

DRAFT REPORT

Waste Characterization Study



September 2021



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TABLE OF CONTENTS

TABLE OF CONTENTS	I
1. INTRODUCTION	1
2. WASTE GENERATORS	1
3. STUDY DESIGN	2
3.1 Sampling Plan	2
3.2 Material Categories.....	4
4. FIELD DATA COLLECTION METHODS	5
4.1 Retrieval of Downtown Samples	5
4.2 Downtown Cardboard	6
4.3 Sampling of Residential Loads	6
4.4 Manual Sorting	7
4.5 Data Recording.....	7
4.6 Data Analysis	8
5. COMPOSITION OF DOWNTOWN BUSINESS DISTRICT MATERIALS	9
6. COMPOSITION OF DOWNTOWN CARDBOARD	11
7. COMPOSITION OF RESIDENTIAL REFUSE	12
8. CONCLUSIONS AND RECOMMENDATIONS	14

TABLE OF CONTENTS

List of Figures

Figure 2-1 Park City Downtown Business District Map	1
Figure 4-1 Sampling Truck Arriving at the Landfill	6
Figure 4-2 Freshly Tipped Load from Park Meadows West and Thaynes Canyon.....	7
Figure 4-3 Fieldwork Data Entry Form	8
Figure 5-1 Restaurant & Bar Refuse Composition.....	9
Figure 5-2 Divertibility of Restaurant & Bar Refuse	10
Figure 6-1 Commercial Cardboard Dumpster Audit Results.....	12
Figure 7-1 Residential Refuse Composition	13
Figure 7-2 Divertibility of Residential Waste.....	13

List of Tables

Table 2-1 Residential Refuse Collection Route Summary	2
Table 3-1 Sampling Plan	3
Table 3-2 Material Categories and Divertibility Class	5
Table 4-1 Commercial Sample Retrieval Schedule.....	6
Table 5-1 Detailed Composition of Restaurant & Bar Refuse.....	11
Table 7-1 Detailed Composition of Residential Waste	14

WASTE CHARACTERIZATION STUDY

1. INTRODUCTION

Park City, Utah is a world-renowned tourist destination cradled in the Wasatch Mountains about 32 miles from Salt Lake City. The surrounding area caters to outdoor adventurers of all stripes and is recognized as a world-class skiing and snowboarding destination in the winter. Park City also hosts many popular festivals and attractions, drawing visitors nationwide and internationally throughout the year. Park City’s tourism industry has been crucial to the city’s success since its days as a mining town. Today, only about 30 percent of all Park City residents reside in the city year-round, with seasonal residents making up the remaining population.

Park City is also internationally recognized as a leader in environmental sustainability. In its recent Vision 2020 process, which entailed extensive community engagement, environmental leadership with an emphasis on zero waste by 2030 was identified as a community priority.

To further its understanding of opportunities to divert incrementally more material from landfill disposal in the pursuit of its zero waste goals, the City retained MSW Consultants to perform a Waste Composition Study for both its residential waste routes, and also for the Downtown Park City Business Improvement District (BID), which is a central hub for shopping and dining throughout the year.

This report summarizes the methodology and sampling plan developed to guide the composition study and presents the results of the research in graphical and tabular format. The report also offers observations about opportunities to increase diversion within Park City.

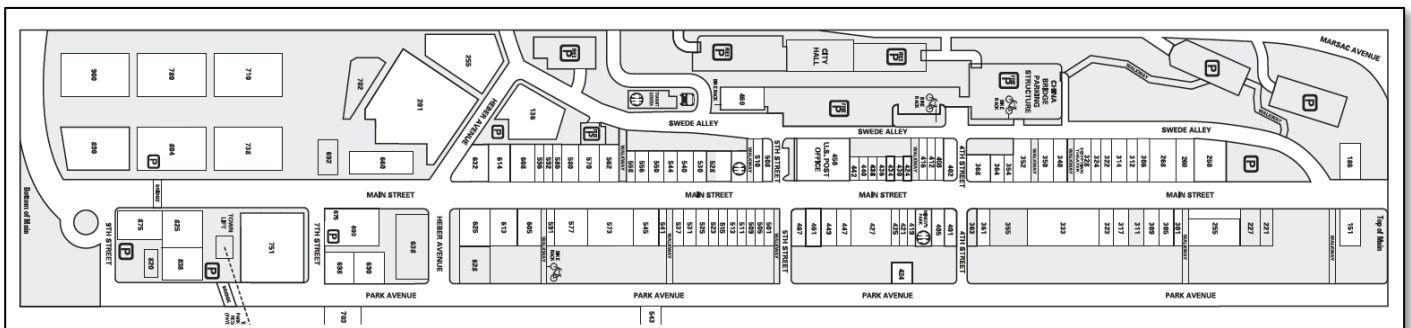
2. WASTE GENERATORS

The analysis of disposed waste streams focused on two generator groups within Park City:

- ◆ The Park City Downtown Business Improvement District (BID), and
- ◆ Residential households receiving contracted collection service.

Park City’s downtown business district, shown in Figure 2-1, features a variety of restaurants, bars, retail stores, galleries, hotels, event venues, and professional services offices. In total, over 200 businesses make their home on or adjacent to Park City’s Main Street.

Figure 2-1 Park City Downtown Business District Map



The City provides curbside refuse and recycling collection to households within its service area via a contract with Republic Services. Republic runs five refuse collection routes each week to provide refuse collection to Park City Residents. Table 2-1 lists all routes serviced for single-family residences in Park City each week.

WASTE CHARACTERIZATION STUDY

Table 2-1 Residential Refuse Collection Route Summary

Collection Day	Route #	Collection Area
Wednesday	273	Park Meadows West/Thaynes Canyon
Wednesday	274	Prospector Square/Three Kings
Wednesday	271	Park Meadows East
Friday	274	Old Town/Solamere
Friday	273	Deer Valley

This study obtained and sorted samples from both the BID and from the residential sector in Park City.

3. STUDY DESIGN

3.1 SAMPLING PLAN

The objective of the sampling plan for any waste characterization study is to obtain a representative distribution of samples from the targeted waste streams and generator sectors in the study.

For the BID waste stream composition analysis, MSW Consultants compiled information about the business types and associated square footage for all entities operating in the BID. Based on prior business classifications developed by the City, the following business types were identified as the primary groupings for the BID.

- ◆ **Retail:** Park City’s BID features a wide variety of jewelry stores, athletic apparel shops, designer clothiers, and specialty stores focusing on the sale of consumer goods. Examples include Lululemon, Norsk Leather & Fur, Utah Ski & Golf, and Dolly’s Books. While plenty of these stores can be found along the length of the BID, it was found during this study that these businesses contribute little to the overall waste stream.
- ◆ **Restaurant & Bar:** There is a significant dining scene in the BID, and consequently restaurants and bars were identified as the primary generator of wastes to landfill. Examples include Grappa Italian Café, Flying Sumo, Red Banjo Pizza, and No Name Saloon & Grill.
- ◆ **Lodging:** Businesses in the Lodging Sector are classified as short-term accommodations typically for tourists to the Park City Area. Sampling teams encountered little material from this sector, but it is expected that generation ramps up notably in the winter.
- ◆ **Services:** Businesses in the Services sector include a broad range of businesses from insurance offices to barber shops. Waste generation was found to be minimal from businesses within this sector.
- ◆ **Venues:** The BID has a few performance venues within its service area, such as the Egyptian Theatre. Waste generation is highly variable at these locations; therefore, the decision was made to avoid sampling from the venues.

Galleries: Park City’s BID is home to several art galleries catering to appreciators of a wide variety of artistic tastes. Galleries impact on the waste stream is overall negligible, with occasional spikes in cardboard generation throughout the year.

At the outset of the planning process, it was determined that samples should be obtained from all six of the business groupings shown above. MSW Consultants accordingly developed a sampling plan that overweighted the restaurant businesses due to their known higher generation of wastes, but also attempting to capture wastes from all identified business types.

City Staff was responsible for contacting eligible businesses to recruit participants in the study. The City asked businesses to fill out a questionnaire to inform about refuse generation behaviors and determine the

WASTE CHARACTERIZATION STUDY

time of day at which it would be possible to obtain refuse materials from the business prior to depositing wastes into one of the BID's central roll-off container. Based on responses from BID businesses, a sample retrieval plan was developed to visit participating businesses during various hours of operation to retrieve samples of wastes and recyclables for analysis. A total of 39 samples were allocated to BID businesses for field data collection.

Additionally, the study targeted grab samples from residential collection routes delivering wastes to the Summit County Landfill. These samples were obtained with the help of a loader when the Park City residential trucks tipped their full loads.

Table 2-2 summarizes the targeted number of samples for both the participating BID businesses, as well as for the residential refuse loads. Note that samples from the BID included materials sources from more than one business in most cases.

Table 3-1 Sampling Plan

Type	Targeted Samples	Actual Samples
Retail	1	0
Restaurants & Bars	18	13
Lodging	1	0
Services	3	0
Venues	0	0
Galleries	1	0
Residential	15	11
All	39	24

As shown in this table, the number of samples ultimately obtained fell short of the targets established jointly by MSW Consultants and the City. The reasons for this shortfall are itemized below:

- ♦ **Failure by Businesses to Deliver Sample Material.** Despite the efforts of the project team to recruit and alert businesses to participate in this study by accumulating wastes on the schedule sampling day, there were meaningful shortfalls in the number of businesses that were actually able to follow through on this commitment.
- ♦ **Insufficient Business Refuse Generation.** Other than the restaurants, which were found to be generating significant wastes and were successfully sampled during the project, other business types defined in the study were found to be generating markedly less waste than anticipated. In some cases – especially galleries – little to no waste was available and several of these establishments reported as much to field data collection personnel. Some of the lower than anticipated waste generation may have been attributable the summer being more off season, and/or due to lower than usual visitation due to nearby wildfires
- ♦ **Unscheduled Modification to a Residential Refuse Route.** On Friday, the final day allocated for sample collection, one of the residential collection trucks never arrived to dump at the landfill during business hours. It was assumed that the driver was unable to complete their shift in time to dump on Friday, with a plan to empty the truck first thing in the morning on the following Monday. Despite attempts by MSW Consultants as well as Summit County Landfill staff to reach multiple Republic Services contacts to rectify this matter, the undelivered load was ultimately not able to be sampled, resulting in a shortfall to the residential sampling targets.

WASTE CHARACTERIZATION STUDY

It should be noted that very small quantities of wastes were obtained from other BID business types. Despite accumulating materials from more than one of each business type, not enough material was captured to make up a representative sample and consequently the results have been excluded from this report.

Data collected from the Residential Sector and the Restaurant & Bar commercial sector was found to be sufficient to draw meaningful conclusions from each of their respective result sets, however. Therefore, the remainder of this report focuses on the composition of wastes from the Restaurant & Bar businesses in the BID and on the Residential sector.

3.2 MATERIAL CATEGORIES

Each sample of refuse was sorted into 48 material categories. Table 2-5 shows the breakdown of the material categories within their respective material groups. Detailed definitions for each of these categories are contained in Appendix A.

One of the objectives of this study was to identify constituents in the waste stream that could be diverted from landfill through locally available means. Accordingly, each material was assigned a “recyclability class” which included:

1. **Recyclable Cardboard and Paper:** All cardboard and paper targeted in the curbside collection programs in the County, including aseptic boxes & gable top cartons.
2. **Recyclable Containers:** Metal cans and plastic bottles and other packaging targeted in the curbside collection programs in the County.
3. **Compostable Organics:** Food waste and compostable paper that could potentially be diverted via commercial composting or other organics management program.
4. **Not Readily Divertible:** Materials for which there are no readily available outlets for recycling, composting, or other diversion from landfill.

WASTE CHARACTERIZATION STUDY

Table 3-2 Material Categories and Divertibility Class

Material Category	Divertibility Class	Material Category	Divertibility Class
Paper		Organics	
Corrugated Cardboard/Kraft Paper	1	Food Waste	3
Take Out Containers, Food, and Beverage	3	Yard Waste	3
Aseptic Boxes & Gable Top Cartons	2	Remainder/Composite Organics	4
Mixed Recyclable Paper	1	C&D	
Compostable Paper	3	Wood - Treated/Painted/Stained	4
Remainder/Composite Paper	4	Wood - Untreated/Clean	4
Plastic		Drywall/Gypsum Board	4
PET (#1) Bottles and Jars	2	Asphalt Roofing	4
PET (#1) Non-bottle Containers	2	Asphalt Paving, Brick, Concrete, and Rock	4
PET (#1) Containers - Contaminated	4	Carpet & Carpet Padding	4
HDPE (#2) Natural Containers	2	Remainder/Composite Construction & Demolition	4
HDPE (#2) Colored Containers	2	HHW	
HDPE (#2) Containers - Contaminated	4	Household Hazardous Waste or HHW	4
Rigid Plastic Containers #3-#7s	4	Batteries (All Types)	4
Rigid Plastic Containers #3-#7s - Contaminated	4	Medically-Related Waste	4
Expanded Polystyrene "Styrofoam"	4	Electronics	
Plastic Bags and Film	4	All Electronics	4
Durable/Bulky Rigid Plastics	4	Other	
Remainder/Composite Plastic	4	Recyclable Textiles and Clothing	4
Metal		Other Textiles and Leather	4
Aluminum Containers	2	Rubber Products	4
Aluminum Foils and Trays	4	Disposable Diapers & Sanitary Products	4
Other Non-Ferrous Metals	4	Supermix incl. Dirt & Fines	4
Steel Cans & Lids	2	Bulky Materials	4
Other Ferrous Metals	4	Other Materials Not Elsewhere Classified	4
Glass			
Glass Bottles, Jars & Containers	4		
Remainder/Composite Glass	4		

4. FIELD DATA COLLECTION METHODS

Field data collection involved two primary functions: (i) retrieval of sample materials from Downtown businesses and from inbound residential collection trucks, and (ii) sorting and weighing the samples at a central work area for use in developing composition estimates. These steps are described below.

4.1 RETRIEVAL OF DOWNTOWN SAMPLES

After receiving all questionnaire responses from the respondent businesses, City staff categorized eligible businesses by their ideal collection times and scheduled for pickup. Businesses were given their scheduled collection time and a set out location was communicated in advance.

At each of the business collection events, an MSW staff member driving a box truck went to each collection location, loaded all bagged refuse into the truck, and marked each bag with a tag identifying the business type. Each collection event took roughly two hours to complete. Upon completion of each collection route, the driver took all material back to the landfill for weighing and processing. Table 2-5 provides

WASTE CHARACTERIZATION STUDY

additional detail on each collection event. As shown, 41 businesses were targeted to supply samples of refuse.

Table 4-1 Commercial Sample Retrieval Schedule

Collection Event	Date	Time of Day	# of Businesses
Monday Evening	8/16/21	6:00PM - 8:00PM	8
Monday Night	8/16/21	11:00PM - 1:00AM	6
Tuesday Morning	8/17/21	11:00AM - 1:00PM	13
Tuesday Afternoon	8/17/21	3:00PM - 5:00PM	14
Total			41

Once at the landfill bags were unloaded and separated by generator sector, where 150 lb. samples were weighed from the available piles. These samples were then staged next to the sorting area.

Figure 4-1 Sampling Truck Arriving at the Landfill



4.2 DOWNTOWN CARDBOARD

In addition to the analysis of Park City’s commercial and single-family residential refuse stream, the City also had an interest in evaluating the cleanliness of City’s cardboard recycling. MSW Consultants provided an audit of one of Park City’s Downtown Business District dumpsters to gain a better understanding of the level of contamination present in the cardboard stream. This was done by bringing one of the BID’s common cardboard dumpsters to the sorting area where it was dumped of its contents by a loader and had non-cardboard materials removed and sorted as a sample.

4.3 SAMPLING OF RESIDENTIAL LOADS

Due to the limited number of routes run each week, the determination was made to collect samples from each route in the Park City collection area. Upon arrival, MSW Consultants interviewed the drivers of Park City trucks to confirm the geographic origin, as well as other pertinent data. This information was noted on a handheld tablet computer, along with a unique identifying number associated with that vehicle on that day.

Selected loads of waste designated for sorting were tipped in a designated area at the landfill. From each selected load, two to four samples of material were selected based on random “grabs” from the perimeter

of the load. For example, if the tipped pile is viewed from the top as a clock face with 12:00 being the part of the load closest to the front of the truck, the first samples was taken from 3 o'clock, 6 o'clock, 9 o'clock, 12 o'clock, and then from 1, 4, 7, and 10 o'clock, and so-on.

Figure 4-2 Freshly Tipped Load from Park Meadows West and Thaynes Canyon



Once the area of the tipped load was selected, the Field Supervisor instructed a Summit County Landfill loader operator to take a “grab” sample or “scoop” of wastes from that point in the tipped load. The grab was then dropped into an arranged row of barrels at the direction of the Field Supervisor. The contents of these barrels were weighed to confirm the minimum sample weight of 200 lbs. had been reached, and each sample was given a unique identification code. Samples were then driven to the sorting area where they were staged for sorting.

4.4 MANUAL SORTING

Once each sample had been acquired, the material was manually sorted into the prescribed component categories. Plastic 18-gallon bins with sealed bottoms were used to contain the separated components. Sorters were asked to specialize in certain material groups, with someone handling the paper categories, another the plastics, another the glass and metals, and so on. In this way, sorters were able to become highly knowledgeable in a short period of time as to the definitions of individual material categories. The sorting protocol was the same for both the downtown commercial and single-family residential samples.

4.5 DATA RECORDING

The weigh-out and data recording process is the most critical process of the sort. The MSW Consultants’ Crew Chief oversaw all weighing and data recording of each sample. Once each sample was sorted, and fines swept from the table, the weigh-out was performed. Each bin containing sorted materials from the just-completed samples was carried over to the scale. The sorting crew assisted with carrying and weighing the bins of sorted material, and the Crew Chief recorded all data.

The Crew Chief used a rugged tablet computer to record the composition weights. The tablet allowed for samples to be tallied in real time so that field data collection could immediately identify and rectify errors associated with light sample weights. The tablet synchronizes with the cloud via internet, providing excellent data security. Each sample was cross-referenced against the Field Supervisor’s sample sheet to

WASTE CHARACTERIZATION STUDY

assure accurate tracking of the samples each day. The real-time data entry offered several important advantages:

- ◆ The template contains built-in logic and error checking to prevent erroneous entries.
- ◆ The template sums sample weights in real time so the Crew Chief can confirm achievement of weight targets for each and every sample.

Figure 4-3 shows a screenshot of the tablet-based data entry screen. All data were synchronized to a *WasteInsight™*, a cloud-based data analytics system.

Figure 4-3 Fieldwork Data Entry Form

Downtown Park City Business Improvement District Back

Enter Sample Weights
Use this form to enter header information and sample weights by material categories for new samples. You may also update existing header and weight information for previously submitted samples.

Sample ID: Thursday, September 16, 2021 09:38 am

Sample Notes:

PRE-WEIGH (lbs): SORTED (lbs):

Field ID:	Barrel Weights		
SAMPLE			0.0
Generator:	1	Corrugated Cardboard/Kraft Paper	5.75
Industrial, Commercial & In: <input type="text" value="v"/>	2	Take Out Containers, Food, and Beverage	2.60
Stream:	3	Aseptic Boxes & Gable Top Cartons	5.45
Refuse <input type="text" value="v"/>	4	Mixed Recyclable Paper	5.60
Facility:	5	Compostable Paper	5.70
Summit County 3 Mile LF	6	Remainder/Composite Paper	5.70
Origin:	7	PET (#1) Bottles and Jars	3.90
select one <input type="text" value="v"/>	8	PET (#1) Non-bottle Containers	3.90
Hauler:	9	PET (#1) Bottlers, Jars, and Containers - Contaminated	3.90
Other (write-in): <input type="text" value="v"/>	10	HDPE (#2) Natural Containers	3.90
Truck Type:	11	HDPE (#2) Colored Containers	3.90
select one <input type="text" value="v"/>	12	HDPE (#2) Containers - Contaminated	3.90
Truck Number:	13	Rigid Plastic Containers #3-#7s	3.90
Ticket Number:			
Load Weight (tons):			

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4.6 DATA ANALYSIS

A statistical analysis was performed to calculate the mean composition for each of the material categories and for each material stream in this study. Samples were first normalized by converting the sample data from weight to percentage. Then, the sample mean was determined by averaging the percent composition of each material across all samples.

Confidence intervals are provided for each material category as well as for major material groups (e.g., "paper", "plastic", etc.). Confidence intervals have been calculated at a 90 percent level of confidence, meaning that we can be 90 percent sure that the upper and lower bounds of a confidence interval successfully capture its respective population mean. (The converse is also true: that there is a 10 percent chance that a confidence interval will fail to capture its population mean.) In general, as the number of samples increases, the width of the confidence intervals decreases, although the more variable the underlying waste stream composition, the less noticeable the improvement for adding incremental samples.

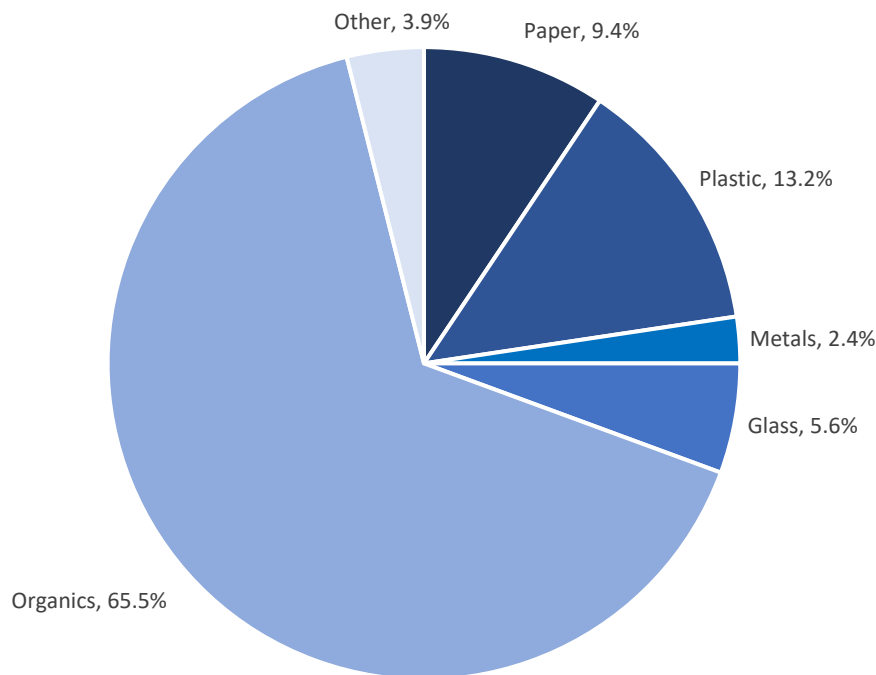
To supplement the analysis contained in this report, the City has also been provided with three months' of online access to the *WasteInsight* system, which performs similar analytics and generates bar charts and pie charts to illustrate results.

5. COMPOSITION OF DOWNTOWN BUSINESS DISTRICT MATERIALS

Based on the experiences in this study, a significant majority of the landfill-bound refuse originating from the Downtown Business District. The composition estimates provided herein are consequently focused on the Restaurant and Bar generator sector.

Figure 5-1 shows the restaurant and bar waste composition by major material group. As shown, organic materials comprise the majority of this waste stream.

Figure 5-1 Restaurant & Bar Refuse Composition



WASTE CHARACTERIZATION STUDY

Figure 5-2 illustrates the percentage of material that could potentially be diverted from the restaurant and bar waste stream. As shown, 83 percent of all material disposed could either be diverted for conventional recycling (an be diverted at this time. Unsurprisingly, compostable organics (specifically from food waste) compose much of all landfill-bound material found in the Restaurant & Bar generator stream.

Figure 5-2 Divertibility of Restaurant & Bar Refuse

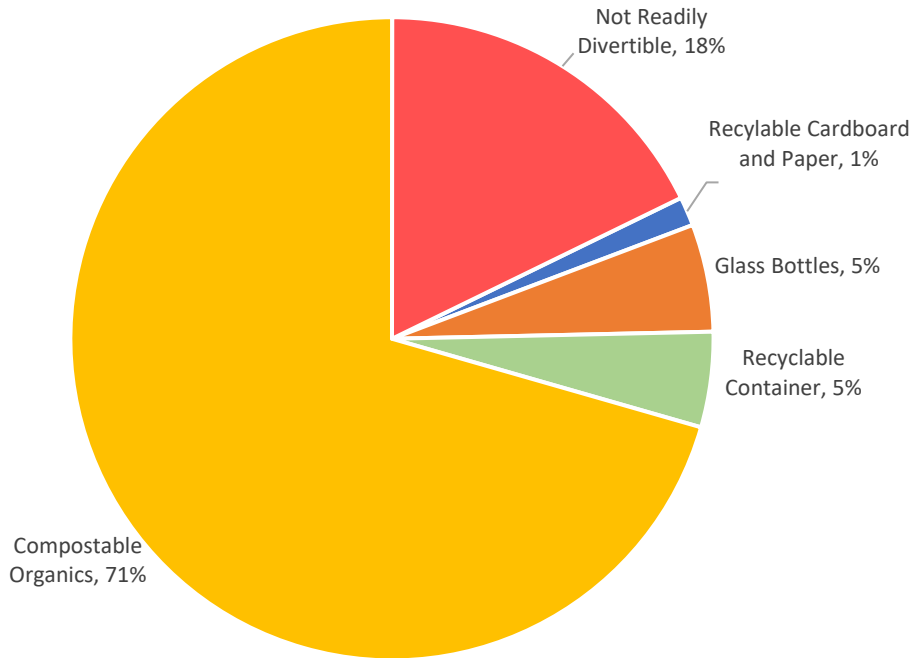


Table 5-1 provides the detailed tabular composition of the refuse collected from Park City restaurants and bars. This table shows the mean composition, and margin of error (at a 90 percent level of confidence) of each of the constituents in the refuse stream.

WASTE CHARACTERIZATION STUDY

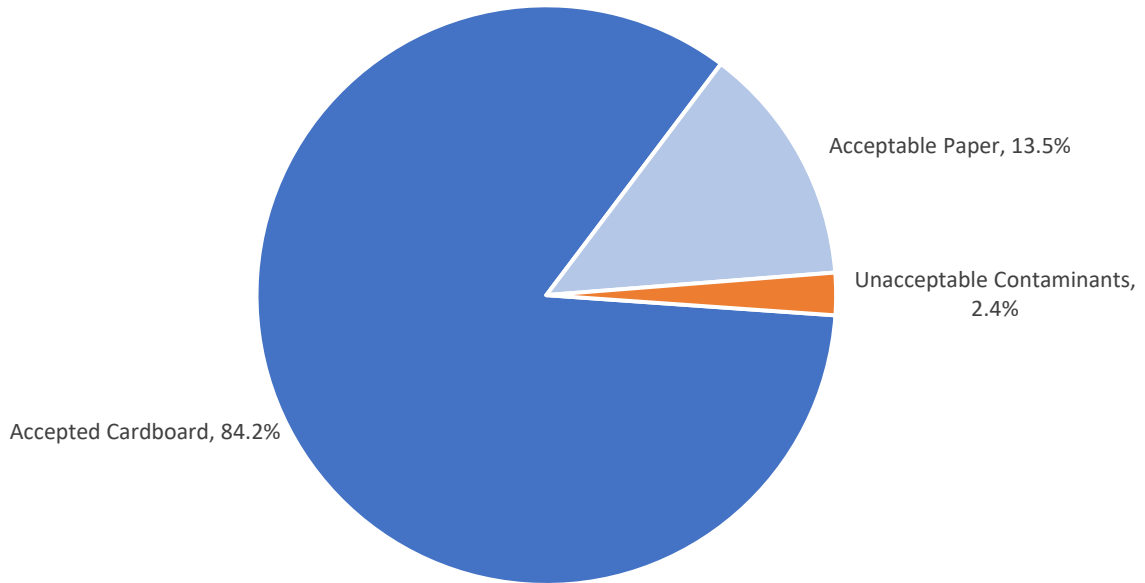
Table 5-1 Detailed Composition of Restaurant & Bar Refuse

Material Category	Mean	MoE	Material Category	Mean	MoE
Paper	9.4%	2.8%	Organics	65.5%	6.7%
Corrugated Cardboard/Kraft Paper	0.8%	0.4%	Food Waste	65.3%	6.7%
Take Out Containers, Food, and Beverage	0.3%	0.2%	Yard Waste	None Found	
Aseptic Boxes & Gable Top Cartons	0.8%	0.4%	Remainder/Composite Organics	0.1%	0.2%
Mixed Recyclable Paper	0.7%	0.3%	C&D	0.2%	0.2%
Compostable Paper	5.0%	1.9%	Wood - Treated/Painted/Stained	0.0%	0.0%
Remainder/Composite Paper	1.9%	1.6%	Wood - Untreated/Clean	None Found	
Plastic	13.2%	3.9%	Drywall/Gypsum Board	None Found	
PET (#1) Bottles and Jars	0.8%	0.3%	Asphalt Roofing	None Found	
PET (#1) Non-bottle Containers	0.4%	0.2%	Asphalt Paving, Brick, Concrete, and Rock	None Found	
PET (#1) Bottlers, Jars, and Containers - Contaminated	0.3%	0.1%	Carpet & Carpet Padding	None Found	
HDPE (#2) Natural Containers	0.9%	0.3%	Remainder/Composite Construction & Demolition	0.1%	0.2%
HDPE (#2) Colored Containers	0.2%	0.2%	HHW	0.0%	0.0%
HDPE (#2) Containers - Contaminated	0.2%	0.2%	Household Hazardous Waste or HHW	None Found	
Rigid Plastic Containers #3-#7s	0.6%	0.3%	Batteries (All Types)	None Found	
Rigid Plastic Containers #3-#7s - Contaminated	0.4%	0.5%	Medically-Related Waste	None Found	
Expanded Polystyrene "Styrofoam"	0.1%	0.2%	Electronics	0.0%	0.0%
Plastic Bags and Film	5.8%	1.5%	All Electronics	None Found	
Durable/Bulky Rigid Plastics	0.0%	0.0%	Textiles	0.5%	0.3%
Remainder/Composite Plastic	3.4%	4.0%	Recyclable Textiles and Clothing	0.0%	0.1%
Metal	2.4%	1.1%	Other Textiles and Leather	0.5%	0.3%
Aluminum Containers	0.8%	0.4%	Other	3.2%	2.9%
Aluminum Foils and Trays	0.7%	0.3%	Rubber Products	0.8%	0.3%
Other Non-Ferrous Metals	0.0%	0.0%	Disposable Diapers & Sanitary Products	0.1%	0.2%
Steel Cans & Lids	0.9%	0.9%	Supermix incl. Dirt & Fines	2.0%	3.0%
Other Ferrous Metals	0.0%	0.0%	Bulky Materials	None Found	
Glass	5.6%	4.0%	Other Materials Not Elsewhere Classified	0.4%	0.2%
Glass Bottles, Jars & Containers	5.4%	3.9%			
Remainder/Composite Glass	0.2%	0.3%			
			Total	100%	
			Number of Samples	13	

6. COMPOSITION OF DOWNTOWN CARDBOARD

Figure 5-3 reflects the composition of the cardboard dumpster in the downtown area. As shown, almost 85 percent of the contents was in fact corrugated cardboard. 13.5% was paperboard containers, considered acceptable in the dumpster by the City's processor. The largest contributors to the cardboard dumpster's contamination were unacceptable forms paper packaging and plastic containers and film not appropriately separated before disposal into the dumpster.

Figure 6-1 Commercial Cardboard Dumpster Audit Results



7. COMPOSITION OF RESIDENTIAL REFUSE

Figure 5-4 shows the residential waste composition by major material group. As shown, organics comprise over 36 percent of the refuse disposed at the County landfill.

Figure 7-1 Residential Refuse Composition

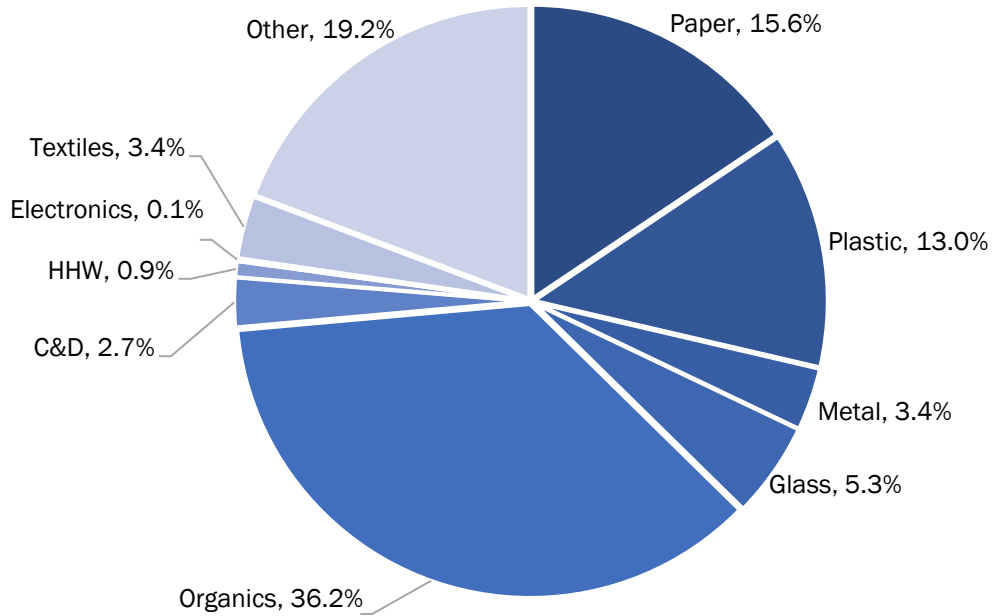
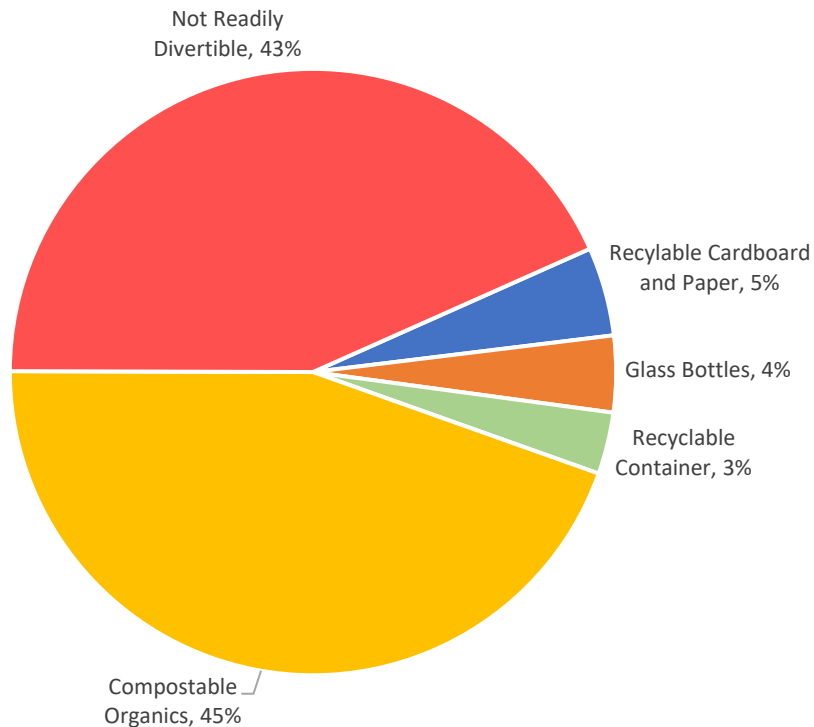


Figure 5-5 illustrates the percentage of material readily divertible from the refuse stream. Once again, compostable organics like paper to-go containers, compostable paper products, food waste, and yard waste, can represent meaningful areas for improvement in diverting material from the landfill.

Figure 7-2 Divertibility of Residential Waste



WASTE CHARACTERIZATION STUDY

Table 5-1 provides the detailed tabular composition of Park City’s Single-family residential refuse. This table shows the mean composition and margin of error (at a 90 percent level of confidence) of each of the constituents in the refuse stream.

Table 7-1 Detailed Composition of Residential Waste

Material Category	Mean	MoE	Material Category	Mean	MoE
Paper	15.6%	1.9%	Organics	36.2%	5.8%
Corrugated Cardboard/Kraft Paper	1.2%	0.4%	Food Waste	23.2%	3.5%
Take Out Containers, Food, and Beverage	0.5%	0.2%	Yard Waste	11.6%	6.2%
Aseptic Boxes & Gable Top Cartons	0.3%	0.1%	Remainder/Composite Organics	1.5%	1.2%
Mixed Recyclable Paper	3.5%	1.9%	C&D	2.7%	1.8%
Compostable Paper	9.3%	1.4%	Wood - Treated/Painted/Stained	1.7%	1.6%
Remainder/Composite Paper	0.7%	0.2%	Wood - Untreated/Clean	0.3%	0.2%
Plastic	13.0%	2.9%	Drywall/Gypsum Board	None Found	
PET (#1) Bottles and Jars	0.8%	0.3%	Asphalt Roofing	0.0%	0.0%
PET (#1) Non-bottle Containers	0.6%	0.2%	Asphalt Paving, Brick, Concrete, Rock	0.3%	0.5%
PET (#1) Containers - Contaminated	1.3%	0.6%	Carpet & Carpet Padding	0.0%	0.0%
HDPE (#2) Natural Containers	0.2%	0.1%	Remainder/Composite C&D	0.4%	0.5%
HDPE (#2) Colored Containers	0.4%	0.2%	HHW	0.9%	0.4%
HDPE (#2) Containers - Contaminated	0.1%	0.1%	Household Hazardous Waste or HHW	0.5%	0.2%
Rigid Plastic Containers #3-#7s	0.4%	0.1%	Batteries (All Types)	0.1%	0.1%
Plastic Containers #3-#7s - Contaminated	0.6%	0.3%	Medically-Related Waste	0.4%	0.4%
Expanded Polystyrene "Styrofoam"	0.4%	0.2%	Electronics	0.1%	0.2%
Plastic Bags and Film	6.4%	1.7%	All Electronics	0.1%	0.2%
Durable/Bulky Rigid Plastics	0.5%	0.6%	Textiles	3.4%	1.2%
Remainder/Composite Plastic	1.4%	0.4%	Recyclable Textiles and Clothing	1.4%	1.1%
Metal	3.4%	1.4%	Other Textiles and Leather	2.1%	0.9%
Aluminum Containers	0.5%	0.1%	Other	19.2%	5.4%
Aluminum Foils and Trays	0.4%	0.2%	Rubber Products	0.6%	0.6%
Other Non-Ferrous Metals	1.2%	1.0%	Disposable Diapers & Sanitary Products	4.0%	1.0%
Steel Cans & Lids	0.6%	0.5%	Supermix incl. Dirt & Fines	12.8%	5.2%
Other Ferrous Metals	0.8%	0.8%	Bulky Materials	0.9%	1.1%
Glass	5.3%	1.4%	Other Materials Not Elsewhere Classified	1.0%	0.5%
Glass Bottles, Jars & Containers	4.1%	1.3%			
Remainder/Composite Glass	1.2%	0.6%	Total	100%	
			Number of Samples	11	

8. CONCLUSIONS AND RECOMMENDATIONS

This study was successful at compiling a baseline understanding of the City’s residential waste stream composition, and also provided excellent insight into the composition of restaurant and bar waste, which was the most prevalent generator at the time of year the data collection took place. Not surprisingly, diversion opportunities in the restaurant sector revolve around food wastes and compostable low-grade papers. Organic wastes are also prevalent in the residential waste stream, although to a lesser degree.

The study suggests that cardboard recycling in the downtown area is effective, and that businesses are generally diligent about properly disposing of cardboard. The study also confirms that the mobile recycling drop-off recycling system, which provides an outlet for glass bottles, is a necessary component to divert glass which is otherwise not accepted in single stream recycling in the City.

The following recommendations are offered for consideration by the City:

- ◆ **Gradual Expansion of Commercial Organics Diversion:** The prevalence of food waste in the commercial refuse stream represents an opportunity to greatly reduce the amount of landfilled material originating from the Park City Downtown Business District. Many county and local governments facilitate food waste diversion by providing a simple composting operation on or adjacent to the landfill or yard waste management parcel. There can be no ideal “one size fits all” approach to reducing food waste in the many restaurants and bars in Park City, but working with businesses on a case-by-case level can make positive strides in organics diversion. Most businesses should be able to implement a diversion program targeting back-of-house food waste (kitchen waste, trimmings, etc.) as a solid first step in this process. Another opportunity, while often more challenging, is reducing the amount of front-of-house food waste disposed of by businesses. This often requires a degree customer participation and is therefore generally less reliable. It is recommended that the City coordinate with businesses to capture back-of-house organics as a first step, and potentially expanding to front-of-house food waste in the future.
- ◆ **Increase Capture of Glass from BID:** Glass bottles were found to be a meaningful remaining component of the restaurant waste stream. Given the availability of a glass drop-off with Park City’s Mobile Recycling Center, it may be worthwhile ramping up efforts with the restaurants and bars to increase glass diversion.
- ◆ **Consider Performing a Winter Season Study:** As mentioned in this report, several of the business groups targeted in the study did not generate enough materials to be captured in the research. Setting aside the increased logistical challenges of performing a winter season study with heightened downtown activity, the data obtained in the winter high season would flesh out a full understanding of other business sectors, including lodging and potentially the retail and service sectors. However, it is acknowledged that a winter study could be especially challenging as it would place additional burdens on businesses to set aside material during a busier time of year.

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APPENDIX A
MATERIAL CATEGORY DEFINITIONS

Group	Material Category	Category Definition
Paper	Corrugated Cardboard/Kraft Paper	Corrugated boxes or paper bags made from kraft paper. Wavy center layer sandwiched between two outer layers without wax coating on the inside or outside. Examples include cardboard shipping containers and moving boxes, computer packaging cartons, and sheets and pieces of boxes and cartons. Does not include chipboard. Examples of kraft paper include paper grocery bags, un-soiled fast food bags, department store bags, and heavyweight sheets of kraft packing paper. Relatively unsoiled pizza boxes acceptable.
	Take Out Containers, Food, and Beverage	Paper take out containers and cups used for food service.
	Aseptic Boxes & Gable Top Cartons	Aseptic containers (multi-layered packaging that contains shelf-stable food products such as apple juice, soup, soy/rice milk, etc.) and "gable top" cartons (non-refrigerated items such as granola and crackers; refrigerated items such as milk, juice, egg substitutes, etc.). Rigid food and beverage cartons are usually paper-based, may be any shape, and may include a plastic pour spout as part of the carton.
	Mixed Recyclable Paper	Recyclable paper other than the paper types mentioned above. Examples include white office paper, junk mail, manila folders, manila envelopes, index cards, white envelopes, white window envelopes, notebook paper, carbonless forms, groundwood paper, softcover books, chipboard and uncoated paperboard, and deep-toned or fluorescent dyed paper.
	Compostable Paper	Low-grade, biodegradable paper that cannot be recycled, as well as food contaminated paper. Examples include paper towels, napkins, paper plates, waxed papers and waxed cardboard, and tissues.
	Remainder/Composite Paper	Paper products made mostly of paper but combined with large amounts of other materials such as plastic, metal, glues, foil, and moisture. Examples include corrugated cardboard coated with plastic, cellulose insulation, blueprints, sepia, onion skin, foil-lined fast food wrappers, frozen juice containers, carbon paper, self-adhesive notes, hardcover books, and photographs.
Plastic	PET (#1) Bottles and Jars	Clear or colored PET bottles or jars. The plastic resin number "1" is visible in the center of the triangular recycling symbol and may also bear the letters "PETE" or "PET". A PET container usually has a small dot left from the manufacturing process, not a seam. It does not turn white when bent.
	PET (#1) Non-bottle Containers	Non-bottle containers such as rectangular PET clamshell or tray containers used for produce; etc. The plastic resin number "1" is visible in the center of the triangular recycling symbol and may also bear the letters "PETE" or "PET". The color is usually transparent, green, or clear. This category only includes PET non-bottle containers that did not previously contain hazardous materials.
	PET (#1) Bottles, Jars, and Containers - Contaminated	PET bottles, jars, and containers more than 25 percent full of food or liquid.
	HDPE (#2) Natural Containers	Natural colored HDPE bottles. This plastic is usually either cloudy white, allowing light to pass through it (natural). When marked for identification, it bears the number "2" in the triangular recycling symbol and may also bear the letters "HDPE". Also includes natural buckets, pails or paint cans made of HDPE and designed to hold 5 gallons or less of material. This category only includes colored HDPE containers that did not previously contain hazardous materials.
	HDPE (#2) Colored Containers	Colored HDPE bottles. In contrast with natural HDPE, the colored HDPE is usually a solid color and opaque. When marked for identification, it bears the number "2" in the triangular recycling symbol and may also bear the letters "HDPE". Also includes colored buckets, pails or paint cans made of HDPE and designed to hold 5 gallons or less of material. This category only includes colored HDPE containers that did not previously contain hazardous materials.
	HDPE (#2) Containers - Contaminated	HDPE bottles, jars, and containers more than 25 percent full of food or liquid.
	Rigid Plastic Containers #3-#7s	Bottles, jars, containers, lids, and other packaging that are made of types of plastic other than PET (1) or HDPE (2). Items may be made of vinyl, LDPE, PVC, PP, PS, or other plastic. They may bear the number 3, 4, 5, 6, or 7 in the triangular recycling symbol, or may bear no recycling symbol. Examples include clamshells, trays, tray lids, cups, bowls, plates, hardware and fastener packaging, detergent and cleaning products bottles, squeezable bottles, frozen food containers, microwave food trays, vitamin bottles, cookie trays found in cookie packages, small (less than 1 gallon) brittle (single-use) plant containers such as nursery pots and plant six-packs.
	Rigid Plastic Containers #3-#7s - Contaminated	Rigid plastic containers #3-#7s more than 25 percent full of food or liquid.
	Expanded Polystyrene "Styrofoam"	Food and non-food packaging. Includes clamshell "Styrofoam" food containers, as well as cups, plates, and bowls. Includes finished products made of expanded polystyrene such as block Styrofoam padding and packing peanuts.
	Plastic Bags and Film	Plastic retail bags used to contain merchandise to transport from the place of purchase, given out by the store with the purchase. Retail Film Bags sorted into this category will largely be clean: free of excessive debris or moisture.
Durable/Bulky Rigid Plastics	Plastic items other than containers or film plastic, that are made to last for more than one use. These items may bear the numbers 1 through 7 in the triangular recycling symbol. Examples include crates, buckets (including 5-gallon buckets), baskets, totes, large plastic garbage cans, large tubs, large storage tubs/bins (usually with lids), flexible (non-brittle) and durable flower pots of 1 gallon size or larger, lawn furniture, large plastic toys, tool boxes, first aid boxes, and some sporting goods, CDs and their cases, plastic housewares such as durable (not single-use) dishes, cups, and cutlery.	
Remainder/Composite Plastic	Plastic that cannot be put in any other type or subtype. Includes items made mostly of plastic but combined with other materials. Examples include auto parts made of plastic attached to metal, plastic drinking straws, produce trays, foam packing blocks (not including expanded polystyrene blocks), plastic strapping, handles and knobs, plastic cup lids, some kitchenware, plastic toys, plastic string (as used for hay bales), and plastic rigid bubble/foil packaging (as for medications).	
Metals	Aluminum Containers	Aluminum containers for food or beverage. Also includes aluminum cat food containers.
	Aluminum Foils and Trays	Non-container aluminum products such as aluminum foil or aluminum food trays. Does not include items significantly contaminated with food or other material.
	Other Non-Ferrous Metals	Any metal item, other than aluminum cans, foils or trays, that is not stainless steel and that is not magnetic. These items may be made of aluminum, copper, brass, bronze, lead, zinc, or other metals. Examples include copper wire, shell casings, and brass pipe. Also includes composite material that is mostly non-ferrous metal by weight.
	Steel Cans & Lids	Steel or tin food or other containers. Includes aerosol containers. If significant food or other product remains in the container (greater than the weight of the container), it shall instead be sorted in that product material category.

Group	Material Category	Category Definition
Metals	Other Ferrous Metals	Any iron or steel that is magnetic or any stainless steel item. This type does not include tin/steel cans. Examples include structural steel beams, metal clothes hangers, metal pipes, stainless steel cookware, security bars, and scrap ferrous items. Also includes composite material that is mostly ferrous metal by weight.
Glass	Glass Bottles, Jars & Containers	Includes all glass bottles and jars, regardless of color. Examples include beer and soft drink bottles, and jars for food or other materials. If significant food or other product remains in the container (greater than the weight of the container), it shall instead be sorted in that product material category.
	Remainder/Composite Glass	Non-container glass. This category includes items made mostly of glass but combined with other materials. Examples include Pyrex, Corningware, crystal and other glass tableware, mirrors, non-fluorescent light bulbs, auto windshields, laminated glass, or any curved glass. Uncoated plate glass - includes window and door glass, table-tops, and some auto glass (side windows).
Organics	Food Waste	Food wastes and scraps, including meat, bone, dairy, grains, rinds, teabags, coffee grounds with filters, etc. Excludes the weight of food containers, except when container weight is not appreciable compared to the food inside.
	Yard Waste	Plant material, including woody material, from any public or private landscapes. Examples include leaves, grass clippings, plants, brush and branch prunings and trimmings.
	Remainder/Composite Organics	Organic material that is not food or yard waste. Includes cork, popsicle sticks, hair, animal waste, cigarette butts, chopsticks, woven baskets, and small non-construction related wood products.
C&D	Wood - Treated/Painted/Stained	Wood that contains an adhesive, paint, stain, fire retardant, pesticide or preservative. Does not include wood furniture.
	Wood - Untreated/Clean	Any wood which does not contain an adhesive, paint, stain, fire retardant, pesticide or preservative; includes such items as bulky wood waste or scraps from newly built wood products. Does not including land clearing debris or yard waste prunings and trimmings. The presences of nails or screws are acceptable.
	Drywall/Gypsum Board	Interior wall covering made of a sheet of gypsum sandwiched between paper layers. Examples include used or unused, broken or whole sheets of sheetrock, drywall, gypsum board, plasterboard, gypsum board, gyproc, and wallboard.
	Asphalt Roofing	Composite shingles and other roofing material made with asphalt. Examples include asphalt shingles and attached roofing tar and tar paper.
	Asphalt Paving, Brick, Concrete, and Rock	Includes asphalt paving materials, set or unset, and all types of fire-clay bricks. Includes Portland cement mixtures (set or unset), with or without aggregate materials (gravel, etc.). Includes rock gravel larger than 2" in diameter.
	Carpet & Carpet Padding	Flooring applications consisting of various natural or synthetic fibers bonded to some type of backing material. Carpet padding may include plastic, foam, felt, or other material used under the carpet to provide insulation and padding.
	Remainder/Composite Construction & Demolition	Construction and demolition material that cannot be put in any other type or subtype. This type may include items from different types combined, which would be very hard to separate. Also includes fiberglass insulation, ceramic fixtures, and other miscellaneous C&D Materials not mentioned above.
HHW	Household Hazardous Waste or HHW	Hazardous household items containing paints, thinners, solvents, vehicle equipment fluids, cleaners, pesticides/herbicides and fertilizers. Includes fluorescent bulbs and CFLs, light ballasts, and mercury-containing devices.
	Batteries (All Types)	Dry batteries, rechargeable batteries and lead-acid batteries.
	Medically-Related Waste	Treated or untreated medical waste. Includes bandages, gauze, diabetic strips, syringes, needles, other sharps, and medical tubing. Includes similar items from veterinary usage, medical research, or industrial laboratories.
Electronics	All Electronics	Includes all electronic items with a circuit board, including CRTs or other video displays, plasma and LCD monitors, cell phones, personal computers, laptop computers, notebook computers, processors, keyboards, etc. Includes stereos, VCRs, DVD players, etc. This category does not include automated typewriters or typesetters.
Textiles	Recyclable Textiles and Clothing	Clothing, rags, and accessories made of natural and synthetic textiles such as cotton, wool, silk, woven nylon, rayon, polyester, and other materials. Examples include pants, shirts, fabric purses, bed sheets, and towels.
	Other Textiles and Leather	Clothing, rags, accessories, and other textiles that are soiled/contaminated or that do not fit into the Recyclable Textiles and Clothing category. Includes footwear and leather products.
Other	Rubber Products	Finished products and scrap materials made of natural and synthetic rubber, such as bathmats, inner tubes (not tires), rubber hoses, and foam rubber. Excludes footwear.
	Disposable Diapers & Sanitary Products	Adult and baby disposable diapers, and feminine hygiene products.
	Supermix incl. Dirt & Fines	Small mixed fragments 2" and smaller, and includes miscellaneous fines (paper, plastic, glass, etc.), sand, and dirt.
	Bulky Materials	Large, hard-to-handle items that are not defined separately. Examples include all sizes and types of furniture, mattresses, box springs, and base components.
	Other Materials Not Elsewhere Classified	Any other type of waste material not listed in any other sort category. Includes cosmetics, shampoos, lotions, etc.

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