WASTE COMPOSITION OF ST. LUCIE COUNTY

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Prepared for:
St. Lucie County

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EXECUTIVE SUMMARY

During the week of May 11th-15th, 2026, students from the University of Florida, Florida Polytechnic University, and Florida Atlantic University performed a waste composition study at the St. Lucie County Solid Waste Baling & Recycling Facility. This study was funded by the Florida Department of Environmental Protection (FDEP) through the Solid Waste Infrastructure for Recycling (SWIFR) grant[1]. The goals of this project were to: 1) provide St. Lucie County with a current evaluation of their municipal solid waste (MSW) composition; and 2) update FDEP's *WasteCalc* tool, which relies on waste characterization data to calculate the material composition of MSW for each of Florida's 67 counties.

Throughout the study week, 40 samples were sorted, with waste originating from residences and businesses in both the municipalities and unincorporated areas of St. Lucie County. Incoming garbage trucks were randomly selected from each category of the sampling plan until the desired number of samples were acquired. An approximately 200-pound sample of MSW was obtained from each truck, and the waste was manually sorted into 38 different categories by undergraduate researchers from the SWIFR team. After the sample was sorted, the contents of each category were weighed and discarded. The mass-based composition of each sample was calculated, then averaged across all samples to determine the overall composition of the St. Lucie County's waste stream. The results found "Other Plastics" to be the largest component at 18.2%. Typical contents placed into this category include #3-#7 plastic containers, expanded polystyrene, food service containers and utensils, and flexible plastics. The results of the St. Lucie County waste composition will be integrated into *WasteCalc* to provide more accurate and representative results for this and other similar counties in the state.

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1. INTRODUCTION

St. Lucie County, located in the Treasure Coast region of Southeast Florida, is the eighteenth most populous county in the state, with an estimated 394,074 residents across the unincorporated areas and 3 municipalities[2]. The County owns and operates the Solid Waste Baling & Recycling Facility, which accepts municipal solid waste (MSW) from businesses, single-family homes, and multifamily complexes in the County for disposal. The site also includes single stream recycling, household hazardous waste processing, and construction and demolition (C&D) debris disposal operations.

The St. Lucie County Solid Waste Division has a contract with WastePro to provide curbside collection of MSW and recyclables for residents in unincorporated areas of the County, while FCC collects waste from residents in Port St. Lucie. Businesses also use WastePro and FCC for collection, or may contract directly with other haulers for service. There is a transfer station located in Fort Pierce which sends waste to the Okeechobee Landfill, so the St. Lucie County Solid Waste Baling and Recycling Facility primarily accepts waste from the unincorporated areas, Port St. Lucie, and "mom-and-pop" customers (who either use the hand unload area or dump trailers on the tipping floor).

2. METHODOLOGY

2.1 Preparation

Experience from previous waste composition studies conducted by the researchers suggested that 40 samples could reasonably be selected and sorted over the course of a weeklong waste composition study. ASTM D5231-92: *Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste*[3] was followed for development of the sampling plan and protocol.

Equation 1 was used to determine the proportion of the 40 samples that should come from residential and commercial sources. For this study's purpose, commercial waste included businesses as well as multifamily residences (e.g., apartment complexes, condominiums) and residential waste strictly included waste from single-family homes. Based on the tons of commercial, multifamily residential, and single-family residential waste collected in St. Lucie County in 2024 (from the 2024 FDEP annual solid waste report)[4], it was determined that 22 samples should originate from commercial and multifamily sources and 18 samples should originate from single family residential sources.

Equation 1

$$Number\ of\ Samples = 40 * \frac{Annual\ Tons\ of\ Residential\ or\ Commercial\ Waste}{Total\ Annual\ Tons\ Collected}$$

2.2 Sampling Method

During the weeklong composition study, samples were obtained from the tipping floor of the St. Lucie County Solid Waste Baling & Recycling Facility. Scale house attendants and operators assisted in sample selection and identification, with open-top roll-offs and “mom-and-pop” haulers disposing of C&D debris or other bulky wastes excluded from this study due to the difficulty of manually sorting this material.

The trucks carrying samples of interest (i.e., WastePro trucks from the unincorporated areas and FCC trucks from Port St. Lucie) were directed to back into a specified area of the tipping floor where samples could be safely obtained. Once the trucks were emptied, a loader would scoop up a bucket full of waste and drop it off near the sorting area. From there, a skid steer was used to randomly select an approximately 200-lb sample of waste and load the sample into 96-gallon rolling carts, as seen in **Figure 1**.

Figure 1 - Example of Sample Collection

2.3 Sorting Method

The sorting table was staged away from the tipping floor and sampling area to provide the researchers with a safe space to work away from facility operations and vehicle traffic. Once the samples were prepared by the skid steer operator, the sorting team weighed the carts on a floor scale to ensure the contents totaled approximately 200 pounds. Then, the carts were lifted onto a sorting table with a one-inch square mesh top, as shown in **Figure 2**.

Any material which passed through the mesh was classified as “residuals” and remained unsorted; material remaining on top of the mesh was manually sorted into 38 material categories using the list in the *Material Categories* section of the Appendix. The residuals were captured on a tarp and weighed separately. A lined bin was reserved for each of the material categories, and once the entire sample was sorted, the bin liners were removed, weighed, and disposed of in a nearby open top roll-off container provided

by the County (**Figure 3**). The mass of each material category was recorded on the sampling sheet in the Appendix so the overall mass-based composition could be determined.

Figure 2 – Set-up of St. Lucie County Waste Composition study

Figure 3 - Weighing of Materials Categories

3. DATA AND RESULTS

3.1 Raw Data Collected

Raw data refers to the fact that the composition is presented in the 38 categories decided upon by the SWIFR team and St. Lucie County. The next section organizes the data into broader categories to give a general breakdown of the MSW stream. Each table in this section is color-coded to match the general category it falls under in *Section 3.2*. The percentages were based on the average mass fraction for each category.

The equations used, as seen below, follow the ASTM D5231 method[3].

Equation 2 was used to determine the individual mass fraction of each category in a sample.

Equation 2

$$mf_i = \frac{w_i}{\sum_{i=1}^{j} w_i}$$

Where:

$mf_i = mass\ fraction\ of\ component\ i$
$w_i = weight\ of\ component\ i$
$j = number\ of\ components$

Then, the mass fraction for all 40 samples was averaged and multiplied by 100 to obtain a percentage, as seen in **Equation 3** and **Equation 4**.

Equation 3

$$\overline{mf}_i = \frac{1}{n}\sum_{k=1}^{n} mf_i$$

Equation 4

$$Category\ Percentage = \overline{mf}_i * 100$$

Raw data from the St. Lucie County waste sort is shown in **Table 1**. The mass fraction of the total waste stream, commercial samples, and residential samples were calculated and recorded.

Table 1 - Raw Data from the St. Lucie County Waste Sort

WasteCalc Category	Material Category	Total (n=39)	Mass Percent Residential (n 18)	Commercial (n 21)*
Newspaper	Newspaper	0.5%	0.5%	0.4%
Corrugated Cardboard	Corrugated Cardboard (OCC)	6.7%	3.3%	9.7%
Office Paper	High Grade Paper (Office Type)	2.9%	2.3%	3.4%
Other Papers	Polycoated Aseptic Containers	2.6%	3.0%	2.3%
	Boxboards	1.7%	2.1%	1.4%
	Other Paper	13.5%	12.5%	14.3%
Glass Packaging	Green	0.3%	0.4%	0.3%
	Clear	1.4%	1.6%	1.2%
	Brown	0.3%	0.5%	0.2%
	Other Glass/Ceramics	0.4%	0.3%	0.5%
Steel Cans	Steel/Tin Cans	0.8%	0.7%	0.8%
Other Ferrous Metals	Other Ferrous Metals	1.3%	1.9%	0.8%
Aluminum Cans	Aluminum Cans/Foil	1.6%	2.1%	1.2%
Non-Ferrous Metals	Other Non-Ferrous	0.5%	0.6%	0.4%
Textiles	Clothing, Footwear, Other Textiles	5.3%	7.2%	3.7%
Yard Trash	Yard Waste	2.9%	4.1%	1.8%
Food Waste	Food Waste	12.8%	13.7%	12.0%
Plastic Containers	#1 PET Bottles	1.9%	1.9%	1.8%
	#2 HDPE Bottles	0.9%	0.7%	1.1%
Other Plastics	#3-7 (Other Plastic Bottles)	0.1%	0.2%	0.1%
	Expanded Polystyrene	1.5%	1.0%	1.9%
	Rigid Plastic (Food Service Plastics)	2.7%	2.8%	2.6%
	Recyclable Flexible Plastics	6.2%	5.7%	6.6%
	Non-Recyclable Flexible Plastics	5.3%	4.3%	6.1%
	Other Plastics	2.5%	2.5%	2.4%
C&D	Un-Treated Clean Wood	1.4%	1.4%	1.4%
	Rocks, Concrete, and Bricks	2.1%	0.4%	3.6%
	Other C&D Debris	1.9%	1.2%	2.5%
	Treated Wood	0.1%	0.0%	0.2%
Other Miscellaneous	Rubber and Leather	0.3%	0.1%	0.5%
	Small Appliances/Electronics	1.1%	0.8%	1.4%
	Medical Waste	0.6%	0.2%	0.9%
	Hazardous Waste	0.3%	0.4%	0.2%
	Rechargeable Battery Products	0.2%	0.2%	0.1%
	Residuals	6.9%	8.6%	5.4%
	Liquids	2.1%	1.4%	2.7%
	Other Organics	6.5%	9.1%	4.2%
	Other Miscellaneous	0.1%	0.1%	0.0%

*Note: A commercial sample which included more than 100 pounds of food waste was excluded from the analysis to avoid skewing the results. The research team tries to prevent selecting and sorting samples that are dominated by a single material category, so the results remain reflective of the overall waste composition.

3.2 Processed Data

Data presented in this section has been complied into more general groups, based on the 18 material categories in FDEP's *WasteCalc* tool. For example, the categories of "Other Paper", "Polycoated Aseptic Containers", and "Boxboards" were compiled into the general category "Other Paper". Presenting data in this manner provides a broad overview of St. Lucie County's waste stream and allows for harmonization with the existing *WasteCalc* tool. Processed data from the St. Lucie County waste sort is shown in **Table 2** below. Graphical representations of each waste stream can be found in **Figure 4** - **Figure 6**

The largest component of the overall waste stream in St. Lucie County was "Other Plastics" at 18.2%. This category includes #3-#7 plastic containers, expanded polystyrene, food service containers and utensils, and flexible plastics. In the US Environmental Protection Agency's (EPA) Advancing Sustainable Material Management: 2018 Fact Sheet, the highest component of US MSW landfilled in 2018 was "Food" at 24.1%, followed by "Plastics" at 18.5%, and then "Paper & Paperboard" at 11.8%[5]. The results of the St. Lucie County waste sort are consistent with these findings, as "Other Paper", "Other Plastics" and "Food Waste" were the three largest components. The lowest material components in this study were "Newspaper" and "Non-Ferrous Metals" at 0.5% each. Recyclable materials, including glass, aluminum cans, steel cans, plastic bottles, corrugated boxes, newspaper, and office paper sum to approximately 17.7% of the overall MSW stream.

Table 2 - Processed Data from the St. Lucie County Waste Sort

		Mass Percent	
WasteCalc Category	**Total (n=39)**	**Residential (n 18)**	**Commercial (n 21)**
Newspaper	0.5%	0.5%	0.4%
Corrugated Cardboard	6.7%	3.3%	9.7%
Office Paper	2.9%	2.3%	3.4%
Other Papers	17.8%	17.7%	18.0%
Glass Packaging	2.4%	2.8%	2.1%
Steel Cans	0.8%	0.7%	0.8%
Other Ferrous Metals	1.3%	1.9%	0.8%
Aluminum Cans	1.6%	2.1%	1.2%
Non-Ferrous Metals	0.5%	0.6%	0.4%
Textiles	5.3%	7.2%	3.7%
Yard Trash	2.9%	4.1%	1.8%
Food Waste	12.8%	13.7%	12.0%
Plastic Containers	2.8%	2.6%	2.9%
Other Plastics	18.2%	16.5%	19.6%
C&D	5.6%	3.0%	7.7%
Other Miscellaneous	17.9%	20.9%	15.4%

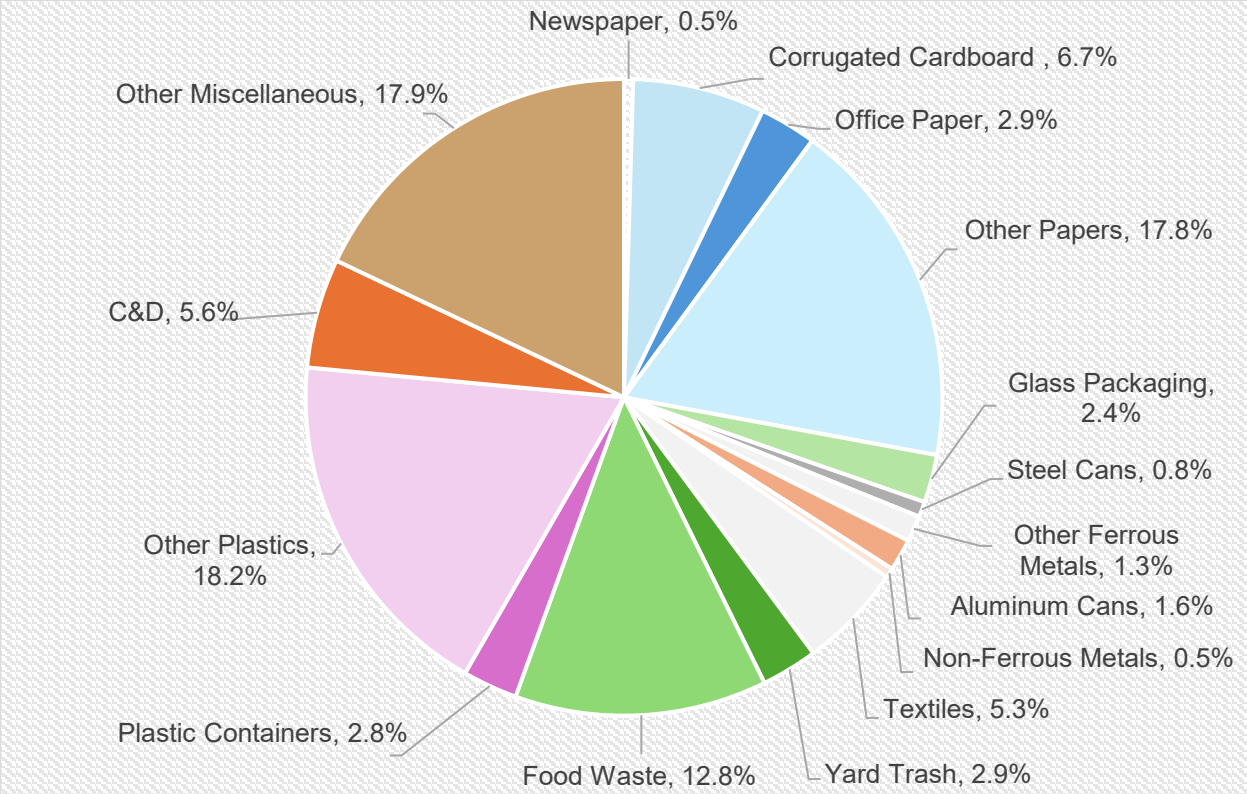

Figure 4 – Total Waste Composition

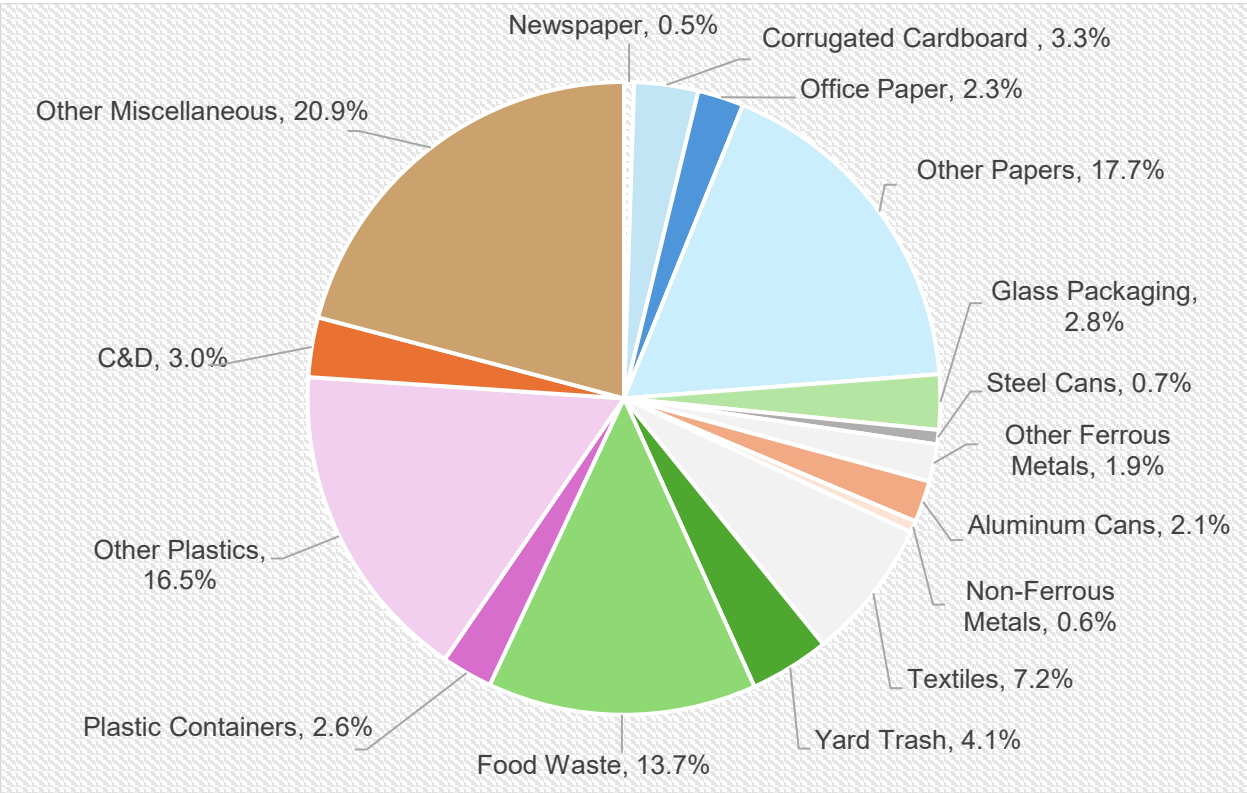

Figure 5 - Residential Waste Composition

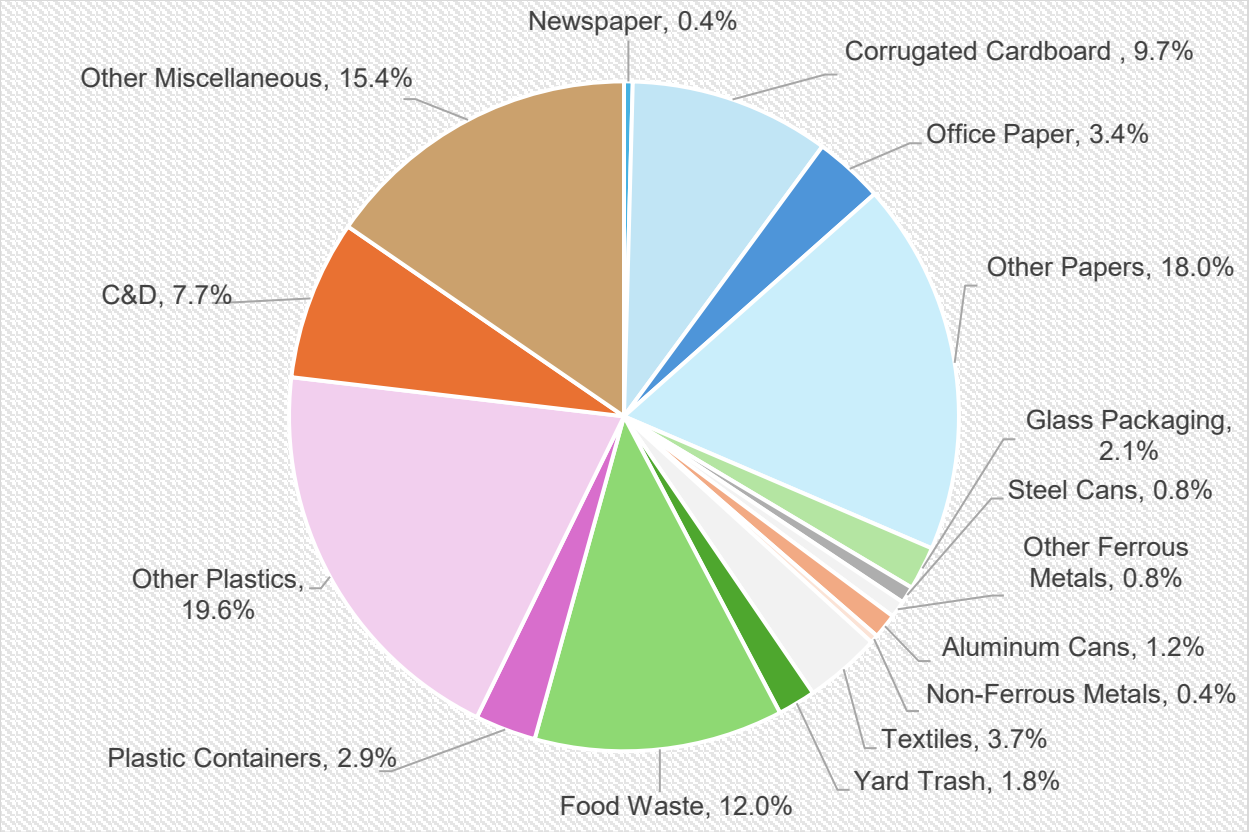

Figure 6 - Commercial Waste Composition

4. CONCLUSION

Results of the St. Lucie County waste composition study can now be incorporated into the *WasteCalc* program that's used in the statewide annual solid waste and recycling reports. *WasteCalc* is an online tool created by FDEP and outside contractors that allows any county in Florida to input information about the amount of waste landfilled, recycled, and combusted[6]. Currently, many counties in Florida do not have recent or any waste composition data. When this occurs, *WasteCalc* generates material composition percentages based on counties that are similar in population density However, it is important to conduct waste composition studies in locations throughout Florida so *WasteCalc* can provide more accurate and representative information. The data obtained in this study will provide more accurate results for St. Lucie County and other similar counties. The information provided may also help St. Lucie County to make decisions about sustainable materials management in the future.

5. REFERENCES

(1) US EPA. *State and Territory Grant: Florida*; Investing in America through the Bipartisan Infrastructure Law Solid Waste Infrastructure for Recycling; EPA 530-F-23-008-FL; 2023. https://www.epa.gov/system/files/documents/2023-09/Florida_SWIFR.pdf.

(2) UF BEBR. *Recent Population Data*. https://bebr.ufl.edu/population/population-data/ (accessed 2026-03-06).

(3) ASTM International. *ASTM D5231-92: Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste*. https://store.astm.org/d5231-92r16.html.

(4) Florida Department of Environmental Protection. *2024 Solid Waste Management Report*. https://floridadep.gov/waste/waste-reduction/content/2024-solid-waste-management-report (accessed 2025-12-16).

(5) US EPA, O. *Advancing Sustainable Materials Management: Facts and Figures Report*. https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/advancing-sustainable-materials-management (accessed 2025-12-16).

(6) Florida Department of Environmental Protection. *Waste Calc Introduction*. https://prodapps.dep.state.fl.us/wastecalc/ (accessed 2025-12-16).

APPENDIX

Material Categories

Category		Detailed Description
1	Newspaper	High cellulose content, high photo degradation paper
2	Corrugated Cardboard (OCC)	Corrugated cardboard packaging (e.g., Amazon boxes)
3	High Grade Paper (Office Type)	Manila envelopes, note cards, printer paper, tablets with binding, mail envelopes without a plastic window
4	Polycoated Aseptic Containers	Bleached and unbleached paperboard coated with HDPE used as food/beverage containers (e.g., ice cream cartons, milk cartons, juice boxes) as well as Takeout containers and cups with a waxy coating; does NOT include pizza boxes.
5	Boxboards	Cereal boxes, egg cartons (not coated with wax, plastic or metal).
6	Other Paper	Paper towels, paper plates, waxed paper, tissues, and other papers that are soiled with food during use (e.g., pizza boxes); brown paper bags and kraft paper; junk mail, carbonless paper, envelopes with and without windows, toilet paper cores and other mixed recyclable papers; magazines, phone books, glossy paper; any other containers composed mostly of paper with other materials attached (e.g., pringles cans, gum wrappers, tissue boxes, mail envelopes with a plastic window); anything that does not fall into the above categories.
7	#1 PET Bottles	Clear and colored bottles with necks
8	#2 HDPE Bottles	Milk, beverages, water bottles, liquid detergent bottles, some hair care bottles and cleaning products bottles with necks and other products with necks
9	#3-#7 (Other Plastic Bottles)	#3-#7 plastic bottles with necks
10	Expanded Polystyrene	Polystyrene drink cups, food containers, and styrofoam products such as packaging peanuts and blocks
11	Rigid Plastic (Food Service Plastics)	Plates, bowls, takeout clamshells, salad trays, microwave trays, utensils, takeout cups and lids, straws and stirrers, wide mouth cups and tubs (without a neck) and lids (e.g., solo cups; yogurt or sour cream containers; fruit clamshells)
12	Recyclable Flexible Plastics	Grocery Store and Retail Store Plastic Shopping Bags, Produce Bags, Plastic Shipping Envelopes, Case Wrap (e.g., Plastic wrap that covers cases of water bottles), Bubble Wrap, Air Pillows, Food Storage/Sandwich Bags (e.g., Ziplock bags), Product Overwrap (e.g., Plastic that covers paper towels, napkins, bath tissue, etc.), Cling Wrap, Bread Bags, Dry Cleaning Bags, Newspaper Bags
13	Non-recyclable flexible plastics	Degradable Bags, Frozen Food Bags, Candy Wrappers, Chip Bags, Salad Mix Bags, Six-pack Rings, Metalized Film, Bank Bags, X-ray Film, Shower Curtains, Silicone Bags
14	Other Plastics	Plastic such as toys, toothbrushes, vinyl hose, and lawn furniture; items are predominately plastic with other materials attached such as disposable razors, pens, lighters, toys, and binders; anything that does not fall into the above categories. Includes flexible packaging contaminated such that it cannot be sorted
15	Green Glass	Green glass bottles, containers, and green cullet (broken glass pieces)
16	Clear Glass	Clear glass bottles, containers, and clear cullet (glass pieces); mirrors, glassware, crystal, Pyrex and corning ware, laminated curved glass such as windshields, flat auto, clear or tinted window, door, shelf, tabletops
17	Brown Glass	Brown glass bottles, containers, and brown cullet (broken glass pieces)

18	Other Glass/Ceramics	Glass not otherwise classified, ceramics, structural ceramics like pottery and porcelain, and engineered ceramics such as refractory and abrasive materials.
19	Aluminum Cans/Foil	Cans and bi metal cans (nonmagnetic); food containers, trays, pie tins, and foil pieces
20	Steel/Tin Cans	Tin and steel food, pet food, and other containers, including bi-metal cans mostly of steel; does NOT include aluminum
21	Other Ferrous Metals	Ferrous and alloyed ferrous scrap metals that a magnet will adhere to
22	Other Non-Ferrous	Non-ferrous metal scrap such a brass, copper, or other non-magnetic metal; includes aluminum products such as window frames and cookware
23	Yard Waste	Grass clippings, twigs, branches, leaves, etc.
24	Food Waste	Food preparation wastes, food scraps, spoiled food
25	Other Organics	Combustible materials including wax, bar soap, cigarette butts, feminine hygiene products, disposable diapers, vacuum cleaner bag contents, leather, briquettes, and fireplace, burn barrel, and fire-pit ash, animal waste, kitty litter, and other organic material not classified elsewhere
26	Un-treated Clean Wood	Clean wood (e.g., 2 x 4's and 2 x 6's, sheets of plywood)
27	Rocks, Concrete, and Bricks	Rocks, concrete, and bricks
28	Other C&D Debris	Includes asphalt roofing shingles, gypsum wallboard, fiberglass, oriented strand board, particle board, and other construction/demolition materials
29	Treated Wood	Includes pressure treated wood
30	Rubber and Leather	Rubber gloves; finished products and scrap materials made of natural and synthetic rubber, such as bathmats, inner tubes, rubber hoses, and foam rubber and leather items
31	Clothing, Footwear, Other Textiles	Shoes, tennis shoes, fabric materials and clothing, including natural and synthetic textiles, such as cotton, wool, silk, woven nylon, rayon, and polyester; includes non-rag stock grade textiles such as heavy linens and draperies (e.g., pillows, blankets, towels, sheets)
32	Small appliances/ Electronics	Toasters, stereos, other small appliances and electronic equipment (non-refrigerant); computer-related electronics (e.g., Laptops, monitors, printers, mouse, stereos) and personal portable products (e.g., cell phones, chargers, camcorders, gaming devices, cameras)
33	Medical Waste	Blood pressure cuffs, pharmaceuticals, hypodermic needles, needle covers, medical tubing, articles contaminated with red (blood) colored substances, and contaminated medical device packaging
34	Hazardous Waste	Automotive products and fluids (e.g., oil filter, motor oil/diesel oil, and containers contaminated with oil), paints and solvents, pesticides, herbicides and fungicides, household cleaners, mercury containing products (e.g., fluorescent bulbs, barometers, thermostat switches, thermometers, car switches), cathode ray tubes (large monitors)
35	Rechargeable Batteries and Products Containing Those Batteries	Lead Acid Batteries (Could be from ride-on toys, lawn mowers, and discarded batteries from cars, trucks, boats, etc.); Small Sealed Lead Acid (SSLA/Pb) Batteries (Found in UPS battery back-ups, ride-on toys, mobility scooters, security systems, emergency devices, robotic lawn mowers, etc.); Ni-Cd (Found in power tools, digital cameras, two-way radios, cordless phones, etc.); Ni-MH (Found in robotic vacuums, robotic lawn mowers, power tools, digital cameras, two-way radios, cordless phones, etc.); Li-Ion (Found in cell phones, power tools, laptops, power banks, toys, robotic vacuums, robotic lawn mowers, etc.)
36	Residuals	Unsorted materials which pass through the 1” x 1” mesh table
37	Liquids	Bottled liquids
38	Other Miscellaneous	Other materials that do not fit into a previously described category

Example Sampling Sheet

Sample #	
Date and Time Pulled:	
Date Sorted:	
Hauler:	
Hauler Truck #:	
Truck Weight (inbound):	
Truck Weight (outbound):	
Total Sample Weight (lbs):	
Description of Sample:	
Waste Stream (commercial or residential):	
Origin of Waste (incorporated or unincorporated):	

Notes
Any bulky items or white goods? Approximate area of collection: Notes/observations from driver about load:

Example Data Collection Sheet

Category	Material		Weight (lbs)	Category	Material		Weight (lbs)
Newspaper	1	Newspaper		Plastic Containers	18	#1 PET Bottles	
Corrugated Cardboard	2	Corrugated Cardboard (OCC)			19	#2 HDPE Bottles	
Office Paper	3	High Grade Paper (Office Type)		Other Plastics	20	#3-7 (Other Plastic Bottles)	
Other Papers	4	Polycoated Aseptic Containers			21	Expanded Polystyrene	
	5	Boxboards			22	Rigid Plastic (Food Service Plastics)	
	6	Other Paper			23	Recyclable Flexible Plastics	
Glass Packaging	7	Green			24	Non-Recyclable Flexible Plastics	
					25	Other Plastics	
	8	Clear		C&D	26	Un-treated Clean Wood	
					27	Rocks, Concrete, and Bricks	
					28	Other C&D Debris	
					29	Treated Wood	
	9	Brown		Other Miscellaneous	30	Rubber and Leather	
	10	Other Glass/Ceramics			31	Small Appliances/Electronics	
Steel Cans	11	Steel/Tin Cans			32	Medical Waste	
					33	Hazardous Waste	
Other Ferrous Metals	12	Other Ferrous Metals			34	Rechargeable Battery Products	
Aluminum Cans	13	Aluminum Cans/Foil			35	Residuals	
Non-Ferrous Metals	14	Other Non-Ferrous			36	Liquids	
Textiles	15	Clothing, Footwear, Other Textiles			37	Other Organics	
Yard Trash	16	Yard Waste			38	Other Miscellaneous	
Food Waste	17	Food Waste					