rigid Plastic Film	8.4%	9.5%	-11.4%	9.8%	10.3%	-4.9%	10.4%	12.0%	-13.3%	9.7%	10.9%	-10.9%
13 Expanded Polystyrene												
14 All Other Plastics												
15 Tin/Steel Cans	1.0%	1.8%	-44.9%	1.4%	1.6%	-14.9%	1.0%	1.1%	-9.3%	1.1%	1.4%	-24.8%
16 White Goods/Small Appliances	0.9%	1.6%	-41.9%	1.0%	0.9%	11.1%	1.3%	1.7%	-23.5%	1.2%	1.5%	
17 Other Ferrous												
18 Aluminum Cans	0.7%	0.9%	-21.4%	1.1%	1.2%	-11.9%	0.7%	0.7%	0.6%	0.8%	0.9%	-14.3%
19 Other Non-Ferrous	0.3%	0.6%	-48.4%	0.4%	0.5%	-13.9%	0.3%	0.9%	-70.5%	0.3%	0.8%	-61.3%
20 Glass Containers	3.4%	5.3%	-36.9%	6.3%	9.8%	-35.8%	3.7%	5.9%	-37.8%	4.0%	6.3%	-36.1%
21 Other Glass	0.2%	0.8%	-79.3%	0.2%	1.4%	-88.3%	0.3%	0.5%	-33.8%	0.3%	0.7%	-62.3%
22 Textiles	5.4%	4.3%	24.5%	4.5%	8.1%	-44.9%	2.3%	2.7%	-14.0%	3.6%	4.1%	-12.3%
23 Special Wastes												
25 Household Batteries	0.5%	0.6%	-23.8%	0.2%	0.4%	-50.0%	0.2%	2.1%	-90.5%	0.3%	1.3%	-77.9%
24 Electronics	2.0%	2.9%	-32.9%	1.8%	3.4%	-46.2%	1.6%	2.3%	-31.0%	1.7%	2.7%	-35.6%
26 Clean Wood Waste												
27 Treated Wood Waste	6.6%	8.4%	-21.9%	6.5%	3.4%	91.2%	10.5%	10.6%	-0.9%	8.6%	8.8%	-1.8%
28 C&D Debris												
30 Yard Waste	21.7%	13.9%	56.4%	2.2%	0.8%	169.5%	3.3%	3.6%	-8.5%	8.5%	6.7%	27.4%
31 Food Waste	12.2%	10.7%	14.0%	16.5%	11.5%	43.9%	18.5%	13.4%	38.2%	16.3%	12.2%	33.8%
29 Tires and Rubber												
32 All Other Garbage	11.4%	6.5%	76.5%	16.0%	8.0%	100.0%	10.1%	4.0%	152.5%	11.5%	5.4%	113.2%
33 Liquids												
34 Grit												
TOTALS	100%	100%		100%	100%		100%	100%		100%	100%	

Note: Columns might not appear to total to 100% due to rounding.

3.7 Bulky Waste

Table 3.8 presents the results, as a percentage by volume, of the bulky waste visual audit, as well as the 90 percent confidence intervals. Because of the wide variety in the types and quantities of items received as part of this waste stream, the confidence intervals are very wide. Table 3.9 converts these volumetric percentages to percentage by weight based on industry-accepted conversion factors. Individual sample data for the bulky waste sector can be found in Appendix G; photographs of a number of loads are provided in Appendix H.

Table 3.8: Composition of Bulky Waste Disposed (% by volume)

Material Category	Weighted Average (% by volume)	Lower Bounds	Upper Bounds
Corrugated Cardboard	1.6%	-2.2%	5.5%
Other Paper	1.3%	-4.0%	6.6%
Other Non-Ferrous	0.8%	-1.8%	3.4%
Other Ferrous	0.6%	-2.1%	3.3%
Plastic Film	1.0%	-4.4%	6.3%
Polystyrene/Insulation	1.4%	-4.7%	7.5%
Rigid Plastics	11.4%	-14.9%	37.7%
Other Plastics	0.0%	-0.5%	0.6%
Yard Waste	19.5%	-18.5%	57.4%
Treated Wood	14.0%	-19.6%	47.5%
Untreated Wood	15.5%	-14.4%	45.3%
Carpet and Padding	0.9%	-3.8%	5.6%
Drywall	7.3%	-14.4%	29.0%
Roofing Shingles	0.4%	-6.9%	7.6%
Rock/Gravel/Grit	6.5%	-10.9%	23.9%
Tile	0.6%	-9.9%	11.0%
Concrete	4.2%	-23.5%	31.8%
Sod	3.6%	-33.2%	40.3%
Furniture	0.6%	-2.0%	3.2%
C&D Debris Bagged Waste	0.5%	-1.7%	2.7%
Glass	0.2%	-0.7%	1.0%
Textiles	0.1%	-0.8%	0.9%
Rubber	1.4%	-7.4%	10.1%
Dirt	0.3%	-3.6%	4.1%
Porcelain	0.2%	-1.5%	1.8%
Fiberglass	0.8%	-7.4%	9.1%
MSW	2.0%	-8.6%	12.7%
Boats	3.5%	-20.9%	28.0%
Total	100.0%		

Note: Columns might not appear to add correctly due to rounding. In addition, the confidence interval is a statistical calculation; therefore, the lower bounds may be a negative number.

Table 3.9: Conversion of Volumetric Percentages to Weight Percentages for Bulky Waste

Material Category	Weighted Average (% by volume)	Estimated Volume (cy)	Average Density (lbs/cy)	Estimated Weight (lbs)	Weighted Average (% by weight)
Corrugated Cardboard	1.6%	14	50	705	0.2%
Other Paper	1.3%	11	363.5	3,971	1.0%
Other Non-Ferrous	0.8%	7	150	1,012	0.3%
Other Ferrous	0.6%	5	150	793	0.2%
Plastic Film	1.0%	8	23	193	0.1%
Polystyrene/Insulation	1.4%	12	17	209	0.1%
Rigid Plastics	11.4%	97	50	4,869	1.3%
Yard Waste	19.5%	166	300	49,888	13.1%
Treated Wood	14.0%	119	400	47,718	12.5%
Untreated Wood	15.5%	132	400	52,844	13.9%
Carpet and Padding	0.9%	8	84.4	644	0.2%
Drywall	7.3%	62	600	37,477	9.8%
Roofing Shingles	0.4%	3	731	2,360	0.6%
Rock/Gravel/Grit	6.5%	56	1500	83,510	21.9%
Tile	0.6%	5	1214	6,121	1.6%
Concrete	4.2%	36	860	30,613	8.0%
Sod	3.6%	31	667	20,385	5.3%
Furniture	0.6%	5	145	754	0.2%
C&D Debris Bagged Waste	0.5%	4	150	632	0.2%
Glass	0.2%	1	600	810	0.2%
Other Glass	0.0%	-	-	-	-
Textiles	0.1%	1	175	114	0.0%
Rubber	1.4%	12	1350	15,795	4.1%
Dirt	0.3%	2	929	2,054	0.5%
Porcelain	0.2%	1	860	1,142	0.3%
Fiberglass	0.8%	7	17	122	0.0%
MSW	2.0%	17	225	3,934	1.0%
Boats ^a	3.5%	30	416	12,480	3.3%
	100.0%			381,146	100.0%

Note: Columns might not appear to add correctly due to rounding.

^a The density of a boat can vary greatly. The density used is based on the actual weights of boats or boat forms disposed during the week of the visual audit.

Section 4

Summary and Diversion Opportunities

4.1 Opportunities to Enhance Materials Recovery

The results of this WCS offer insight into the potential for additional waste diversion. Figure 4.1 and Table 4.1 identify the materials found in the processable waste received at Bridgeway Acres, by generator sector and aggregated, that offer the greatest potential for recycling or composting.

Figure 4.1: Potentially Recyclable or Compostable Materials (% by weight)

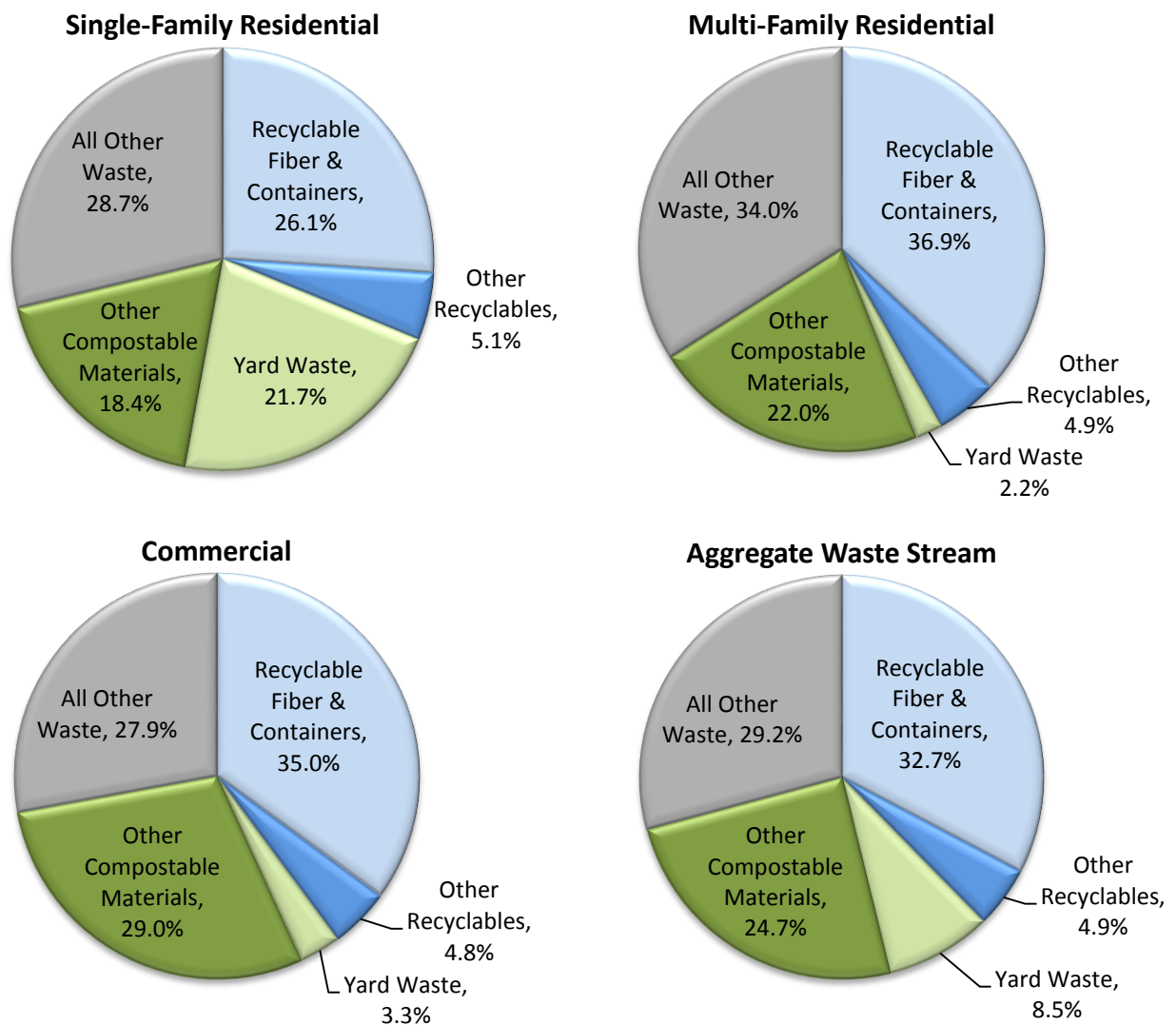


Table 4.1: Potentially Recyclable or Compostable Materials (% by weight)

	Material Category	Single-Family Residential	Multi-Family Residential	Commercial	Aggregate
1	Newspaper	2.0%	3.0%	2.2%	2.3%
2	Corrugated Containers	5.0%	5.9%	10.5%	8.1%
3	Office Paper	0.8%	0.8%	1.1%	1.0%
4	Other Recyclable Paper	9.3%	11.8%	11.3%	10.8%
6	Aseptic Containers	0.3%	0.6%	0.4%	0.4%
	RECYCLABLE FIBER	17.3%	22.1%	25.5%	22.5%
7	PET Bottles	1.4%	2.4%	1.5%	1.6%
8	HDPE Bottles	0.7%	1.4%	0.8%	0.9%
9	Non-Bottle Plastics #1 and #2	0.8%	1.2%	0.9%	0.9%
10	Other Plastic Containers (#3-#7)	0.8%	1.0%	1.0%	0.9%
15	Tin/Steel Cans	1.0%	1.4%	1.0%	1.1%
18	Aluminum Cans	0.7%	1.1%	0.7%	0.8%
20	Glass Containers	3.4%	6.3%	3.7%	4.0%
	RECYCLABLE CONTAINERS	8.7%	14.8%	9.5%	10.2%
11	Bulky Rigid Plastics	1.9%	1.7%	1.6%	1.7%
16	White Goods/Small Appliances	0.0%	0.0%	0.0%	0.0%
17	Other Ferrous	0.9%	1.0%	1.3%	1.2%
19	Other Non-Ferrous	0.3%	0.4%	0.3%	0.3%
24	Electronics	2.0%	1.8%	1.6%	1.7%
	OTHER POTENTIALLY RECYCLABLE MATERIALS	5.1%	4.9%	4.8%	4.9%
5	Low Grade Paper	5.2%	5.2%	6.9%	6.1%
26	Clean Wood Waste	1.0%	0.2%	3.5%	2.2%
30	Yard Waste	21.7%	2.2%	3.3%	8.5%
31	Food Waste	12.2%	16.5%	18.5%	16.3%
	POTENTIALLY COMPOSTABLE MATERIALS	40.1%	24.2%	32.3%	33.2%
12	Non-Rigid Plastic Film	4.3%	5.1%	6.2%	5.5%
13	Expanded Polystyrene	1.0%	0.8%	1.0%	0.9%
14	All Other Plastics	0.5%	0.9%	0.7%	0.7%
21	Other Glass	0.2%	0.2%	0.3%	0.3%
22	Textiles	5.4%	4.5%	2.3%	3.6%
23	Special Wastes	0.4%	0.1%	0.1%	0.2%
25	Household Batteries	0.1%	0.1%	0.1%	0.1%
27	Treated Wood Waste	3.5%	0.5%	2.8%	2.6%
28	C&D Debris	2.1%	5.7%	4.2%	3.8%
29	Tires and Rubber	1.2%	0.3%	0.5%	0.7%
32	All Other Garbage	9.5%	14.2%	7.8%	9.4%
33	Liquids	0.6%	1.4%	1.2%	1.0%
34	Grit	0.1%	0.2%	0.6%	0.4%
	ALL OTHER MATERIALS	28.7%	34.0%	27.9%	29.2%
	TOTALS	100.0%	100.0%	100.0%	100.0%
	PERCENTAGE OF WASTE STREAM	29.5%	17.1%	53.4%	100.0%

Paper and containers, which are commonly included in recycling programs, comprise nearly 33 percent of the waste disposed in the County, ranging from 26-35 percent depending on the generator sector. Yard waste makes up 8.5 percent of the waste disposed, with the highest percentage (nearly 22 percent) found in the single-family residential waste stream. Other material types that could potentially be composted (Food Waste, Other Non-Recyclable Paper, and Wood Waste) contribute an additional 25 percent. Recovery of organics other than yard waste is not common in Florida, although programs for source separating organics prior to collection or separating them after collection through mixed waste processing have been implemented in a number of communities in the United States.

Provided below are opportunities, based on the study results, to increase the County's materials recovery efforts. These opportunities would need to be balanced with maintaining the operational efficiency and financial viability of the County's WTE facility and other programs; however, such analysis was beyond the scope of this project. Therefore, these opportunities are offered for the County's consideration.

- **Comprehensive and Consistent Curbside Recycling Program:** The County's existing open market collection program makes it challenging to implement a comprehensive and consistent curbside recycling program within the unincorporated county. Program consistency within the entire county is further impeded by the existence of 24 municipal entities. While most have curbside recycling programs, they may differ in the types of materials collected and how they are collected. Requiring collection service providers in the unincorporated county to offer a standard level of curbside recycling service, for example through licensing requirements or a service contract, would help alleviate this issue. In addition, working with municipal partners to develop consistent recycling programs (e.g., materials accepted and collection method) would provide a more cohesive effort.
- **Outreach and Education:** Consistent curbside recycling programs throughout the County would enable the County and municipalities to jointly launch a cohesive public outreach and education campaign. It would also enable all parties to consistently brand the program to increase public recognition and participation.
- **Multi-Family and Commercial Technical Assistance:** Multi-family residences and commercial businesses both offer opportunities for increased materials recovery, but programs to capture recyclables from these generator sectors require a different approach than single-family curbside recycling. Direct technical assistance can help educate owners or operators of multi-family complexes and commercial businesses about the availability of recycling services, how to set up a program, and the benefits to the complex or business. The largest businesses or complexes, or those that generate the greatest quantities of recyclables, should be targeted first. For example, during the sorting events, some loads of commercial waste were found to contain as much as 46 percent recyclable paper (sample 22, City of Dunedin).
- **Yard Waste Collection and Processing:** Substantial opportunity exists for diverting additional yard waste from disposal, especially in the single-family residential sector. If the County wishes to divert more yard waste to composting, a lower yard waste tipping fee could provide an incentive for segregating this material or collection service providers could

be required to collect segregated yard waste (e.g., through licensing requirements or service contract).

- **Food Waste Diversion:** Because of its moisture content, food waste is generally not high in heat content and, therefore, would be a likely candidate to divert from the WTE facility. As demonstrated by the study, supermarket and restaurant waste can consist of approximately 38 percent food waste. To divert this material from the WTE facility, a commercial food waste recovery program and the infrastructure to process this material would need to be developed.
- **Mixed Waste Processing:** The opportunities outlined above all involve some form of source separation of materials prior to collection. Another option would be to process, through some form of mixed waste processing facility, the waste received at Bridgeway Acres to recover recyclable materials prior to combustion. The feasibility of this option would need to be further evaluated.

4.2 Opportunities for Bulky Waste Diversion

An objective of the WCS was to characterize the bulky waste that is landfilled at Bridgeway Acres in order to determine if any materials could be processed and utilized as fuel in the WTE plant. Table 4.2 provides the heat value, expressed in British Thermal Units (BTUs) per ton, for each material category.

As noted below, approximately 30,000 tons of bulky waste was disposed at Bridgeway Acres in fiscal year (FY) 2014. This figure was derived by obtaining from County staff the total quantity of waste disposed in South Landfill during that year, and then deleting Special Waste and street sweeping tonnage, the latter of which was estimated by annualizing the amount received during the week of the visual audit.

Bulky waste received in FY 2014 ^a	40,568	tons
Less Special Waste ^b	-4,882	tons
Less est. street sweepings ^c (106 tons/week x 52 weeks)	-5,500	tons
Est. bulky waste received in FY 2014	30,186	tons

^a Class III waste from October 01, 2013 through September 30, 2014 reported by the County included 240-Special Waste, 300-Commercial, and 310-Residential.

^b Class III 240-Special Waste as reported by the County for FY2014.

^c Street sweepings identified during the Waste Composition Study, August 25-29, 2014.

Table 4.2 estimates the potential annual tonnage of each material type by applying the estimated percentage by weight to the 30,000 tons of bulky waste disposed in FY 2014. Figure 4.2 depicts both the percentage by volume and by weight of the potentially combustible and non-combustible materials in bulky waste.

Table 4.2: Heat Values for Bulky Waste

Material Categories	Heat Value (million BTU/ton) ^a	Waste Composition (% by weight)	Estimated Annual Tonnage	Calculated Annual Heat Value (million BTUs)
Plastic Film	38.0	0.1%	20	800
Rigid Plastics	38.0	1.3%	380	14,400
Polystyrene/Insulation	35.6	0.1%	20	700
Rubber	26.9	4.1%	1,240	33,400
Corrugated Cardboard	16.5	0.2%	60	1,000
Carpet and Padding	15.2	0.2%	50	800
Textiles	13.8	0.0%	10	100
Roofing Shingles	12.0	0.6%	190	2,300
Treated Wood	10.0	12.5%	3,760	37,600
Untreated Wood	10.0	13.9%	4,160	41,600
MSW	10.0	1.0%	310	3,100
Boats ^b	8.6	3.3%	980	8,428
Fiberglass ^c	8.6	0.0%	10	86
Other Paper	6.7	1.0%	310	2,100
Yard Waste	6.0	13.1%	3,930	23,600
Other Non-Ferrous	0.0	0.3%	80	0
Other Ferrous	0.0	0.2%	60	0
Sod	0.0	5.3%	1,600	0
Glass	0.0	0.2%	60	0
Other Glass	0.0	0.0%	0	0
Dirt	0.0	0.5%	160	0
Porcelain	0.0	0.3%	90	0
Furniture	Varies	0.2%	60	Varies
C&D Debris Bagged Waste	Varies	0.2%	50	Varies
Drywall ^d	NA	9.8%	2,950	NA
Rock/Gravel/Grit	NA	21.9%	6,570	NA
Tile	NA	1.6%	480	NA
Concrete	NA	8.0%	2,410	NA
TOTALS		100.0%	30,000	170,014

NA = Not Available

^a Sources: Energy Information Administration, Methodology for Allocating Municipal Solid Waste to Biogenic and Non-Biogenic Energy, March 2007, pages 9-10.

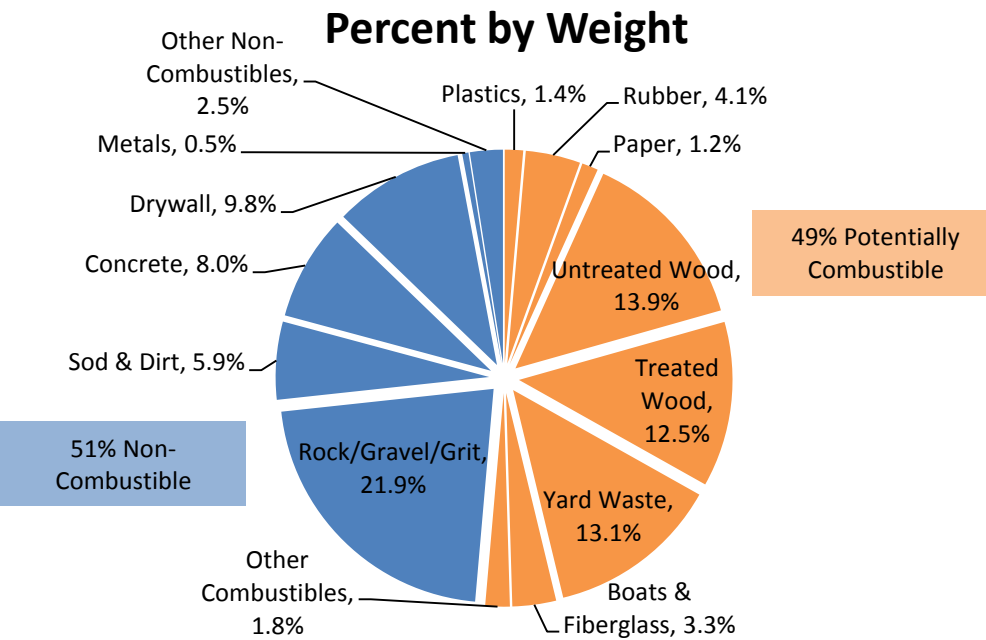
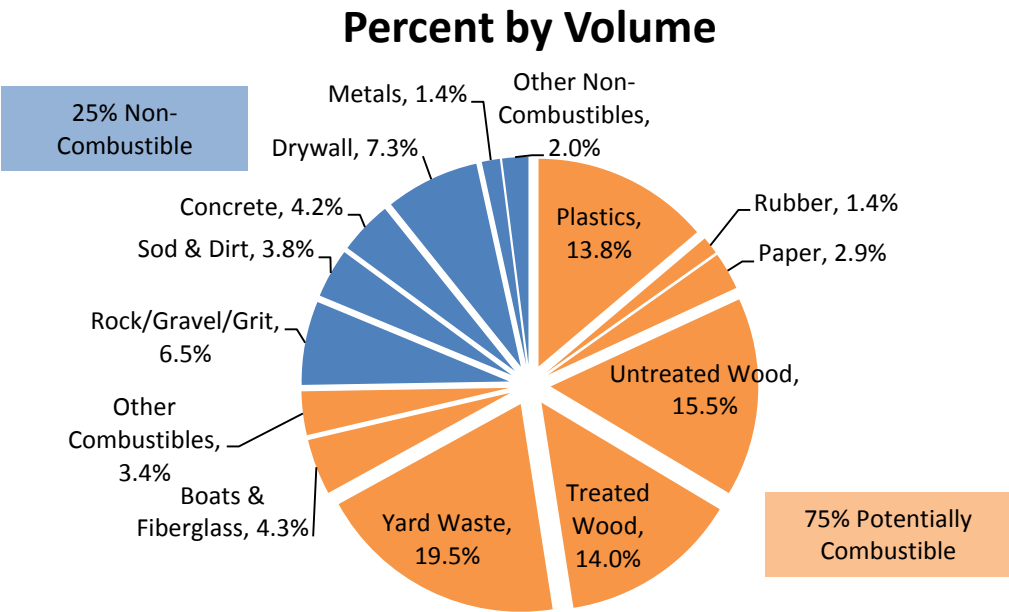
Nikolas J. Themelis and Charles Mussche, 2014 Energy and Economic Value of Municipal Solid Waste Currently Landfilled in the Fifty States, Earth Engineering Center, Columbia University.

^b Per M. Davalio, et. al. ("Mechanical Properties of Unsaturated Polyester Resin"), boat composition determined to be unsaturated polyester resin. Per "Developments in the Science and Technology of Composite Materials" (ECCM4), material has estimated heating value of 8.6 BTU/ton.

^c Category consisted primarily of jet skis and fiberglass molds; therefore, same BTU value as for boats is used estimation purposes.

^d Drywall, when combusted, produces sulfur dioxide gas, which in high quantities may limit alkaline scrubbers in WTE facilities and reduce their ability to remove other acidic gases. Therefore, for purposes of this analysis, recovery of drywall for incineration is not recommended.

Figure 4.2: Potentially Combustible and Non-Combustible Materials in Bulky Waste



Based on this analysis of bulky waste, observations during the visual audit, and additional research, the following potential diversion opportunities were identified:

- Potentially combustible materials comprised approximately 49 percent by weight and 75 percent by volume of the loads that were audited. Materials identified as most viable for incineration based on heat value and potential to be size-reduced are Treated and Untreated Wood, Yard Waste, Rubber, and Rigid Plastics. In addition, Other Paper, Corrugated Cardboard, Carpet and Padding, Polystyrene/Insulation, Plastic Film, and Roofing Shingles could be separated for incineration.
- Fiberglass boats, if reduced in size, also have the potential to be incinerated; however, about 60 percent of the composite waste will remain as ash due to the high percentage of inorganic materials. In addition, the resulting ash may contain pollutants requiring further processing before landfilling. Combustion of fiberglass may also lead to the emission of hazardous flue gasses, in that the small glass fiber spares may cause problems to the dust filter devices.⁶ Trials have shown mixing up to 10 percent fiberglass waste with municipal solid waste may be a practical solution to prevent clogging of dust filter devices.⁷ The County should further assess their system to ensure the ability to process this material.
- Yard waste could be diverted for energy conversion, or alternatively composted.
- Bulky waste also contains a substantial amount of non-combustible materials that could potentially be diverted for beneficial use.
 - Rock and gravel could potentially be used as construction aggregate.
 - Sod and dirt could potentially be added to compost or used as fill material.
 - Crushed concrete and concrete aggregates could be used for road base, ready mix concrete, asphalt pavements, soil stabilization, pipe bedding, and landscape materials.
 - Drywall, when incinerated, produces sulfur dioxide gas, which in high quantities may limit alkaline scrubbers in incinerators and reduce their ability to remove other acidic gases.⁸ However, the County's current WTE facility operator, Covanta, has indicated that small quantities of drywall mixed with other municipal solid waste is acceptable.⁹ Alternatively, drywall can be processed to produce new drywall, used as a concrete additive, or used as a composting additive. To our knowledge, no recyclers in Florida are currently accepting post-consumer drywall for recycling.¹⁰ The County could explore the feasibility of incorporating drywall into its

⁶ Reinforced Plastics.com, <http://www.reinforcedplastics.com/view/319/recycling-wind/>.

⁷ European Confederation of Nautical Industries, Nautical Activities: What Impact on the Environment? A Life Cycle Approach for "Clear Blue" Boating, June 2009 – Second Edition.

⁸ J.W. Mustakas, "University of Florida Gypsum Board Waste: An Analysis of Current Trends and a Proposal for Future Diversion" (Graduate thesis, University of Florida, 2009), 30.

⁹ Email from Joseph Treshler, Senior Vice President, Business Management/Development & Community Affairs, Covanta Energy Corporation, to Kelsi Oswald, Director, Pinellas County Department of Solid Waste, 12 January 2015.

¹⁰ Personal communication with Gene Jones, CEO of Southern Waste Information eXchange, Inc. (SWIX), 14 January 2015.

- composting operations. The additional gypsum would result in a calcium- and sulfur-rich compost that is beneficial to some crops.^{11,12}
- Ferrous and non-ferrous metals are readily recycled if extracted from other bulky waste.

To divert materials for incineration or other beneficial use would require some form of sorting and processing system. For incineration, size-reduction would be needed for larger items so they would meet the four foot limit of the WTE infeed. Provided below is a preliminary discussion of system needs; a more detailed operational and economic analysis would be needed to determine the viability.

- Designated loader and operator: Some of the material entering the landfill would need little more than a loader and operator to separate materials for incineration. A loader with a grapple bucket could easily pull materials that are less than four feet in size, such as yard waste, wood, carpet, plastics, and paper, from incoming loads and deposit them in a roll-off container for transport to the WTE plant. The operator could also segregate other materials such as concrete, rock, sod and dirt for reuse in other areas of the facility.
- Mechanical size-reduction: Items larger than four feet in size would need to be mechanically processed before being sent to the WTE plant for energy recovery. Based on visual observation, at least one-third of the materials are greater than four feet by four feet in size. These materials include dimensional lumber, large utility poles and railroad ties, boats and jet skis, sheets of plywood, large stumps and branches, and boats. Commercial equipment is available that is capable of shredding bulky waste such as boats, mattresses, railroad ties, carpet, etc.¹³

Due to the capital investment required for a bulky waste processing system, a more detailed financial analysis is warranted to further evaluate the economic and operational feasibility.

4.3 Use of Study Results in State Reporting

The results of this study can be utilized by the County when calculating the composition of waste generated within the County for annual state reporting purposes. The WCS results estimate the composition of processable residential and commercial solid waste received at Bridgeway Acres for disposal. The results do not include materials diverted for recycling or composting or bulky or other types of waste received at the County or private facilities for processing or disposal. To determine the composition of waste generated within the entire County, these materials need to be added to the study results.

Appendix I provides instructions, as well as a form, for County staff to utilize when determining the composition of all waste generated within the County. KCI will also provide County staff with an electronic version of this form for use when compiling future annual solid waste reports for the State.

¹¹ Construction & Demolition Recycling Association, <http://www.cdrecycling.org/compost>, accessed 15 January 2015.

¹² Construction & Demolition Recycling Association, <http://www.cdrecycling.org/land-application>, accessed 15 January 2015.

¹³ SSI Shredding System, Inc., <http://www.ssiworld.com/products/products4-en.htm>.

Appendix A: Waste Characterization Study Material Categories

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Appendix A: Waste Characterization Study Material Categories

#	Material Categories	Description of Categories
1	Newspaper	Newspaper (loose, tied, or shredded) including other paper normally distributed inside newspaper such as ads, flyers, etc.
2	Corrugated Cardboard (OCC)	Uncoated brown "cardboard" boxes with a wavy core (no plastic liners, waxy coatings).
3	Office Paper	Printed or unprinted paper typically generated in an office environment including white, colored, coated and uncoated papers, and manila and pastel colored file folders.
4	Other Recyclable Paper	All magazines, catalogs, paperboard, chipboard, brown paper bags, telephone books, and other printed material on glossy and non-glossy paper.
5	Low Grade Paper	All remaining paper not categorized in other paper categories, including waxy cardboard and contaminated paper (i.e., napkins, pizza boxes, paper towels, fast-food wrappers, etc.).
6	Aseptic Containers	Gable top milk cartons, juice boxes, and other similar containers.
7	Polyethylene Terephthalate (PET) Bottles (SPI #1)	Clear and colored bottles or containers coded PET #1 such as soda bottles, water bottles, etc.
8	High-density Polyethylene (HDPE) Bottles (SPI #2)	Clear/natural and pigmented bottles or containers coded HDPE #2 such as milk jugs, detergent bottles, etc.
9	Other Non-Bottle Plastics #1 and #2	Clear and colored plastic items labeled PET #1 such as clamshell containers, frozen food trays, disposable cups, and other items labeled PET #1. Also includes wide-mouthed tubs and containers labeled HDPE #2 including lids. Examples include yogurt cups, margarine tubs, Cool Whip® tubs, and other non-bottle HDPE items.
10	Other Recyclable Plastic Containers (SPI #3-#7)	Plastic containers coded #3-#7, with the triangle label symbol.
11	Bulky Rigid Plastics	Consists of non-container rigid plastic items such as plastic drums, crates, buckets, baskets, toys, refuse totes, lawn furniture, flower pots, laundry baskets, and other large plastic items. <i>Does not include electronic toys.</i>
12	Non-Rigid Plastic Film	Grocery bags, garbage bags, plastic sheeting, Saran® wrap, visqueen, etc.
13	Expanded Polystyrene Foam (EPS) (Styrofoam®)	Disposable coffee cups, coolers, or packaging material, which are typically white and are made of expanded polystyrene beads. Also includes food service trays and egg cartons.
14	All Other Plastics	Any plastic materials not categorized above, such as deodorant cases, toothpaste tubes, tooth brushes, broom heads, etc.
15	Tin/Steel Cans	Tin-plated steel cans, usually food containers, and aerosol cans.
16	White Goods/Small Appliances	Household appliances such as refrigerators, stoves, toasters, vacuums, and salvageable items such as machinery.

Appendix A: Waste Characterization Study Material Categories (continued)

#	Material Categories	Description of Categories
17	Other Ferrous	Steel, clothes hangers, sheet metal products, pipes, miscellaneous metal scraps, and other magnetic metal items.
18	Aluminum Cans	Aluminum soft drink, beverage, and some food cans.
19	Other Non-Ferrous	Scrap aluminum, aluminum foil, and catering trays, and other non-magnetic metal, copper wiring and tubing, and brass fixtures.
20	Glass Containers	Clear, Brown, and Green glass bottles and containers.
21	Other Glass	Window panes, mirrors, ceramics, and drinking glasses.
22	Textiles	Clothing apparel, rags, leather, blankets, curtains, shoes, wallets, purses, belts, and scrap leather.
23	Special Wastes	Cleaners, oil, pool chemicals, fluorescent lights, medical waste, solvents, etc., that are considered household hazardous waste.
24	Electronics (E-waste)	Electronic devices such as televisions, computers, cell phones, cordless telephones, PDA, handheld devices, rechargeable batteries, etc.
25	Household Batteries	Household batteries including AA, AAA, C, D, 9-volt, and button types.
26	Clean Wood Waste	Untreated and unpainted lumber, pallets and dimensional lumber. Also includes untreated/unpainted wood furniture including chairs, cabinets, dressers, etc.
27	Treated Wood Waste	Treated and painted lumber, pallets, and dimensional lumber. Also includes treated/painted wood furniture including chairs, cabinets, dressers, etc.
28	C&D Debris	Construction and demolition debris that includes concrete, carpet, drywall, insulation, and roofing materials.
29	Tires and Rubber	Small and large tires and other items made of rubber.
30	Yard Waste	Shrub and brush prunings, household bedding plants, weeds, leaves, grass clippings, and other landscaping and gardening wastes.
31	Food Waste	Meat and vegetable waste (includes coffee grinds and tea bags).
32	All Other Garbage	All other wastes not included in the above categories, including diapers and products that are composite of materials such as frozen juice cans, binders, Pringle's® can, chip bags, etc.
33	Liquids	All liquids found in containers will be emptied here.
34	Grit	Indistinguishable items less than 1-inch in diameter.

Appendix B:

Visual Audit Form

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Appendix B
PINELLAS COUNTY
VISUAL CHARACTERIZATION FORM
FOR THE 2014 WASTE COMPOSITION STUDY



SAMPLE #

RECORDER: _____ LOCATION: _____

DATE AND TIME: _____

WTE NON PROCESSABLES

BULK WASTE

HAND UNLOAD BULK

VEHICLE DESCRIPTION

HAULER OR BUSINESS NAME: _____

TYPE OF VEHICLE: REAR LOADER FRONT-END LOADER OPEN-TOP ROLL OFF

CLAW TRUCK DUMP TRUCK PASSENGER VEHICLE VEHICLE WITH TRAILER

OTHER: _____

LOAD CAPACITY

PERCENT FULL

CUBIC YARDS: _____



____ X ____ X ____
LENGTH WIDTH HEIGHT

LOAD DESCRIPTION

Percent of Exceeding 4' x 4' _____

Appendix C:

Single-Family Residential Sample Results

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Appendix C: Single-Family Residential Sample Results (% by weight)

Hauler/Location		Belleair Beach	Waste Mgmt	Dunedin	Unincorp	Clearwater	Clearwater
Material Categories	sample #	7	11	19	20	21	22
1	Newspaper	0.3%	2.2%	0.7%	4.7%	2.7%	0.2%
2	Corrugated Cardboard	7.2%	9.1%	5.4%	3.6%	3.7%	2.6%
3	Office Paper	0.0%	0.6%	1.0%	0.1%	2.6%	0.1%
4	Other Recyclable Paper	12.3%	8.2%	6.7%	9.5%	7.6%	10.7%
5	Low Grade Paper	5.3%	3.5%	5.0%	2.6%	6.7%	9.2%
6	Aseptic Containers	0.0%	0.1%	0.1%	0.1%	0.1%	0.1%
7	PET Bottles	0.7%	2.7%	1.0%	1.0%	0.5%	1.8%
8	HDPE Bottles	0.1%	0.8%	0.2%	0.7%	0.8%	0.2%
9	Other Non-Bottle Plastics #1 and #2	0.6%	1.0%	0.3%	0.2%	0.7%	1.2%
10	Other Plastic Containers (#3-#7)	0.3%	0.6%	1.9%	0.4%	0.2%	1.7%
11	Bulky Rigid Plastics	6.8%	1.5%	3.6%	2.8%	1.4%	1.1%
12	Non-Rigid Plastic Film	3.0%	5.6%	7.0%	4.6%	4.6%	5.3%
13	Expanded Polystyrene	0.4%	2.5%	1.0%	0.4%	0.2%	1.9%
14	All Other Plastics	0.3%	0.7%	0.7%	1.1%	2.1%	0.6%
15	Tin/Steel Cans	0.8%	1.3%	0.5%	0.6%	0.9%	0.8%
16	White Goods/Small Appliances	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	Other Ferrous	0.2%	0.7%	0.5%	0.4%	1.6%	0.9%
18	Aluminum Cans	0.3%	0.8%	0.6%	0.5%	0.5%	0.4%
19	Other Non-Ferrous	0.3%	0.4%	0.2%	0.2%	0.2%	1.6%
20	Glass Containers	1.5%	3.0%	0.4%	3.5%	1.8%	3.8%
21	Other Glass	0.3%	0.0%	0.1%	0.0%	0.0%	0.0%
22	Textiles	0.6%	4.8%	5.7%	2.8%	4.5%	1.2%
23	Special Wastes	0.0%	0.1%	0.3%	0.0%	0.0%	0.0%
24	Electronics	0.0%	2.2%	0.8%	0.6%	0.7%	0.1%
25	Household Batteries	0.1%	0.1%	0.0%	0.0%	0.1%	0.3%
26	Clean Wood Waste	0.0%	3.7%	0.8%	0.6%	2.9%	0.1%
27	Treated Wood Waste	3.5%	10.6%	0.9%	1.1%	5.3%	0.0%
28	C&D Debris	0.7%	0.2%	1.7%	8.5%	0.7%	0.4%
29	Tires and Rubber	1.0%	0.0%	2.6%	0.1%	0.2%	0.0%
30	Yard Waste	38.5%	2.6%	30.1%	26.8%	33.5%	5.7%
31	Food Waste	5.5%	18.3%	12.0%	7.4%	8.7%	30.3%
32	All Other Garbage	9.0%	8.3%	7.6%	14.8%	3.9%	16.1%
33	Liquids	0.3%	1.9%	0.7%	0.4%	0.3%	1.8%
34	Grit	0.0%	2.1%	0.0%	0.0%	0.0%	0.0%
TOTALS		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix C: Single-Family Residential Sample Results (continued)

Hauler/Location		Clearwater	Waste Mgmt	Unincorp	Unincorp	Unincorp	Gulfport
Material Categories	sample #	23	31	32	42	43	45
1 Newspaper		0.5%	1.3%	2.4%	1.6%	1.5%	1.4%
2 Corrugated Cardboard		2.4%	5.1%	28.8%	2.2%	0.2%	4.0%
3 Office Paper		1.7%	0.1%	1.6%	1.6%	0.0%	0.1%
4 Other Recyclable Paper		18.2%	15.5%	8.2%	10.7%	7.4%	9.6%
5 Low Grade Paper		4.6%	4.8%	3.0%	11.1%	7.8%	4.1%
6 Aseptic Containers		0.2%	0.8%	0.3%	0.3%	0.3%	0.2%
7 PET Bottles		1.2%	1.6%	0.1%	1.8%	1.7%	1.0%
8 HDPE Bottles		0.5%	0.7%	0.2%	1.1%	1.0%	0.3%
9 Other Non-Bottle Plastics #1 and #2		0.3%	0.6%	0.3%	1.8%	1.1%	1.2%
10 Other Plastic Containers (#3-#7)		1.7%	0.8%	0.3%	1.4%	1.1%	0.8%
11 Bulky Rigid Plastics		1.6%	1.7%	1.6%	1.2%	0.5%	0.8%
12 Non-Rigid Plastic Film		4.1%	4.1%	3.8%	4.9%	4.9%	3.1%
13 Expanded Polystyrene		0.4%	0.6%	0.1%	0.7%	0.5%	0.2%
14 All Other Plastics		0.2%	0.4%	0.7%	0.5%	0.8%	0.5%
15 Tin/Steel Cans		0.8%	1.5%	0.3%	1.0%	1.1%	1.0%
16 White Goods/Small Appliances		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17 Other Ferrous		0.0%	0.2%	0.2%	0.5%	0.1%	0.0%
18 Aluminum Cans		1.1%	0.6%	0.1%	1.7%	1.3%	0.9%
19 Other Non-Ferrous		0.1%	0.3%	0.2%	0.2%	0.3%	0.1%
20 Glass Containers		1.5%	3.8%	3.7%	5.0%	4.6%	7.5%
21 Other Glass		0.0%	0.0%	0.0%	0.7%	0.1%	0.0%
22 Textiles		17.9%	15.1%	1.8%	3.6%	2.6%	5.9%
23 Special Wastes		0.0%	0.0%	0.0%	7.7%	0.2%	0.2%
24 Electronics		7.9%	0.2%	2.2%	3.0%	1.1%	0.4%
25 Household Batteries		0.0%	0.1%	0.1%	0.1%	0.1%	0.0%
26 Clean Wood Waste		0.0%	2.3%	0.0%	0.0%	0.0%	0.0%
27 Treated Wood Waste		0.0%	5.2%	0.0%	1.9%	28.3%	0.1%
28 C&D Debris		0.1%	2.5%	1.2%	0.0%	0.0%	0.2%
29 Tires and Rubber		0.0%	0.1%	0.0%	0.2%	0.1%	1.0%
30 Yard Waste		8.0%	11.4%	19.9%	9.2%	9.9%	27.6%
31 Food Waste		11.8%	9.8%	7.7%	14.3%	13.6%	12.7%
32 All Other Garbage		12.6%	8.2%	10.9%	9.2%	6.9%	14.8%
33 Liquids		0.6%	0.4%	0.0%	0.9%	0.8%	0.3%
34 Grit		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
TOTALS			100.0%	100.0%	100.0%	100.0%	100.0%

Appendix C: Single-Family Residential Sample Results (continued)

Hauler/Location		St. Petersburg	St. Petersburg	Seminole	St. Petersburg	St. Petersburg	Unincorp
Material Categories	sample #	54	56	60	66	69	75
1	Newspaper	4.6%	1.6%	3.6%	1.7%	0.6%	2.8%
2	Corrugated Cardboard	0.2%	6.3%	1.6%	2.3%	8.1%	1.0%
3	Office Paper	0.1%	0.0%	0.0%	3.5%	0.1%	0.0%
4	Other Recyclable Paper	6.0%	4.3%	7.2%	12.1%	6.4%	7.2%
5	Low Grade Paper	4.2%	2.5%	7.0%	2.6%	2.4%	4.1%
6	Aseptic Containers	0.2%	0.0%	0.2%	0.1%	0.0%	0.0%
7	PET Bottles	0.5%	0.7%	0.8%	1.1%	2.3%	1.4%
8	HDPE Bottles	0.5%	0.4%	0.2%	0.8%	1.9%	0.5%
9	Other Non-Bottle Plastics #1 and #2	0.7%	0.8%	0.7%	0.4%	0.5%	0.8%
10	Other Plastic Containers (#3-#7)	0.2%	0.3%	0.7%	0.6%	0.9%	0.8%
11	Bulky Rigid Plastics	0.6%	2.7%	1.3%	0.8%	1.1%	1.1%
12	Non-Rigid Plastic Film	2.6%	2.6%	2.4%	2.9%	3.5%	3.2%
13	Expanded Polystyrene	0.6%	0.5%	0.5%	0.4%	1.3%	0.4%
14	All Other Plastics	0.1%	0.2%	0.2%	0.5%	0.2%	0.4%
15	Tin/Steel Cans	0.9%	0.8%	0.6%	1.1%	1.5%	1.1%
16	White Goods/Small Appliances	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	Other Ferrous	0.1%	3.6%	0.8%	2.2%	2.4%	3.2%
18	Aluminum Cans	0.6%	0.8%	0.4%	0.6%	0.5%	1.0%
19	Other Non-Ferrous	0.3%	0.2%	0.0%	0.1%	0.4%	0.1%
20	Glass Containers	3.6%	0.3%	6.8%	1.2%	2.9%	5.3%
21	Other Glass	0.0%	0.1%	0.2%	0.0%	0.0%	0.4%
22	Textiles	0.2%	0.8%	0.7%	3.4%	13.6%	13.6%
23	Special Wastes	0.0%	0.0%	0.0%	0.1%	0.1%	0.2%
24	Electronics	0.1%	0.0%	0.0%	2.7%	0.1%	9.3%
25	Household Batteries	0.0%	0.0%	0.0%	0.0%	0.0%	0.2%
26	Clean Wood Waste	0.0%	0.0%	0.0%	1.5%	3.8%	0.1%
27	Treated Wood Waste	0.1%	0.8%	1.9%	0.3%	8.5%	0.8%
28	C&D Debris	15.2%	7.0%	2.4%	0.8%	0.3%	0.7%
29	Tires and Rubber	0.0%	0.0%	0.5%	0.0%	0.9%	21.3%
30	Yard Waste	41.8%	48.5%	25.4%	42.3%	15.5%	7.5%
31	Food Waste	8.9%	9.2%	13.7%	8.2%	9.4%	11.0%
32	All Other Garbage	6.6%	4.7%	19.9%	5.6%	10.6%	0.5%
33	Liquids	0.5%	0.4%	0.2%	0.2%	0.4%	0.0%
34	Grit	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
TOTALS		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix C: Single-Family Residential Sample Results (continued)

Hauler/Location		Republic	Unincorp	St. Petersburg	St. Petersburg	Unincorp	St. Pete Beach
Material Categories	sample #	76	77	79	80	81	82
1	Newspaper	2.4%	1.3%	3.6%	1.1%	2.7%	3.4%
2	Corrugated Cardboard	2.3%	2.6%	3.8%	5.0%	7.9%	6.1%
3	Office Paper	4.6%	0.1%	0.9%	0.4%	0.2%	0.0%
4	Other Recyclable Paper	12.9%	12.4%	7.0%	4.4%	9.9%	8.8%
5	Low Grade Paper	9.1%	4.6%	7.1%	2.5%	4.5%	6.4%
6	Aseptic Containers	1.6%	0.3%	0.3%	0.1%	0.2%	0.5%
7	PET Bottles	2.3%	1.1%	3.5%	1.4%	1.4%	1.6%
8	HDPE Bottles	2.2%	0.9%	1.0%	1.0%	0.2%	0.5%
9	Other Non-Bottle Plastics #1 and #2	1.0%	1.2%	1.0%	0.4%	0.9%	0.6%
10	Other Plastic Containers (#3-#7)	1.1%	0.8%	0.7%	0.4%	0.8%	1.1%
11	Bulky Rigid Plastics	3.3%	1.8%	1.4%	2.9%	0.7%	2.2%
12	Non-Rigid Plastic Film	7.8%	4.9%	4.6%	3.2%	3.7%	5.0%
13	Expanded Polystyrene	0.3%	6.6%	1.0%	0.8%	1.2%	0.6%
14	All Other Plastics	0.4%	0.2%	0.2%	0.1%	0.2%	0.2%
15	Tin/Steel Cans	0.8%	1.5%	0.6%	1.7%	1.0%	1.2%
16	White Goods/Small Appliances	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	Other Ferrous	1.6%	0.0%	0.9%	2.1%	0.0%	0.8%
18	Aluminum Cans	0.3%	1.5%	1.3%	0.8%	0.4%	0.4%
19	Other Non-Ferrous	0.6%	0.4%	0.3%	0.3%	0.3%	0.7%
20	Glass Containers	1.8%	4.4%	4.9%	5.3%	5.1%	2.6%
21	Other Glass	0.8%	0.3%	0.0%	0.1%	0.0%	0.0%
22	Textiles	2.8%	4.8%	9.2%	9.3%	0.6%	2.5%
23	Special Wastes	0.0%	0.0%	0.1%	0.0%	0.2%	0.2%
24	Electronics	6.3%	0.7%	4.1%	0.2%	0.0%	1.6%
25	Household Batteries	0.1%	0.1%	0.1%	0.0%	0.2%	0.1%
26	Clean Wood Waste	0.1%	0.0%	0.3%	6.3%	0.2%	0.0%
27	Treated Wood Waste	3.0%	0.0%	2.9%	0.7%	0.0%	2.9%
28	C&D Debris	0.0%	0.3%	1.0%	3.3%	0.0%	1.1%
29	Tires and Rubber	0.2%	0.0%	0.2%	0.2%	0.1%	0.1%
30	Yard Waste	8.0%	19.0%	6.0%	34.1%	30.4%	27.7%
31	Food Waste	12.1%	18.9%	23.1%	4.0%	11.3%	10.4%
32	All Other Garbage	9.3%	8.7%	8.2%	7.6%	15.7%	10.3%
33	Liquids	1.0%	0.7%	0.8%	0.5%	0.0%	0.4%
34	Grit	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
TOTALS		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix C: Single-Family Residential Sample Results (continued)

Hauler/Location		LARGO	
Material Categories	sample #	Average	Weighted Avg
1 Newspaper		1.9%	2.0%
2 Corrugated Cardboard		2.9%	5.0%
3 Office Paper		0.2%	0.8%
4 Other Recyclable Paper		8.9%	9.3%
5 Low Grade Paper		5.1%	5.2%
6 Aseptic Containers		0.2%	0.3%
7 PET Bottles		1.0%	1.4%
8 HDPE Bottles		0.6%	0.7%
9 Other Non-Bottle Plastics #1 and #2		0.8%	0.8%
10 Other Plastic Containers (#3-#7)		0.6%	0.8%
11 Bulky Rigid Plastics		2.3%	1.9%
12 Non-Rigid Plastic Film		3.8%	4.3%
13 Expanded Polystyrene		0.8%	1.0%
14 All Other Plastics		0.4%	0.5%
15 Tin/Steel Cans		1.1%	1.0%
16 White Goods/Small Appliances		0.0%	0.0%
17 Other Ferrous		0.4%	0.9%
18 Aluminum Cans		0.8%	0.7%
19 Other Non-Ferrous		0.2%	0.3%
20 Glass Containers		2.0%	3.4%
21 Other Glass		1.0%	0.2%
22 Textiles		7.6%	5.4%
23 Special Wastes		0.1%	0.4%
24 Electronics		2.9%	2.0%
25 Household Batteries		0.1%	0.1%
26 Clean Wood Waste		1.2%	1.0%
27 Treated Wood Waste		0.4%	3.5%
28 C&D Debris		3.8%	2.1%
29 Tires and Rubber		0.8%	1.2%
30 Yard Waste		25.9%	21.7%
31 Food Waste		9.9%	12.2%
32 All Other Garbage		11.9%	9.5%
33 Liquids		0.6%	0.6%
34 Grit		0.0%	0.1%
TOTALS		100.0%	100.0%

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Appendix D:

Multi-Family Residential Sample Results

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Appendix D: Multi-Family Residential Sample Results (% by weight)

Hauler/Location		Sawgrass Apts	Largo	Largo	Harbor Cay	Progressive	Republic
Material Categories	sample #	2	8	13	14	24	28
1	Newspaper	2.7%	3.4%	3.5%	6.3%	9.9%	1.6%
2	Corrugated Cardboard	4.1%	3.1%	12.8%	9.3%	3.7%	5.7%
3	Office Paper	0.9%	3.3%	1.7%	0.9%	1.1%	1.0%
4	Other Recyclable Paper	14.8%	10.4%	6.9%	6.1%	11.4%	14.8%
5	Low Grade Paper	7.4%	8.5%	12.2%	4.6%	6.5%	4.6%
6	Aseptic Containers	0.2%	0.3%	0.5%	0.3%	0.3%	1.4%
7	PET Bottles	2.4%	1.3%	2.3%	2.5%	2.2%	2.6%
8	HDPE Bottles	1.0%	1.7%	1.4%	0.8%	0.7%	3.4%
9	Other Non-Bottle Plastics #1 and #2	0.6%	0.9%	0.7%	0.6%	0.6%	1.6%
10	Other Plastic Containers (#3-#7)	1.0%	1.4%	1.1%	0.4%	1.3%	1.0%
11	Bulky Rigid Plastics	2.2%	0.7%	1.0%	0.7%	1.2%	2.4%
12	Non-Rigid Plastic Film	3.3%	7.0%	4.9%	4.6%	3.9%	6.4%
13	Expanded Polystyrene	0.5%	0.9%	0.6%	0.7%	0.5%	0.7%
14	All Other Plastics	1.1%	0.7%	0.4%	0.5%	0.2%	4.0%
15	Tin/Steel Cans	0.8%	1.6%	1.0%	2.3%	0.7%	2.2%
16	White Goods/Small Appliances	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	Other Ferrous	1.3%	0.5%	0.9%	0.0%	0.3%	0.1%
18	Aluminum Cans	0.4%	1.3%	1.3%	0.7%	1.0%	0.6%
19	Other Non-Ferrous	0.3%	0.4%	0.7%	0.3%	0.1%	0.4%
20	Glass Containers	5.1%	5.7%	6.8%	5.8%	4.4%	4.9%
21	Other Glass	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%
22	Textiles	0.3%	6.3%	2.8%	4.3%	2.4%	1.6%
23	Special Wastes	0.0%	0.7%	0.0%	0.0%	0.0%	0.1%
24	Electronics	3.4%	0.3%	9.9%	0.0%	0.5%	0.0%
25	Household Batteries	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%
26	Clean Wood Waste	0.0%	1.2%	1.5%	0.0%	0.0%	0.1%
27	Treated Wood Waste	0.0%	0.0%	0.0%	0.0%	0.4%	0.0%
28	C&D Debris	0.0%	0.0%	0.0%	0.0%	21.8%	0.0%
29	Tires and Rubber	0.2%	0.2%	0.0%	0.0%	0.2%	0.1%
30	Yard Waste	0.0%	4.6%	0.0%	0.0%	0.0%	0.0%
31	Food Waste	27.8%	22.8%	16.5%	22.0%	9.0%	19.9%
32	All Other Garbage	16.3%	8.0%	6.4%	25.2%	14.3%	17.2%
33	Liquids	1.6%	0.6%	2.1%	1.2%	1.4%	1.5%
34	Grit	0.0%	2.3%	0.0%	0.0%	0.0%	0.0%
TOTALS		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix D: Multi-Family Residential Sample Results (continued)

Hauler/Location		Republic	Dunedin	Waste Mgmt	Waste Mgmt	St. Petersburg	St. Petersburg
Material Categories	sample #	33	35	36	41	48	59
1	Newspaper	0.7%	1.1%	2.5%	1.6%	1.4%	0.2%
2	Corrugated Cardboard	4.8%	3.2%	4.7%	7.0%	16.9%	3.6%
3	Office Paper	0.8%	0.1%	0.0%	0.1%	1.6%	0.1%
4	Other Recyclable Paper	11.9%	10.6%	9.7%	15.1%	16.3%	13.6%
5	Low Grade Paper	4.9%	2.7%	5.7%	1.4%	3.0%	4.4%
6	Aseptic Containers	0.5%	0.7%	2.2%	0.5%	0.1%	0.5%
7	PET Bottles	3.0%	2.4%	3.1%	3.0%	2.2%	1.6%
8	HDPE Bottles	1.2%	0.9%	2.3%	1.3%	2.7%	0.3%
9	Other Non-Bottle Plastics #1 and #2	1.5%	1.0%	2.8%	1.0%	1.1%	1.6%
10	Other Plastic Containers (#3-#7)	0.7%	0.6%	1.4%	1.2%	1.5%	0.7%
11	Bulky Rigid Plastics	1.3%	1.4%	2.5%	5.5%	1.6%	0.2%
12	Non-Rigid Plastic Film	4.4%	5.9%	8.0%	5.5%	5.7%	3.6%
13	Expanded Polystyrene	1.0%	0.3%	1.9%	1.0%	0.9%	0.5%
14	All Other Plastics	0.7%	0.8%	2.2%	0.7%	0.2%	0.3%
15	Tin/Steel Cans	2.1%	0.7%	2.7%	1.2%	0.9%	0.3%
16	White Goods/Small Appliances	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17	Other Ferrous	1.0%	0.2%	2.7%	0.7%	0.8%	2.2%
18	Aluminum Cans	0.5%	0.6%	2.9%	1.5%	0.3%	1.5%
19	Other Non-Ferrous	0.2%	0.3%	1.5%	0.2%	0.2%	0.1%
20	Glass Containers	6.7%	4.3%	7.1%	4.7%	1.5%	20.1%
21	Other Glass	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%
22	Textiles	3.3%	5.6%	2.8%	11.1%	2.1%	3.0%
23	Special Wastes	0.0%	0.0%	0.0%	0.3%	0.0%	0.1%
24	Electronics	1.1%	0.4%	4.5%	0.9%	1.7%	0.2%
25	Household Batteries	0.0%	0.1%	0.0%	0.1%	0.0%	0.2%
26	Clean Wood Waste	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%
27	Treated Wood Waste	0.1%	0.3%	2.1%	2.3%	0.0%	0.3%
28	C&D Debris	0.4%	12.6%	0.0%	1.8%	16.0%	0.0%
29	Tires and Rubber	0.2%	0.1%	2.0%	0.2%	0.2%	0.0%
30	Yard Waste	5.3%	3.3%	1.9%	4.4%	0.0%	5.2%
31	Food Waste	18.1%	15.0%	9.2%	12.9%	9.8%	20.7%
32	All Other Garbage	22.5%	24.2%	9.3%	10.6%	10.2%	11.5%
33	Liquids	1.0%	0.6%	2.1%	1.3%	1.2%	3.0%
34	Grit	0.0%	0.0%	0.4%	0.0%	0.0%	0.0%
TOTALS		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix D: Multi-Family Residential Sample Results (continued)

Hauler/Location		St. Petersburg	St. Petersburg	
Material Categories	sample #	62	83	Weighted Avg
1	Newspaper	4.0%	2.5%	3.0%
2	Corrugated Cardboard	0.8%	3.2%	5.9%
3	Office Paper	0.0%	0.0%	0.8%
4	Other Recyclable Paper	11.4%	13.1%	11.8%
5	Low Grade Paper	3.4%	4.2%	5.2%
6	Aseptic Containers	0.7%	0.2%	0.6%
7	PET Bottles	2.9%	1.6%	2.4%
8	HDPE Bottles	1.6%	0.5%	1.4%
9	Other Non-Bottle Plastics #1 and #2	1.8%	1.4%	1.2%
10	Other Plastic Containers (#3-#7)	1.0%	1.0%	1.0%
11	Bulky Rigid Plastics	0.8%	2.7%	1.7%
12	Non-Rigid Plastic Film	4.3%	2.8%	5.1%
13	Expanded Polystyrene	1.1%	0.3%	0.8%
14	All Other Plastics	0.1%	0.4%	0.9%
15	Tin/Steel Cans	1.5%	0.6%	1.4%
16	White Goods/Small Appliances	0.0%	0.0%	0.0%
17	Other Ferrous	0.1%	2.4%	1.0%
18	Aluminum Cans	1.3%	0.6%	1.1%
19	Other Non-Ferrous	0.3%	0.9%	0.4%
20	Glass Containers	7.2%	3.6%	6.3%
21	Other Glass	0.0%	1.2%	0.2%
22	Textiles	3.3%	13.3%	4.5%
23	Special Wastes	0.1%	0.3%	0.1%
24	Electronics	1.0%	2.3%	1.8%
25	Household Batteries	0.0%	1.5%	0.1%
26	Clean Wood Waste	0.0%	0.2%	0.2%
27	Treated Wood Waste	0.0%	1.8%	0.5%
28	C&D Debris	9.0%	19.3%	5.7%
29	Tires and Rubber	0.2%	0.0%	0.3%
30	Yard Waste	1.6%	3.3%	2.2%
31	Food Waste	20.1%	10.4%	16.5%
32	All Other Garbage	20.3%	3.3%	14.2%
33	Liquids	0.3%	1.0%	1.4%
34	Grit	0.0%	0.0%	0.2%
TOTALS		100.0%	100.0%	100.0%

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Appendix E:

Commercial Sample Results

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Appendix E: Commercial Sample Results (continued)

Hauler/Location		St. Petersburg	St. Petersburg	Supermkts	Restaurant	Institution	
Material Categories	sample #	85	86	Organics	Organics	Organics	Weighted Avg
1 Newspaper		0.9%	7.4%	1.9%	1.1%	3.7%	2.2%
2 Corrugated Cardboard		20.1%	11.5%	9.5%	13.2%	6.9%	10.5%
3 Office Paper		0.0%	0.7%	9.1%	0.5%	5.4%	0.8%
4 Other Recyclable Paper		6.0%	14.5%	4.9%	8.9%	19.6%	11.4%
5 Low Grade Paper		10.0%	8.1%	5.9%	5.6%	9.0%	7.0%
6 Aseptic Containers		1.4%	0.2%	0.1%	0.2%	0.6%	0.4%
7 PET Bottles		2.1%	1.3%	1.0%	1.3%	4.1%	1.4%
8 HDPE Bottles		0.0%	1.0%	0.4%	0.5%	0.8%	0.8%
9 Other Non-Bottle Plastics #1 and #2		1.7%	1.1%	1.0%	0.6%	1.8%	0.9%
10 Other Plastic Containers (#3-#7)		1.2%	1.2%	1.1%	2.3%	1.2%	0.9%
11 Bulky Rigid Plastics		0.0%	1.1%	0.9%	0.5%	2.3%	1.6%
12 Non-Rigid Plastic Film		8.7%	7.1%	7.9%	5.2%	10.8%	6.1%
13 Expanded Polystyrene		3.1%	0.4%	0.4%	0.8%	1.4%	1.0%
14 All Other Plastics		0.4%	0.3%	0.3%	0.5%	0.4%	0.8%
15 Tin/Steel Cans		2.8%	2.0%	0.1%	0.7%	0.6%	1.0%
16 White Goods/Small Appliances		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
17 Other Ferrous		2.9%	1.0%	0.7%	0.1%	0.7%	1.4%
18 Aluminum Cans		0.6%	1.4%	0.1%	1.0%	1.0%	0.7%
19 Other Non-Ferrous		0.4%	0.3%	0.8%	0.2%	0.4%	0.2%
20 Glass Containers		2.1%	7.9%	1.7%	7.5%	1.5%	3.7%
21 Other Glass		0.0%	0.3%	0.1%	0.2%	0.0%	0.4%
22 Textiles		1.2%	1.3%	2.2%	1.0%	2.0%	2.4%
23 Special Wastes		0.0%	0.1%	0.1%	0.2%	0.0%	0.1%
24 Electronics		0.2%	0.6%	0.7%	0.0%	0.5%	1.7%
25 Household Batteries		0.0%	0.0%	0.0%	0.0%	0.0%	0.1%
26 Clean Wood Waste		2.7%	0.0%	0.2%	0.2%	0.0%	3.9%
27 Treated Wood Waste		1.0%	1.1%	0.6%	0.3%	0.9%	3.0%
28 C&D Debris		2.0%	2.0%	1.0%	0.3%	0.1%	4.5%
29 Tires and Rubber		0.0%	0.1%	0.1%	0.4%	0.3%	0.6%
30 Yard Waste		0.0%	0.1%	1.6%	1.2%	1.9%	3.5%
31 Food Waste		18.0%	20.7%	38.0%	38.3%	10.7%	17.5%
32 All Other Garbage		9.6%	4.7%	5.9%	5.5%	8.6%	7.9%
33 Liquids		1.1%	0.5%	1.5%	1.5%	2.6%	1.1%
34 Grit		0.0%	0.0%	0.2%	0.0%	0.0%	0.7%
TOTALS		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

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Appendix F:

Large Organic Waste Generator Sample Results

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Appendix F: Large Organic Waste Generator Sample Results (% by weight)

Hauler/Location		Wal-Mart	Publix	GF Foods	Guy Harvey Hotel	Eckerd College
Material Categories	sample #	4	27	34	40	46
1 Newspaper		2.5%	1.2%	0.0%	3.4%	0.3%
2 Corrugated Cardboard		6.5%	2.4%	7.1%	10.6%	10.5%
3 Office Paper		0.2%	0.6%	29.0%	2.2%	3.1%
4 Other Recyclable Paper		9.3%	1.9%	5.3%	3.9%	9.3%
5 Low Grade Paper		4.7%	14.0%	0.2%	5.1%	9.5%
6 Aseptic Containers		0.4%	0.0%	0.0%	0.8%	0.4%
7 PET Bottles		3.0%	0.8%	0.1%	2.4%	6.0%
8 HDPE Bottles		1.1%	0.2%	0.0%	0.4%	2.3%
9 Other Non-Bottle Plastics #1 and #2		0.7%	0.5%	1.4%	0.8%	3.4%
10 Other Plastic Containers (#3-#7)		1.5%	0.4%	1.2%	3.0%	0.7%
11 Bulky Rigid Plastics		1.1%	1.4%	0.1%	1.2%	4.8%
12 Non-Rigid Plastic Film		8.0%	7.5%	8.8%	5.8%	12.9%
13 Expanded Polystyrene		0.3%	0.6%	0.3%	0.4%	0.6%
14 All Other Plastics		0.7%	0.4%	0.0%	0.2%	0.5%
15 Tin/Steel Cans		0.2%	0.0%	0.2%	0.9%	0.3%
16 White Goods/Small Appliances		0.0%	0.0%	0.0%	0.0%	0.0%
17 Other Ferrous		2.9%	0.0%	0.0%	0.4%	0.0%
18 Aluminum Cans		0.3%	0.2%	0.0%	0.9%	1.9%
19 Other Non-Ferrous		0.0%	0.4%	0.0%	0.1%	0.3%
20 Glass Containers		6.1%	0.6%	0.0%	5.0%	3.0%
21 Other Glass		0.5%	0.1%	0.0%	0.2%	0.0%
22 Textiles		0.2%	1.3%	5.7%	1.5%	4.5%
23 Special Wastes		0.3%	0.0%	0.0%	0.0%	0.0%
24 Electronics		3.4%	0.0%	0.0%	0.0%	0.0%
25 Household Batteries		0.0%	0.0%	0.0%	0.1%	0.0%
26 Clean Wood Waste		0.8%	0.0%	0.0%	0.8%	0.0%
27 Treated Wood Waste		3.0%	0.0%	0.0%	1.3%	0.0%
28 C&D Debris		3.5%	0.3%	0.5%	1.3%	0.2%
29 Tires and Rubber		0.0%	0.0%	0.2%	0.8%	0.4%
30 Yard Waste		0.4%	5.6%	0.0%	0.8%	5.4%
31 Food Waste		23.1%	46.2%	39.8%	40.8%	11.3%
32 All Other Garbage		8.0%	13.0%	0.1%	2.4%	6.1%
33 Liquids		6.4%	0.4%	0.1%	2.5%	2.1%
34 Grit		1.0%	0.0%	0.0%	0.0%	0.0%
TOTALS		100.0%	100.0%	100.0%	100.0%	100.0%

Appendix F: Large Organic Waste Generator Sample Results (continued)

Hauler/Location		Ferg's Sports Bar	Leroy Selmon's	St. Pete College	Fresh Market	Hooters
Material Categories	sample #	47	51	53	61	74
1	Newspaper	0.1%	0.0%	8.8%	5.0%	1.2%
2	Corrugated Cardboard	17.9%	10.8%	3.2%	25.7%	13.0%
3	Office Paper	0.0%	0.0%	1.4%	0.0%	0.0%
4	Other Recyclable Paper	5.4%	12.1%	22.8%	3.6%	14.7%
5	Low Grade Paper	4.8%	5.7%	13.0%	4.9%	7.1%
6	Aseptic Containers	0.0%	0.1%	0.2%	0.0%	0.0%
7	PET Bottles	0.6%	0.4%	2.8%	0.3%	2.0%
8	HDPE Bottles	0.6%	0.8%	0.5%	0.6%	0.2%
9	Other Non-Bottle Plastics #1 and #2	0.6%	0.1%	0.9%	1.4%	0.9%
10	Other Plastic Containers (#3-#7)	4.6%	0.1%	1.0%	1.2%	1.6%
11	Bulky Rigid Plastics	0.0%	0.0%	1.4%	1.4%	1.0%
12	Non-Rigid Plastic Film	3.4%	5.4%	9.2%	7.1%	6.8%
13	Expanded Polystyrene	0.3%	0.3%	2.0%	0.5%	2.3%
14	All Other Plastics	0.5%	0.3%	0.5%	0.2%	0.9%
15	Tin/Steel Cans	0.0%	1.9%	0.1%	0.1%	0.1%
16	White Goods/Small Appliances	0.0%	0.0%	0.0%	0.0%	0.0%
17	Other Ferrous	0.0%	0.0%	1.5%	0.2%	0.0%
18	Aluminum Cans	2.1%	0.1%	0.6%	0.1%	0.7%
19	Other Non-Ferrous	0.0%	0.2%	0.8%	3.4%	0.6%
20	Glass Containers	12.5%	8.1%	1.7%	0.9%	3.4%
21	Other Glass	0.0%	0.4%	0.0%	0.0%	0.0%
22	Textiles	0.8%	0.2%	0.6%	0.3%	1.7%
23	Special Wastes	0.0%	0.6%	0.0%	0.0%	0.0%
24	Electronics	0.0%	0.0%	1.2%	0.0%	0.0%
25	Household Batteries	0.0%	0.1%	0.0%	0.0%	0.0%
26	Clean Wood Waste	0.0%	0.0%	0.0%	0.0%	0.0%
27	Treated Wood Waste	0.0%	0.1%	0.0%	0.0%	0.0%
28	C&D Debris	0.0%	0.0%	0.0%	0.0%	0.0%
29	Tires and Rubber	0.8%	0.1%	0.6%	0.1%	0.0%
30	Yard Waste	1.7%	0.0%	0.9%	0.0%	2.4%
31	Food Waste	33.1%	44.7%	10.5%	40.0%	34.4%
32	All Other Garbage	8.4%	7.6%	8.8%	2.8%	2.9%
33	Liquids	1.7%	0.1%	5.2%	0.0%	1.8%
34	Grit	0.0%	0.0%	0.0%	0.0%	0.0%
TOTALS		100.0%	100.0%	100.0%	100.0%	100.0%

Appendix F: Large Organic Waste Generator Sample Results (continued)

Hauler/Location		Dunedin High Sch.	
Material Categories	sample #	84	Weighted Avg
1 Newspaper		2.2%	2.0%
2 Corrugated Cardboard		7.0%	10.3%
3 Office Paper		10.3%	4.8%
4 Other Recyclable Paper		25.1%	10.3%
5 Low Grade Paper		5.3%	6.6%
6 Aseptic Containers		1.2%	0.3%
7 PET Bottles		3.7%	1.9%
8 HDPE Bottles		0.0%	0.6%
9 Other Non-Bottle Plastics #1 and #2		1.3%	1.0%
10 Other Plastic Containers (#3-#7)		1.7%	1.6%
11 Bulky Rigid Plastics		1.1%	1.1%
12 Non-Rigid Plastic Film		10.5%	7.6%
13 Expanded Polystyrene		1.7%	0.8%
14 All Other Plastics		0.4%	0.4%
15 Tin/Steel Cans		1.2%	0.5%
16 White Goods/Small Appliances		0.0%	0.0%
17 Other Ferrous		0.6%	0.5%
18 Aluminum Cans		0.8%	0.7%
19 Other Non-Ferrous		0.0%	0.5%
20 Glass Containers		0.2%	3.9%
21 Other Glass		0.1%	0.1%
22 Textiles		1.4%	1.7%
23 Special Wastes		0.0%	0.1%
24 Electronics		0.4%	0.4%
25 Household Batteries		0.0%	0.0%
26 Clean Wood Waste		0.0%	0.1%
27 Treated Wood Waste		2.2%	0.6%
28 C&D Debris		0.0%	0.5%
29 Tires and Rubber		0.0%	0.3%
30 Yard Waste		0.0%	1.5%
31 Food Waste		10.4%	31.1%
32 All Other Garbage		10.5%	6.5%
33 Liquids		0.9%	1.8%
34 Grit		0.0%	0.1%
TOTALS		100.0%	100.0%

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Appendix G:

Bulky Waste Audit Results

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Appendix G: Bulky Waste Audit Results (continued)

							Weighted Average (% by weight)
Material Categories	sample #	85	86	88	89	90	91
Corrugated Cardboard		0.0%	1.0%	9.0%	0.0%	10.0%	0.0%
Other Paper		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Major Appliances		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
HVAC Ducting		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Non-Ferrous		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Ferrous		0.0%	0.0%	10.0%	0.0%	0.0%	0.0%
Other Metal		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Plastic Film		0.0%	0.0%	0.0%	0.0%	3.0%	0.0%
Polystyrene/Insulation		0.0%	0.0%	20.0%	0.0%	0.0%	0.0%
Rigid Plastics		0.0%	20.0%	0.0%	0.0%	0.0%	0.0%
Other Plastics		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Yard Waste		0.0%	49.0%	0.0%	0.0%	0.0%	0.0%
Treated Wood		0.0%	4.2%	9.9%	0.0%	34.0%	100.0%
Untreated Wood		0.0%	0.0%	0.0%	0.0%	51.0%	0.0%
Carpet and Padding		0.0%	9.8%	0.0%	0.0%	0.0%	0.0%
Drywall		0.0%	0.0%	40.2%	0.0%	0.0%	0.0%
Roofing Shingles		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Rock/Gravel/Grit		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Tile		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Concrete		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Sod		100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Furniture		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mattresses		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Furniture		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Household Bagged Waste		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
C&D Debris Bagged Waste		0.0%	0.0%	9.9%	0.0%	0.0%	0.0%
Other Bagged Waste		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Glass		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Glass		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Computers		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Televisions		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other E-Waste		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
HHW		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Tires		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Textiles		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Rubber		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Dirt		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Porcelain		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Fiberglass		0.0%	15.0%	0.0%	0.0%	0.0%	0.0%
MSW		0.0%	1.0%	1.0%	0.0%	2.0%	0.0%
Boats		0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
TOTALS		100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Appendix H:

Bulky Waste Photographs

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Table H: Bulky Waste Photographs

Sample Number 2



Sample Number 6



Sample Number 7



Table H: Bulky Waste Photographs (continued)

Sample Number 10



Sample Number 12



Sample Number 16



Table H: Bulky Waste Photographs (continued)

Sample Number 22



Sample Number 23



Sample Number 27



Table H: Bulky Waste Photographs (continued)

Sample Number 29



Sample Number 31



Sample Number 33



Table H: Bulky Waste Photographs (continued)

Sample Number 40



Sample Number 46



Sample Number 48



Table H: Bulky Waste Photographs (continued)

Sample Number 49



Sample Number 50



Sample Number 51



Table H: Bulky Waste Photographs (continued)

Sample Number 55



Sample Number 60



Sample Number 61



Table H: Bulky Waste Photographs (continued)

Sample Number 62



Sample Number 63



Sample Number 64



Table H: Bulky Waste Photographs (continued)

Sample Number 65



Sample Number 68



Sample Number 69



Table H: Bulky Waste Photographs (continued)

Sample Number 70



Sample Number 71



Sample Number 72b



Table H: Bulky Waste Photographs (continued)

Sample Number 75



Sample Number 77



Sample Number 83



Table H: Bulky Waste Photographs (continued)

Sample Number 88



Sample Number 90



Appendix I:

Instructions to Calculate Waste Generation

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Appendix I: Instructions to Calculate Waste Generation

The WCS estimates the composition of residential and commercial waste delivered to the County for transfer and disposal. The results do not include materials diverted for recycling or composting, bulky or other types of waste received at the County facilities for disposal, or waste materials processed or disposed of at other facilities. To determine the composition of waste generated within the entire County, which is required in annual reports to FDEP, these materials need to be added to the study results.

The form on the following page can be utilized to determine the composition of all waste generated in the County. KCI will also provide County staff with an electronic version of this form for use when compiling future FDEP annual reports. In the form, KCI has converted the 34 material categories utilized in the WCS into the 19 categories required in the state report as outlined below. These percentages have been inserted in Column A of the form.

- Plastic Bottles –WCS categories of PET Bottle, HDPE Bottles, and Other Plastic Containers #3-#7.
- Other Plastics –WCS categories of Non-Bottle Plastics #1 and #2, Bulky Rigid Plastics, Non-Rigid Plastic Film, Expanded Polystyrene, and All Other Plastics.
- Other Paper –WCS categories of Other Recyclable Paper, Low Grade Paper, and Aseptic Containers.
- C&D Debris – WCS categories of C&D Debris, and Treated and Untreated Wood Waste.
- Miscellaneous – WCS categories of Other Glass, Special Wastes, Electronics, Household Batteries, All Other Garbage, Liquids, and Grit.

Provided below is an explanation of the columns in the form and the steps the County will need to take to calculate the total composition of waste generated in the County.

1. **Column A, 2014 WCS Results**, provides the Aggregate Waste composition data from the 2014 WCS.
2. **Column B, Tons of MSW Disposed** – Enter the total tons of residential and commercial waste received at the County's facility during the year (excluding bulky waste, C&D debris, segregated waste loads, or special wastes) in the yellow-highlighted cell. Formulas in the other cells will automatically calculate the tons of each material disposed by multiplying the percentage of each material category in Column A by the total amount of waste disposed.
3. **Column C, Other Tons Generated** – Enter the tons, by material category, of other waste generated in the County, whether recycled, composted, or disposed. This will include other wastes received at the County's facility, data from the County's Certified Tonnage Reports received from FDEP, and other sources that might not report to FDEP.
4. **Column D, Tons Recycled** – Enter the tons, by material type, of materials recycled, composted, or otherwise diverted from disposal. This will include materials listed on the state's Certified Recovered Materials Dealer Reports, as well as any additional recycling tonnages identified by County staff.
5. **Column E, Total Tons Generated** – Formulas in this column will automatically calculate the total tons of each material generated by adding the tons in Columns B and C.
6. **Column F, Recycling Rate** – Formulas in this column will automatically calculate the recycling rate for each material category and the overall County recycling rate by dividing the figures in Column D by the figures in Column E.
7. **Column G, Composition of Waste Generated** – Formulas in this column will automatically calculate the percentage each material contributes to the total composition of all waste generated within the County by dividing the figures in Column E by the total of Column E.

Appendix I: Instructions to Calculate Waste Generation (continued)

FDEP CATEGORIES	A	B	C	D	E	F	G
	2014 WCS Results	Tons of MSW Disposed ¹ A * (B total)	Other Tons Generated ²	Tons Recycled ³	Total Tons Generated B+C	Recycling Rate (percent) D / E	Composition of Waste Generated (percent) E / (E total)
a. Newspaper	2.3%	0			0		
b. Glass	4.0%	0			0		
c. Aluminum cans	0.8%	0			0		
d. Plastic bottles	3.4%	0			0		
e. Steel cans	1.1%	0			0		
f. Corrugated paper	8.1%	0			0		
g. Office paper	1.0%	0			0		
h. Yard trash	8.5%	0			0		
a. Other plastics	9.7%	0			0		
b. Ferrous metals	1.2%	0			0		
c. White goods	0.0%	0			0		
d. Non-ferrous metals	0.3%	0			0		
e. Other paper	17.3%	0			0		
f. Textiles	3.6%	0			0		
a. C&D debris	8.6%	0			0		
b. Food	16.3%	0			0		
c. Miscellaneous	13.1%	0			0		
d. Tires	0.7%	0			0		
e. Process fuel	0.0%	0			0		
	100.0%		0	0	0		0.0%

¹ Insert total tons of residential and commercial waste received at County's facility into yellow cell in column B.

² Insert tons of other waste (by material type) generated in Pinellas County that were recycled, composted, or disposed.

³ Insert tons of materials (by material type) generated in Pinellas County that were recycled or composted.